EXPLANATION OF SIGNIFICANT DIFFERENCES
COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE

August 2000

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I. INTRODUCTION

A. Site Name and Location

The Commencement Bay Nearshore /Tideflats (CB/NT) Superfund site is located in Tacoma, Washington, at the southern end of the main basin of Puget Sound (Fig. 1). This Explanation of Significant Differences (ESD) describes the cleanup plans for the Thea Foss, Wheeler-Osgood and Hylebos waterways and identifies the disposal sites being selected to contain dredged contaminated sediments from Thea Foss (formerly City) and Wheeler-Osgood, Hylebos, and Middle waterways. The cleanup plan for Middle Waterway will be outlined in a separate ESD in the fall of 2000.

B. Lead and Support Agencies

U.S. Environmental Protection Agency (EPA) – Lead Agency for Sediment Remediation

Washington State Department of Ecology (Ecology) - Lead Agency for Source Control; Support Agency for Sediment Remediation

Puyallup Tribe of Indians - Support Agency for Sediment Remediation

C. Statutory Authority

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 117(c) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.435(c)(2)(i).

D. Purpose

EPA's September 30, 1989 Record of Decision (ROD) for the CB/NT Superfund site selected a remedy involving a combination of five key elements: site use restrictions (now commonly referred to as institutional controls), source control, natural recovery, sediment remedial action (i.e., confinement and habitat restoration), and monitoring, to address contaminated sediments in the waterways of the CB/NT site. This ESD describes the specific manner in which the ROD is being implemented at these individual waterways and points out the significant differences between the ROD and the cleanup plans described in this ESD. The ESD will: (1) describe the

remedial actions consistent with the ROD to clean up contaminated sediments in the Thea Foss, Wheeler-Osgood, and Hylebos waterways of the CB/NT Superfund site; and (2) identify disposal sites that will be used to contain the contaminated sediments to be dredged from Thea Foss, Wheeler-Osgood, Hylebos, and Middle waterways.

II. BACKGROUND

A. Site History

The CB/NT Superfund site is located in Tacoma, Washington at the southern end of the main basin of Puget Sound (Fig. 1). The site includes 10-12 square miles of shallow water, shoreline, and adjacent land, most of which is highly developed and industrialized. The upland boundaries of the site are defined according to the contours of localized drainage basins that flow into the marine waters. The marine boundary of the site is limited to the shoreline, intertidal areas, bottom sediments, and water of depths less than 60 feet below mean lower low water level (MLLW). The nearshore portion of the site is defined as the area along the Ruston shoreline from the Mouth of Thea Foss Waterway to Pt. Defiance. The tideflats portion of the site includes the Hylebos, Blair, Sitcum, Milwaukee, St. Paul, Middle, Wheeler-Osgood, and Thea Foss waterways; the Puyallup River upstream to the Interstate-5 bridge; and the adjacent land areas.

In 1996, EPA deleted the St. Paul Waterway, the Blair Waterway, and all or part of four properties transferred to the Puyallup Tribe in the Puyallup Land Settlement Agreement from the National Priorities List (NPL) because cleanups had been completed in these areas, or studies had been completed showing that they did not require cleanup.

EPA placed the CB/NT site on the NPL of sites requiring investigation and cleanup under EPA's Superfund Program on September 8, 1983. A remedial investigation/feasibility study (RI/FS) was completed by Ecology in 1988. EPA made the final RI/FS available for public comment in February 1989. The RI/FS evaluated contaminants detected in sediments at the CB/NT Superfund site to identify problem chemicals that pose a risk to human health and the environment. The RI/FS concluded that sediments in the nearshore/tideflats area were contaminated with a large number of hazardous substances at concentrations greatly exceeding those found in Puget Sound reference areas. In the RI, a multi-step decision-making process was used to identify problem chemicals, and to identify and prioritize problem areas where these chemicals were present at concentrations that are harmful to humans and wildlife.

Contaminants found at elevated levels in the Thea Foss and Wheeler-Osgood waterways included zinc, lead, mercury, high molecular weight polycyclic aromatic hydrocarbons (HPAHs), low molecular weight polycyclic aromatic hydrocarbons (LPAHs), cadmium, copper, nickel, 2-methylphenol, 4-methylphenol, bis[2-ethylhexyl] phthalate (BEP), butyl benzene phthalate, and polychlorinated biphenyls (PCBs). In addition, non-aqueous phase liquid (NAPL) seeps have been found at the head of the Thea Foss Waterway. The most severely contaminated sediments at Hylebos Waterway had high concentrations of several chlorinated organic compounds (including

PCBs, pesticides, hexacholorbenzene and hexachlorobutadiene), HPAHs, LPAHs, lead, copper, zinc, mercury, and arsenic. Mercury and copper were identified as indicator chemicals of severe sediment contamination in Middle Waterway.

B. Commencement Bay Nearshore/Tideflats Record of Decision

The Commencement Bay site has been divided into smaller project activities, called operable units (OU), in order to more effectively manage the overall cleanup of the site. In the 1989 ROD, EPA designated two operable units for the cleanup of the nearshore/tideflats portion of Commencement Bay: source control (OU 5), which focuses on efforts to control upland discharges or releases to the Bay; and sediment remediation (OU 1), which addresses the cleanup of the contaminated marine sediments in Commencement Bay. The Washington Department of Ecology is the lead agency for source control and EPA is the lead agency for sediment remediation. OUs 2-4 and 6 address contamination at geographically separate areas at the former ASARCO smelter and Tacoma Tarpits.

In the ROD, EPA selected a remedial action for eight of the nine sediment problem areas identified through the RI/FS process as being the most significantly contaminated areas. These problem areas are: 1) Mouth of Hylebos Waterway, 2) Head of Hylebos Waterway, 3) Sitcum Waterway, 4) St. Paul Waterway, 5) Middle Waterway, 6) Head of Thea Foss Waterway, 7) Mouth of Thea Foss Waterway, and 8) Wheeler-Osgood Waterway. The ninth problem area, off-shore of the ASARCO smelter (OU 6), is being addressed in a separate ROD. To date, remedial actions consistent with the CB/NT ROD have been completed at the Sitcum and St. Paul waterways. (The St. Paul Waterway cleanup occurred at a different location than the St. Paul Nearshore Fill selected in this ESD.)

The cleanup objective for the remedial action, as described in Section 10 of the 1989 ROD, states that "the selected remedy is to achieve acceptable sediment quality in a reasonable time frame." "Acceptable sediment quality" is defined as "the absence of acute or chronic adverse effects on biological resources or significant human health risks". The ROD designated biological test requirements and associated sediment chemical concentrations referred to as sediment quality objectives (SQOs) to attain the cleanup objective for the CB/NT site. The PCB SQO was subsequently updated in a 1997 ESD. Habitat function and enhancement of fisheries resources were also identified as overall project cleanup objectives.

The ROD selected a remedy comprised of five key elements: site use restrictions (now commonly referred to as institutional controls), source control, natural recovery, sediment remedial action (i.e., confinement and habitat restoration), and monitoring, to address contaminated sediments in the waterways of the CB/NT site.

The ROD noted that institutional controls would consist primarily of public warnings to reduce potential exposure to site contamination, particularly of contaminated seafood. The

Tacoma/Pierce County Health Department has installed signs at several locations in the CB/NT waterways providing warnings in several languages against eating seafood caught there.

The objectives under source control are to control major sources of contamination to the waterways prior to implementation of active remediation in the waterways and to monitor source control effectiveness both prior to and after completion of sediment remedial action.

For marginally contaminated areas expected to recover naturally to the SQOs within 10 years after sediment remedial action, the ROD calls for natural recovery. For areas that are not expected to recover within a 10-year time frame, the ROD specified that active remediation of problem sediments would be accomplished by utilizing a limited range of four confinement technologies. These technologies are in-place capping, confined aquatic disposal, nearshore disposal, and upland disposal.

Long-term monitoring of the remediated areas, including disposal sites and habitat mitigation areas, is also a component of the remedy. Monitoring will be conducted to evaluate the effectiveness of the remedy in achieving SQOs and in achieving the habitat functions that are called for in the mitigation plans.

C. Analysis of Treatment Technologies

The ROD also concluded that the selected remedy described above represented the maximum extent to which permanent solutions and treatment technologies could be utilized in a cost-effective manner at the CB/NT site. To determine whether the ROD's conclusion about treatment technologies was still valid at this time, EPA Region 10 asked EPA's National Risk Management Research Laboratory in Cincinnati, Ohio to review site-specific data that have been generated at the three waterways since the ROD, and to provide Region 10 with an opinion about the viability and cost-effectiveness of currently available treatment technologies.

EPA's conclusion is that while some new treatment technologies are available, most are still in the pilot stage, and all would be more expensive than the most expensive confined disposal option, upland disposal. The wide-spread, low level sediment contamination present in much of Commencement Bay is not the optimal scenario for applying a treatment technology, which generally works best when applied to low volume, highly concentrated waste. At this time, confinement remains the best option for the contaminated sediments being addressed under the 1989 ROD and this ESD.

Treatment may be used, however, to address localized "hot spot" areas in the Hylebos and Thea Foss waterways. This includes some of the contaminated materials found near the former Occidental Chemical facility on the Hylebos Waterway, which is being addressed under a separate CERCLA response action (see Section V), and potentially NAPL at the head of the Thea Foss Waterway. In general, NAPL is considered a "principal threat" source material. EPA expects that treatment be used to address principal threats wherever practicable. The decision to treat

principal threat materials, however, is made on site-specific basis. EPA has determined that containment is the most appropriate option for the NAPL at the head of Thea Foss Waterway. Some NAPL, however, will be excavated as needed for construction of the cap and may require treatment prior to disposal (see Section V). The need for treatment prior to disposal will be determined by further testing during the remedial design phase.

III. DESCRIPTION OF AND BASIS FOR THE SIGNIFICANT DIFFERENCES

A. Introduction

The CB/NT ROD sets forth a general cleanup approach for the waterways that comprise the CB/NT site and identifies, based on RI/FS sampling data, problem areas requiring response action. Since then, pre-remedial design studies at the individual waterways have better defined the area and volume of sediment exceeding the SQOs, and identified specific areas to be dredged or capped, as well as areas where natural recovery would be appropriate. In addition, the post-ROD studies helped EPA identify which disposal sites (nearshore, in-water, and upland) would be most appropriate to safely contain dredged sediments.

Consequently, this ESD documents the following changes:

a) the size of the problem areas and the volume of sediment to be dredged,
b) institutional controls related to contaminated sediments contained on-site,
c) addition of an option to use a thin layer of clean material to allow marginally contaminated sediments to naturally recover, (i.e. "Enhanced Natural Recovery"),
d) additional specificity of remedial actions for the Thea Foss, Wheeler-Osgood, and Hylebos waterways,
e) elaboration of performance criteria for the cleanup plans,
f) inclusion of the Endangered Species Act (ESA) as an applicable, or relevant and appropriate, requirement (ARAR) for remedial actions under the ROD, and
g) the cost of the remedial action.

While these are significant changes, the cleanups that are described in this ESD are fundamentally consistent with the remedy set forth in the 1989 ROD. The ROD selected natural recovery or confinement as the primary methods for addressing contaminated sediments at the CB/NT site. This ESD identifies natural recovery areas and the areas that require dredging and confinement or capping. The ROD also set forth the types of disposal sites that may be suitable to contain contaminated sediments. Consistent with the ROD, this ESD identifies the locations that will be used as disposal sites. None of the significant differences discussed below fundamentally alter the remedy selected in the ROD.

B. Volume

The ROD recognized that the estimated volume of sediments needing active remediation (i.e., confinement via dredging and disposal or in-situ capping) would be refined during the remedial design phase and that both volume and costs "are anticipated to change accordingly." Since the ROD was signed, additional investigations and studies were undertaken by the potentially responsible parties (PRPs) at each of the three waterways. Those studies have resulted in the identification of higher volumes of sediment that are the subject of remedial action than was originally estimated in the ROD. The increase in contaminated sediment volumes is due to: 1) extensive remedial design sampling, which showed larger areas of contamination than were identified during the limited RI/FS sampling effort; and 2) refinement of natural recovery models in the design phase, which showed a smaller area would achieve SQOs over 10 years through natural recovery than had been estimated during the RI/FS. A comparison of the volume estimates in the ROD with the refined volume estimates in this ESD is provided in Table 1.

Table 1. Comparison of 1989 ROD and 2000 ESD volume estimates

	1989 ROD volume estimate	**2000 ESD volume estimate**
Hylebos	448,000 cubic yards (cy)	940,000 cy*
Middle	57,000 cy	75,000 cy
Thea Foss/Wheeler Osgood	437,000 cy	620,000 cy
Total	**942,000 cy**	**1,635,000 - 1,835,000 cy**

*Confined disposal of an estimated additional 120,000 cy may be needed if additional navigational dredging by the U. S. Army Corps of Engineers (Corps), the Port of Tacoma, and private parties is conducted (see Section V).

In addition to the disposal volumes for the Thea Foss Waterway, 32 acres will be capped; 4 acres will receive a minimal cap to enhance natural recovery; and 21 acres will be monitored to confirm that natural recovery is achieving sediment quality objectives in the required 10 year time frame. At the Hylebos Waterway, the estimated disposal volume includes 11.6 acres in isolated intertidal or under dock/structure areas. If the remedial design shows that those areas can be capped, it would reduce the disposal volume from 940,000 cy to 845,000 cy. Twenty (20.7) acres are identified as natural recovery areas. Refinement of dredge volumes and estimates of capping and natural recovery areas for Middle Waterway will be addressed in a separate ESD.

C. Institutional Controls

The 1989 ROD noted that institutional controls would consist primarily of public warnings to reduce potential exposure to site contaminants, particularly contaminated seafood. Informational and advisory controls, such as fishing and fish consumption notices will continue to be used as long as it takes for fish to lose their contaminant body burdens or be replaced by younger, healthy fish that have not been exposed to contaminants.

To increase the long-term protectiveness of the waterway cleanups, institutional controls are required to meet the following objectives:

1. reduce potential exposure of marine organisms to contaminated sediments disposed of and confined in aquatic disposals sites or confined by capping; and
2. reduce potential exposure to marine organisms to contaminated sediments left on the CB/NT site.

The ROD anticipated that other regulatory programs would address contaminated sediment exposed due to navigational dredging or dredging conducted for development purposes, such as permitting requirements under Section 404 of the Clean Water Act and the state Shoreline Management Act. Thus, institutional control mechanisms that will be used to achieve the objectives stated above include governmental controls, such as local, state, and federal regulatory permitting/approval processes for dredge and fill projects in the waterways, city zoning ordinances that limit site use, or other types of governmentally required best management practices regarding maintenance activities in the waterway and removal and placement of in-water pilings. Additionally, parties constructing and maintaining the disposal sites must agree to maintain the disposal sites so as to prevent contaminated sediments from migrating or becoming exposed. Owners and/or operators of any disposal sites must ensure that any uses made on the top of the disposal site will not disturb the integrity of the disposal site or cause or contribute to the exposure of contaminated sediments to the environment. Other institutional controls may be used on a property-specific basis if determined necessary and feasible, including proprietary controls relying on real property interests, such as environmental easements and land use restrictions.

D. Natural Recovery and Enhanced Natural Recovery

The ROD identified natural recovery as an important component of the overall remedy. The expectation is that in some areas, the natural processes of sedimentation, chemical degradation, and surface sediment mixing due to bioturbation will allow contaminated sediments to recover to SQOs within 10 years after cleanup. Areas with marginally contaminated sediments that were expected to recover naturally to SQOs within 10 years after sediment remedial action would be initially exempt from sediment remedial action. Monitoring to confirm the long-term effectiveness of natural recovery is required under the ROD, and the need for active sediment remediation will be reconsidered if subsequent monitoring data indicates that natural recovery is not viable in a reasonable timeframe.

In this ESD, EPA is adding a component to help accelerate the natural recovery process. In certain locations, natural recovery will be enhanced through the application of a thin layer of clean material in specific areas of marginal contamination. This method is being referred to as Enhanced Natural Recovery. The application of minimal volumes of clean material speeds up the natural sedimentation at the outset and enhances the recovery of bottom-dwelling animals in surface sediments, which aids in building a larger base of clean material that will cover the marginally contaminated sediments.

E. Disposal Sites

The ROD did not select specific disposal sites for contaminated sediments. This ESD selects two in-water disposal sites (St. Paul Nearshore Fill, and Blair Slip 1) and upland disposal in a regional landfill, consistent with the four confinement options considered acceptable under the ROD. See Section VI.

F. Specific Cleanup Plans for the Thea Foss, Wheeler-Osgood, and Hylebos Waterways

Consistent with the ROD, this ESD describes the specific cleanup plans for Thea Foss, Wheeler Osgood, and Hylebos waterways. See Section V.

G. Performance Criteria for the Cleanup Plans

Consistent with the ROD, this ESD describes the specific performance criteria that the cleanup plans must meet to ensure that the cleanup is protective of human health and the environment. See Section IV.

H. Protection of Endangered Species

ESA is an action-specific and location-specific ARAR for the response actions under the ROD. The recent listing of Puget Sound chinook salmon and bull trout as threatened species under ESA has emphasized the need for EPA to work with the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), the other natural resource agencies, and Native American tribes to evaluate habitat impacts and habitat enhancement opportunities on a bay-wide basis.

Conservation and recovery of listed species has been an important consideration in approving cleanup plans and selecting disposal sites. Consistent with the ROD cleanup goal of enhancing habitat function and fisheries resources, EPA, Washington Department of Natural Resources (DNR), and the City of Tacoma hired a fisheries biologist from the University of Washington to conduct a bay-wide habitat assessment, *Commencement Bay Aquatic Ecosystem Assessment* (Simenstad, 2000). The assessment, discussed in Section IV.F., identifies habitat concerns associated with in-water disposal sites and incorporates effective salmon recovery components into EPA's cleanup decisions. These components have been incorporated into EPA's requirements for mitigation under Section 404 of the Clean Water Act.

EPA has prepared a biological assessment of the impacts the remedial actions in this ESD will have on the threatened or endangered species and has submitted it to NMFS and USFWS. The assessment is also included in the administrative record for this ESD. EPA's assessment has concluded that performance of the remedial actions together with all of the mitigative measures that will be required is not likely to jeopardize the continued existence of any federally listed or threatened or endangered species or result in the destruction or adverse impacts to critical habitat

for these species. EPA will continue to consult with NMFS and USFWS on these cleanup plans. The consultation process may result in adjustments to mitigation plans and remedial action plans to ensure protection of endangered species and their habitat during the construction of the remedy.

I. Costs

The 1989 ROD provide a range of cost estimates for dredging contaminated sediments and disposal by confined aquatic disposal, nearshore disposal, or upland disposal. Table 2 provides a comparison of the cost estimates in the 1989 ROD to the estimates for implementing the remedial actions outlined in this ESD.

Table 2. Comparison of cost estimates in the 1989 ROD and the 2000 ESD

	1989 ROD cost estimate ($ million)	**2000 ESD cost estimate ($ million)**
Hylebos Waterway	$10.7 - $30.9	$46.1
Thea Foss/Wheeler Osgood	$8.89 - $26.7	$35
Middle Waterway	$2.66 - $7.47	no new estimate

The original ROD cost estimates were based on a smaller volume of sediment to be dredged, as shown in Table 1. The low end of the 1989 ROD cost range represents disposal in a nearshore fill that was associated with a permitted development project. There are some differences in the assumptions used to develop cost estimates in the 1989 ROD and in this ESD. For example, the ROD assumed that site preparation costs for nearshore fills would be absorbed by the developer of the commercial development project. In this ESD, cost estimates include the larger, estimated volume of sediments that require remedial action, and the cost of disposal in the selected disposal sites, including site preparation costs. For both the St. Paul Nearshore Fill and Blair Slip 1 disposal sites, the fill projects would create additional upland property, which will be beneficially used by the landowners. Economic benefits from development of new upland properties have not been taken into account in these cost figures.

For the purposes of providing cost estimates, EPA has assumed that Thea Foss and Wheeler Osgood sediments will be disposed of in St. Paul Waterway and Hylebos Waterway sediments will be disposed of in Blair Slip 1 and the Upland Regional Landfill, based on cleanup options developed by the Thea Foss and Hylebos PRPs. EPA supports this mix but reserves the flexibility to allow the PRPs to make adjustments during design based on final disposal capacity, volumes, and timing. Also, as noted in Section VI (Disposal Sites), EPA will continue to explore expanding the capacity of both the Blair Slip 1 and St. Paul Waterway disposal sites, and using contaminated sediments as upland industrial fill, which if implemented, would lower the volume of sediments requiring disposal in a regional landfill and be expected to reduce cleanup costs. Current cost estimates based on increased volumes of sediment to be dredged are provided in

Appendix A and are summarized below. Costs for Middle Waterway will be refined in a separate ESD.

Hylebos Waterway

Total remediation cost is estimated at $46,137,000 for dredging 940,000 cy of contaminated sediments from the Hylebos Waterway and disposing of 640,000 cy at the Blair Slip 1 disposal site and 300,000 cy at an Upland Regional Landfill. Cost estimates do not include land acquisition or leasing costs that may be related to use of Blair Slip 1 or with dewatering facilities associated with upland disposal. Detailed cost estimates are provided in the Hylebos Pre-Remedial Design Evaluation Report (1999), and in Appendix A of this ESD.

Thea Foss and Wheeler-Osgood Waterways

Total remediation cost for the Thea Foss and Wheeler-Osgood waterways is projected at $35,000,000. Detailed cost estimates are provided in Appendix N-9 of the "Round 3 Data Evaluation and Pre-Design Evaluation Report"and in Table A-3 of this ESD. These detailed cost estimates include the cost of a slurry wall at the head of the Thea Foss waterway, which has been excluded from EPA's selected remedy. Exclusion of the slurry wall reduces the cost from $35.9 to approximately $35 million.

A significant proportion of the total cost is attributed to remediating the head of the Thea Foss (from approximately the SR-509 bridge to the south end of the waterway). If the City's approach for remediation cannot meet specific performance criteria as discussed below then the remedy for the head of the waterway may need to be modified. Modifications may include additional source removal and/or alteration of the cap design or other possible modifications. Consequently, the remediation costs for the head of Thea Foss Waterway may change and thereby result in changes to the total remediation costs.

The following sections IV-VII provide further detail on performance criteria, the specific cleanup plans for Thea Foss, Wheeler-Osgood, and Hylebos waterways, the selected disposal sites for dredged contaminated sediments, and the status of source control actions.

IV. PERFORMANCE CRITERIA FOR THE REMEDIAL ACTIONS

While this ESD describes the remedial actions for the individual waterways with some degree of specificity, remedial design will further refine the details of the remedial actions that will be implemented in the individual waterways. In this ESD, EPA is setting forth performance criteria to be applied for the design and implementation of the cleanup. These performance criteria are consistent with the fundamental cleanup objectives set forth in the ROD and are necessary to ensure that the remedy is protective of human health and the environment, and complies with ARARs. Additional performance criteria will be identified during remedial design.

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A. Cap Requirements

One of the remedial actions selected in the 1989 ROD and in this ESD is capping. EPA intends to maintain the integrity and effectiveness of caps over contaminated sediments through requirements for construction, long-term monitoring, and maintenance, including the following:

1) Caps will have a minimum thickness of three feet and will be constructed to address adverse impacts through four primary functions:
   a) Physical isolation of the contaminated sediment from the ecological receptors;
   b) Stabilization of contaminated sediments, preventing resuspension and transport to other locations within the waterway;
   c) Reduction of contaminants transported through the groundwater pathway to levels that will not recontaminate surface sediments (defined as the "biologically active zone" where most sediment-dwelling organisms live) above the SQOs or adverse biological effect levels, or contaminate surface water at levels exceeding background concentrations or marine chronic water quality criteria;
   d) Provide a cap surface that promotes colonization by aquatic organisms.

2) Long-term monitoring of the cap will include, as appropriate, visual inspection, bathymetric survey, sediment deposition monitoring, chemical monitoring, and biological monitoring.

B. Dredging and Confined Disposal

Performance standards for dredging and confined disposal will be consistent with Clean Water Act and Rivers and Harbors Act requirements. Specific details will be developed during project design. Both the remediated waterways and the disposal sites will be subject to long-term monitoring to ensure that the selected remedy remains protective, including monitoring to ensure that surface sediments do not become recontaminated in the remediated waterways, and that marine chronic water quality standards or background concentrations are not exceeded in surface water outside of the confined disposal sites.

C. Natural Recovery and Enhanced Natural Recovery

Natural recovery or enhanced natural recovery is an acceptable remediation approach at locations where sediments are marginally contaminated and are likely to recover to cleanup levels within the 10 year time frame specified in the ROD. At the CB/NT site, EPA considers marginally contaminated sediments as those with chemical concentrations less than the second lowest Apparent Effects Threshold (AET) value (the SQO is set at the lowest AET) or biological test results that do not exceed the minimum cleanup level (MCUL) values under Washington State Sediment Management Standards. Leaving highly contaminated sediments unaddressed for 10 years after remedial action would create an unacceptable short-term environmental risk, even if these sediments are predicted to naturally recover.

Areas selected for natural recovery (including enhanced natural recovery) will require: (1) monitoring plans, (2) triggers for initiating contingent actions if the monitoring indicates natural recovery will not succeed in the 10 year time frame, and (3) contingent plans for active remediation if monitoring in interim years indicates natural recovery will not occur by year 10.

D. Subsurface Contamination

In some areas where the surface sediments meet "no action" or natural recovery criteria, subsurface sediments are significantly contaminated at depth. The ROD states that SQOs must be met at the time of cleanup (or in 10 years, for natural recovery areas) and in the long-term. In order to meet SQOs in the long term, subsurface sediments must either meet SQOs or be isolated from the surface. Exposure of contaminated subsurface sediments may occur during the cleanup by dredging adjacent areas, through physical processes, such as storms or ship scour, or through future dredging or excavation. In order for subsurface contamination to remain in place, it must either be present at such low levels that it would not present a risk if it were exposed, or it must have a very low potential for exposure. These criteria have been applied in selecting the cleanup plans included in this ESD. These criteria must continue to be applied throughout the design and construction phases of the remediation. If contaminated sediments must be disturbed, for example, to accommodate a new future use, they must be handled in an environmentally responsible fashion and the newly exposed surface must meet SQOs. Either existing regulatory programs or other specific institutional controls described in this ESD will be used, as appropriate, to ensure that SQOs are met.

E. Source Control in the Thea Foss Waterway

Toward the head of the Thea Foss Waterway, municipal stormwater discharges, marinas and highly contaminated subsurface NAPL, both in the waterway and in adjacent uplands, pose a risk of recontamination of surface sediments above SQOs. If further source control actions are not taken, BEP and PAHs are predicted to recontaminate sediments in the waterway after sediment cleanup.

Ecology is working with various parties to complete source control actions in upland areas around the head of the waterway including the area near the west bank NAPL seep. This work is being done under the Model Toxics Control Act (MTCA) and the Clean Water Act.

In the "Round 3 Data Evaluation and Pre-Design Evaluation Report, Appendix U," the City of Tacoma recommended a specific in-water remedial action for the head of the Thea Foss Waterway to address the in-water NAPL contamination and seeps. Based on a subsequent technical memorandum, (Technical Memorandum from Hart Crowser to Mary Henley, City of Tacoma, dated June 14, 2000) the City of Tacoma modified their recommended approach.

The City's modified approach for remediation is acceptable to EPA. In the design phase and prior to remedial action, however, the following specific performance criteria for source control and the remedy for the head of the waterway must be met to eliminate or reduce the potential for

recontamination from storm drains as well as from the NAPL beneath the sediments and in adjacent uplands.

1) An approved stormwater action plan which includes, at a minimum, the following:
   a) an Ecology-approved stormwater sampling and analysis plan which will complete the Stormwater Management Plan for Thea Foss as required under the general NPDES permit,
   b) a phthalate study for determining possible phthalate sources to the Waterway,
   c) pilot testing to determine the contribution of dissolved versus particulate contaminant loading to the Waterway,
   d) an evaluation of stormwater structural controls, and
   e) an implementation schedule for the above stormwater studies, plans and controls.

2) A final remedial design based on modeling and treatability studies, and other appropriate studies, that conclusively determine that NAPL in the waterway will be stabilized and prevented from migrating to other portions of the waterway and from recontaminating surface sediments. In addition to the cap performance requirements discussed at Section IV.A. above, the sorbent cap must at a minimum also meet the following requirements:
   a) The final design of the cap must demonstrate that hydraulic control can be achieved in order to prevent remobilization of NAPL within the waterway.
   b) The final design must demonstrate that it prevents recontamination from any source material below the cap.
   c) The cap must require minimal maintenance.
   d) NAPL stabilization should include removal of contaminant source material where necessary for effective confinement.

EPA will require additional source removal and/or modification of the cap design if these performance criteria cannot be met by the City's remedial design and implementation.

F. Mitigation

Throughout pre-remedial design planning, EPA has identified all appropriate and practicable steps to avoid short- and long-term unacceptable adverse impacts to the Commencement Bay aquatic environment. All appropriate measures will be taken during remedial design, construction, and site maintenance to continue to avoid and minimize adverse impacts. Such measures that will be required by EPA include, but are not limited to, avoidance of fish-critical activity periods for in-water work, incorporation of "best-design" features and/or materials into remedial and compensatory mitigation plans that protect or enhance ESA-listed species, and creation or restoration of critical salmonid habitat. Additionally, EPA will require detailed compensatory mitigation plans to offset loss and other impacts to aquatic habitat and meet ESA responsibilities.

In assessing suitable compensatory mitigation measures, EPA has and will continue to rely upon the framework for the Commencement Bay-wide conservation and recovery strategy in the *Commencement Bay Aquatic Ecosystem Assessment* (Simenstad, 2000), along with data developed during consultation with NMFS and USFWS. The strategy of the Simenstad report focuses on broad landscape attributes and ecosystem processes (i.e., landscape ecology) that promote juvenile salmon utilization of existing and potential Puyallup River delta and Commencement Bay habitats. While the report does not specify or set priorities on discrete actions, it does identify criteria to guide selection of sites and actions. It is EPA's intent that remediation, including required compensatory mitigation, of the CB/NT site cumulatively contribute toward the recovery of ESA listed species. Drawing from the Simenstad report, EPA has identified the following "performance criteria" that must, at minimum, be addressed in any acceptable compensatory mitigation plan:

1) All compensatory mitigation must be consistent with the criteria and findings of the Simenstad report.
2) Preference will be given to compensatory mitigation plans that are consistent with habitat function prioritization criteria[1] (to be determined).
3) All compensatory mitigation plans will include an assessment of how they contribute toward recovery.
4) Mitigation plans must include consideration for connectivity (i.e., habitat that is linked or capable of being linked to other habitat and is intended to avoid mitigative actions that are geographically isolated and underutilized by the target species and/or do not reach full function).
5) Compensatory mitigation sites will be located within or will provide connections to or between one or more of the critical areas of "salmon landscape" (e.g., osmoregulatory transition) described by the Simenstad report within the Commencement Bay and lower Puyallup River watershed.
6) The aspect of *risk* of mitigation success/failure must be specifically factored into habitat plans and provided for up-front rather than solely as a post-construction contingency (i.e., in most cases this will mean additional habitat acreage).
7) All compensatory mitigation plans will include measurable performance objectives, management, monitoring and reporting requirements, responsibilities, and schedule.
8) Native species only will be utilized in any plantings to the maximum extent practicable.
9) Mitigation plans should include facility design and site plans for any development/redevelopment that occurs as a result of a fill. The facility and site

[1]The Simenstad report identifies "several emerging "visions" on broad-scale restoration of the delta-Bay" (p. 3) as well as efforts for upriver restoration (p. 9). The report also identifies a number of parcels or groups of parcels as potential sites. No prioritization of those opportunities has occurred to date. EPA will prioritize preferred habitat functions after consultation with the Services, resource agencies, and the Tribes.

plans must ensure that the facility and site characteristics and functions do not create adverse impacts to water, sediment and habitat quality during construction and operation. For example, the site plan for the expanded Simpson facility should include on- and off-site stormwater treatment; beneficial use of relatively clean stormwater (e.g. rooftop runoff, treated stormwater etc.); lighting and noise impacts minimization, including buffering; and other site-specific best management practices.

Compensatory mitigation plans will be developed pursuant to these performance criteria and in consultation with EPA and resource agencies, and be submitted to and approved by EPA during the remedial design phase. EPA may consider mitigation proposals that do not meet all of the performance criteria if the PRPs demonstrate that the proposal is otherwise consistent with the Simenstad report or otherwise significantly contributes to conservation and recovery of ESA listed species.

None of the compensatory mitigation plans submitted to date have been approved by EPA at this time. In addition, 4.6 acres of intertidal habitat within Thea Foss Waterway and 2.7 acres of intertidal habitat within Hylebos Waterway will be lost due to planned remediation in those waterways and have not been accounted for in any of the compensatory mitigation plans or documents provided to EPA. See Section V., *Habitat Considerations* subsections for Thea Foss and Hylebos waterways for more detail on habitat loss from the cleanup plans.

V. DESCRIPTION OF THE IN-WATERWAY REMEDIAL ACTIONS

A. Thea Foss and Wheeler-Osgood Waterways

In March 1994, the City of Tacoma entered into an Administrative Order on Consent (AOC) with EPA to conduct the design of the remedial action for the Thea Foss and the Wheeler-Osgood waterways. The City has analyzed previous data, conducted additional studies regarding the nature and extent of contamination in the waterways, and prepared a pre-design evaluation. The studies and evaluations to date include the following:

a) three rounds of sampling,
b) a feasibility study to evaluate cleanup actions for NAPL seeps located at the head of the Thea Foss Waterway,
c) an evaluation of potential disposal sites for dredged contaminated sediments,
d) an evaluation of the potential for sediment recontamination after cleanup, and
e) an underwater survey at the head of the waterway to locate the source of NAPL seeps beneath the SR 509 bridge.

These studies and evaluations are contained in the following reports which have been reviewed by EPA and placed in the Administrative Record:

a) Round 1 Data Evaluation Report, Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington, May 30, 1995.
b) Screening of Remedial Options Report, Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington, November 15, 1996.
c) Round 2 Data Evaluation Report, Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington, January 17, 1997.
d) Round 3 Data Evaluation and Pre-Design Evaluation Report, Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington, September 30, 1999.
e) SSMA 7 Technical Update, Memorandum from Hart Crowser to the City of Tacoma , dated June 14, 2000.

The areas within the waterways that require cleanup have been identified. The Thea Foss and Wheeler-Osgood waterways have been organized into Superfund Sediment Management Areas (SSMAs). There are seven SSMAs and they are depicted in Figure 2. The studies that have been completed indicate that the most severe contamination at surface and at depth occurs in segments 6 and 7 and tapers off gradually towards the Mouth of Thea Foss in segments 2 and 1. Primary contaminants found throughout the waterways that require cleanup both at surface and subsurface are BEP and PAHs. Other contaminants, such as metals are more localized. The head of the waterway (SSMA 7) contains deposits of NAPL beneath the sediments. This NAPL presents an ongoing source of conatmination to the waterway via seeps that transport the NAPL to the surface sediments.

Except for SSMA 1, substantial active remediation is needed to achieve cleanup objectives. The following paragraphs describe EPA's remediation plan for Thea Foss and Wheeler-Osgood waterways that is consistent with the remedial action EPA selected in the ROD. EPA's remediation plan is similar to the City of Tacoma's preferred alternative, Alternative 5B, described in the "Round 3 Data Evaluation and Pre-Design Evaluation Report" and in a subsequent technical memorandum. However, EPA's selected remedy for SSMA 7 includes a contingency for additional source removal and/or modification of the cap design if the established performance criteria cannot be met by the City's remedial design and implementation. EPA's remedy also differs from the City's in that it designates some additional areas for either natural recovery or enhanced natural recovery. EPA's remedy is described below.

SSMA 1 (Station 0+00 to 20+00)

No action is required in most of this segment except for SSMAs 1e1 and 1e2, where a cap will be placed to ensure that an area of sediments contaminated with hexachlorobenzene is remediated.

The approximate capping volume required to remediate this area is 15,000 cy of clean material. The remedial action will maintain the current navigable elevation of at least -29 feet MLLW.

SSMA 2 (Station 20+00 to 35+00)

The majority of sampling locations in this segment of the waterway indicate that chemical exceedances are marginal. EPA is requiring natural recovery at those areas where marginal exceedances occur because minor adverse biological effects were predicted for these areas in the City's Round 2 Report. These areas are SSMAs 2b1, 2b3, 2c1a, and 2c1b. In addition, a few discreet areas within SSMA 2 require either capping or dredging. SSMA 2a2 which is adjacent to an upland bank will be capped. Other areas, such as SSMA 2b4 and 2b5 will be dredged approximately four feet to remove all contaminated sediments. While this will eliminate the need for a cap, these areas will be backfilled with clean material to the approximate elevation of surrounding areas.

The estimated total volume for dredging and capping/backfilling this segment is approximately 16,000 cy and 15,000 cy, respectively. The remedial action will maintain the current navigable elevation of -29 feet MLLW.

SSMA 3 (Station 35+00 to 46+40)

The majority of areas within SSMA 3 have SQO exceedances that require removal and/or capping. SSMAs in the navigation channel between the 11th Street Bridge and the 15th Street right of way (ROW) (SSMAs 3b1, 3b2, 3b3, 3b4, 3b5a, and 3b5b) will be dredged to a specified elevation of -32 feet MLLW (elevation -30 feet MLLW with a 2-foot over dredge allowance) to remove all contaminants. Post-dredge samples will be taken to assess chemical concentrations of the dredged surface. If necessary, further dredging and/or some amount of capping may be required. Non-channel areas will undergo a combination of cleanup actions, including no action, natural recovery, capping, and dredging. SSMA 3a1 requires no action based on existing conditions. SSMAs 3a2 and 3a3 are suitable for natural recovery. SSMA 3c1 will undergo a combination of cleanup actions including natural recovery, enhanced natural recovery, dredging and capping. SSMA 3c2 and 3d are areas suitable for capping.

The estimated capping volume for this segment is in excess of 23,000 cy; the dredging volume is approximately 206,000 cy. The navigation channel along this section is authorized to an elevation of -22 feet MLLW. As the channel will be dredged to -32 feet MLLW, this remedial action meets navigation requirements.

SSMA 4 (Wheeler-Osgood Waterway)

Chemical exceedances in this segment indicate that active remediation needs to occur in two main areas: SSMAs 4a and 4c. These areas will be dredged to remove contaminated sediments. It is expected that all contaminants will be removed. The City's studies suggest that dredging SSMA 4a four feet will remove all contaminants. It is expected that SSMA 4c will be dredged to an elevation of -8 feet MLLW (which includes 1 foot of over dredge) to remove all contaminants. This area will then be capped/backfilled to match the current bathymetry for habitat benefits. Approximately 5,000 cy and 22,100 cy will be dredged from SSMAs 4a and 4c, respectively.

In addition, the City of Tacoma recommended no action areas where there are chemical exceedances of the SQOs. EPA requires that these areas be designated as natural recovery areas. If long-term monitoring indicates these areas will not achieve SQOs within 10 years after remedial action, they must be remediated.

The total volume of dredge material from SSMA 4 will be approximately 27,000 cy. The total amount of cap/backfill material needed for SSMA 4 will be nearly 20,000 cy. The Wheeler-Osgood Waterway is not part of the navigation channel. Current elevations will be maintained.

SSMA 5 (Station 46+40 to 52+40)

The navigation channel along this section is divided into two authorized navigation elevations. Between the 11th Street Bridge and the 15th Street ROW, the navigation channel is authorized to an elevation of -22 feet MLLW. From the 15th Street ROW to Station 52+40, the navigation channel is authorized to an elevation of -19 feet MLLW. These areas (SSMAs 5b1, 5b2a, 5b2b, 5b3a, 5b3b and 5b4) will be dredged to a specified elevation of -32 feet MLLW (which includes 2 feet of over dredge) to remove contaminants. It is expected that dredging to this depth will remove all contaminants.

Areas outside of the navigation channel will have a combination of remedial actions, including no action, natural recovery, capping, and dredging. Although SSMAs 5a1 and 5a3 will require no action based on existing conditions, a portion of these SSMAs will be dredged as part of the channel slope. The portions of the bank that the City recommended as no action areas have chemical exceedances of the SQO for copper and zinc; therefore, EPA requires that these areas be remediated either through capping or dredging because banks are not suitable for natural recovery. SSMAs 5c and 5a2, which are located along the channel slope, will be partially dredged. Caps will completely cover these SSMAs to confine remaining contaminants.

The remedial actions in this segment will result in total dredge and cap volumes of approximately 198,000 cy and 16,000 cy, respectively.

SSMA 6 (Station 52+40 to 62+30)

The navigation channel along this section is authorized to an elevation of -19 feet MLLW, however, it will be dredged to an elevation of -24 feet MLLW. Data collected by the City suggests that in places contamination may be considerably deeper. Consequently, a cap will be placed over dredged surfaces resulting in an elevation of -21 feet MLLW which will be 2 feet below the authorized channel depth.

Non-channel areas will receive a combination of no action, natural recovery, dredging and capping. Based on existing conditions, SSMAs 6a2a and 6c will require no action. SSMAs 6a2b and 6b3, located on the east side of the waterway under the Fishing Fleet, will be dredged to an elevation of -17 feet MLLW to remove all contaminated sediments and accommodate marina

users. SMAs 6b4 and 6b5 will be dredged to an elevation of -13 feet and capped back to elevation -10 feet because there are contaminated sediments at depth.

Dredging these areas will result in more than 92,000 cy of sediment needing disposal. Capping will require approximately 58,000 cy of clean material.

SSMA 7 (Stations 62+30 to 72+40 and 77+50 and 80+00)

Contamination in this segment of the waterway is deep and in excess of the authorized navigation depth of -19 feet MLLW. Sediments in SSMA 7b2 within the navigation channel between Stations 62+30 and 68+00 will be dredged to elevation -26 feet MLLW (elevation -24 feet including 2-foot over dredge). This will result in a channel approximately 5 feet below the required channel depth for navigation (-19 feet MLLW) in this area. In SSMA 7b3a, the dredge cut within the navigation channel will taper from -26 feet MLLW at Station 72+00 to -13 feet MLLW near Station 72+40. A cap will be required throughout this area because the majority of sediments at this depth and deeper contain chemical concentrations above SQOs. Following placement of the cap, the mudline elevation will be 2 feet below the authorized channel depth up to Station 72+00 and taper to a final elevation of -10 feet MLLW near Station 72+40.

Non-channel areas including SSMAs 7a and 7b1 (located on the east side of the waterway) will be dredged to an elevation of -13 feet MLLW to provide room for potential marinas. SSMAs 7c, 7d1 and 7d2 will be dredged to an elevation of -13 feet and capped back to an elevation of -10 feet as contaminated sediments exist at depth at these locations.

EPA is selecting the approach recommended by the City of Tacoma for remediation and control of the NAPL at the head of the waterway (approximately from Station 72+00 to 80+00) provided performance criteria specific to source control are met prior to implementation of the remedy. The remedy for the head of the waterway includes the following:

a) Placement of a composite multilayered cap which may consist of sand, sorbent material and geotextile membrane over areas that have active NAPL seeps, to cap and contain those seeps. (The cap must meet the performance requirements described in Section IV. A. and E. above.)
b) Dredging of sediments (some of which may be heavily contaminated with NAPL) as needed for construction of the cap.
c) The appropriate treatment and/or off-site disposal of the contaminated sediments as determined by testing.
d) Placement of at least 3-foot thick sand caps in areas which do not have composite capping material.
f) Placement of a sheet pile wall across the waterway north of the State Route 509 bridge to provide stabilization between the cap in SSMA7 and the remainder of the navigable waterway.

Dredging the channel and slopes will result in approximately 81,000 cy of dredged sediments needing disposal. Caps will be placed throughout SSMA 7 resulting in a total cap volume of approximately 108,000 cy.

Since the post-remediation depth proposed for the head of the waterway (between the north edge of the SR-509 bridge and the head of the waterway) will be more shallow than the federally authorized navigation depth, the City of Tacoma submitted a request to the Army Corps of Engineers (Corps) on August 19, 1999, to partially deauthorize this portion of the navigation channel. Deauthorization is necessary for the cleanup at the head of the Thea Foss to substantially comply with the Rivers and Harbors Act, which is an ARAR. The Corps regional office has completed a public comment period on the deauthorization, and has forwarded its recommendation to deauthorize this portion of the channel to Corps Headquarters. After approval by the Corps, the deauthorization request will be forwarded to the Secretary of the Army and then to Congress for approval.

Thea Foss and Wheeler-Osgood Waterway Cleanup Areas and Volumes

In summary, the remediation plan for Thea Foss Waterway will result in approximate dredging and disposal volumes of 620,000 cy and approximate capping volumes of 255,000 cy. An additional estimated 25,000 cubic yards of sediment and NAPL will be dredged from the heavily contaminated area at the head of the waterway for placement of the cap. These sediments will be tested to determine the appropriate disposal option. If necessary, the sediments from the head of the waterway will be dewatered, treated and disposed off-site.

The remedial action will result in the complete dredging of approximately 24 acres; capping of approximately 32 acres (including some areas that will be dredged and then capped); natural recovery of 21 acres, enhanced natural recovery of approximately 4 acres; and no action at 37 acres.

Complete removal of contaminated sediments will occur in a substantial portion of the navigation channel specifically between the 11th Street Bridge and 15th Street. The waterway will be left deeper than -24 feet MLLW, which is 2 feet below the authorized navigational depth of -22 feet MLLW. This will allow for future maintenance dredging of the waterway. Between 15th Street and approximately station 72+00, the waterway also will be dredged to remove contaminated sediments. However, because the channel is narrow and the contamination deep, it is more difficult to remove all contaminated sediments from this part of the waterway. Therefore, after dredging, a cap of clean sediments will be placed to contain remaining contaminated sediments. In this area, the top of the cap will be left at or deeper than -21 feet MLLW which is 2 feet below the present authorized navigational depth of -19 feet MLLW.

From approximately station 72+00 to the north edge of the SR-509 bridge, there will be a transition to a capping area. As a result, there will be some dredging along this slope and placement of a confining cap. Subject to meeting the performance criteria as described above for SSMA 7, the remaining area between the north edge of the SR-509 bridge and the head of the

waterway will be capped to confine the contaminated sediments in place, leaving the channel depth in this area at an elevation of approximately -10 feet MLLW. Harbor areas that require active remediation also will be: (1) dredged to remove all contaminants, (2) dredged to a specified elevation and capped, or (3) capped. Areas near the Mouth of the Thea Foss with marginal exceedances of the SQOs will undergo natural recovery. Other areas will be capped with minimal volumes of clean material to immediately isolate marginally contaminated sediments and enhance the natural recovery process.

Habitat Considerations

Dredging and capping would sequentially eliminate non-mobile benthos over approximately 56 acres of bottom area during an estimated 1-2 years of construction. These activities, along with natural recovery, would leave a patchwork of clean to much less contaminated bottom that would be predominantly native silty sands rather than the existing, organically enriched sandy silts. The bottom sediments exposed by dredging or created by the cap fill are expected to meet SQOs and to rapidly re-colonize with infauna and epifauna. Dredging and capping would cause temporary and localized impacts to water quality in the vicinity of the active equipment during construction. In-water work would be conducted during periods when few juvenile anadromous fish are present in the nearshore waters to reduce or eliminate the risk of direct impacts to this important resource.

Remedial activities would result in a small decrease in overall area (0.21 acres) below the mean higher high water level (MHHW) due to capping of the bank areas. Total area between MHHW and elevation -10 feet MLLW would decrease by up to 4.6 acres due to dredging to remove contamination. Deeper water habitat area (deeper than -10 feet MLLW) would be increased by that same 4.6 acres, but this is judged to be an unavoidable adverse impact, which requires compensatory mitigation. Habitat quality overall should be improved throughout the two waterways because of the removal or confinement of contaminated sediment. Additionally, provision of soft or organic-rich substrates beneficial to salmonids (e.g., "fish mix" or a silt-sand mix) will be investigated for use as final capping material.

EPA will require compensatory mitigation consistent with the bay-wide mitigation and performance standards discussed in Section IV.F. to offset any loss of habitat, as well as careful timing and monitoring of dredging and capping activities to assure minimal short-term impacts and minimal disruption of migratory salmonids. The resulting substrate should greatly benefit fish and wildlife resources by removing and isolating highly contaminated sediments from biological uptake. EPA will also ensure conservation measures are taken to protect ESA listed species.

B. Hylebos Waterway

EPA and the Hylebos Cleanup Committee (HCC), which consists of ASARCO, Inc., Elf Atochem North America, Inc. (now ATOFINA Chemicals, Inc.), General Metals of Tacoma, Inc., Kaiser Aluminum and Chemical Corporation, Occidental Chemical Corporation, and the Port of Tacoma, entered into an AOC for a pre-remedial design study of the Hylebos Waterway in November

1993. Under the AOC, the HCC has collected more than 500 physical, chemical, and biological samples in two sampling rounds to characterize the nature and extent of contamination, and has developed a cleanup plan to address areas that exceed the SQOs set forth in the 1989 ROD and the 1997 ESD. The HCC also has evaluated the potential for sediment recontamination after cleanup, and has inventoried and evaluated potential disposal sites for dredged contaminated sediments.

During the course of pre-design studies, it was determined that two areas of the Hylebos Waterway should be addressed separately from the overall waterway cleanup described in this ESD, because the materials present are different than the rest of the waterway sediments. In one area, a group of wood products companies (known as the "Wood Debris Group") are working with Ecology to investigate the extent of wood debris in the turning basin at the head of Hylebos Waterway. They are also evaluating options for remediation of wood debris. Ecology's public comment period for the Cleanup Action Plan for the wood debris cleanup closed July 28, 2000.

In the second area, Occidental Chemical Corporation is working with EPA under a separate AOC for two Removal Actions to investigate the extent of, and cleanup options for, a subtidal area known as "Area 5106" and a contaminated embankment in front of the former Occidental facility and an adjacent property at the Mouth of the Hylebos Waterway. In Area 5106, the nature of the sediment contamination is different than other Hylebos sediments, and, if excavated, would require treatment prior to disposal. This area is referred to as the "Area 5106 and Embankment Study Area" in Figure 3a. EPA has issued a separate proposed Engineering Evaluation and Cost Analysis (EE/CA) document for Area 5106 and is receiving public comment during August 2000. After responding to public comments, EPA will prepare an Action Memorandum (analogous to this ESD) to implement the removal action. For the Area 5106 sediments, the EE/CA addresses only those sediments that require treatment prior to disposal. A separate comment period for the embankment area is expected in the fall 2000. EPA's selected action for the embankment area will also be documented in an Action Memorandum. Sediments around and under the 5106 removal area that exceed SQOs but that are outside of the embankment will be addressed under this ESD in the overall Hylebos cleanup. Depending on the selected remedy in EPA's Action Memorandum, an estimated 20,000 cy of treated dredge material from Area 5106 could be disposed of in one of the selected disposal sites identified in this ESD. Because the Area 5106 may be disposed of in one of the selected disposal sites after treatment, the estimated 20,000 cy volume has been included in the estimated total disposal volume for this ESD.

Hylebos Waterway Subtidal Cleanup

The HCC's studies showed that extensive areas at the mouth and head of the Hylebos Waterway, and more limited areas in the middle of the waterway, are contaminated with chlorinated organic chemicals (including PCBs, pesticides, hexachlorobenzene, and hexachlorobutadiene), PAHs, and metals, and will require remediation.

Under the requirements of the AOC, the HCC developed a Pre-Remedial Design Evaluation Report (November 8, 1999), which contains a proposed cleanup plan for contaminated sediments

in the Hylebos Waterway, and proposed disposal sites for dredged sediments. The proposed cleanup plan is shown in Figures 3a-c, and is described in more detail in the report.

As shown in Figure 3a, most of the waterway north of the 11th Street Bridge is to be dredged under the cleanup plan. The area in front of Ole and Charlie's Marina (Sediment Management Area , "SMA" 511), within and in front of the Chinook Marina (SMA 501), and a small area near the 11th Street Bridge (SMA 502) contain only low-level contamination and will be monitored as natural recovery areas.

In the middle of the waterway (Fig. 3b), three areas will be dredged: SMA 421 in front of Taylor Way Properties, SMA 321, a small area near Buffelen Woodworking, and SMA 322 in front of Murray Pacific Corp. (now Port of Tacoma), Modutech, and Hylebos Marina. There also are four small natural recovery areas in the middle of the waterway.

At the head of the waterway (Fig. 3c), most of the waterway from approximately station 110+00 to station 147+00 will be dredged, with the exception of a small natural recovery area at the General Metals graving dock and in front of the General Metals facility. In the upper turning basin, a small area of chemical contamination in front of the Puyallup Tribe's Outer Hylebos property will be addressed as part of this cleanup. The remainder of the upper turning basin will be addressed under a separate cleanup by the Hylebos Wood Debris Group. There are also some small natural recovery areas in the upper turning basin.

As discussed in Section IV, the cleanup must protect against exposure of buried contaminated sediments in the future. Based on existing information, EPA has designated areas for cleanup where there are high or moderate subsurface contamination levels that have a greater potential for exposure, due to their proximity to the navigation channel or remediation dredge areas. There are a few sampling stations with lower-level subsurface contamination, or with insufficient subsurface data to refine the dredging volume. In these instances these areas will require further evaluation during design to determine which areas present a long-term risk of exposure of significant levels of subsurface contamination (e.g., an estimated 20,000 cy area noted as SMA S44 in Fig. 3b must be refined). For the remaining areas not identified for EPA action in this ESD, where and when future dredging or excavation will occur is unknown, but any such activity will be overseen by regulatory agencies as required under the Clean Water Act and the Shoreline Management Act, thus immediate removal of such subsurface sediments is not required. EPA does, however, encourage parties with development needs that involve dredging to consider coordinating their activities with EPA's cleanup schedule. Such a coordinated effort could serve to reduce cost and streamline administrative processes for property owners more than if they wait to initiate work after the Superfund cleanup. This issue is discussed further in the following section, *Hylebos Waterway Cleanup Areas and Volumes.*

Areas requiring dredging will be dredged deep enough to expose clean sediments. In most cases this coincides with the depth of native sediments. Proposed thickness of dredging ranges from 2 to 20 feet, with an average of 6 feet.

The cleanup areas shown in Figures 3a-c represent a preliminary cleanup plan, with specific dredged material management areas and volumes to be finalized and approved by EPA in remedial design.

Hylebos Waterway Intertidal Cleanup

Figures 3a-c also show intertidal areas that require cleanup. The plan presented in the Pre-remedial Design Evaluation Report is for 11.6 areas under dock/structures and isolated intertidal areas to be capped. However, whether intertidal areas will be dredged or capped will be reevaluated in the design phase on a property by property basis, taking into account factors such as:

- protectiveness of the proposed cap,
- compatibility with current land use,
- property owner's willingness to implement use restrictions on the capped area and/or ensure such restrictions will run with the land,
- engineering constraints, and
- avoidance of habitat impacts and any necessary mitigation required under CWA Section 404.

Some intertidal cleanup actions have been addressed by individual property owners working with Ecology. Those intertidal cleanups where EPA has approved the final cleanup will not require remediation as part of the overall waterway cleanup. EPA will, however, determine whether long-term monitoring is needed at these properties as part of the waterway design process. To date, EPA has approved the intertidal cleanups at SMA 232 at General Metals of Tacoma and SMA 241 at the former USG Interiors facility (see Figure 3-c).

Hylebos Waterway Cleanup Areas and Volumes

The total area of the Hylebos Waterway is 285 acres. Under this cleanup plan, 85.5 acres of open access areas (825,000 cy) will be dredged, 11.6 acres (95,000 cy) of intertidal and dock/structure area will be either dredged or capped depending on the final remedial design, and 20.7 acres are natural recovery areas. Additional acreage will be cleaned up under the Occidental Chemical and Wood Debris Group response actions. The total dredging volume represented by the sediment cleanup shown on Figures 3a-c is 845,000 cy, which includes the 20,000 cy estimated for SMA S44. For the purposes of estimating needed disposal site capacity, EPA has assumed that both SMA S44 area, and the intertidal or dock/structures areas will be dredged for a total of 940,000 cy. The estimated cost of this remedy, assuming disposal of dredged sediments at the Blair Slip 1 disposal site and an Upland Regional Landfill is $46,137,000.

An additional volume of contaminated sediments in the Hylebos Waterway may require confined disposal if dredged for navigation or future development purposes. Hylebos Waterway is a federally authorized navigation channel with an authorized depth of -30 feet MLLW. EPA is working with the Corps to determine whether the Superfund cleanup can be coordinated with

additional dredging by the Corps at the request of waterway users. This would increase the volume of sediments dredged and requiring confined disposal, but would address waterway users' concerns about shoaling in the navigation channel. It would also minimize future ecological impacts due to dredging by helping to ensure that no further dredging of the Hylebos Waterway would be needed for many years.

Some property owners also may wish to include additional dredge areas if their future use plans may require dredging and, as a result, risk future exposure of buried contaminated sediments. Because of the difficulties associated with dredging and disposal of contaminated sediments, EPA encourages property owners and waterway users to consider any current or future additional dredging needs and to discuss with EPA whether this dredging can be coordinated with the cleanup. While dredging solely for navigation or other development purposes is outside the scope of this Superfund action, EPA will work with private parties and the Corps to integrate additional dredging activity into the remedial design schedule if there is interest by the parties. For the purposes of determining needed disposal site capacity, EPA has estimated that an additional 120,000 cy of capacity may be needed if a Corps dredging project and dredging by other waterway users is included in the cleanup.

A number of factors could alter EPA's estimate of 120,000 cy of additional sediment resulting from dredging. EPA's estimate of 120,000 cy is based on a conditions survey conducted by the Corps that estimated 120,000 cy of dredging would be needed to address shoaling areas that are currently impacting navigation in the waterway. The Corps' 120,000 cy estimate includes some overlap with the CERCLA remediation areas, however, it does not include any additional dredging to address contaminated surfaces that may remain after the shoaling areas are dredged, which could increase the volume. The Corp's estimate also does not address any potential needs for development purposes. The draft ESD cited an additional volume of 300,000 cy based on the possibility of a much larger Corps dredging project beyond the shoaling areas identified in the Corp's conditions survey.

To pursue any Corps dredging project would require resolution of a number of issues that cannot be fully addressed at this time, including level of interest by private parties. For example, any navigation dredging would need to be initiated by a local sponsor and would require private parties to coordinate with the Corps to determine the precise dredging volume and subsequent cost sharing arrangements required for dredging and disposal. EPA encourages parties with an interest in additional dredging to work together to resolve these issues.

Habitat Considerations

Remedial activities in the Hylebos Waterway would result in the dredging and/or capping of approximately 96 acres of bottom area during an expected 2-3 year construction period, sequentially eliminating non-mobile benthos over that area. These actions include the capping of 11.6 acres of intertidal and shallow subtidal habitat and the dredging of 85.5 acres of subtidal habitat. In the intertidal area, approximately 2.7 acres of intertidal habitat would be converted to subtidal habitat. The resulting substrate would consist of clean imported sand or clean native

sediment. These activities, along with natural recovery, would leave much less contaminated bottom sediment which is expected to result in improved habitat quality throughout the waterway. The bottom sediment exposed by dredging would re-colonize with infauna and epifauna, as would any cap sediment. Dredging and capping activities would cause temporary and localized impacts to water quality in the vicinity of the active equipment during the construction period. In-water work would be conducted during periods when few juvenile anadromous fish are present in the nearshore waters to reduce or eliminate the risk of direct impacts to this important resource. The net effect of these changes to the aquatic ecosystem would be the loss of 2.7 acres of intertidal habitat, which will require compensatory mitigation. The remedial actions may also result in the loss of a very small area of salt marsh (approximately 25 square feet). It may be possible to avoid impacting this area, and this will be closely scrutinized during development of the final project design. Habitat quality for the remainder of the site overall would increase because of the removal of contaminated sediments. Additionally, provision of soft or organic-rich substrates beneficial to salmonids (e.g., "fish mix" or a silt-sand mix) will be investigated for use as final capping material.

EPA will require compensatory mitigation consistent with the bay-wide mitigation and performance standards discussed in Section IV.F. to offset the 2.7 acres and any additional loss of habitat, as well as careful timing and monitoring of dredging and capping activities to assure minimal short-term impacts and minimal disruption of migratory salmonids. The resulting substrate should greatly benefit fish and wildlife resources by removing and isolating highly contaminated sediments from biological uptake. EPA will also ensure conservation measures are taken to protect ESA-listed species.

C. Middle Waterway

EPA and the Middle Waterway Action Committee (MWAC), which is comprised of Foss Maritime Co., Marine Industries Northwest, Inc., and Pioneer Industries, Inc., entered into an AOC for preparation of pre-remedial and remedial design studies for Middle Waterway in April 1997. Under the AOC, MWAC has completed two rounds of sampling to characterize the nature and extent of contamination. MWAC submitted a draft data evaluation report, draft evaluation of remedial options, and draft remediation plan to EPA in June 2000, which are currently under review by EPA. MWAC currently estimates that 75,000 cubic yards of contaminated sediments may require removal.

Contaminated sediments dredged from Middle Waterway will be disposed of in one of the sites selected in this ESD. EPA will issue a future ESD for public comment, which defines the areas of Middle Waterway to be remediated.

VI. DISPOSAL SITES

A. Background

Since 1996, EPA has held several meetings and discussions with potentially responsible parties, representatives of federal, state, and local government, Native American tribes, environmental

groups, and members of the public. EPA met with these parties in an effort to: 1) identify potential disposal sites that meet the criteria set forth in the 1989 ROD, 2) discuss the pros and cons of each site and 3) narrow the list of potential sites to those sites most acceptable to EPA and other parties. Ten sites were identified by this process. EPA's further internal analysis narrowed the list to a few candidate sites.

In June 1999, EPA issued a fact sheet that presented EPA's evaluation of disposal sites for confinement of contaminated sediments dredged from Thea Foss, Wheeler-Osgood, Hylebos, and Middle waterways. The fact sheet described the factors used to evaluate the disposal sites and provided a refined list of promising sites. The list included nearshore fills at Blair Slip 1 and St. Paul Waterway, and confined aquatic disposal sites at Mouth of Hylebos and the Hylebos Upper Turning Basin. Along with these four in-water sites, EPA retained the option to send some volume of contaminated sediments to a regional upland landfill. EPA stated that it would focus further technical evaluations on these promising disposal sites. EPA also solicited public comment on the evaluations and information provided in the fact sheet and the proposed disposal site list. The comments received on EPA's refined list of disposal sites were considered in developing this ESD, and are discussed in Section X.

Subsequent technical evaluations indicated that construction of the Hylebos Upper Turning Basin disposal site would involve serious technical challenges, and may adversely impact migrating salmon. The proposal for the Hylebos Upper Turning Basin disposal site was to build an underwater confined aquatic disposal (CAD) facility at the end of a long, narrow channel, in an area of low circulation and flushing. Due to ongoing deposition of fine sediments with high organic content, near-bottom dissolved oxygen levels drop below levels necessary to support sensitive aquatic species for much of the summer and fall. Dredging and disposal may further reduce dissolved oxygen levels. The turning basin is located at the mouth of Hylebos Creek, a salmon bearing stream. Fish must pass through the disposal site to reach Hylebos Creek. In EPA's judgement, the Hylebos Upper Turning Basin disposal site, while not infeasible, had some serious technical challenges to overcome, and it is uncertain whether migrating salmon could be protected during construction. For these reasons, EPA has not selected this disposal site.

In November 1999, EPA issued a draft ESD proposing disposal of dredged contaminated sediments at three in-water disposal sites: Blair Slip 1, St. Paul Nearshore Fill, and a CAD at the Mouth of the Hylebos Waterway. EPA believes the Mouth of Hylebos site satisfies EPA's threshold criteria of overall protectiveness and compliance with ARARs, and is cost effective and technically implementable. However, based on public comments and further evaluation of the Mouth of Hylebos disposal site, EPA has determined that it is not an administratively implementable alternative at this time. Several issues have been raised about use of the Mouth of Hylebos Waterway disposal site that have not been resolved, including:

1) the landowner, DNR's, stated preference that CADs only be used for temporary disposal while EPA sees them as a long-term solution;
2) lease rates for use of state-owned, aquatic land;
3) need to relocate an existing lease holder at the mouth of the Hylebos;

4) a waiver or Plan amendment of the City of Tacoma's Shoreline Master Plan would be needed, because the majority of the mouth of Hylebos site is in the district S-13, which is designated a "conservancy environment"; and
5) numerous adverse comments received from homeowners, members of the public, and environmental groups.

All of these issues could potentially be resolved, however resolution is expected to be time-consuming. During that time, cleanup would be stalled.

Because EPA has determined that the Mouth of Hylebos CAD is not an administratively implementable alternative at this time, EPA is selecting upland disposal in a regional landfill as an element of the CERCLA remedy in conjunction with the Blair Slip 1 and St. Paul Waterway disposal sites. EPA has determined that the upland regional landfill alternative is feasible and cost-effective, and best meets the CERCLA evaluation criteria.

After the public comment period on the draft ESD closed (February 2000) and the many issues concerning the CAD site at the Mouth of the Hylebos were clarified, a group of four Hylebos Waterway potentially responsible parties hired a neutral third-party facilitation firm, Merritt and Pardini, and requested EPA's support and participation in a public outreach process to develop a solution for disposal of contaminated sediments dredged from Hylebos Waterway. EPA participated in the outreach process, which consisted of a series of three workshop sessions held over a three-month period from March through June 2000. A summary of the workgroup sessions and the workgroup's "Consensus Statement and Conclusions" were provided to EPA on June 21, 2000. The consensus statement is to:

1) Maximize the capacity of Blair Slip 1;
2) Maximize the use of upland industrial fill site(s) (i.e., Kaiser, others);
3) Upland disposal, capping, and Puget Sound Dredged Disposal Analysis [PSDDA; now Dredged Material Management Program (DMMP)] disposal as appropriate for residual volumes based on successful implementation of items 1 and 2;
4) Make sediment available for a treatment bench test if requested by a vendor; and
5) Based on assumed volume (of 940,000 cy) and contingent on the success of items 1 through 4, the Mouth of Hylebos CAD site is not part of this consensus statement.

In response to these recommendations, EPA agrees with the workgroup's recommendation (item 1) that the capacity of Blair Slip 1 be maximized to the extent practicable. EPA will also extend this recommendation to the St. Paul Waterway disposal site. The outreach forum's recommendation on upland industrial fill (item 2) was presented in sufficient concept-level detail to allow for further development during remedial design. The information presented in the recommendations was not, however, sufficient to allow EPA to select alternative on-site upland disposal sites rather than disposal of dredged materials in an upland regional landfill. EPA will allow PRPs to develop such alternatives during remedial design. If they can be demonstrated to EPA's satisfaction to be compatible with existing land use, protective of human health and the environment, compliant with applicable, or relevant and appropriate requirements and cost

effective, then EPA will consider these on-site alternatives as a means to reduce or eliminate the need for disposal at an upland regional landfill.

EPA's ESD includes upland disposal, capping and DMMP disposal as appropriate (item 3). EPA is also willing to make contaminated sediments available to a vendor for bench testing of treatment technologies (item 4), if requested and if compatible with the cleanup schedule, but will not require any such testing of the potentially responsible parties (PRPs).

In summary, EPA has selected Blair Slip 1 and the St. Paul Nearshore Fill and disposal at an upland regional landfill as disposal sites to contain contaminated sediments dredged from Hylebos, Thea Foss, Wheeler-Osgood, and Middle Waterways. The location of these disposal sites is shown in Figure 4. EPA will consider an upland on-site fill as an alternative to disposal at an upland regional landfill if it meets the criteria discussed above. More detailed information about the selected disposal sites is provided below.

B. St. Paul Nearshore Fill

The St. Paul Nearshore Fill (see Fig. 4) will consist of a containment berm and dike of clean dredge material and/or select fill material across the mouth of the waterway. New intertidal habitat will be constructed on the face of the berm.

The fill will create an upland area on top of which Simpson Tacoma Land Company (hereafter Simpson) plans to expand its manufacturing facilities. In order to accommodate the volume of material that needs to be dredged from the Thea Foss, Wheeler-Osgood, and Middle waterways, the St. Paul Waterway must be deepened. A preliminary facility layout that will be refined in the final design process indicates that the St. Paul Fill will have a capacity of approximately 600,000 to 750,000 cubic yards. EPA requires that the St. Paul Nearshore Fill be utilized to its maximum feasible capacity. Once all the contaminated material that needs to be disposed is placed into the St. Paul Fill, the area will be covered by a 6 to 7 foot thick cap.

Construction of the St. Paul Fill will require relocation of the log haul-out facility currently located at the head of the St. Paul Waterway. Simpson is proposing to relocate the facility to the inner end of the subtidal portion of Middle Waterway, at the mouth. Simpson will need to receive approval from Ecology to ensure that their plans are consistent with Ecology policy concerning new log rafting and haul out areas. The relocated log haul out facility must be designed to avoid and minimize habitat impacts and to meet the Best Management Practices (BMPs) in the City of Tacoma's Shoreline Program and comply with practices recently agreed upon for log haul out in Hylebos Waterway (e.g. no log grounding and bark control). Design details of the facility will also need to be approved by EPA.

The creation of the nearshore fill will result in the loss of approximately 13.6 acres of littoral and subtidal aquatic habitat, including 7.6 acres of mudflats. This particular habitat loss is of great concern to EPA, the Trustees, the Puyallup Tribe, and other interested parties. Although the site has been degraded by historic industrial and commercial navigation use, it still provides important

fish and wildlife support functions (refugia, feeding, migration) and compensatory mitigation is required to offset loss of habitat and other impacts.

After evaluation and input from the interested parties, Simpson developed a compensatory mitigation plan to offset losses due to the proposed nearshore fill. The mitigation plan was designed to emphasize recovery for migratory salmonid populations by providing a nearshore habitat connection between the Puyallup River and other existing nearshore habitats. The plan includes approximately 25 acres of estuarine habitat comprised of 15 acres of enhanced and 10 acres of created intertidal habitat, creation of a tidal channel and wetland marsh with a fresh water source, and preservation of land for a potential connector channel between the Puyallup River, the marshland, and Middle Waterway.

At this time, EPA is uncertain of the ability of the Upper Middle Waterway mitigation area to fully function as claimed. EPA believes there are insufficient baseline fish use and salinity data in both St. Paul and Middle Waterways to provide reasonable assurance that juvenile salmonid use will equal or exceed current use levels within the St. Paul Waterway impact area. This uncertainty is partially related to the fact that the St. Paul Waterway is closer to the Puyallup River and its associated fresh water turbidity plume compared to the more distant upper Middle Waterway. Consequently, the provision of a perennial source of river water to the compensatory mitigation lands in the upper Middle Waterway is critical to its functional success toward conservation and recovery of salmonids.

The Habitat Plan (April 2000) notes an option for supplying fresh water from the Puyallup River via rehabilitation and use of a City of Tacoma soon-to-be-abandoned water line along 11th Avenue that will become available in the year 2000 after a new water line is constructed. This pipeline option could potentially allow transfer of the necessary volume of fresh water to the Middle Waterway to achieve immediate benefits to salmonids, including development of brackish marsh habitat. In the future the pipeline could provide fresh water to potential restoration of intertidal brackish marsh and tidal channel habitats in the Delta Reserve/former industrial properties south of 11th Avenue.

EPA is requiring that this pipeline option, and other fresh water source(s) as necessary to meet the volume specifications, be implemented to assure full function of the mitigation project and, in part, to compensate for resource losses from the remedial activities in the Thea Foss Waterway.

Design of the pipe must meet the following requirements:

a) Maximize flow volume, but at a minimum must provide enough volume to create a freshwater lens six inches deep under stratified conditions and extends at least two-thirds the length of the waterway. Pumped artesian well water can be used as necessary to achieve the minimum flow volume. Appropriately treated stormwater or stormwater that meets the appropriate discharge standards may also be used to supplement the flow, but the preferred supplemental source is artesian well water.

b) The capability to eventually divert flows from upper Middle Waterway to the former industrial properties south of 11th Avenue, if those properties are acquired for restoration purposes.

Additionally, EPA has determined that the *risk* of mitigation success/failure must be specifically factored into habitat plans and provided for up-front rather than solely as a post-construction contingency. Accordingly, EPA will require additional acres of aquatic habitat be constructed in addition to what is proposed in the *Habitat Plan and Design Report* (2000) to offset the risk of mitigation failure. EPA will ensure that the requirements specified in this section, and the performance criteria specified in Section IV.F., are included in a final compensatory mitigation plan during remedial design that must be approved by EPA.

C. Blair Slip 1

The Blair Slip 1 disposal site is located at the mouth of the Blair Waterway. The Port of Tacoma has applied for a permit to fill this slip to the ground surface with clean fill (although they have indicated a willingness to use contaminated sediments as fill if required by EPA). The fill project would consist of constructing a berm across the front of the existing slip and filling behind the berm with contaminated sediments to an elevation of +9 feet MLLW, then adding a 7-foot sand cap, converting 13 acres of aquatic land to upland. This fill would be part of a larger Port project to build a new terminal at this location. The Port's permit application is currently under review by the Corps. With this ESD, EPA requires that this slip be filled with contaminated sediments. The current capacity of this site is 640,000 cy.

Information developed by the Port of Tacoma indicates that the slip capacity could be expanded to 750,000 cy if additional clean material is dredged from the bottom of the slip and sent for disposal at a DMMP open-water site. This ESD requires Blair Slip 1 to be designed to utilize its maximum capacity for contaminated sediments to the extent technically practicable.

The creation of a nearshore fill at this site will result in the loss of 13.1 acres of aquatic habitat (including 3.1 acres of intertidal and shallow subtidal habitat). Large piers currently cover the majority of the intertidal and shallow subtidal habitat. An additional 1.1 acres of subtidal habitat would be converted to shallow subtidal and intertidal habitat. Approximately 0.6 acres of existing subtidal habitat would be modified into sloping subtidal habitat.

Mitigation is required under Section 404 of the Clean Water Act to compensate for the impact of the fill on marine habitat. The draft compensatory mitigation plan for use of Blair Slip 1 (December 1998) that was submitted to the Seattle District, Corps of Engineers, as part of the permit application process is insufficient to offset habitat losses and it is unclear as to how it would contribute to conservation and recovery of ESA-listed species. EPA believes that the Simenstad report demonstrates that there is sufficient opportunity within the Commencement Bay and lower Puyallup River watershed to develop compensatory mitigation that also supports conservation of ESA-listed species. Final compensatory mitigation plans will follow the performance criteria discussed in Section IV.F.

D. Upland Regional Landfill

For the purposes of evaluating the upland regional landfill alternative, EPA identified two upland regional landfills that have the capacity to accept the possible dredging volume of Hylebos sediments; Roosevelt Regional Landfill near Goldendale, Washington, and Columbia Ridge Landfill near Arlington, Oregon. These sites are licensed Subtitle D commercial landfills. Bulk chemistry testing during pre-design indicates the sediments in areas other than "hot spots" (see Section II.C.) are suitable for disposal in a Resource Conservation and Recovery Act Subtitle D landfill for solid waste; additional testing will be done in design to confirm this. Both are approximately 200 miles from Tacoma. Dredged sediments would be offloaded landside into a confined stockpile/dewatering area. The location of this temporary disposal area has not yet been identified, however, there are vacant parcels on the shoreline in the vicinity of the dredging project that would provide sufficient capacity. Depending on the weather and water content of sediments, an extended period may be required for dewatering. The free water and interstitial water drained off during the rehandling process would be treated as necessary to meet water quality standards as required by the Clean Water Act and then discharged back to the waterway. After the sediment has been dewatered, it would be loaded into trucks, transported to a rail transfer facility, and transported to the landfill by rail. No compensatory mitigation is deemed owing for disposal of material into an upland regional landfill; although the requirement to avoid and/or minimize adverse impacts is still applicable.

E. Utilization of Disposal Sites

The City of Tacoma has recommended to EPA that the Thea Foss and Wheeler-Osgood contaminated sediments be placed in the St. Paul Nearshore Fill and, if possible, also the contaminated sediments from Middle Waterway. Blair Slip 1 and an upland regional landfill would then be used for the contaminated sediments from the Hylebos Waterway. EPA supports this mix but reserves the flexibility to allow the PRPs to make adjustments during design based on final disposal capacity, volumes, and timing. EPA also will continue to review disposal site designs to ensure that environmental impacts are minimized and unavoidable impacts are adequately compensated.

VII. STATUS OF SOURCE CONTROL

A. Background

The ROD recognized that the sources of contamination throughout the CB/NT Superfund site would have to be controlled before sediment cleanup could be achieved. The cleanup strategy for CB/NT has been to eliminate or reduce ongoing sources of problem chemicals to the extent practicable before implementing in-water cleanup actions. While Superfund is an effective tool to clean up existing contamination, other authorities are needed to address ongoing releases. Several federal, state and local programs were identified as tools to address source control independently of Superfund. In 1989, EPA and Ecology entered into an agreement that identified the Ecology

Commencement Bay Urban Action Team (UBAT) as lead for implementing source control actions. Ecology uses many regulatory tools to control sources, including the Model Toxics Control Act (MTCA) to address upland and groundwater sources and pollutant discharge permits under the Clean Water Act to address direct discharges to the waterways. Ecology reports its progress on the control of sources to EPA and consults with EPA on whether source control is sufficient to move forward with in-water clean up actions.

This ESD does not propose any changes to the source control strategy set forth in the 1989 ROD or the 1992 Source Control Strategy. However, additional information is provided below on how the strategy is being implemented at Thea Foss, Wheeler-Osgood, and Hylebos waterways.

The administrative mechanism used by Ecology to inform EPA of its progress on source control is a series of reports called Milestone Reports issued for each problem area identified in the ROD. There are five types of Milestone Reports and their purpose is as follows:

> Milestone 1 - On-going Confirmed Sources Identified. Ecology has investigated and evaluated all potential sources, and identified all on-going, confirmed sources of problem chemicals.
>
> Milestone 2 - Essential Administrative Actions in Place for Major Sources. Ecology has issued administrative actions, such as orders, consent decrees, or permits, to address major sources of problem chemicals in each problem area to ensure that they will be controlled to the extent necessary to prevent sediment recontamination. Major sources are those most directly linked with current sediment impacts.
>
> Milestone 3 - Essential Remedial Action Implemented for Major Sources. Ecology has implemented all of the remedial actions, such as upland soil cleanup, adoption of best management practices, storm drain cleaning, etc., for all major sources. Essential remedial actions are those needed to eliminate or reduce those contaminant sources that are most likely to recontaminate sediments.
>
> Milestone 4 - Administrative Actions in Place for All Confirmed Sources. Ecology has implemented all of the administrative actions discussed under Milestone 2 for all confirmed sources.
>
> Milestone 5 - Remedial Action Implemented for All Sources. All essential source control work under the decrees, orders, or permits has been completed.

To date, Ecology has completed the following Milestone Reports for Hylebos, Thea Foss, and Wheeler-Osgood waterways:

> Mouth of Thea Foss: Milestones 1 through 5
> Head of Thea Foss: Milestones 1 and 2
> Wheeler Osgood: Milestones 1 through 5

Mouth of Hylebos: Milestones 1 through 5
Head of Hylebos: Milestones 1 through 5

EPA expects that all Milestone Reports will be submitted and approved by the end of 2001.

The following sections provide more detailed information about completed and on-going source control actions at Thea Foss, Wheeler-Osgood, and Hylebos waterways. Because the nature of the sources of contamination are quite different between the Thea Foss/Wheeler-Osgood Waterways and the Hylebos Waterway, the types of source control implemented and issues associated with them are different. While much of the source identification and control work at all waterways has focused on working with individual facilities, Thea Foss Waterway has presented some unique challenges due to several large storm drains discharging into the waterway and multiple sources and deposits of NAPL.

B. Thea Foss and Wheeler-Osgood Waterways

Ecology identified numerous sources to the Thea Foss and Wheeler-Osgood waterways and took cleanup action. Some of the sources that were cleaned up include the following:

D Street Petroleum (groundwater at petroleum facility)
Superior Oil (groundwater at petroleum facility)
UNOCAL (groundwater at petroleum facility)
BP Oil (groundwater at petroleum facility)
Totem Marine Services (boat yard, hull washing)
Picks Cove (boatyard, hull maintenance, stormwater)
J.M. Martinac (shipyard, stormwater and sandblast grit on beach)
Marine Iron Works (storm drains)
West Coast Grocery (storm drains)
1147 Dock Street (bank contamination)
Chevron Bulk Plant (soils)
MPS/Truck Rail Handling (storm drains)
Kleen Blast (storm drains)
Olympic Chemical (groundwater)
City-owned parcels (various historical sources on west shore)

In addition to Ecology's efforts to control independent sources at Thea Foss and Wheeler-Osgood waterways, the City of Tacoma has been actively involved in controlling municipal sources by implementing the Stormwater Management Plan for Thea Foss Waterway. The program is required as part of the City's NPDES permit and lays out a step-wise, on-going process for characterization of effluent, identification and prioritization of potential chemical sources, actions to address sources, and monitoring and reporting on results. Under this program, the City of Tacoma has conducted hundreds of inspections, required businesses to implement best management practices, and required cleaning of stormwater drains, lines and catch basins. These actions, coupled with Ecology's efforts, have eliminated or reduced numerous significant sources

of contamination to stormwater discharging to the waterway. A summary of the stormwater source control actions undertaken for the Thea Foss and Wheeler-Osgood waterways by the City of Tacoma is described in the Round 3 Data Evaluation and Pre-Design Evaluation Report.

While much progress has been made and many sources have been eliminated or reduced, source control is and will continue to be an ongoing prevention activity. Based on existing information, there continues to be some risk of recontamination of sediments towards the head of the Thea Foss Waterway if further actions are not taken to reduce sources of BEP (bis[2-ethylhexyl] phthalate) and PAHs (polycyclic aromatic hydrocarbons). Ecology still must select and implement a cleanup for the coal tar and creosote sources on the uplands at the head of the Thea Foss Waterway. The City of Tacoma also must implement further actions, including potential capital improvements to the municipal storm drains to reduce contaminant loadings to eliminate or significantly reduce the potential for recontamination of sediments. EPA and Ecology are working to ensure that appropriate controls are being applied to the stormwater sources considered likely to contribute to sediment recontamination. Additionally, in accordance with the ROD, results from the monitoring of sediments and effluent discharges will be used as feedback to the regulatory agencies who will monitor the effectiveness of source control actions. See Section IV for additional discussion about and specific requirements for source control.

C. Hylebos Waterway

Ecology identified 10 major ongoing sources to Hylebos Waterway sediment contamination:

Occidental Chemical Corporation (manufacturer of chlorine and chlorine-based chemicals)
Elf Atochem 3009 Taylor Way (inactive log sort yard)
Elf Atochem 2901 Taylor Way (former manufacturer of chlorine-based chemicals)
Kaiser Aluminum and Chemical Corp. (metal fabricator)
General Metals of Tacoma (metal scrap yard)
Wasser Winters (inactive log sort yard)
Louisiana Pacific (operating log sort yard)
Tacoma Boat (former large shipyard)
B&L Landfill (drains to Hylebos Creek)
Blair Backup Property (inactive log sort yard)

Essential source control actions have been completed for all of these facilities, as documented in Ecology's milestone reports for Mouth and Head of Hylebos Waterway.

In addition, Ecology identified 19 other ongoing sources of contamination to Hylebos Waterway sediments. Essential administrative actions (orders, decrees, or permits) are in place to address all of these sources of problem chemicals to Hylebos Waterway sediments, as documented in Ecology's November 1999 Milestone 4 reports for Mouth and Head of Hylebos Waterway. Ecology issued its Milestone 5 reports, documenting completion of source control for all Hylebos Waterway sources on June 14, 2000.

Ongoing sources of sediment contamination from these facilities have been addressed through a variety of permit and cleanup actions, including excavation and/or capping of upland contaminated soils, groundwater pump and treat, installation of sheet pile barrier walls, control of industrial and storm water discharges, and long-term monitoring programs. Appended to the Milestone 3 and 4 reports for the Head of Hylebos Waterway are evaluations of the effectiveness of groundwater and stormwater controls in preventing sediment recontamination after the completion of source control actions. These technical memoranda describe a conservative approach, based on data collected after source control actions have been completed, to estimating stormwater and groundwater contaminant loads to sediments. A similar analysis was completed for Mouth of Hylebos facilities in the Mouth of Hylebos milestone reports. The evaluation concluded that, in general, there was a very low risk of recontamination of Hylebos Waterway sediments from groundwater or stormwater discharges. Nonetheless, in accordance with the ROD, Ecology will continue to monitor and evaluate the effectiveness of source control actions.

VIII. SUPPORT AGENCY COMMENTS

Ecology concurs with this ESD. In particular, Ecology supports EPA's efforts to work with the Corps to integrate the Superfund cleanup on the Hylebos Waterway with a navigational dredging project and dredging for private development purposes. Ecology offered to explore grant funding opportunities to facilitate this additional dredging. Ecology is concerned about responsibility for oversight of navigational dredging of contaminated sediments after the Superfund cleanup. Finally, Ecology encourages EPA to begin cleanup in 2001.

The Puyallup Tribe also concurs with this ESD. However, the Tribe stated concerns about a number of things they believe need to be emphasized in the remedial design to support salmon recovery. These include:

a) emphasize permanence and long-term effectiveness in the cleanup design;
b) design intertidal cleanups to prevent or minimize habitat loss; and
c) avoid use of natural recovery as a cleanup method as much as possible.

The Tribe also stated their support for the bay-wide mitigation approach (see Section IV.F.) and providing "up-front" mitigation to address uncertainty in mitigation plans.

EPA will continue to coordinate with Ecology and the Puyallup Tribe to incorporate their concerns to the extent possible during remedial design and implementation of the cleanup. Concurrence letters from Ecology and the Puyallup Tribe are attached as Appendix B.

IX. AFFIRMATION OF THE STATUTORY DETERMINATION

Considering the new information that has been developed in this ESD and in the Administrative Record, EPA believes that the cleanup plan is and will be protective of human health and the environment, complies with Federal, State and Tribal requirements that are applicable, or relevant and appropriate to this remedial action as identified in the ROD (with the addition of ESA), and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment was not found to be

practicable, this remedy does not satisfy the statutory preference for treatment as a principle element. Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

X. PUBLIC PARTICIPATION ACTIVITIES

EPA has held regular public meetings and has issued many fact sheets to update the public on its activities since the ROD was signed in 1989. Because the selection of disposal sites was of particular interest to the public, EPA has held a series of "Disposal Sites Forum" meetings since 1996. In these meetings, options for sediment disposal were discussed with members of the public, government agencies, Native American tribes, environmental groups, and industry representatives. The group developed a list of candidate sites considered "most promising" for sediment disposal. All of the sites that were considered by EPA are on that list.

EPA mailed a fact sheet and held a 45-day public comment period from July 1, 1999 to August 16, 1999 on its proposed refined list of disposal sites. The refined list included four sites. Approximately 100 people attended a public meeting on June 21, 1999 to discuss the refined list, as well as the latest information on source control and the waterway cleanup plans. EPA also held two meetings with homeowners who live near the location of the proposed Mouth of Hylebos disposal site on July 28, 1999 and November 3, 1999, for a more detailed discussion of that disposal site. On January 12, 2000, Chuck Clarke, EPA's Regional Administrator, met with residents of Marine View Drive to hear their concerns about the proposed Mouth of Hylebos disposal site.

EPA considered the comments received from the public in developing the draft ESD. EPA received more than 20 letters commenting on the June 1999 fact sheet. Many letters urged EPA to move forward with the cleanups of the waterways and to select the St. Paul Nearshore Fill site as a disposal site. There were also letters expressing opposition to the Mouth of Hylebos disposal site. The issues raised in these letters included concerns about noise during construction, concerns about construction activities impeding water access, the site's geologic stability, the impact on property values, the potential effect on the drinking water supply, the impact on homeowner views, and others. EPA also received comments from a number of people who support disposal on state-owned aquatic lands and who urged use of a CAD site.

EPA mailed a fact sheet describing the draft ESD to 1300 people. A public comment period was held from November 29, 1999 to January 3, 2000. Over 100 people attended a public meeting held by EPA on December 8, 1999 to discuss its proposal and take comments from the public. A request for an extension to the comment period was received, and the date to submit public comment was extended until February 2, 2000.

EPA received 180 comment letters during the public comment period. Many letters expressed opposition to the proposed Mouth of Hylebos disposal site and to the proposed cleanup action at

the head of the Thea Foss Waterway. Comments were received from the Puyallup Tribe and from state and federal resource agencies who expressed concerns related to the specific cleanup plans and mitigation proposed under the Clean Water Act.

As a result of the opposition to this proposed site, a group of potentially responsible parties called Partnership for a Clean Waterway (PCW) hired a consultant, Merritt & Pardini, to conduct a series of workshops to look for creative solutions to the cleanup of the Hylebos Waterway. Three workshops were held from March through June 2000. The workshops brought together federal, state, and local agencies, the tribes, and interested community members to identify concerns and explore alternatives to the Mouth of Hylebos CAD site. EPA attended all of the meetings, and the information has been considered for the final decision in this ESD. EPA has placed the recommendations that resulted from the Merritt-Pardini workshops in the administrative record. In particular, EPA has incorporated the recommendations to maximize the capacity of Blair Slip 1 to the extent practicable and to allow further consideration of upland disposal on an upland parcel(s) of property if implementable and in compliance with any ARARs.

A summary of the comments received during the public comment period and EPA's responses is included as Appendix C to this ESD.

Signed:

Michael F. Gearheard, Director
Office of Environmental Cleanup

8/3/00
Date

Appendices

A Cost Summaries for the Hylebos, Thea Foss and Wheeler Osgood Waterway Remedial Actions
B State of Washington Concurrence Letter
Puyallup Tribe of Indians Concurrence Letter
C Responsiveness Summary

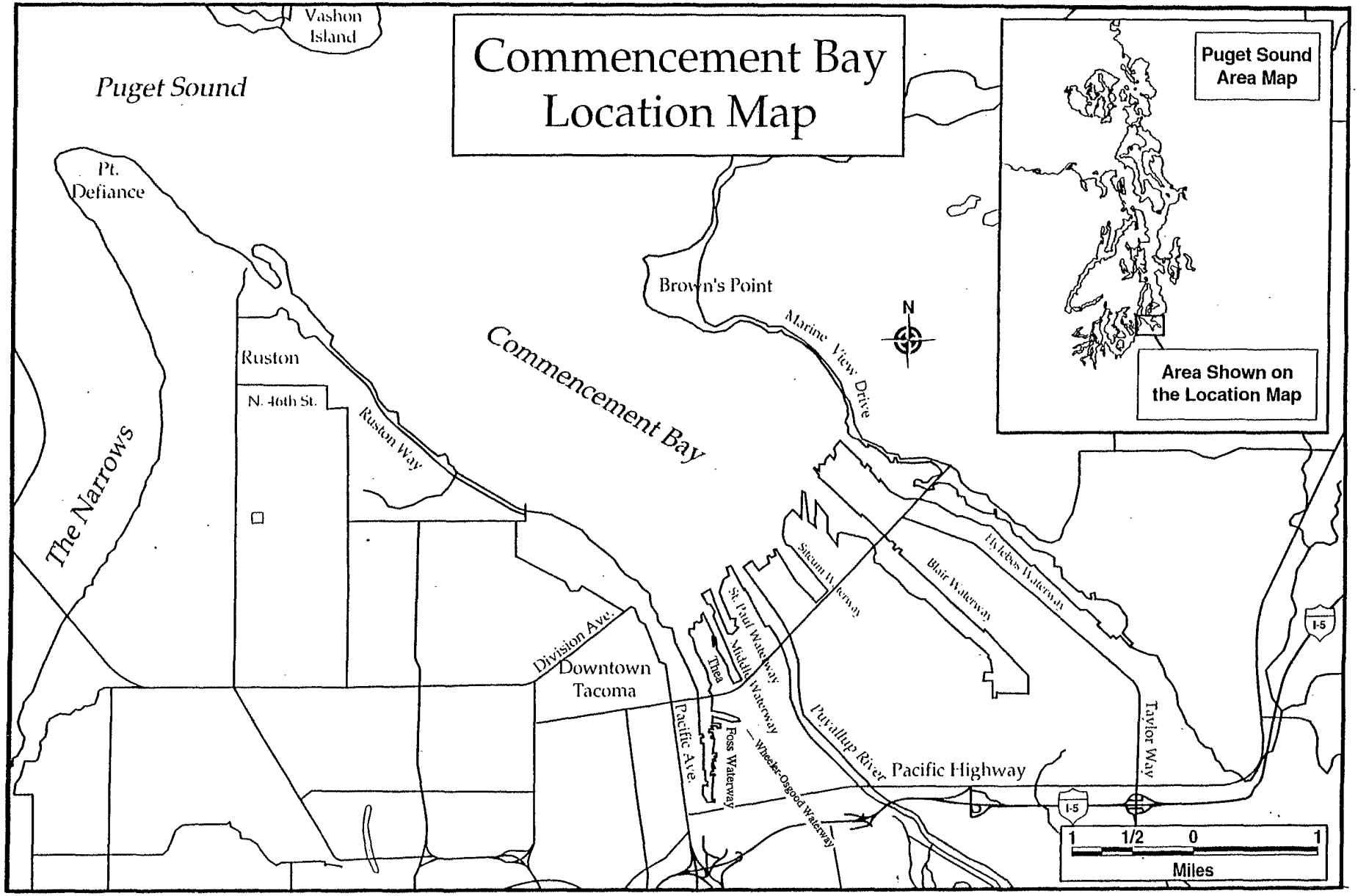
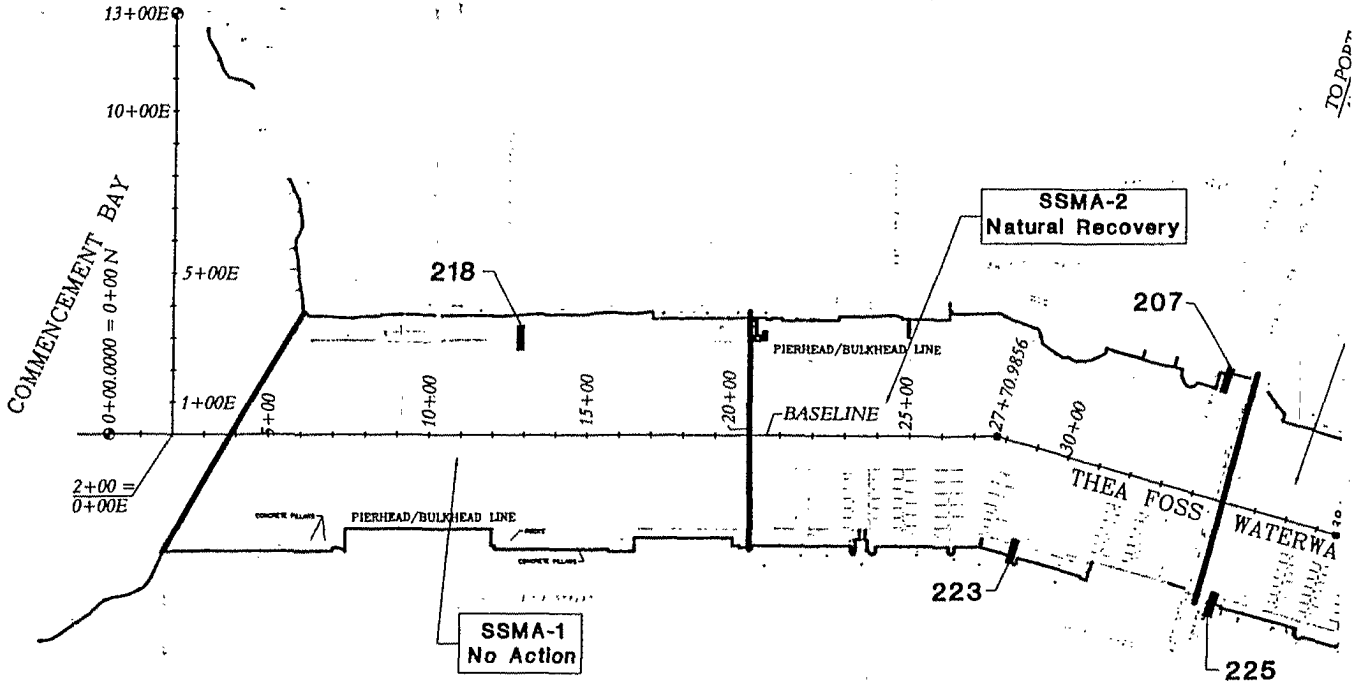

Commencement Bay
Location Map
Puget Sound
Vashon Island
Pt. Defiance
The Narrows
Ruston
N. 46th St.
Ruston Way
Commencement Bay
Brown's Point
Marine View Drive
N
Puget Sound Area Map
Area Shown on the Location Map
Division Ave.
Downtown Tacoma
Thea
Middle Waterway
St. Paul Waterway
Sitcum Waterway
Blair Waterway
Hylebos Waterway
Pacific Ave.
Foss Waterway
Wheeler-Osgood Waterway
Puyallup River
Pacific Highway
I-5
Taylor Way
1 1/2 0 1
Miles

Figure 1

Major SSMA Divisions



Regional Map

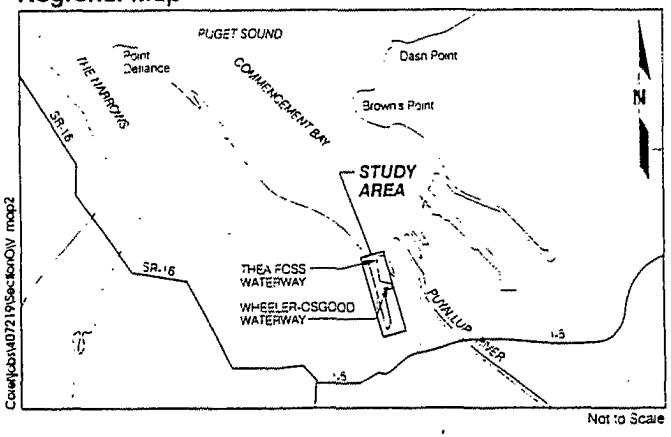
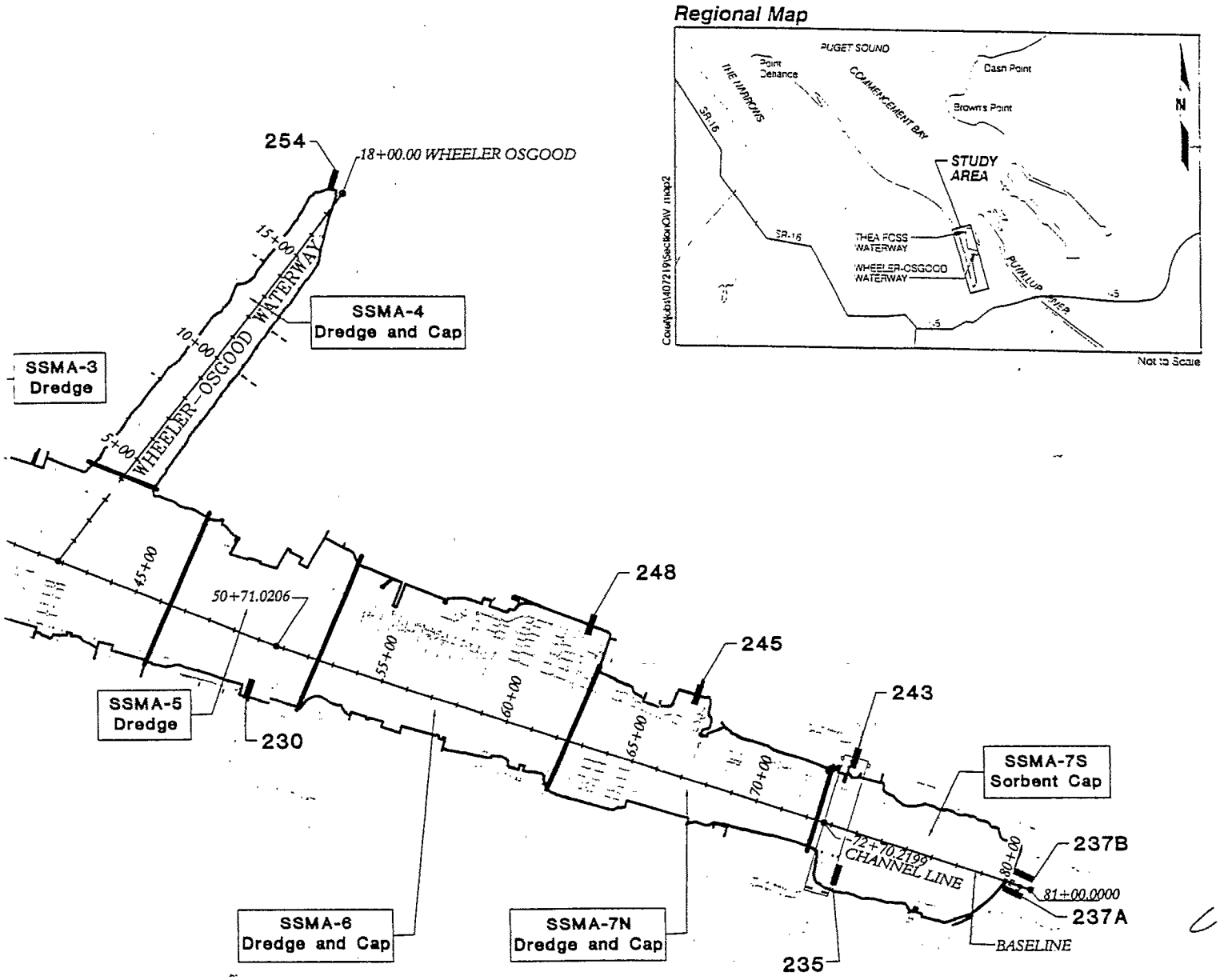


Figure 2A
Thea Foss Waterway Cleanup Area



HARTCROWSER

Figure 2B

Thea Foss and Wheeler Osgood
Waterways Cleanup Areas

SSMA 7 Proposed Remedial Design

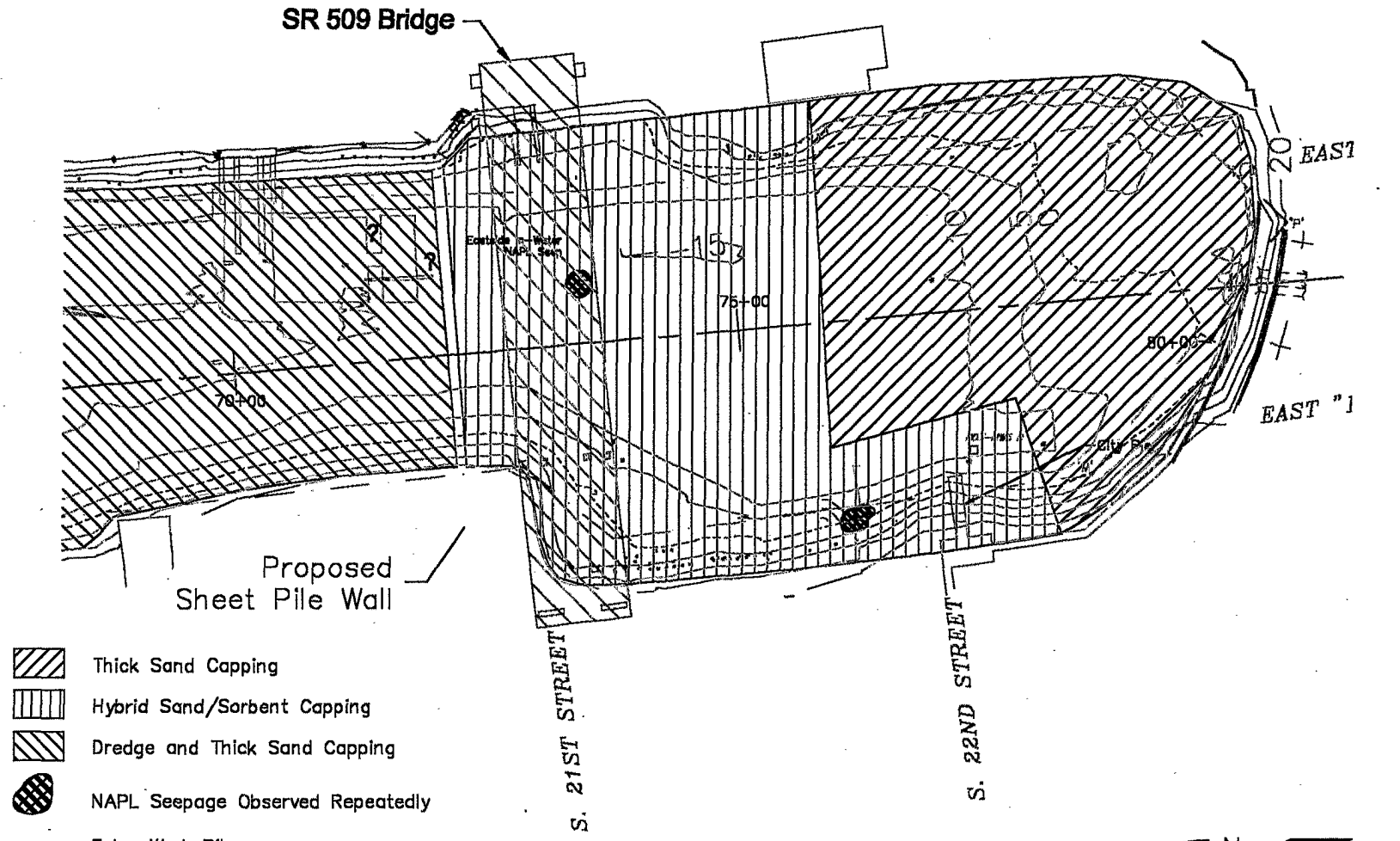


Figure 2C

Head of Thea Foss Waterway Cleanup Areas

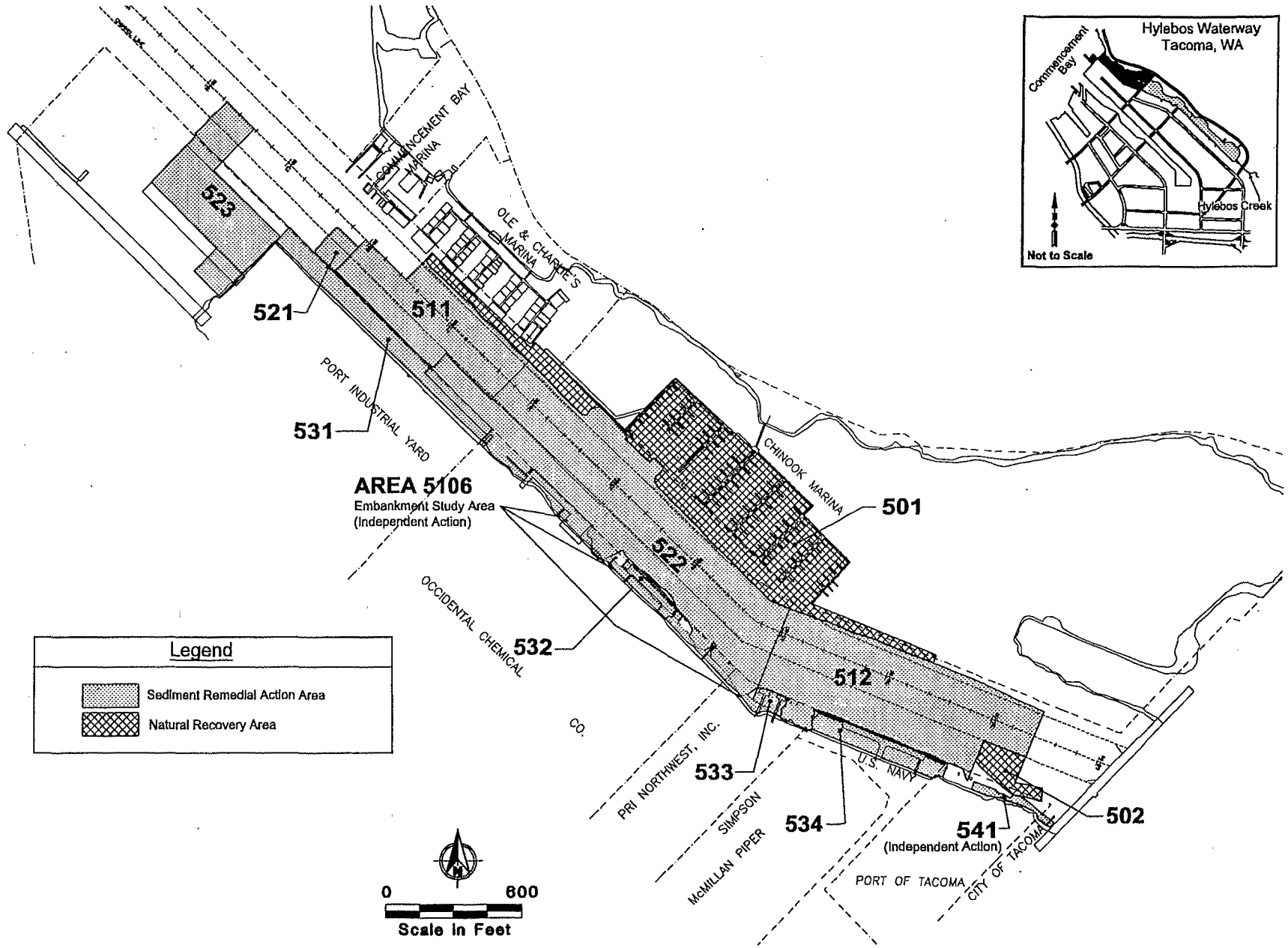
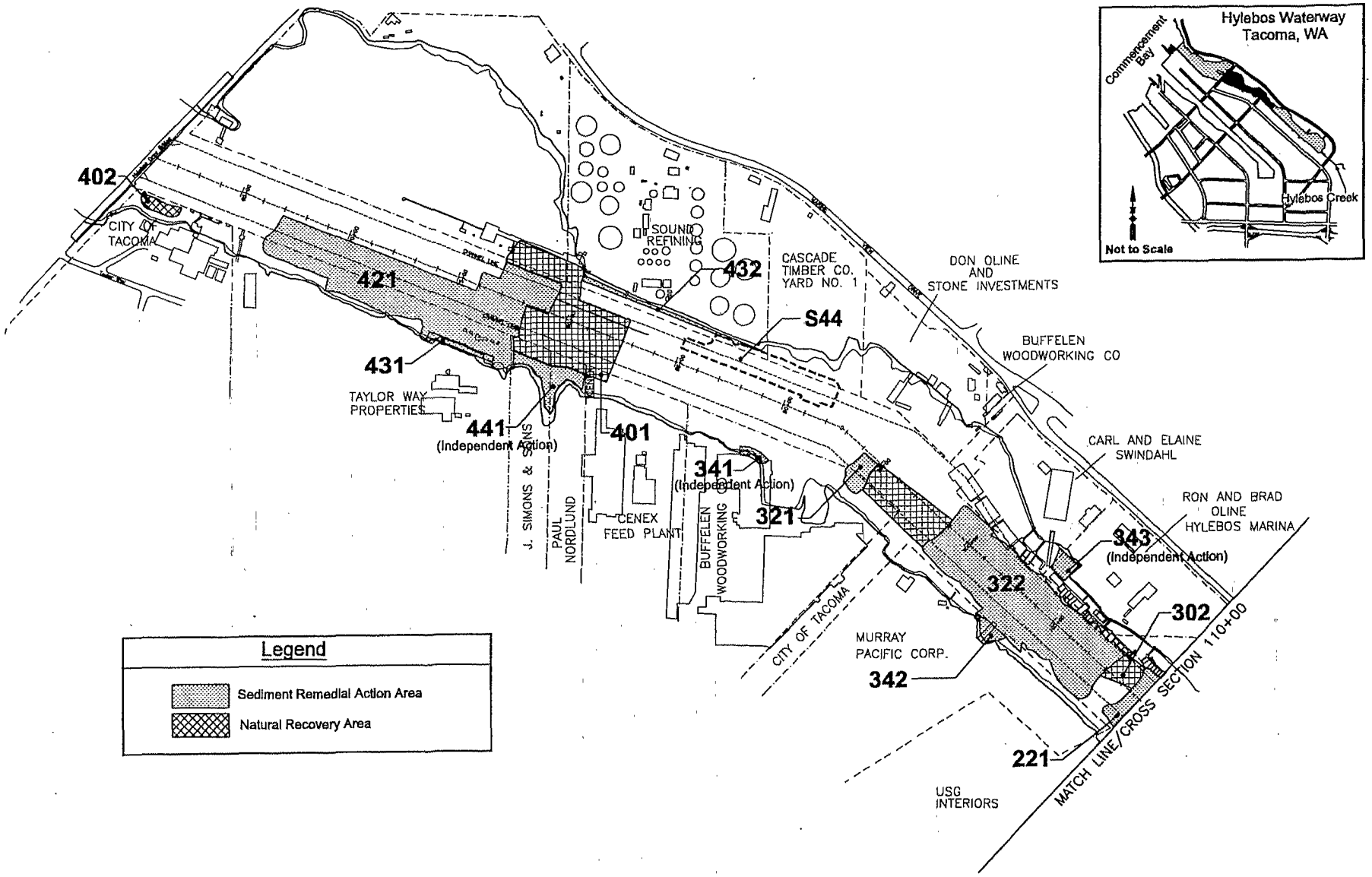


Figure 3A

Hylebos Waterway Cleanup Areas

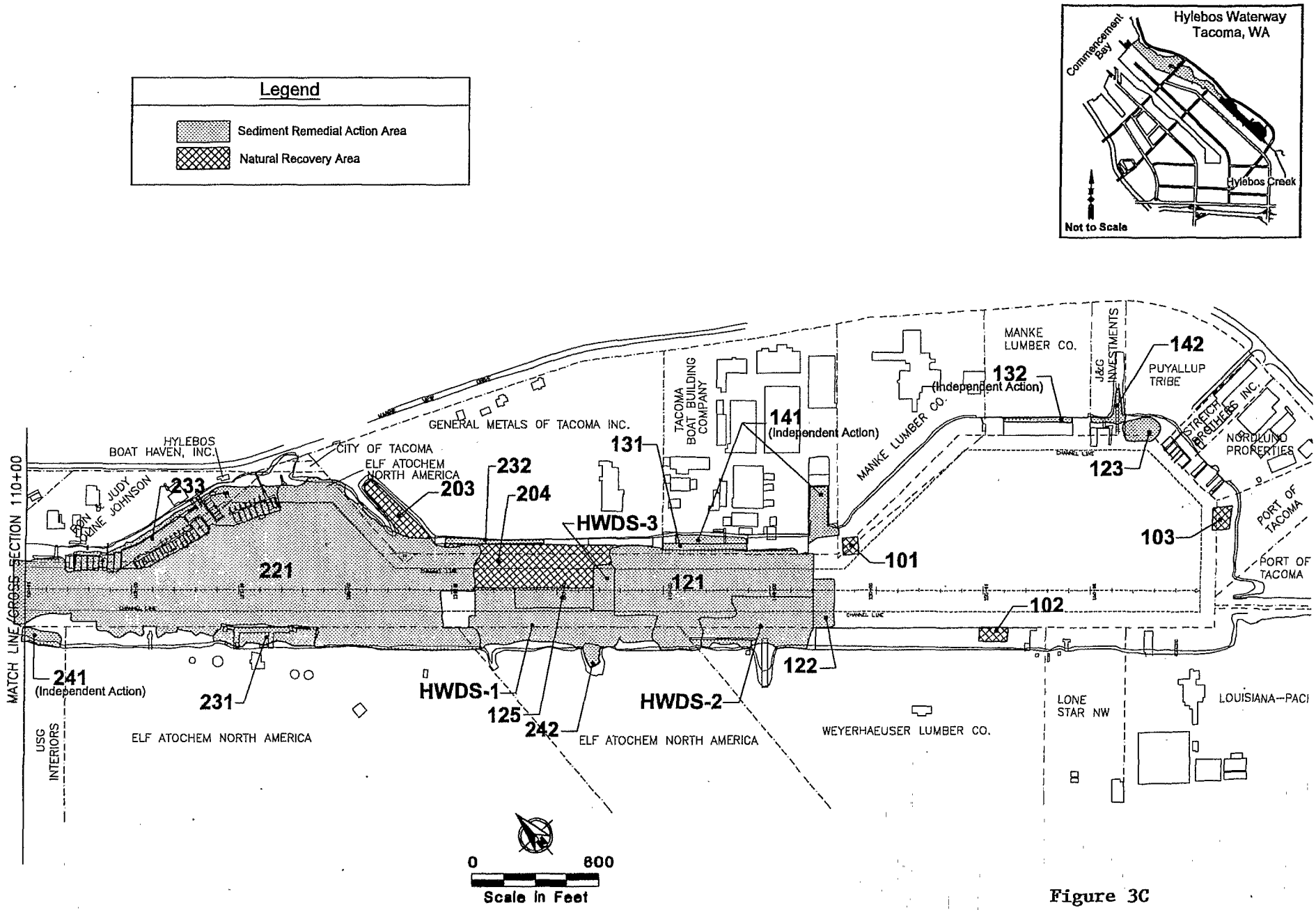
10/20/99



10/20/99

Figure 3B

Hylebos Waterway Cleanup Areas



10/20/99

Figure 3C

Hylebos Waterway Cleanup Areas

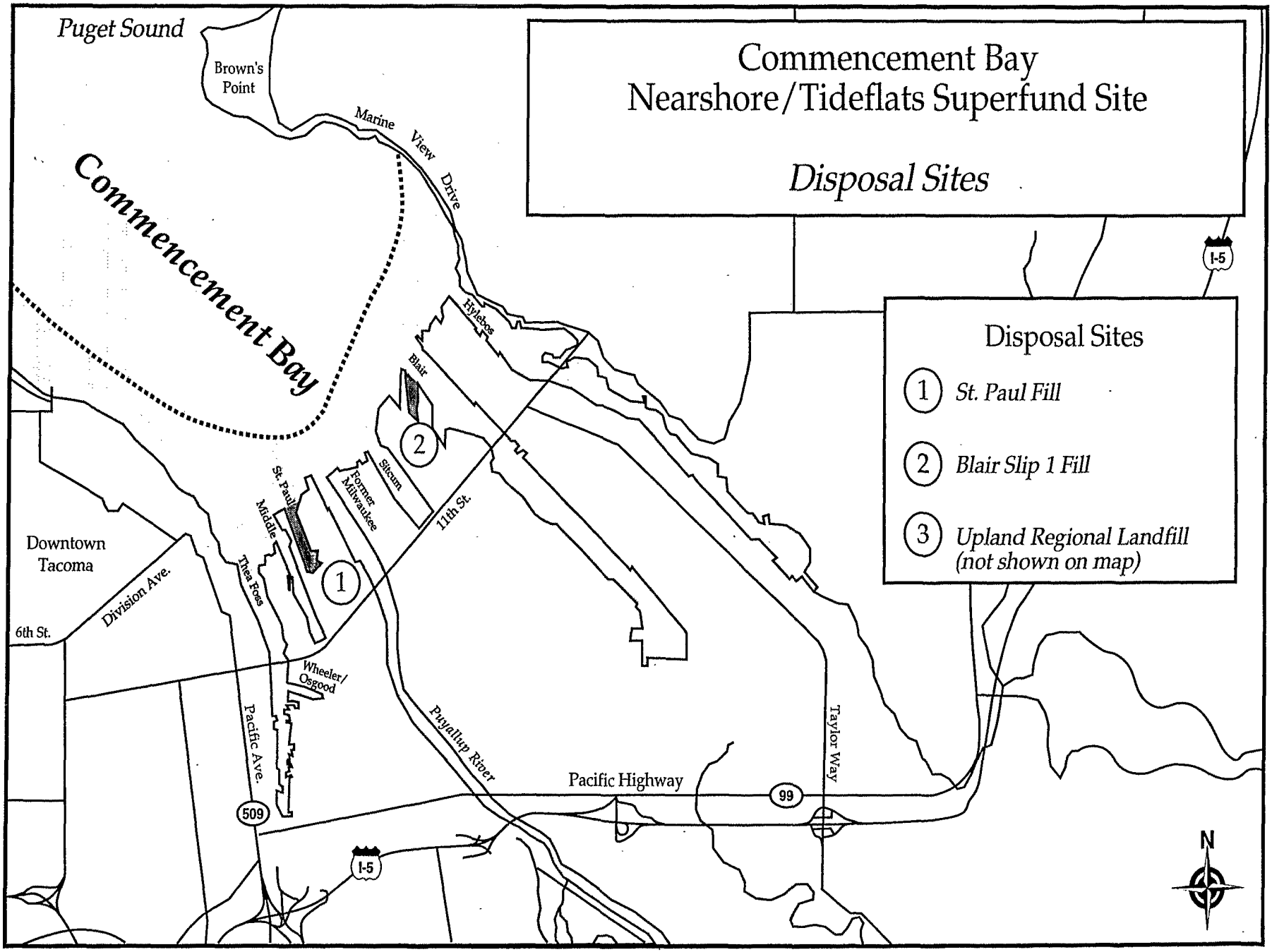

Puget Sound
Brown's Point
Marine View Drive
Commencement Bay
Commencement Bay
Nearshore/Tideflats Superfund Site
Disposal Sites
Disposal Sites
1 St. Paul Fill
2 Blair Slip 1 Fill
3 Upland Regional Landfill (not shown on map)
I-5
Hylebos
Blair
2
St. Paul
Former Milwaukee
Siteum
11th St.
Middle
Thea Foss
1
Downtown Tacoma
Division Ave.
6th St.
Wheeler/ Osgood
Pacific Ave.
509
Puyallup River
Pacific Highway
99
Taylor Way
I-5
N

Figure 4

Appendix A

Cost Summaries for the Hylebos, Thea Foss and Wheeler Osgood Waterway Remedial Actions

Table A-1. Cost of Dredging Hylebos Waterway Sediments and Disposal in Blair Slip 1 (640,000cy)

Category Disposal Site 640,000 CY	Quantity	Unit	Unit Cost ($)	Cost ($)
Disposal Site Development				
Mobilization and Demobilization				
Pier Demolition Equipment	1	LS	50,000.00	50,000
Clamshell Equipment	1	LS	200,000.00	200,000
Hydraulic Equipment	1	LS	100,000.00	100,000
Site Preparation				
Pier Demolition	6,600	TON	150.00	990,000
Temporary Facilities (Relocate Facilities, Lighting, Site Office)	1	L.S.	250,000.00	250,000
Berm Foundation Excavation and Disposal at PSDDA Site				
Clamshell and Bottom-Dump Barge	45,000	CY	7.50	338,000
DNR Disposal Site Use Fee	45,000	CY	0.45	20,000
Berm Construction w/Imported Crushed Material				
Bottom-Dump Barge (-50 feet to -5 feet)	76,000	CY	14.00	1,064,000
Haul Barge and Clamshell (-5 feet to +18 feet)	25,000	CY	17.00	425,000
Berm Outer Slope Riprap, 2 feet Thick (Class II)	10,400	Ton	20.00	208,000
Place 7-foot Cap with Sand from Puyallup River by Hydraulic Dredge				
Hydraulic Dredging	180,000	CY	5.00	900,000
DNR Sand Purchase Cost	180,000	CY	3.19	574,000
Budget Allowance to Install Wick Drains	1	LS	1,000,000.00	1,000,000
Water Quality Monitoring	1	LS	250,000.00	250,000
Surveying	1	LS	145,000.00	145,000
Mitigation and Monitoring <5>	1	LS	3,350,000.00	3,350,000
Long-Term Monitoring and Maintenance <2>	1	LS	760,000.00	760,000
Land Acquisition <3>	1	LS	0.00	-
Cost Subtotal				10,624,000
Engineering & Design			15%	1,594,000
Contingency			20%	2,125,000
Total Estimated Disposal Site Cost <1>				14,343,000

Source: Hylebos Waterway Pre-Remedial Design Evaluation Report, Hylebos Cleanup Committee, November, 1999.

Table A-1 (continued)

Category Disposal Site 640,000 cy	Quantity	Unit	Unit Cost ($)	Cost ($)
Dredging and Disposal				
Dredge Hylebos Waterway Sediment (See Section 6) and Dispose of at Site 12 <4>				
Clamshell and Bottom-Dump Barge	354,000	CY	6.50	2,301,000
Clamshell and Rehandling w/Derrick and Flat-Deck Barge (Fill above -5 feet)	286,000	CY	12.50	3,575,000
Dredging and Disposal Subtotal				5,876,000
Engineering and Design			15%	881,000
Construction Oversight and Monitoring by HCC Authorized Representative	1	LS	250,000.00	250,000
Contingency			20%	1,175,000
Dredging and Disposal Cost Total				8,182,000
Total: Disposal Site Development and Dredging and Disposal Cost <1>				22,525,000

<1>The estimated cost for construction of Nearshore CDF 12 (Slip1) includes all anticipated construction-related costs, without consideration of whether the costs are commercial development costs associated with the Port of Tacoma's proposed filling of Slip 1 to expand its existing marine container facility, or CERCLA response costs associated with the handling and disposal of Hylebos dredged sediments.

<2> Long-term monitoring monitoring and maintenance costs were calculated based on the Confined Disposal Site Study, Programmatic EIS. Draft, February, 1999.

<3> No cost for land acquisition, if any, is included in this cost estimate.

<4> Cost does not incude dredging under floating docks and fixed structures.

<5> Mitigation costs provided by Port of Tacoma (9/24/99 Memo to HCC), based on the Port's proposed mitigation plan for Terminal 3/4 Northern Expansion Plan (PIE, December 22, 1998)

Table A-2. Cost of Dredging Hylebos Waterway Sediments and Disposal in an Upland Regional Landfill (300,000cy)

Category Dredge and Dispose 300,000 cy Sediment	Quantity	Unit	Unit Cost ($)	Cost ($)
Mobilization	1	LS	250,000.00	250,000
Dredge Sediment (Clamshell) from Hylebos Waterway Problem Areas, and Off-Load to a Land-Side Stockpile Area <1> <2>	300,000	CY	9.60	2,880,000
Dewater Sediment <3>	300,000	CY	1.20	360,000
Load Sediment into Waste Management Gondola Cars	300,000	CY	1.00	300,000
Transport to Regional Landfill and Dispose	450,000	Ton	30.00	13,500,000
Monitoring During Construction	1	LS	200,000.00	200,000
Mitigation	1	LS	N/A	N/A
Long-Term Monoitoring and Maintenance	1	LS	N/A	N/A
Land Acquisition	1	LS	N/A	N/A
Cost Subtotal				17,490,000
Engineering & Design			15%	2,624,000
Contingency			20%	3,498,000
Total Estimated Dredging and Disposal Site Cost = Project Cost				23,612,000

<1> Cost Estimate does not include dredging under floating docks and fixed structures.

<2> Cost estimate does not include land easement, if any, for stockpile site.

<3> Cost estimate includes barrier, impermeable liner, runoff water collection and disposal.

Source: Hylebos Waterway Pre-Remedial Design Evaluation Report, Hylebos Cleanup Committee, November, 1999.

Table A–3 Preliminary Engineer's Cost Estimate of Waterway Remediation Alternative 5B with Disposal at the St. Paul Nearshore Facility

TASK	QUANTITY	UNIT	UNIT COST	COST
PRE-CONSTRUCTION				
Mobilization/Demobilization	1	EA	$550,000	$ 550,000
Baseline Water Quality Survey	1	EA	$100,000	$ 100,000
Pre- and Post-Dredge Surveys	2	EA	$25,000	$ 50,000
NEARSHORE FACILITY CONSTRUCTION				
Disposal Facility Preparation				
Remove and Dispose of Piling	400	EA	$200	$ 80,000
Site, Building, and Utility Demolition	1	EA	$190,000	$ 190,000
Deepen Nearshore Facility and Construct Berm				
Berm Construction below Elev. -5 ft MLLW	167,000	CY	$5.25	$ 876,800
Berm Construction above Elev. -5 ft MLLW	23,000	CY	$8.00	$ 184,000
Installation of Overflow Weirs	2	EA	$40,000	$ 80,000
Construction of Perimeter Berm	7,500	CY	$8.00	$ 60,000
Cap Nearshore Fill Site to Finished Subgrade				
Middle Waterway Excavated Material	90,000	CY	$4.00	$ 360,000
Off-Site Dredge Material	42,500	CY	$8.75	$ 371,900
Perimeter Berm Material	7,500	CY	$0.50	$ 3,800
Site Mitigation/Restoration				
Remove and Dispose of Piling	1,370	EA	$200	$ 274,000
Final Contouring of Tidal Channel in Middle Waterway	90,000	CY	$0.50	$ 45,000
Final Contouring of St. Paul Habitat	100,000	CY	$0.50	$ 50,000
Habitat Material Dredged from St. Paul	273,000	CY	$5.25	$ 1,433,300
High Marsh Grading and Planting	1	EA	$100,000	$ 100,000
Rock-lined Berm Construction (High Marsh)	3,000	CY	$24.00	$ 72,000
Intertidal Reef (Riprap)	4,000	CY	$40.50	$ 162,000
Freshwater Wetland Excavation/Diversion				
Vinyl Sheet Pile with Granular Fill	2,000	LF	$285	$ 570,000
Excavation and Disposal/Reuse	30,000	CY	$8	$ 240,000
Freshwater Wetland Grading and Plantings	1	EA	$60,000	$ 60,000
Breach Dike	1	EA	$200,000	$ 200,000
Freshwater Supply (Rehabilitate abandoned City line)	2,500	LF	$25	$ 62,500
Logs	500	LF	$210	$ 105,000
Ecology Blocks	2,000	LF	$115	$ 230,000
DREDGE, HAUL, AND DISPOSE OF AT NEARSHORE FILL SITE [1]				
Hydraulic Dredge				
Channel	460,000	CY	$5.25	$ 2,415,000
Slopes	135,000	CY	$5.75	$ 776,300
WATERWAY CAPPING[1]				
Channel Areas - *In Situ* and Thick Cap over Dredge Cuts	105,000	CY	$8.75	$ 918,800
Slope Areas				
Slope Protection Filter	82,000	CY	$25.00	$ 2,050,000
Slope Quarry Spalls	18,000	CY	$24.00	$ 432,000
Slope Riprap	3,000	CY	$40.50	$ 121,500
RELATED CONSTRUCTION				
Construct Temporary Marinas	1	LS	$45,000	$ 45,000
Remove and Replace Marinas	113,000	SF	$5.00	$ 565,000
Remove and Dispose of Debris	1	LS	$25,000	$ 25,000
Regrade Sediments at Head of Waterway	2,000	CY	$0.50	$ 1,000
Armor Twin 96-inch Outfalls	1	LS	$110,000	$ 110,000
Remove and Replace Piling	50	EA	$2,500	$ 125,000
Remove and Replace Outfalls	5	EA	$10,000	$ 50,000
Miscellaneous Demolition and Slope Work	1	EA	$200,000	$ 200,000
SSMA 7 REMEDIATION (see Table N-19)[2]	1	LS	$12,317,400	$ 12,317,400
CONSTRUCTION SUPPORT				
Construction Management (See Table N-10)	56	WKLY	$10,000	$ 560,000
Water Quality Monitoring (See Table N-10)				
Intensive	19	WKLY	$20,000	$ 380,000
Routine	37	WKLY	$14,000	$ 518,000
Bathymetric Surveys (Thea Foss Waterway) (See Table N-10)	1	LS	$57,500	$ 57,500
Bathymetric Surveys (St. Paul Neashore Fill Site) (See Table N-10)	1	LS	$23,800	$ 23,800
Post-Dredge Sediment Sampling and Analysis (See Table N-10)	1	LS	$51,800	$ 51,800
Monitoring Wells (St. Paul Nearshore Fill Site) (See Table N-10)	3	LS	$10,000	$ 30,000
LONG-TERM MONITORING (Present Worth)				
Thea Foss Waterway Monitoring	1	LS	$80,300	$ 80,300
St. Paul CDF Monitoring	1	LS	$300,000	$ 300,000
St. Paul CDF Contingency Reserve	1	LS	$630,000	$ 630,000
Habitat Monitoring and Adaptive Management (Including Middle Waterway and Puyallup Wetland)	1	LS	$682,000	$ 682,000
			SUBTOTAL:	$ 29,975,700
			CONTINGENCY @ 20%:	$ 5,995,200
			TOTAL ESTIMATED COST:	$ 35,970,000

Notes:

407225/Round3/AppendixN.xls -

Source: Round 3 Data Evaluation and Pre-Evaluation Report, City of Tacoma, 1999

Note: This table includes the cost of a slurry wall at the head of Thea Foss Waterway, which has been excluded from EPA's selected remedy. Exclusion of the slurry wall reduces the cost of the remedy to approximately $35 million.

Appendix B

State of Washington Concurrence Letter
Puyallup Tribe of Indians Concurrence Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

RECEIVED
JUL 21 2000
Environmental Cleanup Office

July 17, 2000

Ms. Lori Cohen
EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101

Dear Ms. Cohen:

The Department of Ecology (Department) has reviewed EPA's Explanation of Significant Differences (ESD), dated June 2000, for the Commencement Bay Nearshore/Tideflats Superfund Site. The ESD describes the cleanup plans for Hylebos, Thea Foss, and Wheeler-Osgood Waterways. The Department concurs with the ESD.

The Department appreciates EPA's willingness to work with private parties and the Army Corps of Engineers to integrate navigational dredging into the remedial design schedule, if there is interest by the private parties. The Department also appreciates EPA's statement encouraging private property owners and waterway users to consider any current or future additional dredging needs and to alert EPA. The Department continues to be available to help with this endeavor, including potential grant funding to local public entities that provide financial support to navigational dredging. The Department will not assume responsibility for overseeing navigational dredging of Hylebos sediments contaminated at depth above levels suitable for open water disposal under PSSDA. The Department maintains that such responsibility remains with EPA under CERCLA.

In addition, the Department has reviewed EPA's revised estimate for the residual PCB level in Hylebos Waterway post-remediation ("Recalculation of Residual PCB Concentrations in Commencement Bay Sediment", undated). The Hylebos remedy selected in the 2000 ESD assumes that at least 940,000 cubic yards of sediment will be removed from the waterway, whereas the 1997 ESD assumed only 508,000 cubic yards of sediment would be removed. Because considerably more PCB's will be removed than anticipated in 1997, the residual PCB level that EPA expects to achieve is now 28% below the level selected in the 1997 ESD and 14% below the level originally proposed in the 1989 Record of Decision. These calculations are based on area-weighted averages for

Hylebos Waterway. The Department concurs with this analysis and the new cleanup goal, assuming additional active remediation would take place if the goal were not achieved 10 years after cleanup.

EPA should continue to push for a 2001 start for active remediation and we will assist as we can to see that goal realized.

Sincerely,

James J. Pendowski, Manager
Toxics Cleanup Program

JJP:nh

Puyallup Tribe of Indians

Allison Hiltner
US EPA Region 10
1200 Sixth Ave
Seattle, WA 98101

Re: Concurrence on Explanation of Significant Differences (ESD) Commencement Bay Nearshore Tideflats Superfund Site.

Dear Allison:

Thank you for taking the time and meeting with me to review the above referenced document. With this letter, the Puyallup Tribe concurs on the ESD for clean up of Hylebos and Thea Foss/Wheeler Osgood waterways and disposal site selection for the CB/NT Superfund Site.

Although the Puyallup Tribe supports the cleanup of contaminated sediments from the Hylebos and Thea Foss/Wheeler Osgood waterways, we have numerous concerns regarding the menu of proposed methodologies to achieve cleanup.

As stated in our 1/31/00 comment letter to your agency, the Puyallup Tribe of Indians are the indigenous people of Commencement Bay who still rely on the aquatic resources of this embayment for subsistance as well as cultural and spiritual health. Additionally, the Tribe owns valuable economic properties on the Hylebos and Blair waterways. The ultimate success of this cleanup means more to this Tribe than another entity.

The recovery of salmonid stocks will continue to be in jeopardy if the cleanup remedy fails. The Tribe insists that during remedial design, EPA places a higher preference on permanent long-term effective cleanup. All Intertidal cleanup must be designed to prevent habitat loss. The reliance on Natural recovery, particularly in Hylebos waterway needs to be minimized. The Puyallup tribe remains unconvinced that natural recovery can be achieved in an active navigational waterway.

Finally, the Tribe fully supports the two in water disposal sites identified in the ESD. The mitigation is adequate but the Tribe has some concern regarding the "uncertainty factor" as it relates to the Simpson proposal. The Tribe feels that this uncertainty factor is true for all mitigation and restoration projects undertaken in Commencement Bay. As part of the CWA section 404 and ESA salmon recovery, the Tribe believes that this factor should be applied Baywide and that EPA and the Natural Resource Agencies support the option of establishing up front additional mitigation either through an additional project or a mitigation bank to develop a project located in the river node area identified in the Baywide habitat assessment.

In conclusion, the Puyallup Tribe of Indians concurs with the final ESD. However, the Puyallup Tribe encourages the EPA to work with the PRP's during remedial design to achieve cleanup solutions that will be the most protective of human health and the natural resources of Commencement Bay. The Tribe looks forward to the cleanup of these waterways and remains supportive of EPA's efforts.

Sincerely,

Bill Sullivan

Bill Sullivan
Director of Natural Resources &
Environmental Programs

Cc Tribal Council
Fisheries
Legal
Files

2002 East 28th Street • Tacoma, Washington 98404 • 206/597-6200

Appendix C
Responsiveness Summary

CB/NT ESD RESPONSIVENESS SUMMARY

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF ACRONYMS

AET	apparent effects threshold
AKART	all known and reasonable treatment
ARARs	applicable, or relevant and appropriate requirements
BA	Biological Assessment
BEP	bis-2-ethylhexyl phthalate
BMPs	best management practices
CAD	confined aquatic disposal
CBN/T	Commencement Bay Nearshore/Tideflats
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CHB	Citizens for a Healthy Bay
COCs	contaminants of concern
cy	cubic yards
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DMMP	Dredged Materials Management Program
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESD	Explanation of Significant Differences
HCC	Hylebos Cleanup Committee
HPAHs	high molecular weight PAHs
LNAPL	light non-aqueous phase liquid
LPAHs	low molecular weight PAHs
MCUL	minimum cleanup level
MLLW	mean lower low water
MLs	maximum levels
MTCA	Model Toxics Control Act
MUDS	multi-user disposal site
MWAC	Middle Waterway Action Committee
NAPL	non-aqueous phase liquid
NCP	National Contingency Plan
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OMMP	Operations, Maintenance, and Monitoring Plan

PAHs	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PCW	Partnership for a Clean Waterway
PDI	physical disturbance index
PMA	Port Management Agreement
ppb	parts per billion
PRDER	Pre-Remedial Design Evaluation Report
PRPs	Potentially Responsible Parties
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SAP	sampling and analysis plan
SMAs	Sediment Management Areas
SQOs	sediment quality objectives
SRAL	Sediment Remedial Action Level
SSMA	Superfund Sediment Management Area
USFWS	U.S. Fish and Wildlife Service
WASP	Water Quality Analysis Simulation Program
WDFW	Washington State Department of Fish and Wildlife
WDG	Wood Debris Group
WDNR	Washington State Department of Natural Resources
WDOT	Washington State Department of Transportation
WRDA	Water Resources Development Act

1.0 OVERVIEW

The purpose of this responsiveness summary is to summarize and respond to public comments submitted to EPA on the draft Explanation of Significant Differences (ESD) to the Record of Decision (ROD) for the cleanup of the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site. This responsiveness summary has been prepared in accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and July 1999 guidance document entitled *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA 540-R-98-031). The public comment period was held from November 29, 1999 to February 2, 2000. A public meeting was held on December 8, 1999 to present the draft ESD and to accept oral and written public comments. The meeting was attended by over one hundred people.

A number of issues were raised by attendees at the public meeting who expressed opposition to the proposed Mouth of Hylebos confined aquatic disposal (CAD) facility and to the proposed cleanup action at the head of the Thea Foss Waterway. Questions that were answered at the public meeting were recorded in the meeting transcript, which is available in the Administrative Record for the site. Those questions are not included in this responsiveness summary. Formal comments made at the public meeting are included in the responsiveness summary.

One hundred-eighty comment letters were received from citizens during the public comment period. The majority of the commentors presented concerns similar to those expressed at the public meeting. In addition, comments were received from the Puyallup Tribe (Tribe) and from state and federal resource agencies who expressed concerns related to the specific cleanup plans and mitigation proposed under Section 404 of the Clean Water Act.

The following responsiveness summary is presented by waterway, with specific topics called out within each waterway section. Topics applicable to Commencement Bay as a whole are provided last. Comment numbers corresponding to comment letters received during the public comment letter are provided at the end of specific comments.

1.1 Changes to the Proposed ESD

In response to significant public comment on EPA's proposed selection of disposal sites and other elements of the selected remedies, EPA has:

- Withdrawn the Mouth of Hylebos CAD as a disposal site;
- Required both nearshore fill disposal sites, St. Paul Waterway and Blair Slip 1, to be maximized for disposal of contaminated sediments from the CB/NT site to the extent practicable;
- Identified use of an upland regional landfill for disposal of contaminated sediment;
- Allowed further analysis of upland disposal within the CB/NT site boundaries during remedial design for EPA's consideration and approval as a means to lower disposal costs;
- Modified the cleanup plan for Thea Foss Waterway, especially the remedy for the head of the waterway;
- Modified the stormwater performance criteria for the Thea Foss Waterway; and
- Specified performance criteria for compensatory mitigation

EPA has incorporated these changes into the final ESD for the remedial actions at the Thea Foss and Hylebos waterways and selection of disposal sites for the CB/NT Site. More information regarding these changes are provided in this responsiveness summary. EPA received numerous comments about the proposed Mouth of Hylebos CAD site. Even though EPA did not select the

CAD in the final ESD, EPA has responded to the comments on the CAD in the responsiveness summary.

2.0 HYLEBOS WATERWAY

2.1 General Comments about Hylebos CAD Disposal Facility

Comment 1: Many comments were received opposing the Mouth of Hylebos CAD facility due to its proximity to nearby residences and as an inappropriate use of state-owned aquatic land. A few commentors supported its selection as a practical alternative to move the Hylebos Waterway cleanup forward.

I strongly oppose the Hylebos mouth CAD. [18] [24] [79] [93] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147]

As I understand it, the justification for the Mouth of Hylebos CAD site proposal is that the detritus from decades of log storage would be cleared up at the same time. Given the local current, sedimentation and biological processes I have observed over the years, I would speculate that if the log rafts were removed, the detritus problem would resolve itself naturally over a short period of time. [174]

We are writing to ask you to reconsider the proposal to use the mouth of the Hylebos Waterway as a CAD site for approximately two million cy of contaminated sediments from within the waterway. The United States Environmental Protection Agency (EPA) is considering a proposal to construct a 33-acre CAD facility adjacent to Marine View Drive and close to residential homes. We believe there are significant problems with the choice of that site and that better cleanup alternatives exist. [12]

Until such time as the availability of CAD sites and other substantive issues are resolved with Washington State Department of Natural Resources (DNR), Middle Waterway Action Committee (MWAC) continues to oppose any effort by EPA to settle DNR's liability for the CBN/T site or any of its problem areas. [152]

I oppose EPA's proposal to use up to 33 acres of state-owned aquatic land at the mouth of Hylebos Waterway to dispose of 700,000 cy of sediments contaminated with toxic chemicals. The site is public trust land managed by DNR. It is not a wasteland, but a biologically active and important habitat area that is used by a wide variety of birds, fish, shellfish, including 24 species of over-wintering waterfowl and 8 species of shorebirds. [3] [5] [6] [7] [8] [9] [10] [11] [13] [19] [25] [26] [91] [94] [173] [175] [176] [177]

Another concern for the Hylebos mouth site is that the DNR may not agree to allow use of this site. They probably have some very good reasons for not wanting to be party to a toxic waste dump there. There will be considerable pressure on them from outside sources to not give permission. [18] [24] [79] [93] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147]

I feel very strongly about the use of public lands. I believe that they are owned by the public to be preserved for the public. Aquatic public lands are especially precious because they are scarce and because they are so necessary to the survival of many species of wildlife, not the least of which is the salmon. I can not imagine why I should give up my aquatic lands so that polluters can save money. [83]

The Olympic Environmental Council strongly opposes EPA's proposal to use state-owned aquatic land at the mouth of Hylebos Waterway to dispose of 700,000 cy of sediments contaminated with toxic chemicals. We would oppose it being dumped in any other waterway, as well. [105]

Some commentors supported the Mouth of Hylebos CAD site, especially if a restoration project is included with the construction of the CAD, noting that such a restoration project would be consistent with the restoration priorities listed in the bay-wide habitat assessment (Simenstad 1999). [29] Commentors noted that the Mouth of Hylebos CAD would have the least impact on the environment of all of the three proposed in-water disposal sites. [89][150] Commetors also noted a significant cost savings could be achieved by placing all CBN/T contaminated sediments in the Mouth of Hylebos CAD site, rather than using three separate disposal sites. [89]

The Tribe is hopeful that the mouth of Hylebos site will be selected after the concerns of adjacent landowners have been resolved. We recognize that viable disposal options in Commencement Bay are extremely limited for many reasons. While the Tribe doesn't favor disposal of contaminated sediments in a CAD, we also recognize the value of compromise only if cleanup of the remaining waterways can be implemented as soon as possible. The one issue that has frustrated the Tribe is the lack of a settlement between EPA and DNR. We urge EPA to take whatever steps are necessary to put this issue to rest. The State of Washington signed the ROD in 1989 acknowledging that nearshore fills and CADs were options for remedial actions. It makes little sense to proceed with the conditions outlined on page 26 of the draft ESD, (i.e., design issues) until EPA and DNR reach agreement. [56]

Response 1: *The significant opposition to the Mouth of the Hylebos CAD is acknowledged. During the public comment period it was discovered that the CAD site would be inconsistent with the current local Coastal Zone Management Act land use plan. Additionally, many issues raised by the landowner, DNR, about use of state-owned aquatic land have not been resolved. Therefore, EPA has withdrawn its selection of the CAD for disposal of contaminated sediments. See Response 136.*

Although EPA has withdrawn the Mouth of Hylebos disposal site, EPA still believes that the alternative is technically implementable and that short-term and long-term effectiveness issues raised during the public comment period could be addressed satisfactorily. EPA has included responses in this summary to the significant comments raised regarding the technical implementability of a CAD site at the Mouth of Hylebos Waterway to address the issues raised. Part of EPA's interest in a CAD site at the mouth of the Hylebos is because of its size and proximity to the remedial action areas and it's potential for creating salmonid habitat. While construction of a CAD site in this area would certainly facilitate the removal of the woody debris, it was not a selection factor, as suggested by one of the commentors. It is unlikely, based on experience at other locations with large accumulations of wood debris, that the problem will "resolve itself". However, cleanup of woody debris is a condition of DNR's lease, so it will be addressed regardless of EPA's designation of this site as a potential CAD.

EPA agrees that DNR, as the owner of aquatic lands, must articulate the terms under which the Mouth of Hylebos disposal site would be made available

EPA did not propose the Mouth of Hylebos disposal site so that the potentially responsible parties can save money. EPA's regulations, the National Contingency Plan (NCP), are explicit that cost, effectiveness, and implementability are required balancing factors in the decision. The mouth of Hylebos CAD was proposed because it met the ROD objectives and could have significantly enhanced critical salmonid habitat that has been identified in the Simenstad report (2000) as important to recovery of ESD-listed species. See Response 6.

EPA acknowledges the opposition to in-water disposal of contaminated sediments, on state-owned aquatic lands or elsewhere. EPA has, however, been successful at constructing in-water disposal sites at other locations.

Comment 2: Several comments expressed concern over long-term risk and hazards from a CAD. Specific concerns cited include geologic instability/uncertainty, additional risks to aquatic wildlife from the presence of contaminated sediments, loss of shellfish and beach life habitat, and drinking-well water or fish consumption from the immediate area creating exposure to toxins. [3] [5] [6] [7] [8] [9] [10] [11] [13][15] [16][17][19] [25] [26][84][86] [91] [94][96][97][98][99][100][101] [105] [173] [174] [175] [176] [177]

Response 2: *If the site was constructed, a long-term monitoring plan would be required that routinely verifies that no contaminated sediments are being released (e.g., to nearby drinking-water wells, beach habitat, etc.). Individual concerns (drinking water, seismic hazards, impacts to aquatic communities, etc) are discussed in more detail in the following sections. See Sections 2.2 and 2.3 for more detailed responses.*

2.2 Potential Impacts to People and Aquatic Organisms

2.2.1 Impacts to the Community

Comment 3: Several nearby homeowners expressed concern about whether adequate accommodations could be made during and after the construction of the CAD, including: concern over depressed property values, lack of fire protection, concern over drinking water quality, noise and other disruptions, and, limitation of water/marine access.

The proposed CAD at the mouth of the Hylebos Waterway is the only proposed site where people live and will be located 300 feet from a residential development. Privately-owned wells are the only source of drinking water for the potentially impacted residents. No studies have been made as to whether the disposal site will compromise or contaminate the domestic wells used by adjacent residents. Excavating into the aquifers increases the risk of saltwater intrusion in the water supply. Breaching the aquifer may also increase the draw-down and significantly lower the head to a point below domestic access. Will it also affect the municipal wells at-depth of the growing community on the hill above my home? What choice do the residents have if the wells become contaminated or are no longer viable? Tacoma Public Utilities does not supply municipal water in this area. We were told at a meeting several months ago that the decision to locate the disposal site here was made strictly based on engineering calculations and data, and no consideration was given to the human element. Should contamination of drinking water occur at some time in the future as a result of this siting, will the then owner or manager of the site (the DNR) be responsible for the associated costs of cleanup or lawsuits? If that were to happen, the costs would be passed on to the citizens instead of the responsible parties.

Why were the residents who live close to the proposed mouth of Hylebos CAD not involved from the very beginning, like the Puyallup Tribe of Indians? Why was Foss Tug not involved, who is a major landowner of waterfront property near the disposal site? [3] [5] [6] [7] [8] [9] [10] [11] [13][15] [16][17][19] [25] [26][84][86] [91] [94][96][97][98][99][100][101] [105] [173] [174] [175] [176] [177][181]

Response 3: *EPA believes the likelihood of impact to the drinking water wells would be very low, if the Mouth of Hylebos CAD were to be constructed. Regional ground water flow data indicate that ground water in the area most likely flows from the residents' wells towards the area of the CAD, so there is little likelihood that construction of the CAD would impact nearby drinking water wells. The municipal wells referenced are likely too far removed from the construction site to be impacted. As part of the design process, EPA would have evaluated in more detail the potential impacts of a CAD site on residents' drinking water wells for salt water*

intrusion, loss of head in the wells, and related concerns. The design analysis would have to show that these wells would not be impacted by the CAD site. If an unforeseen impact to the residential drinking water did occur from the construction of the CAD, EPA would require that an alternate water supply (e.g., bottled water as a temporary measure or hookup to municipal water as a permanent solution) be provided as part of the cost of the cleanup. To address long-term responsibility in the future, EPA would negotiate a settlement agreement requiring the potentially responsible parties (PRPs) to be responsible for the long-term maintenance of the CAD. Costs for a failure of the CAD or other unexpected impacts from it would not have been passed on to the citizens of the State of Washington through DNR.

EPA began to discuss the possibility of a Mouth of Hylebos CAD site with the homeowners as soon as it was identified as one of the more promising potential disposal sites that would receive serious consideration. The Puyallup Tribe has been involved, as a natural resource trustee and support agency for the remedial action, since the CB/NT site was placed on the National Priorities List in 1983. Foss Tug was notified and had an opportunity to participate through EPA's public meetings associated with the Disposal Sites Forum. Although the CAD has not been selected as a disposal site, EPA will continue to work towards including interested members of the community as the cleanup is implemented.

Comment 4: Current best estimates are that construction of the CAD facility would take 3 years based on two 12- hour shifts daily, 6 days a week, assuming that the project does not encounter unseen delays. A worse case estimate that construction would run 5 years is not unrealistic, especially if the site is expanded as has been often expressed. Construction, occurring within 300 feet of our homes, will be a daily part of our community's life throughout the course of the project. Nearness of the construction activity to our homes results in a loss of privacy, loss of view, increase noise levels, and an overall loss of quality of life that we have worked to achieve within our community. Additionally, this community can expect that our limited access for parking will be pushed beyond capacity by on-site workers commuting to their job site. As a shoreline community, water craft and water based activity plays a large role in the daily lives of Marine View Drive residents. Many residents literally use their boats as many others would an automobile.

Construction activities that limit our community's easy access to open water would have an immense impact on the daily lives of our residents and severely restrict the rightful enjoyment of our properties. Bright lights will be required during periods of darkness or low light, which is of consequence to those living directly within the construction zone. Sound travels great distances over water; so increased noise levels generated by construction activities will be a consistent factor in our daily lives. If this project is rammed through, what safeguards will EPA and Hylebos Cleanup Committee (HCC) make to protect my community from suffering any adverse impacts or inherent stresses from construction and operation of the CAD facility? Will EPA or HCC provide temporary housing to those residents who may feel their homes are unlivable during the construction phase of the project?

Because CERCLA does not include a National Environmental Policy Act (NEPA) process, issues related to impacts to residents are not adequately addressed within the Superfund process. Residents, many of which are second, third or fourth generation of their family to live in these homes, will find little or no remedy for the adverse consequences of being forced to live with site construction and operation. Many homes within the community are transferred from one family member to another and this raises a number of concerns regarding long-term human health impacts if the structure should fail in any one of a number of possible ways. [16][17] [86][96]

Response 4: *EPA acknowledges that short-term impacts would have been created during construction. Because the CERCLA process includes an equivalent impacts analysis as the NEPA process, a separate NEPA review is not required. Although some short-term impacts would be unavoidable, EPA would not require or provide temporary housing during construction*

activities. Based on EPA's experience with other projects (e.g., soil removal in residential yards), the agency believes that adequate accommodations can be made without the need to relocate residents. Based on the current conceptual design, the CAD would not have prevented access to homes from small water craft entirely. Measures to minimize impacts would be addressed during the remedial design. Over the long-term, EPA believes a CAD facility could be designed that would preserve the level of services and amenities currently available to the nearby homeowners. Upon completion of the CAD, EPA believes that this site would have minimal, if any impact on existing human use and enjoyment of the area. The CAD would be under water for most tidal cycles. EPA also believes that this site would have a high potential to improve habitat conditions for fish and wildlife by increasing the area of shallow subtidal/intertidal habitats within the Commencement Bay nearshore environment.

Comment 5: During construction, property values would plummet. At completion values would rise, but probably not to pre-construction levels. People needing to sell their homes, usually their largest asset, would find that nobody wants to live next to a waste dump and have great difficulty selling or sell at a steep discount. There is little or no reason for the residents to desire or support the Mouth of Hylebos site. This site, as well as the Thea Foss mouth site are going to impact the greatest quantities of people due to their locations. If the Mouth of Hylebos site is selected as a disposal site, it could be devastating financially to members of our community. If myself or others in my community had to sell their houses and properties it would be at a loss, if we were able to sell them at all. Is EPA or the HCC prepared to indemnify property owners against the financial devaluation of their homes?
[17] [86][22] [17] [20][22][86] [18] [24]][79] [86[93] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147]

Response 5: *EPA does not believe that property values would suffer long-term declines if a CAD was sited at the mouth of Hylebos Waterway because the completed project would leave no visible signs of the construction and would not be expected to significantly alter existing property uses. EPA would not indemnify property owners for construction activities necessary to ensure an environmentally protective cleanup of the Hylebos Waterway.*

2.2.2 Risks to Existing Aquatic Communities

Comment 6: Several homeowners, interested citizens groups, and individuals expressed concern over the loss of wildlife and habitat that would occur during construction of a CAD or as a result of failures of a CAD to contain contaminated sediments over the long term. Commentors described the Mouth of Hylebos area as one that has been "rejuvenated" and "transformed" over the past 10 to 20 years as a thriving habitat. [15][97][96] Commentors stated that the Mouth of Hylebos area is not a wasteland, but is a relatively healthy, existing habitat. Some of the specific points reiterated by numerous commentors are provided below.

The Mouth of Hylebos represents the last remaining unarmored and relatively undisturbed shoreline. The Mouth of Hylebos disposal site lies directly within the Hylebos Creek migration corridor for juvenile salmonids entering the bay and salmon returning to spawn and juveniles entering the bay and Puget Sound. The migration of salmonids into Commencement Bay involves thousands of small salmon whose presence in the area often extends beyond the established June 15th fish window. Later in the season the Pacific herring, a species that may be listed under the Endangered Species Act (ESA) in the future, also inhabits the area. [3] [5] [6] [7] [8] [9] [10] [11] [13][17] [19] [25] [26] [86] [91] [94] [95][173] [175] [176] [177].

There are many species that currently use the proposed Mouth of Hylebos disposal site that would be disturbed. The two to three year construction schedule will cause temporal impacts and leave

all of the identified species without habitat during the construction. This, in turn, will have further negative impacts by resulting in overuse of the remaining habitat in Commencement Bay. [17]

Building this CAD is simply not worth the risk that it poses to the water in Commencement Bay and the Hylebos Waterway nor is it worth the risk to the wildlife using the area. There is no guarantee that the habitat destroyed by the proposed CAD site at the Mouth of Hylebos site will successfully be replaced. Destroying existing habitat, for the possibility of replacing it with better habitat is "ludicrous and unproven." [16][101] [84][1][73][101][174][86]

Over one hundred species of birds make this their home according to the Tahoma Audubon Society. Likewise, kelp and eel grass beds have maximized the environment of the would-be-displaced residents of the 33 acre CAD footprint; molting crabs, mussels, limpets, octopii, and crab. There is no guarantee that these beds can be reestablished nor that the existing community of organism will be restored once the project is finished, and they *will* be devastated during the excavation process. [101]

Puget Sound's aquatic resources have already been compromised too much from a variety of human activities. Please don't make this reasonable healthy area of the bay, or any other aquatic area for that matter, assume additional risk from this waste. Please do not allow the short-term economics to permit the HCC members to shirk their responsibility of properly disposing these toxic wastes in a safe location. [1]

In selecting the relatively inexpensive but as yet untested disposal site at the mouth of the Hylebos Waterway, EPA failed to employ viable, permanent and environmentally responsible options of sediment disposal using treatment technology or removal to an upland certified landfill. In making this decision, cost alone has been the single largest factor under consideration and ignores the potential cost to Commencement Bay ecosystems, the best interest of the community and possible hazards operation of such a facility could present. [86]

Response 6: *EPA agrees the intertidal and shallow subtidal areas at the mouth of the Hylebos Waterway provide habitat for numerous species of wildlife. To address concerns about salmon migration during the construction of the disposal site, EPA asked the PRPs to modify their conceptual design so that the portion of the site closest to the shoreline would be below -10 feet (mean lower low water or MLLW). Juvenile salmon feed on the aquatic organisms living in shallow areas above -10 feet MLLW. By moving the disposal site to deeper water, salmon will not be impeded in their migration at this critical life stage. As salmon grow, they move out into open water, where their movement again would not be impeded by the disposal site. In addition, a berm would be built around the entire disposal site during construction, preventing fish from entering the site and being exposed to the contaminated sediments. The material from the berm would be redistributed over the site at the end of the construction phase to form a base upon which habitat can be constructed. Also, construction will be shut down during the "fish windows", when juvenile salmon are migrating through the area.*

While the construction of a CAD facility would create short-term impacts to the aquatic habitat and associated wildlife that are dependant on the impacted area, the overall project would result in improvement in habitat beneficial to wildlife. In-water construction activities must comply with the Clean Water Act and the ESA, which require that impacts to wildlife, and especially listed species, must be minimized during construction. In addition, habitat mitigation is required to compensate for any loss of habitat. This site provides significant opportunity to construct critical salmonid habitat on top of the cap to mitigate for impacts. The February 2000 Simenstad report identifies this area as one where restoration projects would be particularly beneficial to migrating salmon.

The current use of the area where the CAD is to be located has been used for log rafting for the past 60 years. Several studies, including testing done in similar areas at the head of the Hylebos

Waterway, have shown that the accumulations of wood waste found under this type of log rafting area, often are toxic to aquatic organisms or limit their use of this habitat. Construction of a CAD with clean material as a cover, would provide a more beneficial habitat.

EPA proposed the Mouth of Hylebos disposal site in part because of the beneficial effects to salmon this site could ultimately provide. Concerns about the recent ESA listing of chinook salmon prompted EPA, DNR, and the City of Tacoma (City) to commission Charles Simenstad, a researcher at the University of Washington, to conduct a Commencement Bay-wide aquatic ecosystem assessment. The assessment, "Commencement Bay Aquatic Ecosystem Assessment" (hereinafter, the Simenstad report) has been used to ensure that enhancement of salmon habitat was an important part of our decision-making process. The Simenstad report focused on areas where salmon habitat was limited, and where habitat restoration projects would have the most benefit. The report identified four priority areas where restoration projects should be targeted, including the location of the proposed Mouth of Hylebos disposal site. The opportunity exists to design a habitat project at the mouth of the Hylebos Waterway, as was done for the St. Paul cap at the mouth of the Puyallup River, to incorporate confinement of contaminated sediments. Building new habitat beneficial to juvenile salmonids on top of the disposal site would greatly increase the acreage of habitat available in the area, so the long-term effects of the disposal site on Hylebos Creek salmon runs would be a significant improvement in habitat and forage areas.

Comment 7: [EPA] failed to require submission of an adequate biological assessment that reflects the reliance of multiple species on the proposed Mouth of Hylebos CAD site. EPA has stated that protection and/or enhancement of habitat for fish and wildlife counts highly among its goals in developing sites for sediment disposal. However, it seems that a habitat analysis of the site was not performed. This analysis is a critical screening tool necessarily performed before any site can properly be designated as a preferred site for sediment disposal. Thus, nominating the area beyond the mouth of Hylebos Waterway as a preferred site for disposal of contaminated sediments was premature. [17][86][39]

Response 7: *EPA has chosen not to select the Mouth of Hylebos CAD in the final ESD. However, a preliminary habitat analysis had been performed and is contained in Appendix C of the Hylebos Waterway Pre-Remedial Design Evaluation Report. Had EPA selected the Mouth of Hylebos CAD, it would have been incorporated into the Biological Assessment (BA) for the CBN/T cleanup.*

2.3 CAD Feasibility and Effectiveness

2.3.1 Accidental Damage to the CAD

Comment 8: Several commentors stated that often problems arise that are not anticipated. They believe that this site by its location and its design of being underwater makes it more difficult to control and engineer than the other sites on or abutting land. One comment stated that in-water disposal is an unproven method and a great risk of sediment dispersal exists during the burial process from extreme tides and storms. Other commentors noted that, there are too many unknowns regarding the future of CAD facilities to risk developing another one in Puget Sound. [1] [16][79] [93][97] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147]

A few commentors stated that even with engineering controls in place, a misplaced load of contaminated sludge at the Hylebos mouth site would have the worst adverse effect of all the sites. One commentor noted that there are often problems that are not anticipated. The commentor expressed concern that the proposed CAD is underwater making it more difficult to control and engineer than the other sites that abut land. The commentor stated that while a properly sited and constructed CAD may provide some beneficial characteristics to the aquatic

landscape, the risk and long term uncertainty associated with this approach outweigh the potential benefits. [28][18] [24]

I do not accept the loss of access to the waters of this state caused by the erosion and transport of dredge tailings (contaminated or otherwise) that will take place in front of their home. Are hundreds of thousands of cy of sediment plus top dressing going to be dumped underwater and not wash up on the shore? [96]

Response 8: *There is a substantial body of information on in-water disposal of materials and construction of CAD sites that has been gained through carefully reviewing efforts in the United States and in other countries. Local examples include the Simpson Tacoma Kraft cap and the Commencement Bay Puget Sound Dredged Materials Management Program (DMMP) open-water disposal site. EPA believes that this is a feasible approach and the design and construction would not be extremely difficult to accomplish.*

The CAD design includes a berm that extends to the water's surface entirely surrounding the disposal site, which would greatly minimize the potential for a load to be inadvertently dumped in the wrong place.

EPA would require that containment measures be implemented during placement of the contaminated sediments. These include a temporary berm that would enclose the site. Placement would be carefully monitored to assure that contaminated sediments do not impact the adjacent beaches or waterway. Water access to adjacent properties would be maintained to the maximum extent possible during construction activity. Future access should be unaffected. The design and construction would be monitored by EPA to assure that releases of contaminated materials would not occur; or if they occur, would be minor and addressed immediately. Also see Response 2. EPA would also require that appropriate construction and monitoring procedures be adopted and documented by the PRPs. EPA would actively monitor in-water disposal at the site to ensure proper placement and to resolve design or construction issues as they occur. EPA would require long-term monitoring of a CAD to assure project integrity and adequate protection of human health and the environment.

Comment 9: In the past there has been incidences where large freighters have been involved in mechanical failures that resulted in them floating along without power, with their large drafts the hull of these freighters could damage the cap of the CAD and release toxins to the area. This is another fact that was overlooked by EPA and should be addressed. [102]

Response 9: *The design would consider shipping accidents to the extent that it is possible to anticipate them. In the event of a potential or actual breach of the constructed CAD, EPA would require that the monitoring plan will include contingent response actions.*

Comment 10: A few commentors question what provisions would be made to restore a cap or fill that has been damaged by earth movement and /or tidal energy [12][39]

Response 10: *A long-term monitoring and contingency plan would be required for the CAD including monitoring on a planned schedule, as well as episodic monitoring after a catastrophic event that has the potential to damage the CAD. Any damage found, either during planned or episodic monitoring, would require prompt repair.*

2.3.2 Potential for Erosion

Comment 11: Without analysis or understanding of existing site conditions an arbitrary decision was made to create an up to 30 plus acre mound of contamination, based in the marine ecosystem's benthic community, and rising to within a few feet of the bay's surface and the impacts of the dynamic natural forces of current and wave. When questioned regarding the CAD

site suitability for salmon habitat, Professor Charles Simenstad replied that one should instead question why it wasn't already there. The natural environment that shaped and sustained our ESA-listed salmon stocks will not, over time, tolerate an anthropogenic anomaly imposed upon it. [96]

Response 11: *In Commencement Bay, human activity and industrial development has filled in nearly all of the historic habitat (saltmarsh, mudflats, and shallow water habitats) formerly associated with the mouth of the Puyallup River. What remains of this formerly extensive deltaic complex is the steep outer faces outside the waterways of the man-made nearshore/tidefalts. Sediments deposited by the Puyallup River are funneled to this steep outer face and must settle into the deeper waters of Commencement Bay that now abut the bay, instead of spreading out the relatively shallow areas along the margins of the Bay. Given sufficient time, a new, shallow delta will form at the present mouth of the Puyallup River and the material from the river will begin to accumulate and move, spreading along the face of the present nearshore/tideflats into the Mouth of Hylebos area. Placement of material in that location, such as via a properly designed CAD site, would be merely an acceleration of a geohydrologic process that is occurring naturally already, albeit at a very slow rate. EPA's proposal in the draft ESD for a CAD at the Mouth of Hylebos was intended to take advantage of those natural processes and significantly accelerate them to develop a significant shallow water/intertidal habitat complex that would function as the nearshore/tideflats once did prior to industrial filling. This critical habitat complex would have continued to trap Puyallup River sediments, becoming larger and more varied in the long-term.*

Comment 12: Several commentors noted that the Hylebos mouth appears to have the greatest negative impact of the four finalist sites. One commentor noted that the engineering involves the use of long dikes to help control, but not stop dispersion of contaminants. The commentor believed that this is a problem because of the flow of water past this site on tidal changes and storms that would have a high potential of breaching the containment dikes. The fact that the length of the dikes is far greater at this site than any of the other site options and all the sides abut water further increases the potential negative impacts. Several commentors were concerned that the cap would not stay in place due to the amount of erosion that they experience on the shore near their homes. One commentor also expressed concern that a lot of money would have to be spent (and more construction) at a later date to replace the cap. Another problem identified in the comments is that winds can pick up the particulate from dumped dredged materials with no natural or artificial barriers to slow the winds down. Additional comments expressed that the finished elevation of the CAD facility would be only -10 feet MLLW and that tidal energy and surging wave action created by strong tides and storms would batter the outside edge of the facility. This would result in the cap of the disposal site becoming scoured out and releasing the contaminated sediments into the bay. [98] [12] [86] [14] [20] [18] [24] [4][102]

The same concerns were expressed by another commentor who indicated the north shore of Commencement Bay is an area of intense tidal energy, especially during winter storm events. These storms predominately come out of the southwest with strong winds that batter the shoreline with increased wave energy driven by winds and low air pressure. Typically, several storms of this nature occur each year. Aside from increased severe erosion of the shoreline and property damage to homes, tidal energy scours the nearshore area. After these storm events, the beach is littered with kelp, eelgrass, soft-shelled clams, and other debris scrubbed from the nearshore tidal area. Clearly the outside edge of the CAD facility, elevated from -40 to -0 feet, would similarly be battered by surging wave action and the cap of the disposal site would be scoured out. [17]

Response 12: *If the CAD had been selected, both the face of the CAD site and the cap may have been armored to protect the site from any potential damage from tidal currents and storm generated waves. Additional design studies and evaluation would have generated information including the amount and type of armoring necessary to assure project integrity. Alternatively, the outer berm and cap could have been over-designed to allow some erosion of clean cap*

material without releasing contaminated sediment. Part of the design effort would have been to properly protect the CAD while also providing habitat and insuring minimal impact to the character and use of the shoreline.

Comment 13: [T]the log storage area that would be replaced by the CAD has acted as a breakwater for us over the years, protecting the shoreline and our houses from damage. As presented, at best, the shallow water created by the disposal site would do nothing to the wave action. At worst, it would slow the wave action down enough to cause the waves to double up and become steeper and more destructive. At the meetings I have attended the possibility of building a breakwater as part of the CAD and extending the City's water main in case of ground contamination has been discussed, but I have not heard of any serious engineering plans for this proposal. [174]

Response 13: *No engineering plans have been prepared. EPA's process does not require such plans until the site is selected and remedial design is conducted. During design EPA would determine whether a breakwater or an alternative engineered solution is a necessary component of the design, and detailed engineering plans would be developed. DNR has indicated that they may require the log storage area to be eventually removed regardless of the placement of a CAD. Therefore the log-storage area does not provide a long-term structure to protect the shoreline. In addition, Washington Department of Ecology (Ecology) is putting more and more restrictions on log storage that will also prevent their use as breakwater.*

2.3.3 Geotechnical/Seismic Stability

Comment 14: Many commentors stated that DNR data show that the site is unstable and prone to disturbances from underwater landslides.

The issues of tidal energy, geology, and seismic activity as pose a concern regarding the integral strength of the proposed facility. Failure of the disposal site would release toxins to the water column, presumably to be washed ashore with high tides. Such a failure would expose residents twice daily to passive exposure to these toxic contaminants. [17]

In addition, many commentors stated that seismic and land movement studies have not been done considering that Puget Sound is susceptible to earthquakes and earth movement. Because of this, the commentors believe that the true cost of in-water disposal cannot be estimated until the risk of land movement has been estimated and the consequences evaluated. One commentor stated that the CAD is basically fill material and liquefaction during a seismic event could likely cause facility failure. The commentor believed that regardless of the safety record for CADs in other locations, each new site with its associated geology and soils, carries it's own risks. Other commentors noted that EPA failed to require geotechnical and engineering testing to determine the suitability or safety of the site prior to designating it as a preferred disposal site. One commentor noted that the Mouth of Hylebos site is the only site in Commencement Bay where EPA did not require extensive testing to confirm a candidate site's suitability to safely construct and operate a disposal facility. Another commentor expressed concern as to whether or not the nearshore area would support the weight of the CAD facility, especially at the outside edge where the elevation drops rapidly. [17] [86][83] [101] [1] [3] [5] [6] [7] [8] [9] [10] [11] [13] [19] [25] [26] [91] [94] [173] [175] [176] [177] [99] [100] [105][86] [98][83][88] [14] [12][39][102]

Response 14: *The proposed CAD facility at the mouth of the Hylebos Waterway is only in a conceptual development stage. Because the site is not available, EPA did not select it as a disposal site. If EPA had selected the site, many aspects of the site would still need to be investigated, however, EPA had sufficient information to select the Mouth of Hylebos CAD as a disposal site. Additional information developed during remedial design would include such elements as exposure risk, sediment dispersion, tidal energy, seismic stability, geology, and the foundational stability of the site.*

EPA believes that CADs can be constructed to account for long-term risks and prevent unacceptable hazards. EPA is aware of the survey conducted by the DNR that includes the Mouth of Hylebos area as a potential seismic zone. DNR's survey is of a general nature, and shows an area of potential concern for potential landslides based on seismic activity 400 feet landward of the continental shelf, based on historical studies. The Mouth of Hylebos proposed disposal site lies within this area of concern. It does not designate the Mouth of Hylebos as being of a significantly greater risk than other areas in this broad area of concern. In EPA's discussions with DNR, they acknowledge that susceptibility to subsidence in an earthquake is site-dependent, and the purpose of the study was to highlight areas where site-specific seismic studies are needed. To prevent unacceptable hazards, EPA would require further seismic studies to modify the CAD design to account for seismic activity short of catastrophic proportions. The design studies and knowledge of other CADs are intended to construct a site that prevents the contaminated sediments from releasing chemicals above pre-defined performance standards.

2.4 Adequacy of the Proposed Cleanup

2.4.1 General Comments

Comment 15: The Wood Debris Group (WDG) notes that their spatial analysis of the data strongly indicates that the contamination is continuous, and that the appropriate approach to designating cleanup areas should presume that the sample stations located away from the HCC's designated sediment management areas indicate the presence of a continuous swath of contamination. They state that the core sample data show no indication that gaps in the contamination exist in the swath extending from the East 11th Street bridge to the entrance into the upper turning basin. The WDG further notes that with regard to stations not on the transect, the sampling is less developed along the shoals and outside the navigation channel. Nonetheless, these stations reflect significant contamination and indicate that not only is the contamination longitudinally extensive, it also encompasses most of the width of the waterway in many places. In fact, most of these stations have subsurface contamination at levels that exceed SQOs. Therefore, it should be assumed that additional cleanup is warranted beyond the designated cleanup areas. [153]

Response 15: *The comment in summary reflects the position that all areas that have contamination above SQOs at depth should be included as cleanup areas whether or not the surface sediment is clean. The designation of cleanup areas in the ESD reflect application of varying factors such as, the location in the waterway, the contaminants in question, contaminant concentrations, uses of the area, etc. See Response 22 for more detailed discussion of how cleanup areas were identified. EPA acknowledges that available sampling data indicates that the area of contamination at depth does not correlate with the area of contamination at the surface. However, it is reasonable to use different factors in determining the need for cleanup primarily because different factors are driving the risk of actual or threatened exposure to receptors and the potential for harm should such an exposure occur. Likewise, long-term monitoring of the effectiveness of the cleanup is a component of the remedial action.*

Comment 16: Occidental agrees with the ESD's conclusion that significant portions of the middle of the Hylebos Waterway require no remedial action. Furthermore, Occidental agrees with the ESD's conclusion that only three isolated, discrete Sediment Management Areas (SMA) in the middle of the Hylebos Waterway require designation for dredging, and that only four small natural recovery areas need be designated, under EPA criteria. [148]

Response 16: *Comment noted. See also response to Comment 15.*

Comment 17: Citizens for a Healthy Bay (CHB) notes that EPA has deferred a number of issues that the HCC Pre-remedial draft failed to resolve, labeling them "design issues". These so-called "design issues" include:

- Remedial actions necessary under existing structures and coordination with property owners.
- Identification of the depth of contamination relative to remedial dredging depths assuring that subsurface contamination is captured in the cleanup action.
- Determination of human health risks from releases during dredging and long-term potential for release of toxins.
- Geotechnical and engineering analysis of the proposed CAD site at the mouth of Hylebos Waterway.
- An adequate biological assessment of the proposed CAD site at the mouth of the Hylebos Waterway that accurately reflects the year-round reliance of this habitat by a wide variety of species.

CHB argues that in no other instance in Commencement Bay has EPA allowed an incomplete and/or inaccurate pre-remedial design plan to go forward, and they question EPA's decision to make an exception in this instance. In fact, HCC has already been asked on several occasions to resolve many of the issues EPA now deferred to design and has failed to do so. The commentor sees no advantage in continuing to delay HCC's compliance in resolving these and other critical issues. [39]

Response 17: *The level of information for all waterways, including Hylebos Waterway, is sufficient for the decisions made in this ESD. Additional information is needed to complete the design, but that is consistent with the CERCLA cleanup process. There is not a significantly different level of information for the Thea Foss Waterway than for the Hylebos Waterway. The HCC coordinated with property owners about uses of their properties and what the sampling data indicated about their intertidal areas. However, more specific technical studies and coordination with property owners will be required for design of a cap or dredging activity. For all these issues, EPA has sufficient information for the purposes of this ESD and will continue to develop additional information as we move through settlement negotiations and the design phase. EPA has included general performance criteria, where appropriate, for both the waterway cleanup and the disposal sites in the ESD. If at any time during design, new information is developed that indicates the cleanup will not meet the ROD objectives or performance criteria, that element of the cleanup plan will be reconsidered.*

Comment 18: Occidental incorporates in these comments by reference all positions and/or objections previously expressed by Occidental and/or the HCC regarding pertinent issues. Such positions and/or objections include, but are not limited to: (a) the purported "expansion" of the two Hylebos "problem areas" established by the ROD; (b) the inappropriate use of benthic testing and analyses; (c) the development and application of inappropriate cleanup criteria, including but not limited to sediment quality objectives, remedial action levels, natural recovery requirements, and altered approaches to subsurface sediment; (d) reliance upon inappropriate testing, analyses, data, and data interpretation methodologies; (e) failure to consider, and/or inadequate consideration of, the cost/benefit consequences of particular actions or requirements; (f) the application of approaches inconsistent with EPA policies and guidance; and (g) actions and requirements by EPA that have resulted in exorbitant and/or inappropriate oversight and response costs. Occidental also reserves the right to adopt positions or objections asserted by other parties. [148]

Response 18: *The form of the comment contains insufficient information to base a response in this summary. However, it is acknowledged that positions and objections have been raised by the commentor and other members of the HCC throughout the development of the pre-remedial design studies, and have been responded to by EPA in reports and/or correspondence, which are contained in the administrative record for this ESD.*

Comment 19: The Washington Department of Fish and Wildlife (WDFW) continues to have concerns regarding the potential impacts on water circulation and dissolved oxygen (DO) levels

within the Hylebos Waterway resulting from the proposed dredging depths. As we indicated in our August 18, 1999 comment letter on the Pre-Remedial Design Evaluation Report for the Hylebos Waterway, there are currently problems with depressed oxygen levels during the late summer and early fall in the waterway. Also, current WDFW regulations (WAC 220-110-320(7)) require that dredging depths in channels not exceed channel depth at the seaward end to avoid such problems. While provision is made for some adjustment of this standard in authorized berthing areas and turning basins, these modifications require some justification. Areas with existing DO problems are inappropriate candidates for such a variance. WDFW recommends that modeling efforts be conducted to evaluate the potential impacts of the proposed dredge depths on circulation and DO in the waterway. They further recommend that long term monitoring of these parameters be conducted to verify the modeling results and ensure satisfactory water quality subsequent to the remedial action. [28]

Response 19: *EPA is aware of the current DO situation in the Hylebos and will not accept any final dredging plan that would result in further degradation of the existing DO conditions. EPA is also aware that the current conceptual dredge plan for Hylebos shows many changes in bottom elevation that have the potential to create isolated low DO pockets. EPA will require that the PRPs redesign the dredge cuts to "smooth out" these areas in design, or do the necessary modeling to show that the proposed uneven bottom will not impact water quality in the long-term. In addition, water quality will be closely monitoring during the entire construction process and after completion to assure adherence to state water quality standards. At the very least, EPA will require the selected remedy to maintain current water quality conditions.*

2.4.2 Subsurface Contamination

Comment 20: The Partnership for a Clean Waterway (PCW) believes that the approach used by EPA to designate areas for cleanup, based on subsurface conditions, is a fundamental departure from the performance criteria set forth in the ROD. The ROD Sediment Quality Objectives (SQOs) apply only to surface sediment, since the point of compliance is the biologically active zone—the top 2 to 10 centimeters of sediment. The ROD recognized that if surface sediment is clean (meets the SQOs) it does not represent an unacceptable threat to human health or the environment. Applying SQOs to subsurface sediments is a change in performance criteria and requires a ROD amendment. [150]

Response 20: *The approach used by EPA to designate cleanup areas is not a fundamental departure from the performance criteria in the ROD. The 1989 ROD sets forth cleanup levels that are to be met in the biologically active zone in the long-term. The ROD incorporates the concept that physical disturbance is a factor in determining where remediation is required. Thus, for the cleanup to be effective in the long-term, pre-design studies had to show, with a high level of certainty, that contaminated subsurface sediment had no potential to become exposed and recontaminate surface sediments. However, pre-design studies did not show that post-cleanup recontamination of clean surface sediments by contaminated subsurface sediments would not occur, so several areas with subsurface contamination were added to the cleanup plan (See Response 22). These stations were added in order to meet the ROD objectives, and no ROD amendment is needed. See also Response 40.*

Comment 21: The PCW further believes that the ESD requirement for dredging subsurface sediment instead of allowing for natural recovery is in direct conflict with the 1989 ROD. The ROD recognized that surface sediment that is predicted to recover to the SQOs within ten years does not present an unacceptable threat to human health and the environment. The ROD concluded that where surface sediment is clean or predicted to recover naturally within ten years, further action is not warranted under the federal Superfund program. EPA's 1989 Responsiveness Summary states: "natural accumulation of cleaner sediment that would result in recovery over a reasonable time period was preferred to the potential adverse impacts of sediment confinement operations (e.g., burial of existing benthic communities). Natural recovery increases the feasibility

of sediment remedial action by enabling resources to be focused on more highly contaminated areas, and by reducing overall costs." The EPA's proposed use of subsurface data is a fundamental altering of the scope and performance criteria set forth in the ROD. It requires a ROD amendment before it can be applied to design and construction of the remediation. [150]

Response 21: *The use of subsurface data to make remedial action decisions is not a fundamental alteration of the scope and performance criteria set forth in the ROD, and a ROD amendment is not necessary. See Response 40. The 1989 ROD includes natural recovery as a component of the remedy in areas that are expected to meet SQOs within 10 years of sediment remedial action. It also notes that recovery factors will be modified based on source loading and sediment data collected during remedial design. The ESD cleanup plans for both Hylebos and Thea Foss/Wheeler-Osgood waterways include a natural recovery component, consistent with the ROD. Part of the remedial design analysis for natural recovery included evaluation of subsurface contamination and its potential to impede the long-term success of natural recovery through future recontamination. The ROD states (p 59) that the "relatively low impact of potential exposure to underlying sediments in marginally contaminated areas" is one of the factors that makes natural recovery an acceptable alternative to active remediation. This analysis was included in the determination of whether SQOs could be met within 10 years. This is fully consistent with the 1989 ROD approach of only allowing natural recovery in areas where further analysis during design shows SQOs will be met in 10 years.*

Comment 22: In the draft ESD, areas with clean surface sediment and areas predicted to recover naturally are slated by EPA for cleanup based on speculation that subsurface sediment might someday be disturbed. PCW comments that actual data conclusively demonstrates that there is low probability of subsurface sediment disturbance at the subject locations—evidenced by the clean surface sediment currently at those locations. If subsurface sediment at the subject locations was a problem, it would have already caused degraded surface sediment quality. [150]

Response 22: *EPA disagrees that existing surface sediment contamination can be used to draw conclusions about the probability and effects of disturbance. The HCC was offered the opportunity to provide evidence in the form of a scour analysis to show these areas will remain as is. The resulting analysis was fairly qualitative and had a high degree of uncertainty. In response, EPA completed its own evaluation of the waterway data to determine the possibility of subsurface disturbance. Individual stations with shallow subsurface chemical concentrations in excess of the segment natural recovery factor that were located in or adjacent to the navigational channel or in areas of higher ship activity (holding or docking areas, turning areas, marina entrances, etc.) were included in nearby cleanup areas. Stations with similar characteristics adjacent to dredging areas were also identified for active cleanup. EPA has included these additional areas in the cleanup plan to reduce the likelihood of post-remedial action recontamination and the need for additional cleanup with its associated expense, monetary and environmental. This approach addresses contaminated subsurface sediments with a high to moderate potential for exposure in the future. Contaminated subsurface sediments with a low potential for exposure would remain in place, subject to long-term monitoring.*

Comment 23: The U.S. Fish and Wildlife Service (USFWS) and the Tribe asked that when possible and/or when subsurface contamination will be exposed, that EPA require removal of these sediments from the waterways and not rely on institutional controls. These sediments, if left in place, may adversely impact natural resources or become the reservoir for recontamination. All subsurface contamination within the active channel should be removed as part of the sediment remedy. [29] [56]

Response 23: *The cleanup plans in the ESD reflect consideration of the potential disturbance of deeper subsurface contamination in the designation of dredging and capping areas, and in determining the depth of dredging areas. The cleanup of the Hylebos Waterway addresses extensive areas of subsurface contamination. The ESD addresses all area where EPA believes*

there is a reasonable potential for subsurface contamination to become exposed through natural or anthropogenic erosional forces. However, the cleanup does not address all subsurface contamination.

Comment 24: NOAA supported the concept of dredging to native sediments as a means of removing all contamination, with the caveat that the final exposed surfaces be sampled to confirm that target chemicals of concern are below the SQOs. [81]

Response 24: *EPA will require sampling to confirm SQOs are met on exposed surfaces after dredging.*

Comment 25: The WDG believes that the HCC did not perform an adequate analysis of the mechanisms that can disrupt sediments and lead to recontamination and hence the ESD does not adequately take this into consideration in developing the cleanup plan. While the draft ESD provides that contaminated sediments may remain in place if the potential for exposure is low, it fails to indicate what criteria should apply in determining the propensity of sediment areas for exposure. Absent a demonstration that contaminated subsurface areas cannot be disrupted, the WDG requests that the ESD designate all parts of the waterway with significant subsurface contamination as cleanup areas, to eliminate the potential for recontamination of the Hylebos Waterway. The WDG is concerned that the HCC has tried to downplay the significance of the potential for recontamination by comparing changes in bottom contours and relying on a self-developed physical disturbance index (PDI) that was discredited in EPA's technical review. Rather than confront the issue of the probability of future disturbances, the HCC made a perfunctory assessment by looking back in time and discussing only the subsurface contamination that has not yet been exposed. Not only does this restricted approach fail to address sediment behavior in the future, it ignores any assessment of whether surface sediments that currently exceed SQOs were derived from prior subsurface contamination. [153]

Response 25: *The Hylebos Waterway cleanup has been expanded beyond that originally proposed by the PRPs to address the potential for recontamination of clean surface sediments by contaminated subsurface sediments. The criteria EPA used for including stations with subsurface contamination in the cleanup plan are discussed in Response 22.*

This approach addresses contaminated subsurface sediments with a high to moderate potential for exposure in the future. Contaminated subsurface sediments with a low potential for exposure would remain in place. Long-term monitoring would alert EPA if some if these areas did become exposed in the future, and PRPs would be responsible for addressing any recontamination. EPA is not, however, considering future navigation dredging as one of the factors in our analysis because existing regulatory programs must consider potential for exposure of contaminated sediment and require that such sediment be handled appropriately.

Comment 26: The WDG commented that any phenomenon that can penetrate the thin surface sediment layer has the potential to redistribute subsurface contamination into the surface layer. The universe of means by which surface sediments can be disrupted cannot be predicted. However, likely causes of such disruptions include ship scour, tidal scour, vessel grounding, removal of structures, installation of structures, and maintenance dredging. Once the surface layers are disrupted, heavily contaminated sediments become exposed. Although the exact mechanisms of recontamination are not known with certainty, observations and investigations within the Hylebos Waterway indicate that recontamination is occurring. For example, the EPA contractors that performed the remedial investigation for Commencement Bay determined that ship scour and releases from adjacent dredging operations had exposed and transported contamination from subsurface sediments to the surface layer. Maintenance dredging in the lower turning basin has been determined to have spread polychlorinated biphenyl (PCB) contamination. [153]

Response 26: *See Response 25.*

Comment 27: The WDG provided specific technical examples of processes that might disturb surface sediments, including:

- Installation or removal of pilings and other structural components,
- Ship scour, including scouring caused by propeller wash, surge, and suction effects caused by inadequate under keel clearances, and
- Near bottom tidal currents, which are sufficiently strong to approach scour velocities in the middle and mouth sections of the Hylebos Waterway. [153]

Response 27: *EPA agrees that it will be important for private property owners and regulatory agencies to be aware of the potential for subsurface contamination to become exposed during future construction activities. Institutional controls to reduce the potential for future exposure of subsurface contaminated sediments have been included in the ESD. Institutional control mechanisms that may be applied to natural recovery areas or where capping is used are: existing regulatory programs that oversee in-water work on pilings installation and removal, dredging, and shoreline development and property land use restrictions.*

EPA also acknowledges the potential for resuspension of sediment due to ship scour and erosion from currents. The cleanup has been expanded to include any significant areas of subsurface contamination within or near the navigation channel in the cleanup plan. See Response 22 and Response 25.

Comment 28: WDG notes that the HCC seeks to justify leaving heavily contaminated subsurface sediments in place by asserting that recontamination is not likely because locations are either distant from currently designated areas, outside the formal navigation channel, away from docks, or have been subject to a favorable DMMP determination. By taking this approach, the HCC has avoided having to define the areal extent of subsurface contamination and thus shifted the discussion of contaminated areas to a station-by-station focus. This approach has allowed the HCC to exclude areas with heavy subsurface contamination from incorporation into sediment management areas. For example, the HCC has designated station 4102A for "no action" on the representation that it passed DMMP bioassay interpretive guidelines. However, Station 4102A, which is located near the center of the waterway, exceeds DMMP Maximum Levels (MLs) for at least nine chemicals (2-methylnaphthalene, acenaphthene, anthracene, fluorene, phenanthrene, benzo(a)anthracene, benzo(a)pyrene, benzo(b+k)fluoranthenes, pyrene, and total low molecular weight polycyclic aromatic hydrocarbons (LPAHs) and is not eligible for disposal at a DMMP site. [153]

Response 28: *DMMP ML exceedances in light of the bioassay results may still receive a suitability determination from DMMP agencies according to a clarification provided by the Corps of Engineers (Corps) (S. Sterling, pers. com. 4/11/00). However, these data are not being used for a suitability determination, rather the DMMP bioassay results were used to screen for the potential for recontamination. In this case, the bioassay results were used by EPA as an indicator of what a biological response may be if these same subsurface sediments were exposed. Given the fact the bioassays passed, EPA did not feel that 4102A warranted active cleanup.*

Comment 29: WDG comments that to implement an effective and permanent remedy, EPA needs to acknowledge that the Hylebos Waterway is an engineered watercourse that is subject to various forms of navigational and construction activities. These activities, in combination with the net circulation pattern, indicate that the potential to redistribute chemical contamination throughout the waterway is significant. The various investigations of the Hylebos Waterway show that contaminants such as polycyclic aromatic hydrocarbons (PAHs) and PCBs are widely distributed throughout most of the Waterway's surface and sub- surface sediments. For example, PCBs are distributed at concentrations consistently above 300 μg/kg in the area that begins

outside the Upper Turning Basin and extends all the way to the Eleventh Street bridge. In many cases, the concentrations of PCBs appear to increase strongly at a depth of 10 to 20 centimeters. [153]

Nordlund Boat also notes that there is compelling evidence that the PCBs have migrated from the neck area into the head of the waterway and were distributed to the sides of the upper turning basin by the disturbances to sediment caused by the turning of large ocean-going vessels. As long-time observers of activities in the Hylebos, they have personally witnessed the upper turning basin turn brown from the suspension of sediment caused by the large tugboats that turn the ships.[178]

Response 29: *EPA agrees that there are various factors that could redistribute chemical contamination in the waterway. EPA has considered this issue in designating cleanup areas. See other responses in Section 2.4.3.*

2.4.3 Limitations/Restrictions on Future Use

Comment 30: The Port of Tacoma (Port) commented that they agree with EPA's statement that "Exposure of contaminated subsurface sediments may occur during the cleanup by dredging adjacent areas, through physical processes, such as storms or ship scour, or through future dredging or excavation". However, the Port does not agree that EPA appropriately applied the criteria in selecting the cleanup plan provided in the ESD. EPA has continued to propose natural recovery and no action in areas where exposure of contaminated sediments will occur in the near future, despite several comment letters from the Port identifying areas where this would be incompatible with Port activities. Specific areas of concern include sediments in front of Parcel 4, the former Murray Pacific site, the former Wasser Winters site, and within the channel north of East 11th Street Bridge. Because of this, the estimate of 940,000 cy of contaminated sediment is inaccurate. Sediment volumes in these areas should be added to the 940,000 cy estimate in order to obtain an accurate estimate of the total cleanup volume. These areas will need to be included in the Hylebos Waterway clean up regardless of whether the Corps performs an additional, extensive dredging project. [154]

The WDG commented that removal of all significant contamination from the active stretches of the Hylebos Waterway is important if recontamination in the coming decades is to be avoided, and that the proposed cleanup for the Hylebos Waterway as depicted in the draft ESD is deficient because it allows substantial subsurface contamination to remain as a reservoir for future recontamination. One of the characteristics of industrial waterways is the propensity for unpredictable change as economic considerations change over time. As economic and land uses evolve, users of waterways must undertake various projects such as maintenance dredging and waterway development that will disrupt sediments. Although capping and natural recovery may be suitable for areas where sediment profiles are expected to be stable, they are inappropriate for the relatively shallow Hylebos Waterway which is an active port where sediments are periodically disturbed by the activities that are inherent to ports. The WDG believes that the approach of shifting the burden for determining future uses to property owners is unfair. The unspoken premise that property owners can know about future uses is unreasonable. For example, The WDG and the Tribe note that today, the Hylebos is a key element of the Port's future development plans. Four years ago, the Port had little interest in the Hylebos Waterway. Subsurface contamination within the active areas of the waterway that is proposed to be left in place will present many difficulties for future property owners as well as potentially jeopardize the remedial efforts. [153][56]

Response 30: *Based on the information developed in these discussions and application of the CERCLA remedy selection criteria, EPA has focused on minimizing the potential for future exposure of contaminated sediments, including the potential for exposure of subsurface*

contamination. EPA considered the following guidelines with regard to accommodating future land use in developing the cleanup plan:

- *All areas where surface contamination is not predicted to naturally recover to SQOs in 10 years, or where there is a reasonable chance that subsurface contamination may recontaminate surface sediments through ship scour, storm surge, or other natural or anthropogenic forces, are included in the cleanup plan.*
- *Where active remediation is needed, dredging to a clean sediment surface is required.*
- *In areas where EPA has not required cleanup under the criteria cited above, but the Port or property owners want cleanup to occur for future development purposes, EPA will make every effort to work with these parties to coordinate additional cleanup to occur at the same time as the overall waterway cleanup.*
- *EPA will actively work with the Corps of Engineers to allow the Corps to perform any needed maintenance dredging at the same time as the waterway cleanup, but it is not a requirement of the Superfund cleanup.*
- *PRPs will remain liable for subsurface contamination that becomes exposed in the future. Compliance with existing laws and, where necessary, Superfund institutional controls will be used to minimize exposure to contaminated subsurface sediments. Post-cleanup monitoring will be required to ensure the remediation remains protective and sediment recontamination is detected.*

EPA has determined that it is not necessary to remediate all contaminated sediments in Commencement Bay to ensure protection of human health and the environment. EPA will, however, work with the Port and property owners to include additional dredge volumes as necessary to accommodate future uses. Property owners requesting additional dredging may be required to pay the incremental cost increase for the work.

Comment 31: The WDG comments that although the Hylebos Waterway is an active area of an industrial port, the draft ESD provides relatively little discussion of how EPA will accommodate routine waterway activities following the cleanup. The intent expressed in the draft ESD appears to be that the HCC or successors will be excused from the requirement to remove subsurface contamination during the CERCLA cleanup on the grounds that regulatory requirements associated with dredging will ensure that proper disposal of contaminated sediments occurs. What is not discussed is that it will be much more difficult after the cleanup to find feasible disposal sites and the effect that the lack of disposal options will have on the environmental condition of the waterway. The Tribe recommends removal of subsurface contamination within the active channel, which will allow for expedited maintenance dredging in the future without the need for expensive, time consuming regulatory processes and most importantly the need for more disposal sites in Commencement Bay. [56][153]

The WDG also notes that the ESD does not explain the magnitude of the regulatory burdens associated with waterway projects that involve contaminated sediments. For example, the permitting efforts for projects involving contaminated sediments are more extensive, time-consuming, and expensive. Likewise, biological assessments involving toxic constituents are more expensive to prepare and take longer to review. Therefore, EPA should explicitly tell parties that removal of all the contaminated subsurface sediments will expedite waterway use and development by reducing the regulatory effort required to approve future projects. [153]

Response 31: *Selecting disposal sites for the cleanup was difficult, and it is not likely to be easier for future routine dredging. EPA is actively working with the Corps to include any*

needed maintenance dredging with the CERCLA cleanup. EPA has also encouraged property owners in the ESD, and will continue to encourage them during CD negotiations, to identify any dredging needed for future development activities, and to conduct such dredging as part of the cleanup.

Comment 32: The WDG comments that the draft ESD appears to accept a cleanup approach which shifts responsibility for removing subsurface contamination from the parties responsible for the contamination to other parties who will continue to use the Hylebos Waterway for maritime activities. Furthermore, while the draft ESD does not explicitly state that EPA intends to limit future activities, there are indications that it implicitly intends to do so. EPA has proposed in the draft ESD to extend institutional controls to affirmative restrictions on the use of real property in and along the waterway. The draft ESD also proposes to use city ordinances and deed restrictions (presumably imposed unilaterally under CERCLA § 106) as a means of limiting use of the waterway to reduce the prospect of exposing subsurface contamination. This approach is fundamentally wrong because institutional controls are unlikely to prevent exposure of subsurface contamination and such controls allow the responsible parties to incur a financial benefit at the expense of future users of the waterway. The Port believes that taking this approach is unwise and will prove to be an undue burden on regulatory agencies such as the Ecology, Corps, USFWS, WDFW, National Marine Fisheries Service (NMFS), and the City, because those agencies will be left with having to find ways to address contaminated sediments that should have been addressed in the Superfund process. This approach will also put the burden of finding and paying for a confined disposal site on the landowners and not on the polluters, or lead to future lawsuits between landowners and responsible parties. [154][153]

Similarly, Nordlund Boat opposes a cleanup approach for the Hylebos Waterway that leaves in place contaminated sediments at depth at concentrations that exceed the SQOs. They support the removal of contaminated sediments in the Hylebos Waterway wherever they exceed the SQOs and regardless of whether the contaminated subsurface sediments are covered by clean surface sediments. Nordlund Boat is particularly concerned about subsurface PCB-contaminated sediments that the ESD proposes to leave in place off shore of Nordlund's dock. In effect, Nordlund Boat is being held responsible for the cleanup of PCB contaminated sediment, even though there is no evidence that activities on the Nordlund Boat property contributed to the presence of PCBs. Nordlund Boat is concerned that any future in-water improvements e.g., berth deepening, replacement or extension of the dock, could be more difficult to permit and more expensive to conduct because of the presence of the PCBs.

Nordlund Boat notes that they were hoping that the benefits arising from the consent decree, such as certainty, finality, and the removal of the stigma associated with unresolved Superfund liability, might come close to matching the significant costs and uncertainties that they have endured over the last decade or more. Unfortunately, the ESD seems to promise that Hylebos waterfront property owners will continue to face significant uncertainties because of EPA's decision to allow the HCC to leave in place contaminated sediments at depth at concentrations that exceed the SQOs. [178]

Response 32: *EPA's mandate under CERCLA is to protect human health and the environment. The ESD cleanup plan does this through a combination of removal (dredging), engineering controls, and monitoring. As noted in Response 30, EPA will work with property owners to add any additional cleanup (dredging) to the cleanup plan for future development purposes at their discretion. EPA's land use policy requires that we consider a reasonably anticipated future use in our risk assessments. However, contamination may be left in place if it is otherwise a protective remedy. Nordlund's comment specifically refers to station 1113, which contained PCBs in subsurface sediment at 1.04 times the SQO, only slightly above the cleanup level. EPA does not believe that this marginally contaminated area, if exposed, would represent a human health or ecological threat. Property owners are welcome to include any additional dredging they think they need for future development plans, and are encouraged to do so if they are*

willing to pay the additional cost. If they don't do this, they will be responsible for making sure that the contaminated materials are handled in an environmentally responsible fashion when they do make future development plans. See Response 30.

Comment 33: PCW commented that adding new ESD performance criteria or site use restrictions is a contradiction to findings of the ROD. They note that EPA stated in the 1989 ROD Responsiveness Summary that permitting requirements under the Clean Water Act and the State Shoreline Management Act are in place for any dredging or other development activity that may involve excavating sediments to accommodate a new future use. Those permitting requirements do assure that sediment will be handled in an environmentally responsible fashion, and that newly exposed sediment does not pose an environmental concern. [150]

Response 33: *The ESD more clearly designates the institutional control objectives that are required for confined sediment to ensure the remedy is protective of human health and the environment. It also provides the types of institutional control mechanism that will be relied on or, in some instances, implemented if feasible to achieve those objectives. Such added details on institutional controls provided for in the ROD are no more than significant differences, which is why they are included in this ESD.*

Comment 34: The Port viewed institutional controls on land use along the Hylebos Waterway as excessive and felt that "[e]xisting federal, state, and local regulations and permit requirements are more than adequate to safeguard the environment from activities associated with future use." The Port made the case that institutional controls represents a penalty to non-polluting landowners that would escalate the cost of doing business in the tideflats and be viewed a detriment to future businesses or developers. The Port further stated that "[a]s a major landowner in and along the Hylebos, [it] can not accept controls that would encumber the continuation of existing uses or limit future uses of its property. We request that this change be deleted from the ESD." [154]

Response 34: *Land use restrictions would have limited use as part of the remedy and would be applicable only in those areas where natural recovery, or capping are used as the remedy. Any area designated as a disposal site would also be subject to some institutional controls. It is anticipated that such restrictions would only be used where it is necessary to preserve the long-term effectiveness of a remedy for a specific area. As an example, no future dredging would be allowed at a CAD site. Some restrictions on the depth of dredging may be included in areas where a cap is constructed so that confinement of underlying contaminated sediment is maintained over time. EPA expects that such protective measures can be addressed through existing regulatory land use regulations and permits. Separate agreements may be required where existing regulations may not be sufficient to ensure the remedy remains protective. However, if land use restrictions are put into place, such reserved uses will only be applicable if the contamination stays in place. Nothing about a land use restriction will prohibit a landowner from removing the contamination such that all restrictions could be eliminated.*

2.4.4 Efforts to Inform Property Owners

Comment 35: The Port and WDG note that the HCC's 1995 [sic] property owners survey of future uses was inadequate. They request that EPA revisit the issue of future uses with property owners along Hylebos Waterway, to get a more accurate picture of future use. The Port states that EPA's view of future use does not include likely long-term uses. EPA should perform it's own survey that provides owners with full disclosure of how leaving contaminated sediment on their land will effect current uses, future development, and property values. EPA should also identify and notify impacted parties of the additional costs that would be borne by landowners and by federal, state, and local permitting agencies to address contaminated sediment that EPA had left behind. EPA should identify how and when those landowners and permitting agencies will be able to recover costs from the polluters who caused the contamination that impacted their current and future development and use. The WDG notes that the HCC's survey of future uses asked

property owners to provide information only for those projects currently underway or for which the owner intended to submit permit applications prior to June 1999. The HCC did not ask property owners to provide information regarding the projects that might occur after 1999 or to describe navigation needs that will require maintenance dredging in the channel and adjacent areas. The draft ESD is founded on a view of future use that is very short-sighted.[154] [153]

The WDG comments that the HCC's inadequate effort to inform property owners and the public about the extent of subsurface contamination has resulted a proposed cleanup that will leave substantial areas of the waterway unaddressed. Although the draft ESD invites current property owners to include additional dredge areas if future plans could expose contaminated sediments, no mechanism has been provided to ensure that property owners have actually been informed that sediments on or near their properties are contaminated at depth. Furthermore, the draft ESD does not make it clear that property owners can add contaminated sediments to the cleanup at no charge to themselves provided they are not responsible for contaminating the sediments. Based on the draft ESD, it appears that no party who is not a member of the HCC has requested an expansion of the cleanup as a result of the HCC's alleged communication efforts. [153]

Response 35: *Aside from property owners survey in 1994, EPA has held periodic meetings for Hylebos property owners to apprize them of the status of the cleanup plan and implications for their property. Property owners have had ample opportunity to review the cleanup plan and ask EPA questions. As indicated in response to comments 30 & 32, property owners will have additional opportunity to incorporate development dredging into the CERCLA remedial design.*

Comment 36: The WDG states that EPA has not explained the legal implications associated with leaving contamination in place. For instance, legal protections granted to settling parties may preclude cost recovery against them by parties forced to remove and dispose of contamination at a later time. Similarly, property owners can be held liable if their activities inadvertently expose the contamination that EPA has allowed to remain behind. In this respect, the draft ESD does innocent property owners a disservice by implying that they have an opportunity to address contamination in areas that may affect their future activities yet failing to disclose where these areas are located. [153]

Response 36: *See Response 30.*

2.4.5 WRDA/Corps Dredging

Comment 37: Ecology noted their appreciation for the excellent work EPA has done communicating with the Corps and other agencies regarding the Water Resources Development Act (WRDA) sponsored navigation dredging of Hylebos Waterway. Ecology encouraged EPA to continue with this effort and noted their commitment to helping in any way to accomplish the more complete remedy that would be realized through a combined navigation and remedial dredging. If the combined navigation and remedial dredging does not occur, the current shoaling hazards to navigation would remain, navigation dredging would continue to be hindered by contamination at depth and, we face the prospect of piece-meal cleanups where future dredging projects need to address contamination at depth (or contamination waiting for natural recovery). For these reasons, the remedy must include the navigation dredging areas affected by contamination (at the surface or at depth) whether or not the WRDA funding becomes available. This will be an important part of Ecology's determination to continue support of the ESD. [80]

Ecology also commented that changes in channel geometry due to navigational dredging and/or new uses of property may affect EPA's expectations concerning natural recovery or stability of existing caps. This needs to be reviewed as EPA makes progress on WRDA sponsored navigation dredging. [80]

PCW further commented that WRDA environmental dredging could address the subsurface sediment issues raised by EPA without any changes to the existing ROD. [150]

Response 37: *The 1989 ROD Responsiveness Summary clarified that CERCLA actions were not intended to address navigational dredging. EPA is fully supportive of a navigational dredging project and will continue to coordinate with the Corps and private parties to encourage efforts to combine navigational dredging needs with the Superfund cleanup, if it can be done without delaying the Superfund cleanup.*

If a combined project is not done, EPA will work with Corps to ensure that any caps do not interfere with, or would not be compromised by, future navigation dredging. As far as new uses of the property, see Responses 30 - 35.

Comment 38: The WDG noted that although maintenance dredging was conducted at frequent intervals prior to the listing of Commencement Bay on the National Priorities List (NPL) in 1981, only a few small and localized private maintenance dredging projects have been conducted in the Hylebos Waterway since that time. The Corps has stated that maintenance dredging in the Hylebos Waterway is being deferred based on an understanding that EPA-lead CERCLA activities would result in the removal of contaminated sediments in areas that will be affected by maintenance dredging. Maintenance dredging can be expected to affect the navigation channel and adjacent areas. In addition to channel maintenance conducted by the Corps, private parties need to dredge the portions of the waterway in the vicinity of their properties to maintain navigation access. Dredging projects not only incur the risk of exposing contaminated sediments, they will generate contaminated dredged material that will need special disposal. [153]

PCW commented that EPA states in the Responsiveness Summary to the 1989 ROD that CERCLA actions do not cover maintenance dredging and areas that may require maintenance dredging or navigational dredging actions will be addressed outside of CERCLA by the substantive and procedural requirements of existing regulations such as the Clean Water Act Sections 401 and 404, hydraulics permits, shoreline substantial development permits, and DMMP. [150]

Response 38: *The cleanup plans contained in this ESD comply with the requirements of the ROD and the 1997 ESD. The ROD anticipated that the CERCLA cleanup would not address areas solely because they may require maintenance dredging in the future. If future dredging projects encounter contaminated sediments, they will have to be disposed of in accordance with DMMP and other applicable laws and guidelines.*

Comment 39: MWAC believes that finalizing the ESD will negatively impact ongoing efforts to explore the viability of proceeding with a dredging project in the Hylebos Waterway under Section 312 of WRDA. A WRDA action for the Hylebos Waterway offers numerous environmental and navigational benefits, including the potential for conducting a larger dredging effort and more comprehensive cleanup, restoring full commercial navigational draft in the waterway, and enhancing economic development in the waterway. [57]

Response 39: *EPA does not believe that delaying the ESD or making final decisions on how the Hylebos Waterway should be cleaned up would be good for the environment or the community. Likewise, EPA does not think making a final decision necessarily will adversely affect ongoing discussions about a potential WRDA project. EPA has had numerous discussions with the Corps regarding the potential for a WRDA dredging project in the Hylebos Waterway, and both EPA and the Corps agree that finalizing the ESD will have no impact on the Corps' ability to do a WRDA project. The Corps' ability to do a WRDA project is more dependent on the availability and willingness of a local sponsor, the availability of funding, and timing issues, than it is on the ESD.*

2.5 Fundamental versus Significant Changes to the ROD

Comment 40: The ESD reflects fundamental alterations to the CBN/T ROD with respect to the scope, performance and cost of the remedy. Thus, CERCLA and the NCP require a ROD amendment(s) rather than an explanation of significant differences. 40 CFR Section 300.435. [148][150]

(a) Comments on fundamental alterations of scope of the remedy:

The ESD and the Hylebos EPA Cleanup Plan inappropriately, and without justification, depart from the ROD's "problem area" determination and conclusion that remediation should be conducted separately in each "problem area." The ROD should not be so fundamentally altered. Indeed, the ESD and the EPA Cleanup Plan themselves demonstrate the appropriateness of the ROD's conclusion that the Hylebos should be addressed in separate "problem areas." [148]

The differences in the ESD's draft cleanup plan fundamentally alter the selected remedy for Hylebos Waterway with respect to scope because of the elimination of the Problem Area limits in the ROD; addition of habitat function and enhancement of fisheries resources as a cleanup goal; and addition of subsurface sediment.[150]

(b) Comments on fundamental alterations of performance of the remedy:

The differences in the ESD's draft cleanup plan fundamentally alter the selected remedy for Hylebos Waterway with respect to performance because there is: near elimination of natural recovery from the remedy; and application of surface sediment SQOs to subsurface sediment.[150]

The ESD accurately observes that "[t]he ROD recognized that the estimated volume of sediments needing active remediation would be refined during remedial design phase and that both volume and costs 'are anticipated to change accordingly.'" ESD, p. 5 (quoting the ROD, emphasis provided). The expansion of the Hylebos sediment volume from the ROD's estimate of 448,000 cy to the ESD's estimate of 940,000 cy (or perhaps even an estimated total 1.3 million cy) cannot be characterized as a "refinement." The ESD's more than doubling (or perhaps trebling) of the sediment volume reflects drastic and inappropriate departures from the ROD through the application of various criteria and EPA decisions to which the HCC has previously objected. [148]

The volume for Hylebos Waterway should be corrected to include the 175,000 cy of wood-waste related dredging mandated by EPA and currently proposed by the WDG. EPA's "refined estimate" of 1,115,000 cy (including wood waste related cleanup) is at least 667,000 cy greater than the ROD volume of 448,000 cy for Hylebos Waterway. The draft ESD represents a volume that is 2.5 times larger than the ROD. As such, the draft ESD does not represent a "refined estimate" of the ROD volumes, but rather a fundamental change in the scope of the cleanup, based on near elimination of natural recovery from the remedy, as well as addition of subsurface sediment in areas that fully satisfy ROD cleanup requirements. These fundamental changes cannot be addressed by an ESD, but rather require a ROD amendment and evaluation of the nine CERCLA criteria in order to comply with the NCP. On the other hand, the expanded volume could be dredged by a WRDA environmental dredging action without any changes to the existing ROD. [150]

(c) Comments on fundamental alterations of the cost of the remedy:

Among the several concerns the HCC expressed about the increase in cost of the Hylebos Waterway cleanup from the ROD estimate of $11,080,000 to the draft ESD estimate of $39,063,000, specific concerns include:

- The ESD's more then trebling (and perhaps quadrupling, or more) of the remedy costs reflects a drastic and inappropriate departure from the ROD. [148]

- One significant cost item not included in the draft ESD, that is part of the ROD estimate, is the sampling and analysis required by EPA as part of the post-ROD pre-remedial design program. This cost is currently over $10,000,000 and expected to be $11,000,000 by completion of the pre-remedial design this year. [150]

- The current cost estimates also do not address significant potential costs associated with mitigation and land acquisition. There is currently much uncertainty associated with the mitigation that might be requested by NMFS and USFWS under the ESA and consequently there has not been a full and complete delineation of mitigation scope, performance or cost in the draft ESD.[150]

The costs associated with EPA's selection of disposal sites for Hylebos Waterway is also in direct contradiction to EPA's final ESD for PCB cleanup levels in Commencement Bay, issued July 1997. In the 1997 ESD, EPA selected a PCB cleanup level that would result in a total Hylebos cleanup volume of 508,000 cy at a cost of $18 million. EPA rejected a more stringent cleanup level, such as 300 μg/kg PCBs, because (1) it would not significantly lower human or ecological risk from Hylebos sediments; (2) it would result in substantially increased cleanup costs to $31 million; (3) it would increase the volume of sediments to be remediated by 70 percent to 891,000 cy creating the need for a second disposal site; and (4) it would result in greater disruption of aquatic organisms during dredging (See July 1997 ESD, pg. 24, Summary of the Comparative Analysis of Alternatives). These same concerns counsel against the currently proposed ESD. EPA has not provided an adequate basis for a total reversal from the positions it held in the 1997 ESD (891,000 cy and $31 million cannot be justified) to the current draft ESD (940,000 cy and $39 million is justified). [148][150]

Without inclusion of all of the cost categories defined by the ROD, including fully defined mitigation and land use costs, there can be no thorough cost totaling for the recommended remedy, no cost effectiveness evaluation, nor complete evaluation of the nine CERCLA criteria. With regards to costs, the ESD is premature and appears to be in violation of the NCP. [150]

Response 40: *The NCP provides that significant differences in the remedial action with respect to scope, performance, or cost that significantly change but do not fundamentally alter the remedy selected in the ROD should be documented in an explanation of significant differences (ESD). 40 CFR §300.435(c)(2)(i). ROD amendments, as provided in the NCP, should be proposed if the differences in the remedial action fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost. 40 CFR §300.435(c)(2)(ii). This ESD is consistent with the NCP. None of the basic features of the remedy selected in the 1989 ROD has been fundamentally altered, e.g., site use restrictions, source control, natural recovery, sediment remedial action, and monitoring. The information that has been developed through the pre-remedial design sampling and analysis are consistent with, and were expressly anticipated in the ROD. The increases in volume and cost are significant. However, the greater volume and cost has not led to a change in the remedial action objectives or the remedial technology selected as described in the ROD. The ESD is also consistent with EPA guidance regarding documenting post-ROD decisions. "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents," OSWER 9200.1-23P, July 30, 1999.*

The ROD anticipated that the areal extent of contamination would be refined during remedial design. The new data indicates that there are larger areas requiring remediation than originally thought in the ROD; a significant change, but not fundamental. A group of parties agreed to conduct pre-remedial design activities in a comprehensive fashion throughout the Waterway and there were many technical and practical reasons to conduct the studies comprehensively. The ESD describes the specific manner in which the ROD is being implemented at each Waterway. Future negotiations or enforcement actions will determine who will perform the cleanup and how.

The ESD is not adding habitat function and enhancement of fisheries resources as a cleanup goal, the ROD stated that habitat function and enhancement of fisheries resources were part of the overall cleanup objectives. The ESD is not eliminating natural recovery as a part of the remedy. Approximately 20 acres in the Hylebos Waterway and 20 acres in the Thea Foss and Wheeler/Osgood Waterways are designated natural recovery areas.

See Responses 20 - 22 for discussion of subsurface contamination and remediation areas.

The increases in volume of contaminated sediment and concurrent increases in the estimated cost for the remediation are significant differences from the selected remedy. However, such increases in volume and cost has not changed the selected remedial approach of confinement, nor other basic feature of the selected remedy.

Sediment contaminated with wood debris at the head of the Hylebos Waterway that is being addressed by the Department of Ecology under a state cleanup agreement have not been added to the volume requiring cleanup under the ESD.

3.0 THEA FOSS WATERWAY

3.1 Concerns about the Cleanup

3.1.1 Source Control

Comment 41: One commentor raised several technical issues with the set up and development of the Water Quality Analysis Simulation Program (WASP) model and the subsequent conclusions about source control and recontamination that the City has based on the modeled outcomes. These technical issues are as follows: (1) Stormwater loading terms are underestimated and thus bias source control goals and recontamination potential toward less conservative estimates. (2) As presented in the Round 3 Report, the WASP model has levels of potentially recontaminating pollutants (e.g., bis(2-ethylhexyl phthalate (BEP), phenanthrene, pyrene, dibenz(a,h)anthracene) that generates a high level of uncertainty and raises important and unresolved questions about natural recovery and recontamination. (3) The commentor believes that a high-resolution hydrodynamic model, other than WASP, would provide less uncertain estimates for source control goals and recontamination potential, particularly if more recent data were used to assess particulate phase loads to the waterway. [151]

Response 41: *EPA agrees with the commentor that stormwater loading terms used by the City in the WASP model are underestimated. However, EPA does not believe that running another model would eliminate uncertainties with respect to source control goals. As early as 1995, during development of the Round 2 Data Evaluation Report, EPA stated our concerns about loading terms to the City and began asking about calibration of WASP with dissolved phase data. Theoretically, heavier PAHs and BEP should be primarily associated with a particulate (i.e., solid phase) in the waterway. However, the City still chose to use dissolved-phase loading in its calibration of the WASP model. The consequences of the preference for dissolved-phase loading are (1) the model does not calibrate well for the PAH and BEP compounds toward the head of the waterway where loads are significant and (2) the recontamination potential from*

some sources is under-predicted. For these reasons EPA recalculated particulate loads in accordance with the Model Toxics Control Act (MTCA) statistical model. Although the results are not as sophisticated as the efforts conducted by the City, they provide cause for EPA to be conservative by requiring additional stormwater source control, stormwater source control monitoring (under their National Pollution Discharge Elimination System (NPDES)permit that addresses stormwater discharge), and post-remedial monitoring of the waterway.

EPA will likely not run a more sensitive model than WASP because the re-calculated loads are conservative enough to require the City to address stormwater control. at the same level that would be required even if a more sensitive model with larger particulate loads more accurately estimated recontamination potential.

Comment 42: One commentor noted that the load as reported in the Round 3 Report for the stormwater discharge to Superfund Sediment Management Area (SSMA) 5 was not based on current data. Specifically, stormwater sediment trap data from SD230 is not represented in the WASP loading term for that discharge to Segment 5 of the waterway. The commentor directs EPA to use this data in its final evaluation of source control for this segment of the waterway. [166]

Response 42: *Even though the Round 3 Report does not identify a significant sediment load to the waterway for SD230, EPA, Ecology and the City are working with various data (sediment trap, whole water, catch basin and sump) to trace sources and identify effective locations for stormwater treatment. In response to this comment, it is important to note that evaluating the nature of contributing sources to municipal stormwater (e.g., flow from privately-owned and maintained drains or infiltration from groundwater through cracks or joints in the line) is an equally critical part of the decision about what constitutes effective treatment on a given stormdrain.*

Comment 43: Kennedy/Jenks and Shell Oil stated that the evidence is that municipal stormwater is the primary source of existing contamination in surface sediments and the likely source of recontamination throughout the waterway. A remedy selected without acknowledgment of this fact will fail. A remedy selected without the City's commitment to AKART analysis for controlling high molecular weight PAH (HPAH) and phthalate loads from stormwater will also fail. [157][159]

Response 43: *EPA and Ecology are working with the City to establish a level of stormwater control that will reduce phthalate and HPAH loading from stormwater to the waterway. As indicated by EPA's December 29, 1999, comments to the City on the Round 3 Report and in the Administrative Record for this ESD, the lack of certainty about stormwater loadings to the waterway is causing the agencies to be conservative in their assessment of the level of control needed to prevent recontamination of the waterway.*

Comment 44: Kennedy/Jenks commented that BEP is the greatest concern for recontamination and the principal source is municipal stormwater. The proposed remedy does not address BEP contamination. Additionally, municipal stormwater drains account for observed concentrations of PAHs in recent sediments. [157]

Response 44: *As stated in comments on the Round 3 Report, EPA believes that BEP is loading to the waterway in municipal stormwater flow. Dissolved BEP tends to adsorb to particulates, as do the HPAHs for which recontamination is predicted. EPA believes that reductions in BEP and HPAHs in stormwater are necessary , thus additional source controls on stormwater discharge to Thea Foss will be required. Both Ecology and EPA are working with the City on an action plan that includes investigation and pilot testing of structural stormwater controls that may be appropriate for the stormdrains or sub-basins. EPA and Ecology have also asked the City to develop an implementation schedule for improvements and control work. Other stormwater*

controls (e.g., continued source tracing in sub-basins, source inspections, compliance and education, ordinance for privately-maintained connections to the municipal storm lines) will add to the benefit of structural or treatment best management practices (BMPs).

Other sources of recontamination (e.g., marinas) are not as easily controlled as stormwater and recontamination potential from these sources must also be taken into account. Monitoring is an inherent component of the remedy to continue to assess the effectiveness of source control.

Comment 45: Kennedy/Jenks provided a lengthy and detailed review of source loading terms presented in the Round 3 Report as well as an alternative calculation of source loading terms for municipal stormwater. Kennedy/Jenks identifies three particular concerns regarding the limitations on the data that the stormwater loading terms used in the City's Round 3 Report are based on. These concerns are:

- Sampling techniques used by the City did not capture the "first flush" event even though EPA guidance indicates that, typically, runoff from the first hour of a storm can carry more pollutants than a city's untreated sewage flow in that same period of time.

- The data used by the City to determine stormwater loads came from sampling conducted during wet-weather when pollutants have little time to accumulate in storm lines compared to summer and early fall storm events.

- The set of data upon which stormwater loads are based is very limited, consisting of 5 to 11 data at most for base/storm flow conditions.

Kennedy/Jenks then had the WASP model re-run with their revised stormwater loads. The revised model produced two notable results:

- With current levels of stormwater source control (i.e., stormwater loads for HPAH and BEP based on sediment and solids concentrations), the waterway would recontaminate to levels very close to current conditions.

- Without the stormwater PAH source, the head of the waterway would not require remediation. [157]

Response 45: *From information presented in Appendix G-II of the Round 2 Report (Table GII-2A), it appears that first flush from the upper half of 237A/B was captured in about half of the storms sampled. First flush from the lower half of these basins was likely discharged before either (a) personnel reached the sampling locations and/or (b) the tide went out. For smaller basins with times of concentration less than an hour (i.e., 245, 230, 254), sample collection did not begin within the first hour of any of the four storms sampled, so no first flush data are included in the estimated loading terms. EPA, Ecology and the City are discussing the that use of automated samplers to address this data gap.*

EPA concurs that the data used by the City to determine stormwater loads came from sampling conducted during wet-weather when pollutants have little time to accumulate in storm lines compared to summer and early fall storm events.

EPA concurs that loading estimates for stormwater are based on a very limited amount of data. EPA addressed this issue in comments provided to the City for both the Round 2 and Round 3 Reports. Much of the available data were qualified, and the loadings for some chemicals were calculated from as few as two samples (storms 7/10/96 and 10/18/96). For example, loads from storm drains 237A/B were calculated from a limited number of samples that were analyzed using ultra-low detection limits for LPAHs, HPAHs, pesticides, PCBs, mercury and

hexachlorobenzene, but not phthalates. The Round 3 Report indicated data with ultra-low detection limits were used to estimate loads for acenaphthylene (an LPAH) and hexachlorobenzene. Sediment trap data were used to estimate loading terms for PCBs, DDT, ideno(1,2,3-c,d) pyrene and dibenzo(a,h) anthracene (both HPAHs). Estimated loads for all other chemicals were based on whole water data with standard detection limits.

EPA agrees with the conclusion that sediments will recontaminate without additional stormwater controls. EPA, however, strongly disagrees with the assertion that without stormwater as an ongoing source of PAHs, the head of the waterway would not require remediation. Remediation would still be required to clean up the high levels of BEP, other phthalates, PAHs and mercury present in sediments at the head of the waterway. See Response 44.

Comment 46: Kennedy/Jenks provided an alternative AKART analysis to that submitted by the City in Appendix W to the Round 3 Report and in response to the performance criteria for "approvable AKART" and additional source control for stormwater in the ESD. Briefly listed, Kennedy/Jenks' suggested additional steps to stormwater controls are:

a. Where feasible, allow stormwater to infiltrate to the ground for aquifer recharge thus reducing direct loading to waterway sediments.

b. Do additional sampling to determine the nature of stormwater loads (dissolved versus particulate phase) and best application of treatment at sub-basin level; although the performance and efficiency of sub-basin treatment is questionable due to "ubiquitous" nature of the pollutants. [157]

Response 46: *It may be that filtration would be feasible on municipal sub-basins or at other source sites as well; however, filtration is generally space-intensive, depending on local soil permeability. As an example, one application for municipal stormwater treatment at a site in Bellevue, required two one-half acre filters for a sub-basin of approximately 250 acres. Although Appendix W to the Round 3 Report indicates that city-owned space is very limited throughout the basin, making it difficult to apply infiltration on a large scale, small sub-basins, or portions of sub-basins may be treatable and should not be discounted as Ecology, EPA and the City continue to address stormwater treatment.*

With respect to additional sampling, the City has proposed additional sampling for stormwater pollutants in both dissolved and solid phases. Ecology is currently working with the City toward approving a stormwater sampling and analysis plan (SAP) that addresses both whole water and in-line sediment traps. In addition, the City's recently proposed sampling project articulates the City's commitment to Ecology's and EPA's expressed concerns based on the quality and lack of particulate phase stormwater data.

Comment 47: As an alternative to the City's proposed AKART analysis, the commentor suggests stormwater treatment in either of two possible ways would be effective to prevent recontamination from stormwater. The first suggestion is to combine discharges for storm drains 237A/B, 230 and 235, treat it chemically, and dam the head of the waterway to add sedimentation to the combined discharge. The second suggestion is to combine the discharges for storm drains 237A/B, 230, 235 and release the combined discharges to a series of weirs installed in the waterway at the outfall for additional sedimentation, then use a wetlands constructed at the head of waterway for polishing. In detailing the basis for the alternative AKART analysis, the commentor expressed the following additional issues:

a. Kennedy/Jenks doubts that the non-structural BMPs currently in-place or being implemented on sub-basins will provide enough source control to prevent recontamination from municipal stormwater discharges. Thus, additional treatment and structural control are needed.

b. Kennedy/Jenks states that the City's presumption that the primary loads of chemicals of concern are in the dissolved phase is critically flawed as are the source control conclusions based upon it.

c. Kennedy/Jenks' comparison of the City's AKART analysis in the Round 3 Report with a previous report revealed an additional source of uncertainty in the WASP model. [157]

Response 47: *EPA appreciates Kennedy/Jenks reevaluation of stormwater treatment technologies. EPA is issuing the final ESD with performance requirements for stormwater source control which include conducting and submitting an evaluation of structural controls and a schedule for controls .*

EPA does not concur with the City's presumption that the primary loads of chemicals of concern are in the dissolved phase and is requiring additional source control for stormwater. It is most likely that a sequence of structural and/or treatment BMPs, placed strategically in each of the major stormdrain basins, will be more effective at controlling stormwater load than is predicted in the City's analysis. While correct sizing and location of structural and/or treatment BMPs is anticipated to significantly affect stormwater loads to the waterway, it is equally important to note that it is the sum of all stormwater controls, including municipal code for maintenance of private storm lines contributing to the municipal line, that will determine source control effectiveness for stormwater.

Comment 48: The City believes that the unquantified load presented in the Round 3 Report poses a greater source of recontamination than municipal stormwater. The City contends that ongoing discharges of coal tar and creosote from upland sources must be controlled and that the former MPS operation may well be contributing residual BEP to the waterway. [156]

Response 48: *EPA does not agree with the magnitude of the unquantified load presented by the City because so much uncertainty is associated with various aspects of the loading terms for stormwater. During the development of the Round 2 and Round 3 Reports, EPA, Ecology and the City had many discussions about solids normalization, model dynamics, partitioning coefficients, qualified data and detection limits. Each assumption and choice factored into the stormwater loads used in the model also carried limitations and some amount of uncertainty with it. The City pursued its decisions regarding the estimation of stormwater loads and ultimately needed a very large "unquantified source" to make the model balance. While some portion of the "unquantified source" may well be associated with assumptions made for other source load terms to the model, EPA believes that some larger amount of the unquantified portion of total load is, in fact, due to the way stormwater loads were estimated. Appendix L of the Round 3 Report acknowledges an uncertainty of 2 to 3 times for stormwater loads. The stormwater loads estimated by EPA (12/29/99) and other commentors are simply attempts to gain perspective of stormwater loads based on additional empirical data and other reasonable and conservative assumptions.*

While the City may disagree with others over the theoretical chemistry (e.g., partitioning factors) and the fate and effects of various contaminant sources to the waterway, it is the position of EPA that additional source control work for stormwater is necessary. EPA agrees that source control at other locations about the waterway (e.g., west bank seep at the Tacoma Coal Gas site, Picks Cove), including some sources contributing to municipal stormwater, is also needed. As noted in response to Comment 54, if BEP concentrations in SD 245 remain high once the MPS cleanup is complete, additional source control must occur.

Comment 49: The City believes EPA is placing undue emphasis on stormwater as a source of recontamination because stormwater outfalls are visually obvious as compared to other sources. [156]

Response 49: *EPA disagrees. Emphasis on stormwater source control is not undue given that this is a major confirmed ongoing source to the waterway. Current stormwater source investigations show there are ongoing sources of PAH, other than the Tacoma Coal Gas site, and sources of BEP, other than the former MPS site, discharging to the waterway through at least some of the stormdrains.*

The City has so far failed to acknowledge that at least some of the "unquantified" load needed to calibrate the WASP model could be associated with the limits of the data, extrapolations, assumptions, choices and decisions made in developing the stormwater load estimates. An assumption that the unquantified load is an amalgam of historic spills, groundwater infiltration to storm and seeps at the head of the waterway is not justified given the Round 3 Report places precision of the estimated stormwater loads at 200 to 300 percent. EPA does not agree with the assumption that all "unquantified load" is from sources other than stormwater that either have been, or can be, easily controlled.

Comment 50: The City asserts that Tacoma stormwater is no different than stormwater in other municipalities and stormwater discharge to Thea Foss is not terribly different from other Commencement Bay waterways. [156]

Response 50: *EPA does not dispute the City's contention that constituents found in Thea Foss stormwater discharge are similar to those found in other municipal stormwater discharges; however, the City's stormdrains discharge into a NPL site with contaminated marine sediments. In order for the Superfund remedy to be effective, pollutants from stormwater discharges must not be allowed to recontaminate sediments in the waterway.*

Comment 51: The City stated that comparison of stormdrain sediments to SQOs is not appropriate because empirical data and theoretical partitioning calculations indicate HPAHs and BEP do not remain in particulate phase. When stormwater enters the waterway, these pollutants desorb and are carried out the waterway in the dissolved phase. [156]

Response 51: *EPA is not using stormwater sediment trap data in direct comparison with the SQOs. As discussed in comments on the Round 3 Report (11/16/99 and 12/29/99), EPA does not agree with model's chemical partitioning or other aspects of the stormwater loading terms. EPA believes the empirical data of surface sediment quality and stormwater sediment trap data represent higher particulate phase loading from stormwater for certain HPAHs and BEP than indicated in the Round 3 Report.*

Comment 52: Tar seeps on or adjacent to the Tacoma Coal Gas site are a source of greater recontamination potential than stormwater. [156]

Response 52: *EPA believes that the Tacoma Coal Gas site represents a historical source of contamination, and that stormwater represents an ongoing source of contamination. Both historical and ongoing sources must be controlled.*

EPA is aware of the presence of seeps in the waterway or along the west bank next to the Tacoma Coal Gas site. Ecology is working with signatories of an Administrative Order under the state's MTCA on a plan to remove contaminated source material along the west bank. EPA believes that once saturated material in and at the foot of the bank are removed, a cap in the west bank area should be sufficient to prevent recontamination from this source. Because the bulk of contamination at the west bank will be removed, any shallow groundwater discharge through this area will no longer be a pathway to the sediments, EPA and Ecology believe that ongoing contamination to the waterway from the Tacoma Coal Gas site will be controlled.

Upland "hot-spots" of contamination at the Tacoma Coal Gas site do not appear to represent current or ongoing sources of contamination to the waterway. Ecology is also working with

WDOT and the City to complete construction of remedy to the "DA-1 Line" which is also associated with the Tacoma Coal Gas site. This has been a contributing source of non-aqueous phase liquid (NAPL) to stormdrain 237A and once this remedy is in place another source to the waterway will be controlled.

This leaves NAPL-saturated sediments at depth beneath the waterway as uncontrolled with respect to their potential to recontaminate the surface sediments. The cap will be designed to address potential PAH seeps from the NAPL-contaminated sediments.

Comment 53: The former Tacoma Coal Gas operation is typical of similar sites nation-wide with respect to the combinations of PAHs seen offshore and thus source control of this site is a bigger issue for recontamination than EPA has allowed. [156]

Response 53: *EPA agrees that the former Tacoma Coal Gas site is typical of such sites nation-wide and has contaminated the Waterway. The NAPL adjacent to and under the Waterway, particularly the PAH-contaminated seeps migrating from it require consideration in the design of the cap that will effectively confine the contamination and not allow recontamination of the surface of the cap. There are other sources of contamination to the Thea Foss Waterway in addition to the Tacoma Coal Gas site (e.g. stormwater) that must also be dealt with. Thus, given that sediments at the head of the waterway will be cleaned up, the concern for recontamination must be addressed from each of two perspectives. From areas adjacent to and discharging into the waterway, EPA's position on source control and surface sediment contamination are clearly documented in the Administrative Record. In the waterway, EPA is not in contention with the City or other PRPs with regard to the source of NAPLs and contamination at depth. Based on available evidence, it does appear that much additional source material was deposited in the middle of the waterway as a result of past practices. However, from the perspective of cleaning up sediments, the original source(s) of seeping NAPL is of less concern than the paths by which NAPL reaches surface sediments from depth. This is a matter of adequate remedy design rather than an issue of "source control" per se. EPA's position regarding confirmed and ongoing sources has been clarified in response to other comments from the City and the public.*

Comment 54: The former MPS operation on stormdrain 245 is a substantial source of BEP. [156]

Response 54: *EPA does not argue that the former MPS site has been a source of BEP to the waterway, however, MPS has not been the sole source of BEP loading to the waterway. Consequently, stormwater source-tracing efforts must continue as must pilot testing for BMPs to control this contaminant. Ecology is currently overseeing cleanup at the MPS site. Once cleanup is complete, the City has agreed that the storm line between MPS and the outfall should be thoroughly cleaned and resampled. If BEP concentrations remain high in stormdrain 245, then additional control for BEP on this line must be found. EPA and Ecology expect that the City's Stormwater Action Plan will address additional controls.*

Comment 55: The City believes that BEP is less toxic than the SQO of 1,300 ppb would indicate and suggests the DMMP screening level of 8,300 ppb would be more appropriate. [156]

Response 55: *The City contends that the current SQO for BEP is lower than what will actually impact benthic infauna or exhibit toxicity in laboratory bioassays. EPA has agreed with the City that biological monitoring of the remedy will be used to evaluate the toxicity of BEP if it reaches or exceeds the SQO. This is consistent with the ROD, which allows that an SQO may be exceeded but not necessarily initiate remedial action unless biological tests also fail.*

3.1.2 Recontamination of Cleanup Areas

Comment 56: Several commentors spoke to the timing and adequacy of source control with respect to construction of any sediment remedies. USFWS commented that source control should be implemented before remediation at the risk of recontamination. The Tribe commented that it is not their understanding that source control is fully implemented or yet effective to prevent recontamination. In addition, the Tribe maintains that it is necessary to implement stormwater treatment, particularly for stormdrains 237A/B, before sediment cleanup. They also expressed concerns about stormwater source control and its recontamination potential and the need for EPA to establish benchmarks for measuring source control effectiveness. [28][29][56][39][82][166]

Response 56: *From the bay-wide perspective, the entire process of source control was set forth in EPA's 1989 ROD and describes how source control is, in fact, an ongoing effort. At this point in the source control process at the Thea Foss and Wheeler-Osgood waterways, we are ending the pre-remedial design phase and entering the design phase during which the ROD allows source control will continue. In this portion of the source control process, EPA and Ecology are at the point where (1) remedial design can begin but, (2), we must be certain of the outcome on source control issues not yet resolved before starting the remedial action.*

With respect to stormwater source control, EPA is requiring the City to submit an approvable plan for controls and/or treatment to Ecology and EPA, to address source load reduction that cannot be achieved by the upstream source control actions the City has already committed to finish before sediment cleanup begins. Unlike most other source control technologies, stormwater control is an evolving area. Ecology and EPA will ensure that all practical and feasible measures will be taken on the stormdrains prior to beginning remediation.

Baseline monitoring and SQOs will be the benchmarks against which source control effectiveness will be measured.

Comment 57: WDFW commented that as EPA and Ecology work together on implementation of additional source control actions at the head of the waterway, they must give full consideration to the effects of those actions on habitat. [28]

Response 57: *EPA agrees and will ensure that source control actions give consideration to the effects of those actions on habitat.*

Comment 58: USFWS expressed concern that an unproven remedy such as sorbent pads will not provide adequate control for NAPLs that are at depth in the sediments. In turn, this would lead to recontamination, from sediments rather than surface sources, and thus to needing additional disposal with which USFWS generally disagrees. [29]

Response 58: *See Response 60.*

Comment 59: The City states its agreement with EPA and Ecology that it is about time to stop studying the problems of BMPs for stormwater source control and that it is now time to proceed with implementing them.

Response 59: *EPA agrees that BMPs for stormwater control should be implemented as soon as possible. In spite of the City's efforts to meet targets for the many and various tasks and milestones related to stormwater source control, municipal stormwater remains the last major confirmed ongoing source of contamination to the waterway for which implementation of controls is uncertain. While the major basins have recently been characterized, source tracing is an on-going effort in the larger drains. As outlined in the ESD, the stormwater action plan will include additional proactive tasks for controlling stormwater. In addition, EPA and Ecology*

continue their efforts toward evaluating installation of structural and/or nodal treatment in problem sub-basins.

3.1.3 NAPL Contamination at the Head of the Waterway (SSMA 7)

Comment 60: Several commentors stated that the thick layer of oily sludge buried within the sediments at the head of the waterway should be removed. Unless the sludge is removed, it can continue to seep up into the water and down into the groundwater.
[30][31][32][33][34][36][37][40][41][42][43][44][45][46][47][48][49][50][51][52][53][54][55]
[58][59][60][61][62][63][64][65][66][67][68][69][70][72][74][75][76][77][78][90][160][172]

Response 60: *While it may be technically feasible to remove the NAPL/sludge contaminated sediments from the head of the Thea Foss Waterway, the costs as estimated in the City's Round 3 Data Evaluation and Pre-Remedial Design Report would be prohibitive. Costs for the complete NAPL removal alternative were estimated to be $69 million above and beyond the cost of the remedy for the rest of the waterway. The high cost of this alternative is mainly due to the costs associated with treatment of the NAPL contaminated sediment once it is removed (approximately $58 million).*

EPA believes that the selected remedial alternative, evaluated in the Round 3 Data Evaluation and Pre-Remedial Design Report, of containing the entire volume of NAPL with a cap will be protective of the sediments in the waterway. EPA has added a contingency to the ESD, however, that requires additional removal of the NAPL (beyond what is being removed at the west bank) or modification of the cap design or both, if modeling and treatability studies cannot conclusively determine that the final design of the cap will be able to stabilize and prevent NAPL from migrating through the cap.

Comment 61: The difficult situation at SSMA7 either requires a brute force approach like dredging, or an innovative contaminant removal or destruction process. Even if a removal technology only removed part of the contaminant mass, it is much more probable that it would be effective enough to be protective, and we still would have gotten rid of some of the problem. [103]

Response 61: *The selected remedy in the final ESD includes partial removal of source material along the west bank. EPA believes that removal of material along the west bank is necessary in order to prevent source material from continuing to seep into the waterway in this vicinity. In addition, some dredging of heavily contaminated sediment in the waterway will be necessary in order to provide the required navigational depth once the composite cap is constructed. Any dredged contaminated sediment will be dewatered, treated, and disposed at an off-site permitted landfill.*

Comment 62: There are a number of innovative technologies that have potential for success in the Thea Foss, even if they have not yet been applied in an under-water setting. In particular, electrokinetic technologies (such as LASAGNE) or thermally enhanced sparging have potential for actually removing *in situ* a substantial mass of the dense non-aqueous phase liquid (DNAPL) from the sediments. Most of those innovative technologies have been proven successful at upland sites at a cost of about $50 per cubic yard. Assuming it could cost twice as much to apply in the Thea Foss, the total cost of $7 million and change for remediating the 74,000 cy is comparable the currently preferred alternative. The resulting reduction in contaminant mass, along with the likelihood of greatly reduced long-term monitoring costs, would be of great benefit to the marine environment and the citizens of Tacoma. [103]

Response 62: *EPA continues to believe that confinement by capping is protective and cost effective. EPA agrees that there are promising new in-situ treatment technologies that may be able to treat NAPL contamination. Electrokinetic technologies such as LASAGNE have been*

field tested effectively at small scale sites. However, most of these technologies are currently still evolving and are not yet ready to be utilized at larger sites.

Comment 63: If the NAPL/sludge is capped and "walled off" there should be a guarantee that it will be a permanent remedy and that there will be no leaching into the bay or ground water in the future. [36]

Response 63: *EPA has included performance standards in the ESD that ensures that if sorbent material is used for a cap it must be effective in the long term at preventing leaching of contaminants. See Response 60.*

3.1.4 Process for Selecting Cleanup Alternatives (SSMA 7)

Comment 64: The process used to select the preferred alternative for DNAPLs in SSMA 7 was flawed in that one of the alternatives least likely to be effective became the preferred alternative. The result came about by failure to follow published guidance regarding ranking and selecting remediation alternatives. The most significant factor was that the "threshold factors" for ranking alternatives (protection of human health and compliance with ARAR's) were not included in the selection process (Appendix U, Table U-8 of City's Round 3 Data Evaluation and Pre-Remedial Design Report). Regardless of other factors, an alternative is not viable if it is not protective of human health and the environment. [23, 103]

Response 64: *EPA agrees that the City's rationale and ranking of alternatives as shown in Appendix U of the Round 3 Report appears flawed but not for the same reasons as the commentor. EPA has expressed this concern in previous comment letters on the Round 3 Report. However, the City was not required to evaluate the cleanup alternatives using the NCP nine criteria. 40 CFR §300.430(e)(9). The preferred alternative for SSMA 7 as described in the draft ESD and in the City's Round 3 Report is an in situ capping alternative. In situ (in place) capping was evaluated for compliance with the threshold criteria for Superfund remedy selection (protection of human health and the environment, and compliance with ARARs) in the 1989 Commencement Bay Nearshore/Tideflats Record of Decision (ROD). Section 9 of the ROD contains the Summary of Comparative Analysis of Alternatives and Section 9.1 contains the evaluation of alternatives in relation to the threshold criteria. This evaluation concluded that the in situ capping alternative will comply with the threshold criteria.*

Section 8.3.3 of the ROD describes the in situ capping alternative as follows: "In situ capping involves containment and isolation of contaminated sediments through placement of clean material on top of existing substrate. The capping material may be clean, dredged material or fill (e.g. sand). In addition, it may be feasible to include additives (e.g. bentonite) to reduce the hydraulic permeability of the cap or sorbents to inhibit contaminant migration." The preferred alternative as described in the draft ESD includes the use of sorbent material to inhibit contaminant migration. The feasibility of using sorbent material was evaluated in Appendix U of the City's Round 3 Report. The specific sorbent material to be used will be evaluated during the remedial design phase of the project.

A detailed evaluation of the proposed remedy for the entire Thea Foss and Wheeler-Osgood waterways which includes an evaluation of compliance with the threshold criteria can be found in Section 10.3 of the Round 3 Report.

Comment 65: Another problem with the alternative selection process was more subtle, but it had a substantial impact on the final ranking of alternatives. The highly subjective high-medium-low rankings (Table U-8 of the Round 3 Report) were treated like quantitative measures that could be weighted and summed to provide a sound overall rating. [103]

Response 65: *EPA did not rely on the subjective ranking of alternatives as depicted by Table U-8 of the Round 3 Report to select the remedial action for SSMA 7. EPA's selected remedy of an in situ cap for SSMA 7 is consistent with the Summary of Comparative Analysis of Alternatives in Section 9 of the 1989 ROD.*

Comment 66: EPA uses the term "if feasible" when describing certain portions of the proposed remedy for SSMA 7 including dredging in non-channel areas and placement of a slurry cut-off wall along western edge of the waterway. Please explain what the term "if feasible" means. [82]

Response 66: *The term "if feasible" as used in the draft ESD was meant to state that the portion of the remedy would only be implemented if it could physically be constructed. EPA agrees that the term "if feasible" when describing portions of the SSMA 7 remedy is confusing and therefore has deleted this term from the final ESD.*

3.1.5 Schedule

Comment 67: The Tacoma/Pierce County Chamber of Commerce noted that EPA's timely decisions to continue the cleanup of the Thea Foss Waterway are a necessary contribution to the development of the Thea Foss Waterway. The Chamber of Commerce encouraged EPA to approve the plan as submitted so that cleanup of the Thea Foss Waterway can begin in the near future. [161]

Response 67: *EPA agrees that cleanup should begin in a timely fashion and hopes that cleanup will be integrated in the development of the Thea Foss Waterway. The ESD selects the cleanup plan for the Thea Foss and Wheeler-Osgood waterways and EPA hopes that the necessary agreements for cleanup action can be reached with the potentially responsible parties so that cleanup can begin as soon as possible.*

Comment 68: The Thea Foss Waterway was recognized several years ago as an integral component of the revitalization of downtown Tacoma. The desire for a better tomorrow and a vision for our community's future are undoubtedly what motivated our elected City Council to take their unprecedented actions for the Thea Foss Waterway. [161]

Response 68: *Comment noted. EPA recognizes and acknowledges the City for stepping forward and voluntarily agreeing to conduct the necessary pre-remedial and remedial design work prior to implementation of the cleanup action.*

Comment 69: Several commentors stated that with respect to the cleanup plan for Thea Foss, all of the relevant facts are known, all of the alternatives have been evaluated and the public has been adequately involved. These commentors urged EPA to approve the cleanup plan as submitted by the City in the Round 3 Data Evaluation and Pre-Remedial Design Report. [164][165][170][171]

Response 69: *Comment noted. See Response 67.*

Comment 70: One commentor noted that as a taxpayer and concerned citizen he was frustrated when a bureaucracy seems more concerned with process than functionality. The process seems to have caused delays in implementing cleanup and the commentor wondered why the long period of time (over 15 years) was needed to get to a cleanup decision for the Thea Foss Waterway. [163]

Response 70: *There are several reasons for the length of time it has taken to reach a decision on the cleanup plan for the Thea Foss Waterway. Prior to implementation of a cleanup plan for sediment, control of upland contaminant sources must be achieved in order to prevent recontamination of clean sediment. Ecology has made great strides over the past years in conducting the necessary source control cleanups at the numerous facilities located adjacent to and upland of the waterway. The extended time period was also needed because of the necessary*

involvement, participation and input of the numerous potentially responsible parties, regulatory, resource and trustee government agencies, and private citizens in the characterization of the nature and extent of contamination and the design of the cleanup plan for the Thea Foss Waterway.

Comment 71: Simpson commented that they were concerned about the length of time the process has taken. They are concerned about the potential for lack of coordination in the ESA consultation process that could delay any component of EPA's overall cleanup plan.

Response 71: *EPA has coordinated with the potentially responsible parties and the resource agencies as to EPA's biological assessment. EPA will continue to coordinate with interested parties as the consultation process proceeds.*

3.1.6 Cost

Comment 72: One commentor stated that Tacoma's cost estimates reflect a more expensive remedy for the head of the Thea Foss than is needed. [158]

Response 72: *EPA agrees that the cost estimates for the proposed remedy for the head of Thea Foss Waterway as depicted in the City's Round 3 Report and the draft ESD are high. The costs are high due to the estimated cost of sorbent material to be used in the cap along with the cost of the proposed slurry wall. After further evaluation by EPA, and based on public comment and additional information submitted by the City, EPA has eliminated the slurry wall from the remedy. The elimination of the slurry wall has accordingly reduced the estimated cost for the remedy by approximately one million dollars.*

Comment 73: Some commentors stated that the estimated remedial action costs submitted by the City contain two key errors. First, with the respect to the slurry wall construction, they do not include estimates of the costs of hydrologic controls that would be necessary to make the slurry wall effective. Secondly, there are mathematical errors that understate the calculated costs by over $1 million. [157][158]

Response 73: *EPA agrees with the comment. Based on additional information gathered during underwater surveys conducted by the City and EPA along with the Administrative Record for this ESD, EPA has eliminated the slurry wall as part of the remedy. Therefore, the costs shown in the ESD do not include costs for the construction of a slurry wall. Mathematical errors have been corrected in the cost estimates outlined in the final ESD.*

3.2 ADEQUACY OF PROPOSED CLEANUP

3.2.1 Performance Criteria

Comment 74: One commentor noted that the draft ESD listed only construction and monitoring performance criteria for the sediment caps and did not include maintenance criteria. [82]

Response 74: *The cap maintenance criterion of making repairs to correct the effects of subsidence or erosion will be included in the operation and maintenance plans submitted by the PRPs.*

Comment 75: The National Oceanographic and Atomospheric Administration (NOAA) commented that the cap needs to achieve a minimum of three feet thickness after placement. In their experience, caps are not always uniformly thick over large areas. NOAA noted that the draft ESD called for an extra two feet of "overdredge" and that the capping plans should also call for extra cap material to ensure minimum three foot coverage over an entire capping area.

Response 75: *EPA agrees with the comment and the final ESD includes a performance criterion that caps must have a minimal thickness of three feet.*

Comment 76: NOAA noted that in addition to physical isolation and stabilization, caps should provide chemical isolation, preventing diffusion of contaminants through the cap surface.

Response 76: *EPA agrees with the comment and has included a cap performance criterion for chemical isolation in the ESD.*

Comment 77: Several commentors, including DNR, noted that the performance criteria listed in the draft ESD were not specific and that EPA should better define what certain criteria actually mean, and should establish a benchmark for determining when the criteria have been met. DNR noted that the desired functional characteristics of the finished grades will need to be addressed further in finalizing the design. DNR stated that in reviewing the design they want to ensure that the finished grades are adequately engineered to meet operational and ecological performance factors over a reasonably long-term project life span. [82][166]

Response 77: *The performance criteria listed in Section IV of the draft ESD and final ESD are meant to be general criteria that relate to bay-wide remedial actions. Where appropriate, EPA has added more detail to the performance criteria that are relevant to the remedial action conducted at the specific waterway (i.e. Thea Foss and Hylebos). The final ESD has also added performance criteria deemed appropriate for compensatory mitigation plans. Benchmarks and/or trigger levels will be established in consultation with the other resource agencies for determining when the criteria have been met or for instituting additional actions when necessary. Specific design criteria such as functional characteristics of the finished grades will be developed during the remedial design phase.*

Comment 78: The USFWS commented that capping materials have been described in the Administrative Record as being "coarse, large-grained sediment" in order to maintain cap integrity. The draft ESD states that one of the four functions the cap would provide will be to "provide a cap surface that promotes colonization by aquatic organisms". USFWS noted that at some point there should be a more detailed description of the composition of the cap material. USFWS also noted that in order to promote biological recolonization of species consideration should be given to closely matching the composition of the cap material to existing sediment to be capped. [29]

Response 78: *EPA agrees with the comment. Detailed descriptions of the cap material will be provided in the remedial design documents and work plans.*

Comment 79: One commentor stated that performance criteria for natural recovery and enhanced natural recovery should be added to the ESD. [82]

Response 79: *Performance criteria for natural recovery and enhanced natural recovery are that the SQOs much be achieved within 10 years of completion of the remedial action and source control. This is stated in the 1989 ROD and in the ESD. The ROD also states that only marginally contaminated sediments should be considered for natural recovery. The ESD provides further clarification that EPA considers marginally contaminated sediments as those with chemical concentrations less than the second lowest Apparent Effects Threshold (AET) value (the SQO is set at the lowest AET) or biological test results that do not exceed the minimum cleanup level (MCUL) values under Washington State Sediment Management Standards.*

3.2.2 General Comments

Comment 80: One commentor noted that the list of problem chemicals for Thea Foss/Wheeler Osgood Waterways is different from the list of chemicals of concern (COCs) developed during the pre-remedial investigations. The commentor believes that the ROD should be amended accordingly.

Response 80: *Although the magnitude and frequency of chemical exceedances represented by the chemicals of concern (COC) list does not duplicate the older table from the ROD, the primary chemical groups (HPAH, LPAH and phthalates) are present in both. EPA and Ecology are using the most current data to direct source control efforts and remediation. The table of problem chemicals listed in EPA's 1989 ROD was developed from data collected during the remedial investigation and listing phases of the Commencement Bay site. The list of COCs was developed during the pre-remedial design studies of the waterway and was intended to be a summary of the most prevalent chemicals found during these studies. It was not intended to be a comprehensive list of all chemicals present at concentrations above cleanup levels. A ROD amendment is not required because the use of additional data collected during the pre-remedial design does not represent a fundamental change to the selected remedy.*

3.3 CLEANUP APPROACHES

3.3.1 Dredging

Comment 81: Several commentors noted that the additional dredging and disposal accomplished under Alternative 5C is in response to a request from the DNR for deeper harbor depths and does not provide additional environmental protection compared to Alternative 5B. Alternative 5B is less costly, reduces the volume of sediments requiring disposal, and provides the same environmental benefits as Alternative 5C. [156][157][168]

Response 81: *EPA has reevaluated Alternative 5C and agrees with the comment that this alternative does not provide more environmental protection than Alternative 5B. As a result EPA will not require dredging for deeper harbor depths as part of the selected remedy unless the contaminants within the harbor area sediments are above the SQOs.*

Comment 82: One commentor commented that it is not clear from the sampling data presented in the Round 3 Report that the dredging proposed for Segment 3 is necessary to remedy contamination in the waterway. The proposed remedy for Segment 3 seems intended to accomplish a substantial deepening of the waterway for navigational purposes, beyond what is necessary to protect human health and the environment. [168]

Response 82: *Dredging is necessary throughout Segment 3 because sediments exceed SQOs for several contaminants including PAHs, BEP, PCBs, pesticides and metals. Since Segment 3 is part of the federally-authorized navigational channel placing a cap over the contaminated sediments in lieu of dredging would not be feasible and would hinder navigation. Levels of contamination exceeding cleanup levels are found both in surface and subsurface sediments within Segment 3.*

The commentor focused mainly on comparing concentrations of PAHs and BEP in Segment 2 where natural recovery is selected to PAH and BEP concentrations in Segment 3. However, Segment 3 is much more contaminated than Segment 2 in that Segment 3 contains elevated concentrations of PCBs, pesticides and metals (mainly mercury). These contaminants are not likely to naturally recover within the established 10-year timeframe due to lower sedimentation rates in this segment.

Comment 83: J.M. Martinac and the City noted that the draft ESD states that "although SSMAs 5a1 and 5a3 will require no action, based on existing conditions, a portion of these SSMAs will be dredged as part of the channel slope". One bank sample collected from SSMA 5a1 in August 1994 exceeded SQOs for copper and zinc. This sample was taken prior to removal in August 1996 of bank and intertidal sediments within SSMA 5a1 that exceeded SQOs. Therefore, SSMA 5a1 has already been remediated and no action is necessary. In addition, the City's Round 1 Data Evaluation Report identifies only one bank sample in SSMA 5a3 that exceeded SQOs for any contaminant, therefore dredging should not be required in SSMA 5a3. [156][166]

Response 83: *While a bank removal in SSMA 5a1 was conducted, the removal was incomplete as areas under the docks were not remediated. In addition, no confirmatory samples were taken after the removal was completed. Sampling data for SSMA 5a3 is also incomplete so that this location will also require dredging based on the existing data. If additional data becomes available, EPA would reconsider its decision to require dredging at SSMA 5a3.*

Comment 84: Kennedy/Jenks commented that in the description of the preferred remedial action for SSMA 6B4 and 6B5 the term "if feasible" was used to describe possible dredging of these areas. They suggested that the language be modified to indicate that dredging will occur "if practicable" since nearly anything is technically feasible but it may not be practical or cost effective. In addition, Kennedy/Jenks suggested that the text in the ESD should indicate that if the contaminants above SQOs cannot be practically removed, than capping may be necessary. [157]

Response 84: *The suggested changes have been made to the ESD.*

Comment 85: Based on the ESD, depths at the mouth of the waterway will be -29 feet MLLW (SSMAs 1 and 2) whereas the depths in the adjacent, up-waterway areas (SSMAs 3 and 5) will be -32 feet MLLW. Depths farther up the waterway decrease to -21 feet MLLW (SSMA 6) but then increase to -26 feet MLLW (SSMA 7b2). Beyond this the depths taper to -13 feet MLLW (SSMA 7b3a). WDFW recommends that EPA require studies be conducted in Thea Foss Waterway to evaluate the potential impacts on circulation and DO levels within Thea Foss Waterway from these proposed contours. Monitoring of DO levels should also be conducted subsequent to the dredging activities, and over the long term, to ensure satisfactory water quality is achieved and maintained. [28]

Response 85: *EPA is aware that the remedial action for the Thea Foss Waterway will result in varying bottom elevations that could impact circulation and DO levels. EPA will require that DO levels be monitored both during dredging activities and over the long-term to ensure that water quality standards are maintained.*

3.3.2 Capping

Comment 86: As discussed in the Round 3 Data Evaluation and Pre-Design Evaluation Report (Section 2.4.2.3 and Appendix T), native material to be removed from the St. Paul site would provide suitable clean capping material for waterway areas and provide the necessary long-term isolation of underlying sediments from potential propeller wash forces. Further, because grain size characteristics of native St. Paul sediments closely match those of the waterways, use of these materials for capping would promote rapid recolonization by native benthos and epibenthos, facilitating restoration of full habitat function within the waterway capping areas. Similar conclusions have been reached on other waterways. [71]

Response 86: *EPA concurs that this is a good source of capping materials for the reasons stated above. EPA is considering the beneficial reuse options within Commencement Bay of the material removed from St. Paul Waterway.*

3.3.3 SSMA 7 Remedy—Capping and Containment Barriers

Comment 87: Other remedial technologies should be considered in addition to the slurry wall along the western edge of the waterway, such as partial removal from seeps rather than relying on highly technology-intensive remedies without adequate justification. [151]

Response 87: *Construction of a slurry wall will not be implemented because hydrogeologic data indicate that horizontal ground-water flow is not a major factor in migration of source material. Source material along the western edge of the waterway will be removed, which should help control product seepage in this part of the waterway. Ecology is working on upland removal activities in the same area. See Response 61.*

Comment 88: One commentor proposed an alternative ("adaptive management") approach for remediating the SR509 NAPL seep at the head of the waterway, given the uncertain performance and very high cost of the proposed remedy (sorbent cap) in the draft ESD. This approach included; (1) collection of additional data on the SR509 seep via visual observations during low tide and conduct of an underwater survey, and (2) removal of falsework piling related to construction of the SR509 bridge, or cutting off the falsework piles below mudline. [180]

Response 88: *EPA agrees with the comment. Since issuance of the draft ESD, EPA and the City have conducted visual underwater surveys to assess whether the false work pilings are the origin of the SR509 seeps. EPA's survey was inconclusive due to poor visibility in the waterway. The City's underway survey was more successful in that they visually documented artesian ground-water flow in the waterway. The City's survey confirmed that the NAPL seep in the waterway is most likely the result of oily material being pushed to the surface by vertical ground-water flow. The City's survey also documented that the NAPL seeps do not appear to be originating from the false work pilings. However, the falsework pilings may still be removed or cut off at mudline to facilitate construction of the cap.*

Comment 89: The City stated that they recognize the need to complete further studies, as indicated in the ESD, during final design of the remedial measures for SSMA 7. To that end, the City has contracted to prepare a work plan for design level studies of the NAPL contamination at the head of the Thea Foss Waterway. The City also stated that their current plans call for several studies to be conducted to determine the need for and optimum placement of a slurry wall and the configuration and effectiveness of a sorbent cap in SSMA 7. [156]

Response 89: *EPA acknowledges and appreciates the willingness of the City to proceed with the necessary design studies. EPA understands that since issuance of the draft ESD the City has moved forward with additional design studies. In order to ensure the final remedial design meets the remedial action objectives, the final ESD has incorporated performance standards that each component of the remedial action must meet in order for the remedial action to be effective. EPA expects that the City will perform the design studies needed to demonstrate that the components of the remedial action will meet the established performance standards.*

Comment 90: Some commentors, including Ecology, stated that there is no need for the proposed slurry wall along the western bank of SSMA 7 as proposed in the ESD and that EPA has already expressed concerns regarding effectiveness of the slurry wall to control NAPL at the head of the waterway in prior correspondence with the City. These commentors stated that the ESD should be made consistent with EPA's previously stated concerns. [157][158]

Response 90: *Based on the results of additional studies conducted by the City, the slurry wall has been eliminated as a component of the remedy. These studies have documented that the vertical groundwater gradient beneath the waterway is much greater than the horizontal gradient and therefore a slurry wall would not be effective at preventing migration of source material.*

Comment 91: There has been no evidence presented that the SR509 NAPL seep has had any significant impacts on sediment quality. This commentor believes that surface PAH contamination in the head of the waterway and elsewhere is primarily due to ongoing municipal stormwater discharges. [157]

Response 91: *Extensive sampling conducted by the City has shown that subsurface sediment located in the vicinity of the SR509 bridge is heavily contaminated with PAHs. The SR509 NAPL seep is directly linked to the massive subsurface contamination. EPA believes that the mass of contaminated sediment may be due to historical discharges. EPA agrees that the degree of contribution of the NAPL to PAH contamination in surface sediment may be overestimated in the Round 3 Report. However, if the subsurface contamination in the vicinity of the SR509 seep is not remediated it will continue to serve as a source of PAH contamination to the waterway.*

Comment 92: Some commentors stated that other than documenting the presence and approximate location of the subtidal SR509 seep, and the approximate location of the cutoff falsework piles, little work appears to have been completed as part of the City's pre-design studies to assess the cause of the SR509 seep. In their opinion, insufficient data is available for EPA to approve a definite remedy for the SR509 seep. [151][180]

Response 92: *As noted in Response 88, underwater surveys have been conducted by EPA and the City subsequent to issuance of the draft ESD. The underwater survey conducted by the City confirmed that the falsework pilings do not appear to be a preferential pathway for NAPL seeps. The City's underwater survey confirmed that product material is being forced to the surface of the waterway by vertical groundwater flow.*

Comment 93: Several commentors noted that EPA should seriously consider installing a thick sand cap in SSMA 7 considering that EPA has questioned the need for a sorbent cap in its comments to the City regarding the Round 3 Report. [157][158]

Response 93: *EPA has seriously considered installing a thick sand cap in SSMA7 and has determined that a thick composite cap, which could include sand, sorbent, and geotextile layering, could be effective at containing the NAPL in the waterway. Studies being conducted by the City must demonstrate that the composite cap would be protective of human health and the environment, and will prevent recontamination of clean sediment.*

Comment 94: Kennedy/Jenks commented that the ESD should be made consistent with EPA's views expressed in the 29 December 1999 Specific Comment Letter on the Round 3 Report. In particular, the ESD should acknowledge that the SR509 seep may be effectively addressed by a thick sand cap and additional work regarding the falsework pilings. The ESD should also acknowledge that the seep along the west bank may be more effectively addressed by removal of source material.

Response 94: *See Responses 90 - 93.*

Comment 95: Kennedy/Jenks commented that the most compelling argument for use of the thick sand cap for the head of the Waterway is the overwhelming evidence that without further stormwater controls, the extremely expensive sorbent cap is likely to recontaminate and thus require additional remedial action. [157]

Response 95: *See Responses 41- 52.*

Comment 96: NOAA believes that it is unlikely that a sorbent cap will provide a permanent control on the release of contaminants to the waterway. Even if the sorbent cap is effective initially, the sorbent capacity of the cap will eventually be exhausted and "breakthrough" will occur, allowing contaminants to surface in concentrations comparable to those present in the

absence of a cap. That is, any sorbent material has a finite capacity and when this capacity is used up, contaminant migration continues as if there weren't any sorbent present. More detailed evaluation is needed to determine the amount of sorbent required to adequately contain the NAPL sources in the waterway. [81]

Response 96: *EPA agrees with the comment in that any sorbent material will most likely have a finite capacity. Studies must prove that the sorbent material will not be exhausted over the long-term and "breakthrough" of NAPL will be prevented.*

Comment 97: The City commented that although NAPL seepage into the waterway is an easily observable fact and estimates of the mass of PAH input to the waterway from NAPL seepage are considerable, the exact mechanism by which NAPL seepage occurs is still only partially understood. The City intends to conduct additional studies including underwater surveys to further define the mechanisms of NAPL seepage. [156]

Response 97: *EPA acknowledges and appreciates that the City intends to conduct additional studies to further define the mechanisms of NAPL seepage.*

Comment 98: Some commentors, including the Tribe and USFWS, were concerned that the proposed remedy for the head of the Thea Foss (SSMA 7) will not provide for a long-term effective solution. They stated that the proposed alternative is unproven and will not be protective of human health and the environment. [23][56]

Response 98: *The remedy for the head of the Thea Foss is an in situ cap which should include the addition of sorbent material to prevent migration of NAPL. In situ caps have been proved effective at containing contamination at many sites in the Puget Sound region and across the country.*

Generic performance criteria for caps within Commencement Bay are included in the ESD in order to ensure that these caps are protective of human health and the environment. In addition, at the section entitled "Performance Criteria for the Remedial Action" additional criteria for the sorbent cap at the head of the Thea Foss were added. These additional performance criteria include; (1) the capping material must prevent NAPL from entering the waterway and recontaminating surface sediment above the SQO and, (2) if sorbent is used as capping material the sorbent must be effective in the long term and require minimal maintenance.

The cap will be composite cap consisting of sand, geotextile membranes and sorbent material as needed. Composite caps have been successfully used in the past for containing NAPL contamination. EPA agrees that the effectiveness of sorbent material at containing NAPL in the head of the Thea Foss is uncertain. As stated in previous responses, the studies currently being conducted by the City must address the uncertainties regarding the effectiveness of the sorbent material.

Comment 99: Citizens for a Heathy Bay (CHB) commented that the proposed remedy fails to address the presence of the NAPL substance. They stated that a number of questions regarding the NAPL have remained unanswered. These questions include: (1) amount of PAH loading attributable to the NAPL substance, (2) source(s) of the NAPL substance, (3) extent of the NAPL product and NAPL-contaminated sediments/soil, (4) relationship between upland and in-waterway seeps, (5) measures to control the material at its source, (6) pathways of movement to the surface, and (7) whether or not the falsework pilings provides a transport mechanism for subsurface NAPL. [67]

Response 99: *EPA believes that the removal/containment remedy selected for the head of the Thea Foss adequately addresses the presence of the NAPL. Additional characterization of NAPL by the City and any remaining questions concerning the pathways of NAPL movement will*

be addressed during the remedial design phase. Specific answers to the questions raised by the CHB are as follows:

1. *The City conducted extensive sampling and modeling of the PAH loading attributable to all known sources of contamination including the NAPL substance. While there is some disagreement among the City, EPA and other interested parties over the results of the modeling effort, EPA believes that the PAH loading to the waterway due to NAPL seepage is significant enough to warrant product removal at the west bank and containment in the waterway.*

2. *EPA believes that the source of the subsurface NAPL substance is from historical releases from the facilities that formerly operated along the Thea Foss Waterway. This is evidenced by the presence of coal tar material along the west bank of the waterway where a coal gas plant was located and operating until the mid-twentieth century.*

3. *EPA agrees that the vertical extent of NAPL has not been well-defined in the City's Round 3 Report. Additional studies are currently being conducted by the City as part of remedial design to more accurately define the extent of NAPL contamination.*

4. *EPA believes that both upland and in-water seeps are related to historical releases. NAPL source material remains both on the bank and underneath the Thea Foss Waterway. Data provided in the City's Round 3 Report and in the Administrative Record shows that there is one large subsurface mass of heavily contaminated material within the waterway.*

5. *As stated in (4), EPA believes that the NAPL is related to historical releases, most likely from past spillages along the west bank of the waterway.*

6. *Based on recent studies conducted by the City, EPA believes that the SR509 seep may be due to oily material being forced to the surface by the vertical groundwater flow. Based on visual observations during the underwater survey, the false work pilings left in place after construction of the SR 509 bridge do not appear to be conduits for NAPL flow. The seep along the west bank is caused by product material along the bank.*

7. *See (6) above.*

Comment 100: Some commentors raised questions about the engineering of the proposed slurry wall and its stability due to existing slope stability problems along the shoreline of the head of the waterway, and due to the proximity of the proposed slurry wall to the waterway itself. [157][158][180]

Response 100: *See Response 90. Based on additional studies conducted by the City subsequent to issuance of the draft ESD, the slurry wall will not be constructed.*

3.3.4 Natural Recovery

Comment 101: The City noted that the draft ESD indicates natural recovery for areas in SSMA1 where marginal chemical exceedances of SQOs occur. The City noted that they recommended in the Round 3 Report that these areas be classified as no action areas. [156]

Response 101: *EPA has designated areas that minimally exceed the SQO as natural recovery areas consistent with Section 10.2.3 of the 1989 CBN/T ROD which establishes performance*

criteria for natural recovery. The long-term cleanup objective as established in the ROD is the SQO for problem chemicals. Sediment areas with chemicals that minimally exceed the SQO have not met the long-term cleanup objective and therefore, consistent with the ROD, cannot be classified as no action areas.

Comment 102: The City noted that the draft ESD indicates enhanced natural recovery for areas in SSMA2 where marginal chemical exceedances of SQOs occur. The City noted that they recommended in the Round 3 Report that these areas be classified as natural recovery areas. [156]

Response 102: *EPA selected enhanced natural recovery for these areas within SSMA 2 because, as stated in the ESD, biological test results indicated some adverse biological effects for those sediments in SSMA 2 that marginally exceed the SQO. In addition, the sediment contaminant concentrations in these areas are high enough so that the long-term cleanup objective of the SQOs may not be achieved in the entire segment in the established 10-year timeframe.*

Comment 103: NOAA noted that the draft ESD stated that chemical and biological sampling indicate that the sediments in SSMA3c1 are suitable for enhanced natural recovery. NOAA questioned the use of enhanced natural recovery in a marina that may need to be dredged to maintain appropriate depths in the future.

Response 103: *The ESD has been revised to indicate that SSMA3c1 will be partially dredged to remove contaminants and provide appropriate side slopes for the navigational channel.*

3.3.5 General Comments

Comment 104: The City noted that the dredge and cap volumes presented in the draft ESD for SSMA5 and SSMA7 are incorrect.

Response 104: *EPA has corrected the dredge and cap volume estimates for SSMA5 and SSMA7 in the final ESD.*

Comment 105: The City noted that EPA does not mention SSMAs 7b3b, 7d3, 7e, 7f1 or 7f2 in the ESD: however, the City presumes the EPA concurs with the remedy for these SSMAs in the Round 3 Report. [156]

Response 105: *EPA agrees with the City's selected remedies for these areas.*

3.4 Comments on Round 3 Data Evaluation and Pre-Design Evaluation Report

Comment 106: Simpson noted that they were not in complete agreement with the cost estimates in Appendix N of the Round 3 Data Evaluation and Pre-Remedial Design Report nor with the Project Schedule in that Appendix. In their view, the costs of the CAD option, including its land and habitat elements were underestimated. [71]

Response 106: *Comment noted. Cost estimates in Appendix N are meant to be feasibility study level estimates and are designed to be within an accuracy of +50 percent to -30 percent of actual costs. Simpson did not provide details in their comment as to why they thought that the cost elements for the confined disposal option were underestimated.*

Comment 107: NOAA stated that they believe that the data on the horizontal and vertical extent of NAPL contamination presented in the Round 3 Report is insufficient. In particular, data describing the volume and location of DNAPL in relation to the local geologic strata would clarify whether the west bank is the source of all the DNAPL, the volume and depth of DNAPL requiring remediation, and the likely fate of the DNAPL, if it is left in place. Detailed data analysis may clarify if there is more than one DNAPL plume, and whether there is an LNAPL

plume, also. The data presented in Appendix U (of the Round 3 Report) are insufficient to determine whether there is one plume or more, what the sources are and whether the observed floating sheens are from the light non-aqueous phase liquid (LNAPL) plume. [81]

Response 107: *EPA agrees with the comment to the extent that EPA believes that the vertical extent of DNAPL has not been defined and that the source of the NAPL seeps in the waterway has not been identified in the Round 3 Report. Since the issuance of the draft ESD, the City has conducted additional studies including sediment borings and an underwater survey in order to identify the source of the NAPL seeps and to ensure proper placement of capping material.*

Comment 108: NOAA stated that they believe that there is insufficient data and clarity in discussions in the Round 3 Report regarding a likely plume of contaminated groundwater emanating from the DNAPL. The evaluations confuse the likely migration pathway of the dissolved plume, which migrates in response to groundwater (hydraulic) gradients and the much more concentrated DNAPL plume that will migrate in response to gravity along the surface of confining layers/strata. Remediating the groundwater will not affect the DNAPL plume. [81]

Response 108: *EPA agrees that remediating the groundwater will not affect the DNAPL plume and is not selecting groundwater remediation as part of the remedy for the Thea Foss Waterway. Regional groundwater flow is toward the waterway and groundwater monitoring and extensive groundwater modeling have indicated that dissolved groundwater contamination is not a major contributor to contamination in the Thea Foss Waterway. In addition, upland source control actions being conducted by Ecology will eliminate contaminant sources to groundwater.*

Comment 109: Several commentors stated that the City has failed to demonstrate in their studies that the SR509 seep has had any significant impact on sediment quality. The commentors believe that surface PAH contamination in the head of the waterway and elsewhere (in the Thea Foss Waterway) is primarily due to ongoing municipal stormwater discharges. [157][158][168]

Response 109: *EPA believes that the SR509 seep is a source of contamination to the waterway that needs to be remediated in order to ensure that remediation efforts at the head of the Thea Foss Waterway are successful and that clean cap material is not impacted. Extensive sampling conducted during the Round 3 pre-remedial design and other studies conducted by the City clearly indicate that there is a pool of PAH-contaminated NAPL product located beneath the waterway in the vicinity of the SR509 bridge. The pool is located at the base of the recent sediment and is most likely the result of historical spillage dating back decades. Product from this pool is being pushed to the surface by the vertical groundwater flow beneath the waterway. The seep however, is not the only source of contamination to the sediment and the waterway. EPA agrees with the commentors that stormwater is an additional source of contamination to the sediment.*

Comment 110: EPA has presented in its November 18, 1999 General Comment Letter on the Round 3 Data Evaluation Report, and reiterated in their December 29, 1999 Specific Comment Letter uncertainties about the necessity for, and the effectiveness of the proposed sorbent cap. Further, EPA has indicated that there are current uncertainties regarding whether the in-waterway NAPL seep impacts sediment quality at all. We concur with this statement. [157]

Response 110: *EPA agrees that the effectiveness of sorbent material at containing NAPL in the head of the Thea Foss is uncertain. As stated in previous responses, however, the treatability studies currently being conducted by the City must address the uncertainties regarding the effectiveness of a sorbent cap. See also Response 109.*

Comment 111: Although a description of the thick sand cap alternative is provided in Attachment N-1 of the Round 3 Report, it was not included in the City's alternatives evaluation

ranking presented in Appendix U and not given serious consideration in the Round 3 Report. [157]

Response 111: *The thick sand cap was described in Attachment N-1 of the Round 3 Report as an interim remedy. EPA believes that the thick sand cap has merit provided that NAPL related to the two in-waterway seeps is removed and is effective at containing NAPL and preventing recontamination of clean cap material.*

Comment 112: Kennedy/Jenks revised the ranking of alternatives in Table U-8 in Appendix U of the Round 3 Report to compare the thick sand cap alternative to other alternatives evaluated in the Screening Level Feasibility Study of SSMA7. Kennedy/Jenks also provided a narrative comparison of the thick sand cap to the sorbent cap proposed in the Round 3 Report and the draft ESD. In the revised ranking the thick sand cap scored higher and the commentor concluded that the thick sand cap is thus preferred over the other alternatives. [157]

Response 112: *As stated above, EPA believes that the thick sand cap has merit provided removal of source material is effective at containing NAPL and preventing recontamination of clean cap material. The revised ranking of alternatives conducted by the Kennedy Jenks did not include removal of NAPL source material that EPA believes is a critical component in evaluating the effectiveness of a thick sand cap.*

3.4.1 Habitat Mitigation

Comment 113: DNR noted that Wheeler-Osgood Waterway offers the potential for significantly enhanced functions for mudflat intertidal and shallow subtidal habitats. DNR stated that reconnection of the Wheeler-Osgood Waterway to the Puyallup River would substantially benefit sediment functions over the long term. DNR noted that controlled cross delta inputs of Puyallup river water, suspended sediments and organic debris (detritus) could substantially increase the estuarine functional values and would also be beneficial to sustaining a higher level of sediment function for remediated areas throughout the Thea Foss Waterway. [155]

Response 113: *EPA is requiring habitat mitigation for the loss of 4.6 acres of intertidal habitat due to remediation activities in the Thea Foss and Wheeler-Osgood waterways. Likewise, any other unavoidable impacts from the remedial actions, including disposal sites, must be mitigated. The DNR proposal to provide cross delta inputs of Puyallup river water, suspended sediments and detritus to the Wheeler-Osgood Waterway for habitat mitigation has not been offered as an option by any party responsible for mitigating for CB/NT impacts. If such an option were proposed by the potentially responsible parties, EPA will consider it.*

Comment 114: DNR commented that in their assessment, the limited existing habitat values of Thea Foss Waterway rank it along with Blair Waterway, as the poorest choice in Commencement Bay for any investment in habitat enhancements beyond source control and remediation. DNR supports cleanup and source control in the Thea Foss Waterway to provide water column and substrate that will meet water quality standards and questions any small scale habitat projects in the core urban area when there are alternative sites in Commencement Bay that will provide greater benefits. [155]

Response 114: *Comment noted.*

Comment 115: The Tribe is opposed to the loss of approximately 5 acres of intertidal habitat as of part the proposed remedy for the Thea Foss Waterway. The Tribe believes that every effort should be made to protect, cleanup and enhance existing intertidal habitat. If cleanup demands removal of contaminated intertidal sediments, then backfilling to the original elevation and appropriate enhancement will prevent any further loss of in-waterway intertidal habitat.

Response 115: *Every effort will be made to minimize loss of intertidal habitat during cleanup activities.*

Comment 116: The City commented that Alternatives 5B or 5C would result in a conversion of 4.31 or 4.64 acres of intertidal and shallow subtidal area to 4.1 or 4.59 acres of deeper water habitat, for a net difference of 0.21 or 0.06 acre of marine habitat, respectively. This small net difference in habitat area is minor when compared to the scope of the remediation and the associated positive improvements in sediment quality over 60 + acres of habitat and the associated improvement in the overall health of the marine environment of the Thea Foss Waterway. It is the City's position that because of the net long-term improvement in habitat function that would result from remediation, no compensatory mitigation is warranted. [156]

Response 116: *Even though the cleanup of the Thea Foss Waterway will be beneficial to the environment, to comply with ARARs, unavoidable loss of habitat must be compensated, regardless of the purpose of the project. It must be remembered that releases of hazardous substances to the environment is the reason the cleanup is required.*

Comment 117: The CHB does not support the City's conclusion that cleanup in the Thea Foss Wheeler Osgood waterways Superfund site is sufficient mitigation for the more than 4 acres of habitat that will be lost through this cleanup action. Within the CBN/T area, less than 5 percent of the original Nearshore, mudflat and salt marsh habitats remain. What does remain will continue to be at risk by urban and industrial impacts, shoreline development and both point and non-point sources of pollution. The CBN/T ROD established SQOs to protect the aquatic environment stresses the fact that improvement to aquatic habitats is an expected outcome of Superfund cleanup activities. While remedial activities within the waterways will achieve long term improvements to the aquatic and Nearshore environment, these improvements are offset by short-term adverse impacts to that same environment. Removal of the contaminated sediments removes aquatic populations from those same areas. Those populations will decolonize but levels of stability, productivity and community structure, comparable to similar habitats and depths elsewhere in Commencement Bay, will require time to develop. [67]

Response117: *EPA agrees with the comment. See Response 116.*

Comment 118: One commentor stated that EPA should not settle for a Thea Foss cleanup plan that destroys some of the small amount of remaining habitat area without mitigation. The commentor requested that EPA require that all of the habitat lost in the cleanup process be fully compensated. [67]

Response 118: *See Response 116.*

3.5 Use of St. Paul Waterway as a Disposal Facility

3.5.1 St. Paul Habitat Mitigation Plan

Comment 119: WDFW does not support the notion that the proposed mitigation provides adequate habitat area or function to adequately compensate for the loss of habitat associated with the proposed filling of the St. Paul Waterway. WDFW concurs with EPA's suggestion on page 24 of the ESD that Simpson " provide additional mitigation up front". WDFW believes this would be necessary not only to address uncertainty factors associated with the proposed mitigation, but also to fulfill the fundamental objective of providing adequate mitigation area and function to fully compensate for impacts to fish and wildlife resources that would result from the proposed fill. [28]

Response 119: *EPA agrees that there are uncertainties with respect to the functional aspects of the mitigation plan. EPA is requiring that additional mitigation up front be provided to account*

for the potential risk of mitigation failure. Additionally, a freshwater source from the Puyallup River to the Middle Waterway that would allow transfer of Puyallup River water is considered necessary to assure full function of the St. Paul mitigation project.

Comment 120: WDFW and USFWS stated that limitations of the mitigation proposal for St. Paul Waterway are further accentuated by the plan to relocate the log haul-out facility to the middle of the mitigation site. This will necessarily involve industrial activity within the aquatic portions of the mitigation site introducing noise, prop wash, bark debris, and other associated disturbances to fish and wildlife that may utilize the area. While recognizing that Commencement Bay is a highly industrialized urban area, it is still important to strive for creation of mitigation areas that are largely devoid of industrial activities to further enhance use of these areas by fish and wildlife. [28][29]

Response120: *The log haul-out at the head of St. Paul Waterway will be relocated to the western side of the St. Paul/Middle peninsula within the Middle Waterway. The facility has been located and designed to minimize the aquatic footprint and avoid and minimize impacts to the aquatic environment, to meet the best management practices in the City shoreline program, and to comply with practices recently agreed upon for log haul out by the Wood Debris Group in Hylebos Waterway (e.g., no log grounding, bark control). Design details of the proposed facility will still need to be approved by EPA, which may result in further mitigative measures.*

Comment 121: USFWS believes that the proposed mitigation discussed to date for fill of the St. Paul Waterway is inadequate in replacing both the acreage and functional loss to fish and wildlife resources. USFWS stated that the proposed mitigation site in the Middle Waterway does not provide the same level of use by juvenile salmoides for the following reasons:

> 1) The proposed mitigation is based on the creation of an intertidal marsh, yet Simenstad's baywide assessment document states that: "Given the present highly-restricted or lacking delivery of freshwater, sediments and nutrients to the restoration sites in Middle Waterway, the prospect of long-term sustainability of brackish-oligohaline marshes appropriate to this region of the delta is uncertain, if not dubious."(Simenstad 1999.)
>
> 2) The Middle Waterway channel feasibility study conducted by the Corps at the request of the EPA did not, in USFWS's opinion, present a reasonable, cost-effective alternative for providing a freshwater source to the proposed mitigation site. Simenstad's report also states that: "...the only alternative to prevent rediversion of a significant portion of the river flow and bedload sediments would be to construct a major and extremely costly control structure." (Simenstad 1999.) To date, USFWS has not reviewed a complete proposal that would sufficiently provide a freshwater source to adequately support the types of habitats proposed. [29]

Response 121: *EPA agrees that a permanent freshwater source to Middle Waterway is necessary to achieve full habitat function in Upper Middle Waterway for pre-smolt juvenile salmon.*

The St. Paul Habitat Plan (April 2000) notes an option for supplying freshwater from the Puyallup River via rehabilitation and use of a City of Tacoma soon-to-be-abandoned water line along 11th Avenue that will become available in the year 2000 after a new water line is constructed. This pipeline option could potentially allow transfer of the necessary volume of fresh water to the Middle Waterway to achieve immediate benefits to salmonids, including development of brackish marsh habitat. In the future, the pipeline could provide fresh water to potential restoration of intertidal brackish marsh and tidal channel habitats in the Delta Reserve/former industrial properties south of 11th Avenue. EPA is requiring that this pipeline option, and other fresh water source(s) as necessary to meet the volume specifications, be

implemented to assure full function of the mitigation project and, in part, to compensate for resource losses from the remedial activities in the Thea Foss Waterway.

Comment 122: NOAA stated that the mitigation package developed by Simpson for the St. Paul fill is large and complex, and all of it may not work as planned. NOAA requested that Simpson can either provide a very detailed contingency plan for acceptance by the resource agencies to address the significant uncertainties with the plan, or they can construct additional mitigation up front. If the functional attributes of the originally planned habitat do not meet target levels of performance at agreed upon dates, the additional habitat constructed up front would offset the deficiency. If the created habitat does function as planned, then any excess mitigation could be made available to other liable parties at a marketable credit. Of the two approaches, NOAA prefers the later because it will be more protective of natural resources and will reduce temporal losses of habitats and services. [81]

Response122: *See Responses 119 and 121.*

Comment 123: One commentor stated that EPA should not settle for a Thea Foss cleanup plan that destroys some of the small amount of remaining habitat area without mitigation. The commentor requested that EPA require that all of the habitat lost in the cleanup process be fully compensated. [67]

Response 123: *See Response 116 and 121.*

Comment 124: Several commentors support the compensatory mitigation plan that Simpson Tacoma Kraft has developed to offset losses due to the proposed Nearshore fill. Some commentors urged EPA to retain the adaptive management and stewardship program components of the plan as the plan components are likely to provide for a high success rate for the proposed habitat areas. [39, 57, 81, 101, 156]

Response 124: *Comment noted. The adaptive management and stewardship programs are important components of the St. Paul fill mitigation plan.*

Comment 125: Ecology stated that they agree with and support EPA's concerns regarding the mitigation proposed for the St. Paul Nearshore fill. Specifically, whether the amount and value of the mitigation proposed adequately compensates for the loss of the St. Paul habitat and meets the goals of the ESA, the Commencement Bay Aquatic Ecosystem Assessment, and the National Wetlands Policy Forum. Ecology is concerned that the relocation of the log haul-out facility to the Middle Waterway may degrade and jeopardize ongoing and future restoration efforts within Middle Waterway. [85]

Response 125: *Comment noted. See Response 120.*

Comment 126: Simpson commented that EPA should consider the connectivity and cumulative functional values of the habitat components in the lower watershed and neodelta as additional contribution or margin of safety for any one component of the habitat plan. [71]

Response 126: *EPA believes that we have appropriately factored these components into our assessment. EPA evaluated the remedial actions themselves on a watershed basis with regard to potential impacts. Our consideration of compensatory mitigation requirements also involved a bay-wide scope, relying very heavily on the analysis and findings in the Simenstad report (2000). Connectivity and cumulative functional values are fundemental to future compensatory mitigation plans that would be approved by EPA, as is risk. The compensatory mitigation plan for the St. Paul Waterway Nearshore Facility is judged to be consistent in concept with the conservation and recovery strategy for ESA-listed species in the Simenstad report. The habitat components noted by Simpson in their comment provide EPA with some assurrance that once*

the habitat is constructed and made fully functional , the mitigation should contribute positively to the Commencement Bay aquatic system and be located such that other, future mitigation or restoration actions could connect to it. This unrealized potential does not reduce the fundemental risk that this created habitat may in fact not function as Simpson presently describes and as EPA and others hope. Additionally, there is no assurrance that the potential connectivity of the habitat components to other habitat improvement projects will be realized.

Comment 127: While the relocation of the log haul-out is mentioned here, there is no discussion of Simpson's proposed outer Middle Waterway dock. Will this project be evaluated under a separate Corps 404 permit, or is it an integral part of the cleanup and fill project? NOAA does not have enough information to provide comments on mitigation for this project, but we expect that mitigation will be needed. [81]

Response 127. *The relocation of the log haul-out is part of the CERCLA cleanup but the dock to be located in the Middle Waterway is not part of the CERCLA action. Mitigation for the log haul-out is addressed in the April 2000 "Habitat Plan and Design Report; St. Paul Waterway Nearshore Facility" which was distributed to the natural resource agencies for review. EPA did not consider impacts of the proposed Middle Waterway dock in reviewing the mitigation plans because it will undergo a separate permit process.*

4.0 MIDDLE WATERWAY

Comment 128: The draft ESD states that a separate ESD will be prepared on the cleanup plan for Middle Waterway. MWAC and Simpson believe that an ESD for Middle Waterway is unnecessary unless the sediment volumes, cleanup plan and disposal options are dramatically different than discussed in the ROD and ESD. [57]

Response 128: *The 1989 ROD estimated that 57,000 cy of contaminated sediments would require active remediation in the Middle Waterway. The investigations and studies undertaken by MWAC since the ROD was signed have resulted in the identification of higher volumes of sediments that would be subject to remedial action than originally estimated in the ROD. MWAC currently estimates that 75,000 to 100,000 cy of contaminated sediments may require remedial action, which is almost twice the original estimate. In addition, the increased volume may result in a large increase in the estimated cost of the remedy outlined in the ROD. While these changes will not result in a fundamental change to the remedy selected in the ROD, the differences are significant and will be documented in an ESD. Even if the final volume is closer to the ROD estimate, EPA plans to issue an ESD for all CBN/T waterway cleanup plans, as a means of informing the public about the specific implementation of the CBN/T site-wide cleanup plan for each waterway.*

Comment 129: How can EPA expect to reserve space for the Middle Waterway sediments in one of the disposal sites? The disposal site owners have the right to say who dumps what onto their private property. EPA can expect that space would become available but that doesn't make it so. EPA needs to include assurances from the land owners that the Middle Waterway sediments would be welcome in any one of the proposed sites. And second—how can EPA expect to reserve space for the Middle Waterway sediments when there is no cleanup plan for the Middle Waterway? EPA should include the Middle Waterway cleanup plan in this ESD or make the disposal site selection in a separate ESD along with the cleanup plan. [57]

Response 129: *EPA's selection of disposal sites is intended to accommodate contaminated sediments dredged from the Thea Foss, Wheeler-Osgood, Hylebos, and Middle waterways. Therefore, the selected disposal sites must have sufficient disposal capacity to contain the projected volume of contaminated sediments that will be dredged from the Superfund project and any additional dredging by the Corps, the Port, or private parties during the Superfund cleanup.*

The Middle Waterway PRPs have estimated that approximately 75,000 to 100,000 cy of contaminated sediments may require disposal. EPA expects dredged contaminated sediments from the Middle Waterway to be disposed of in the sites selected in this ESD. The City has recommended to EPA that the Thea Foss and Wheeler-Osgood contaminated sediments be placed in the St. Paul Nearshore Fill and, if possible, also the contaminated sediments from Middle Waterway. EPA supports this proposal but reserves the flexibility to allow the PRPs to make adjustments during design based on final disposal capacity.

Comment 130: The baywide assessment states that due to habitat modifications, most osmoregulatory adaptation to salinity by out-migrating juvenile salmonids must take place along the brackish edges of the river plume. The landscape perspective outlined in the document identifies seven strategies that would offer the greatest contribution to the estuarine life history of chinook and other salmon in the watershed. The first strategy is to preserve relict habitat patches as building blocks for future mitigation (Simenstad 1999). The St. Paul Waterway is influenced by the plume of the river and is therefore within the area that is currently utilized for osmoregulatory adaptation by out-migrating juvenile salmonids. The waterway is also composed of 13.6 acres of relict intertidal and shallow subtidal mudflats. Sampling for juvenile salmonid usage in the waterway is limited. However, a 1997 study showed significant use of the St. Paul Waterway by both chum and chinook salmon, and limited use of the Middle Waterway by chinook salmon (Parametrix, Inc. 1997). In conjunction with the scarcity of intertidal habitats, this information further supports our continued concern with the filling of the St. Paul Waterway, and further questions the adequacy of the proposed mitigation for this alternative disposal site. [29]

Response 130: *EPA shares the concern regarding loss of critical habitat. In developing a strategy to meet EPA's responsibility for cleanup and to support bay-wide salmon recovery efforts, EPA faced many difficult choices and has been presented with many obstacles to using deeper, subtidal areas in the Bay for disposal. EPA analyzed the impacts of the remedial actions on the aquatic environment in compliance with Section 404(b)(1) of the Clean Water Act. Because removal of contaminated sediments (i.e., dredging) creates the need to dispose of contaminated sediments somewhere, EPA recognized that finding disposal sites and mitigating for adverse effects required a geographical scope beyond individual waterways. EPA maintained a Commencement Bay-wide perspective in formulating and evaluating remedial action plans and requirements for mitigation in order to ensure that ecological gains result from its cleanup actions. While specific actions and schedules within each individual waterway may vary owing to site-specific conditions, the specific and collective activities of each remediation will cumulatively contribute to practical and measurable improvement to aquatic habitat functions where they are most needed in the watershed. See Response 134.*

5.0 BAY-WIDE CONCERNS

5.1 Bay-wide Restoration Planning

Comment 131: NOAA and the Ecology trustee representative note that due to the scarcity of aquatic and nearshore habitat available for restoration opportunities and the recent ESA listings, cleanup and disposal decisions must be made under a baywide planning and evaluation effort, especially for threatened/endangered trust resources and their habitats. For example, the Hylebos CAD proposal suggests, rather than rebuilding the original bathymetry of the aquatic habitat, modifying it to a depth more beneficial to salmon, and planting vegetation.[81][85]

Response 131: *A baywide assessment of impacts and potential enhancement of salmon habitat was an important consideration in EPA's selection of disposal sites and review of mitigation plans. See Responses 130 and 135.*

Comment 132: DNR notes that a major issue for them is the assumption that physical removal or isolation of contaminants from the surface sediment environment alone will satisfy the objective

of habitat function and fisheries resources enhancement. DNR expects that significant adjustments in design may be required to achieve the habitat function and fish resources enhancement objective as a result of incorporation of estuary landscape restoration considerations. [155]

Response 132: *EPA has sought to incorporate habitat function and fisheries resources enhancement in every decision made in the cleanup process as we implement the ROD. In assessing suitable compensatory mitigation measures, EPA has and will continue to rely upon the framework for the Commencement Bay-wide conservation and recovery strategy in the Simenstad Report, along with data developed during consultation with the Services. The strategy of the Simenstad report focuses on broad landscape attributes and ecosystem processes (i.e., landscape ecology) that promote juvenile salmon utilization of existing and potential Puyallup River delta and Commencement Bay habitats. Drawing from the Simenstad report, EPA has identified "performance criteria" that must, at minimum, be included in any acceptable compensatory mitigation plan. These performance criteria are listed in Section IV the ESD and in the 404(b)(1) evaluation for the cleanup.*

Comment 133: MWAC is opposed to any proposal that would create a tributary or channel from the Puyallup River to the Middle Waterway, as some have suggested. Not only do we believe that it is infeasible in light of existing land use conditions and sediment loads, we believe that such a proposal poses a high risk of scouring the existing productive remnant original mudflat. We agree with Charles Simenstad's conclusion in his Commencement Bay Aquatic Ecosystem Assessment Report that an excessively engineered freshwater channel will divert critical funds and efforts from more functional habitat restoration alternatives. MWAC believes that public and private funds would be better spent and distributed on smaller, more feasible restoration projects elsewhere in Commencement Bay. [57]

Response 133: *EPA is not requiring in the final ESD that a tributary or channel be constructed from the Puyallup River to the Middle Waterway. However, EPA is requiring that a permanent freshwater source be provided to upper Middle Waterway. See Response 121.*

5.2 404(b)(1) Evaluation

Comment 134: I am quite concerned with the prospect of filling in more intertidal/nearshore habitat in the bay, even if it is to support cleanup efforts, considering that a staggering proportion of the original tideflats and marshes have already been filled. The National Wetlands Policy Forum, convened at the request of EPA in 1987, recommends as an interim goal, "achieve no overall net loss of the nation's remaining wetlands base", and a long-term goal of "increase the quantity and quality of the nation's wetlands resource base." Regardless of mitigation, if the filling of St. Paul and Blair Slip 1 go forth, these sites will be made permanently unavailable as existing habitat and as future restoration opportunities. [85]

Response 134: *EPA recognizes the significance of the impacts to intertidal habitat from use of the St. Paul and Blair Slip 1 areas as disposal sites. However, the extensive areas of sediment contamination in Commencement Bay are also negatively affecting habitat. The 1989 ROD designated dredging and capping as remedies to address contaminated Commencement Bay sediments. Dredging will result in the need to dispose of approximately 1.6 million cy of contaminated sediments. EPA analyzed the impacts of the remedial actions on the aquatic environment in compliance with Section 404(b)(1) of the Clean Water Act. Because removal of contaminated sediments (i.e., dredging) creates the need to dispose of contaminated sediments somewhere, EPA recognized that finding disposal sites and mitigating for adverse effects required a geographical scope beyond individual waterways. EPA maintained a Commencement Bay-wide perspective in formulating and evaluating remedial action plans and requirements for mitigation in order to ensure that ecological gains result from its cleanup actions. While specific actions and schedules within each individual waterway may vary owing to site-specific conditions, the specific and collective activities of each remediation will cumulatively contribute*

to practical and measurable improvement to aquatic habitat functions where they are most needed in the watershed. EPA has sought to avoid and minimize adverse impacts to the extent possible. Unavoidable impacts must be compensated consistent with performance criteria that are based on the bay-wide conservation and recovery strategy. EPA's 404(b)(1) evaluation is summarized in the ESD and the full evaluation is included in the Administrative Record. See Response 132.

Comment 135: We appreciated the opportunity to review the draft 404(b)(1) analysis and were impressed with the organization of the document for the complexity of issues and proposed actions. We would like to see the final 404(b)(1) analysis acknowledge the acceptability of the proposed habitat plan for the St. Paul facility and the reliance upon the final adaptive management plan to address any uncertainties, as discussed above. [71]

We also request that the 404(b)(1) analysis be updated on p. 19 to list the "Habitat Plan and Design Report for the St. Paul Waterway Nearshore Facility" (Parametrix, February 2000), which is Appendix Z of the Round 3 Data Evaluation and Pre-Design Evaluation Report, Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington. Appendix Z was circulated in the fall to EPA and all of the natural resource agencies, as was the final Round 3 Report. This appendix has since been updated to reflect comments from EPA Region 10 Aquatic Resources Branch and the monthly interagency St. Paul habitat project planning and design meetings. This report was prepared specifically for the purpose of serving as a supporting technical document for the ESD, 404(b)(1) and BA documents. [71]

Response 135: *It is not possible for EPA to provide it's final determination on the acceptability of the proposed habitat mitigation plan for St. Paul Nearshore Fill at this time because EPA has not been provided with final design plans and specifications for the St. Paul Nearshore Fill project and the Thea Foss remediation project.*

But based on existing information, EPA is uncertain of the ability of the Upper Middle Waterway mitigation area to fully function as claimed. Accordingly, EPA has determined that the risk of mitigation success/failure must be specifically factored into habitat plans and provided for up-front rather than solely as a post-construction contingency. Additionally, a freshwater source from the Puyallup River to the Middle Waterway that meets the criteria listed in Section VI.B. of the ESD is considered necessary to assure full function of the mitigation project and, in part, to compensate for resource losses from the remedial activities in the Thea Foss Waterway. Please see our complete findings in the final ESD and 404(b)(1) evaluation. EPA's decisions are based on review of the April 2000 "Habitat Plan and Design Report; St. Paul Waterway Nearshore Facility" (which is an updated version of the document mentioned in the comment).

Comment 136: Some commentors asserted that EPA proposed three disposal sites (Mouth of Hylebos, St. Paul Nearshore Fill, and Blair Slip 1) without demonstrating that this is the least impact practical alternative, as required by Section 404 of the Clean Water Act. They commented that EPA had not adequately evaluated other alternatives, such as the use of one disposal site at the Mouth of Hylebos, that would greatly reduce loss of habitat in Commencement Bay while at the same time lowering the cost of cleanup.

They note that EPA did not provide a clear rationale regarding the use of the three sites rather than one. Although it is suggested in the Substantive Compliance document that no single site could contain all of the material, this statement is then qualified by the observation that this would be possible through some configuration of the Mouth of the Hylebos CAD. At no point is a limit placed on the capacity of this site and, in the Explanation of Significant Differences document, it appears that this site will only receive material which is beyond the capacity of the other two sites.

They also noted that minimizing the number of sites would have better avoided potential cumulative impacts. Use of two of the sites will result in the loss of aquatic habit, including some

classified as Special Aquatic Habitats. Again, the use of the Mouth of Hylebos CAD site will not only avoid these losses but will actually constitute an environmental enhancement. As the Mouth of Hylebos CAD could contain all of the material while the Blair Slip 1 and the St. Paul sites will not, a prudent approach would be to use the Mouth of Hylebos CAD alone rather than all three sites. In addition, the 404(b)(1) Guidelines at 40 CFR 230.10(a) require the use, where practicable, of the alternative which has the least adverse impact on the aquatic ecosystem.

From the above, the commentor concluded that the Mouth of Hylebos CAD site will have the least impact upon aquatic habitats, will require no mitigation (indeed, with proper design, it will be an environmental enhancement), and can contain ALL of the dredged material (other than some small amount that may need to be disposed at a regional landfill). This being the case, it is not clear why the other two aquatic sites were selected.

Consequently the recommended plan violates the CERCLA criteria for compliance with the substantive requirements of ARARs (Applicable, or Relevant and Appropriate Requirements)—specifically Section 404 of the Clean Water Act. [89][150]

Response 136: *EPA does not agree with the commentors' assertion of violation of the requirements of either the Clean Water Act or CERCLA. EPA carefully evaluated a large range of alternatives for suitable disposal and developed selection criteria to determine the least environmentally damaging practicable alternative. The practical alternatives analysis was consistent with the project purpose of the 404 evaluation, which is: to remediate contaminated Commencement Bay problem areas consistent with the ROD cleanup objectives and, in a manner that is, to the maximum extent practicable, consistent with and supportive of the conservation and recovery of ESA-listed species. In its evaluation, EPA considered site availability, cost-effectiveness, feasibility, avoidance and minimization of impacts to the aquatic environment, and avoidance of jeopardy to and contributions to conservation and recovery of ESA-listed species. These criteria are consistent with Section 404(b)(1) guidelines. However, as a result of public comment and further discussions on the proposed disposal sites, the Mouth of the Hylebos CAD was withdrawn, which resulted in significant reevaluation of the impacts and potential bay-wide improvement from the remedial actions. The final ESD and 404(b)(1) evaluation provides more detailed descriptions of that analysis.*

EPA's major concern with in-water disposal was the need to evaluate the practical alternatives and the cumulative impacts of those sites on a bay-wide basis. EPA maintained a Commencement Bay-wide perspective in formulating and evaluating remedial action plans and requirements for mitigation in order to ensure that ecological gains result from its cleanup actions. It was also EPA's goal that while specific actions and schedules within each individual waterway may vary owing to site-specific conditions, the specific and collective activities of each remediation will cumulatively contribute to practical and measurable improvement to aquatic habitat functions where they are most needed in the watershed. EPA also wanted to assure full capacity for all disposal actions.

The Mouth of Hylebos CAD was considered a priority site because of its location and possible size, and was proposed as a disposal site in EPA's draft ESD. However, conflicts with local Coastal Zone Management Act designated land use and several unresolved issues have led EPA to the conclusion that the Mouth of Hylebos site is not available for use as a disposal site. The unresolved issues are described in the revised 404(b)(1) analysis and include: (1) DNR's stated preference that CADs only be used for temporary disposal while EPA sees them as a long-term solution; (2) lease rates for use of state-owned, aquatic land; and (3) need to relocate an existing lease holder at the mouth of the Hylebos. EPA determined that a considerable amount of time would be needed to resolve these issues, and that the site could not be made available in time for EPA to use it as a disposal site for the Hylebos Waterway cleanup, which does not meet the project purpose. Blair Slip 1, St. Paul Waterway and an upland regional landfill are available for use, feasible, and cost effective. The only available disposal site which could

potentially contain all Commencement Bay contaminated sediments is an upland regional landfill. The cost and logistics, however, make use of an upland regional landfill for all contaminated sediments dredged from the CB/NT site impracticable. During RD, some volume of sediments from any of the three waterways may be found to have physical or chemical characteristics that requires their removal to the upland environment. Additionally, none of the available aquatic sites have the capacity to accept the present estimated volume to be dredged. Accordingly, contaminated sediments also will be disposed at the an upland regional landfill.

Comment 137: The Mouth of Hylebos site has the least habitat impacts to Commencement Bay of the practicable disposal sites identified by EPA. As discussed in the draft ESD, filling St. Paul Waterway results in the loss of 13.6 acres of aquatic habitat, 7.6 of which are mudflats, a protected special aquatic habitat under Section 404 of the Clean Water Act. Section 404 maintains that degradation or destruction of special aquatic sites such as wetlands and mudflats represents an irreversible loss of valuable aquatic resources that should be avoided. Filling Blair Slip 1 results in the loss of 13.1 acres of aquatic habitat, including 3.1 acres of intertidal and shallow subtidal habitat, none of it classified as mudflats. The aquatic habitat loss by the draft ESD totals 26.7 acres, 10.7 of which are mudflats or intertidal/shallow subtidal habitat. Once the least impactive practicable alternative is selected, then and only then can mitigation be considered in the Clean Water Act Section 404 process. [150]

Response 137: *The mouth of the Hylebos CAD is not practicable because it is not available. See Response 136.*

Comment 138: Use of the St. Paul and Blair Slip 1 sites will result in a loss of 26.7 acres of aquatic habitat, including 7.6 acres of mudflats (Special Aquatic Habitat) and 3.1 acres of intertidal and shallow subtidal habitat. In its evaluation of aquatic impacts in the Substantive Compliance document, the EPA rated the St. Paul Waterway as high/high and Blair Slip 1 as medium/high. This loss will require mitigation at some unknown cost. In contrast, the Mouth of Hylebos CAD was rated as medium/low. Rather than requiring mitigation, it is expected to constitute an environmental enhancement. Actions such as environmental enhancement are strongly encouraged by the Supplementary Information for the 404(b)(1) Guidelines at FR 45, No. 248, page 85336. The loss of habitat and subsequent mitigation can be avoided by the use of the Mouth of Hylebos CAD as the single disposal site. [89]

Response 138: *See Responses 136 and 137.*

Comment 139: The use of fewer disposal sites is not only less impactive to Commencement Bay, it also may result in a substantially lower cost of cleanup. For Hylebos Waterway alone, the cost of using Mouth of Hylebos as a single disposal site is $7 million to $14 million less expensive than using two disposal sites based on current cost estimates. Incorporating sediment from other problem areas could further reduce the overall cost for cleanup of Commencement Bay sediments by building economies of scale. Therefore the ESD's recommended cleanup does not meet the CERCLA criteria for cost effectiveness because it is not the least cost, fully protective alternative. In addition, these costs do not include the unknown cost of mitigation which will be required at two of the sites. The use of the Mouth of the Hylebos CAD alone will be less costly and will avoid the costs of mitigation.[89][150]

One of the commentors also stated that in 1988, the Corps revised a portion of its dredging regulations at 33 CFR Parts 209, 335-338. In this revision the Corps developed the concept of the Federal Standard. As defined at 33 CFR 335.7, (the) "Federal Standard means the dredged material disposal alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or the ocean dumping criteria."

Legally, the Federal Standard is applicable only to the Corps when undertaking operation and maintenance activities at Army Civil Works projects. Thus, it is not legally applicable to the Commencement Bay remediation project. It is, however, generically applicable to any dredged material disposal project and has been widely used as a basic principle in the planning and design of dredged material disposal activities. This being the case, if it is applied to the Commencement Bay remediation project it is seen that the project fails two of the three components of the Federal Standard, economic and environmental. [89]

Response 139: *EPA agrees that the Corps' regulations for operation and maintenance activities at Army Civil Works projects are not applicable or relevant and appropriate to apply at the CB/NT site. The CERCLA criteria for determining suitable cost directs EPA to select remedies where costs are proportional to overall effectiveness, 40 CFR §300.430(f)(1)(ii)(D). However, cost is not the only test of alternative suitability. EPA balances cost with several other criteria in the both the CERCLA and 404 alternatives analyses. Nonetheless, as discussed in Response 136, the Mouth of Hylebos CAD is not available. In addition, EPA does not concur that the CAD at the Mouth of the Hylebos Waterway would necessarily require no mitigation. Some aquatic habitat would still be lost or modified. Mitigation measures would still be required to minimize and/or offset any unavoidable impacts to the aquatic environment.*

Comment 140:. The draft ESD recommends disposal sites that are not yet known to be available or implementable. The draft ESD states there is currently much uncertainty associated with mitigation that might be requested by NMFS and USFWS under the ESA—for example a diversion of Puyallup River water to Middle Waterway as part of the mitigation for St. Paul Waterway nearshore fill, or expanded mitigation for the Blair Slip 1 nearshore fill. Furthermore, EPA has not determined if all three of the sites are available or if there will be any costs involved in using the sites. Consequently, contrary to the NCP, there has not yet been a full and complete "feasibility study level" delineation of mitigation scope, performance or cost in the draft ESD, nor a complete evaluation of the nine CERCLA criteria. [150]

Response 140: *The selected disposal sites in the final ESD, as demonstrated by the 404(b)(1) evaluation are practicable, thus, available. Throughout the conceptual development of the disposal sites, EPA required extensive demonstration that impacts at these sites would not cause or contribute to significant degradation of the waters of the United States. Throughout pre-remedial design planning, EPA identified all appropriate and practicable steps to avoid short- and long-term unacceptable adverse impacts to the Commencement Bay aquatic ecosystem. All appropriate measures will be taken during remedial design, construction, and site maintenance to continue to avoid and minimize adverse impacts. Such measures that will be required by EPA include, but are not limited to, avoidance of fish-critical activity periods for in-water work, incorporation of "best-design" features and/or materials into remedial and compensatory mitigation plans that protect or enhance ESA-listed species, and creation or restoration of critical salmonid habitat. Additionally, EPA will require detailed compensatory mitigation plans to offset loss and other impacts to aquatic habitat and meet ESA responsibilities. EPA has sufficient information to finalize this ESD which approves pre-design remediation plans and selects disposal sites for contaminated sediments. EPA engaged in a thorough analysis of the remedial actions in a feasibility study to support the 1989 ROD, and several subsequent pre-design evaluations. An analysis of the nine CERCLA evaluation criteria analysis was provided in the 1989 ROD. A new nine criteria analysis is not required to address significant changes for an ESD.*

Comment 141: The EPA, in the selection of the alternatives [in the draft 404(b)(1) evaluation] indicates that mitigation will be required for Blair Slip 1 and the St. Paul Waterway sites for the lost habitat but not for the Mouth of Hylebos CAD as, with proper design, it will constitute an environmental enhancement and will be self-mitigating. It should be noted that the Guidelines do not provide for the consideration of mitigation in the selection of alternatives and the obvious

spirit and intent of the Guidelines is to select sites which do not require mitigation. If this is not possible, mitigation may be considered, but only after site selection. [89]

Response 141: *EPA agrees with the commentor's statements about the role of mitigation in the 404(b)(1) evaluation and that mitigation would be required for a CAD at the Mouth of the Hylebos Waterway.*

5.3 Cleanup Criteria

Comment 142: USFWS and WDFW believe that the SQOs referenced in the ESD are outdated and not reflective of new scientific information related to acute and chronic adverse effects on biological resources, particularly fish, and may not be sufficiently protective of FWS's trust resources. They are particularly concerned that the SQOs for bioaccumulative, persistent chemicals are not sufficiently protective for fish and wildlife resources. Sediment standards and cleanup objectives in the ROD were derived and based on the protection of benthos species only, and as such, do not accurately predict protectiveness for higher order organisms. For example, recent studies on the effects of PAHs on English sole (*Pleuronectes vetulus*) indicate chemical thresholds of biological effects at levels well below traditional sediment management standards (Johnson, et al., 1994, Horness, et al., 1998). FWS and WDFW recommend that EPA conduct a thorough scientific review of recent studies on PAHs and PCBs and their related impacts to fish and shellfish and adjust, as warranted, the current SQOs to truly ensure acceptable sediment quality is achieved through the remedial actions. Failure to achieve adequate cleanup levels of contaminated sediments will further prolong injuries to aquatic resources in the Bay through continued exposure to contaminants.[28][29]

Response 142: *EPA's risk assessment and rationale for selecting cleanup levels are presented in the 1989 ROD and 1997 ESD, which concluded that the SQOs adequately protect human and ecological receptors. EPA and Ecology collected a considerable amount of sediment contamination and English sole histopathology data during remedial investigation and feasibility study (RI/FS) and considered use of these data in developing cleanup levels. EPA ultimately rejected this approach because even bottom-dwelling fish are not limited to exposure to specific areas of sediment contamination, making the relationship between the fish histopathology data and sediment contamination difficult to interpret.*

The Horness et al. (1998) paper reports on the incidence of tumors and lesions in English sole in Puget Sound and the association with sediment PAH contamination. Based on a compilation of data from various studies, the paper suggests the sediment concentrations of total PAHs greater than 2,000 ppb (dry weight) are likely to cause harmful effects on fish. These studies do not provide a direct relationship between sediment and fish health, rather this concentration is characteristic of a combination of water, sediments and prey that fish were exposed to. Selection of this concentration cannot be used as a sediment value above which harmful effects can always be expected due to the uncertainty of the actual exposure concentration and pathway. In addition, the EPA rejected a similar approach during the development of the cleanup goals because of the lack of direct association with sediment.

With regard to PCBs, EPA received similar comments to the 1997 ESD modifying the PCB cleanup level, and responded to them in the responsiveness summary (see page 46 of the 1997 ESD responsiveness summary). Since then, EPA has received no new information that would indicate that it's 1997 PCB cleanup level is not sufficiently protective of fish.

Comment 143: Several commentors believe that the revised PCB cleanup level of 300 μg/mg violates the narrative cleanup objective in the 1989 ROD, to "achieve acceptable sediment quality in a reasonable time frame." Acceptable sediment quality is defined as the absence of acute or chronic adverse effects on biological resources or significant human health risks. They believe that, in order meet the ROD criteria, EPA must reverse it's previous decision on PCB cleanup

levels in Commencement Bay, changing the PCB SRAL from 450 μg/mg to 240 to 300 μg/mg and the SQO from 300 μg/mg back to the more protective cleanup level established in the original Commencement Bay ROD of 150 μg/mg. The following the specific concerns were raised about the current PCB cleanup standard:

- It dramatically increased the amount of PCB contaminated sediments to remain in Commencement Bay after Superfund cleanup was completed.
- Human and ecosystem health will be is jeopardized.
- Besides industry there are a lot of people involved in boating on the Hylebos and the Foss in marinas, who would not be sufficiently protected.
- Once the cleanup is done you can't go back and clean it up better. It should be done to the best of our ability the first time.
- Protection of human health and safety and of the ecosystem are the reasons clean water laws were passed. Citizens do not want this protection weakened.
- EPA assured that the marine and aquatic communities within Commencement Bay would continue to be adversely impacted by toxic PCB contamination for 10 to 20 years after cleanup of the waterway is conducted. [14] [30] [31] [32] [33] [34] [36] [37] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [72] [74] [75] [76] [77] [78] [86] [90] [92] [155] [172] [180]

Response 143: *EPA's rationale for selecting the 300 μg/mg cleanup level, and it's response to public comments, is presented in the 1997 ESD and the Administrative Record for that decision. Since the ESD has been completed, EPA has received no new information that would indicate that the 300 μg/mg cleanup level is not sufficiently protective of human health or the environment. Based on current information, the Hylebos cleanup plan presented in this ESD will result in a post-cleanup average sediment concentration of 58 μg/mg (dry weight) in Commencement Bay (based on EPA's 7/31/00 letter to NMFS). This concentration is well below sediment effects levels that have been considered for protection of fish.*

Comment 144: The cleanup objective for the remedial actions, as described in Section 10 of the 1989-ROD, states that "the selected remedy is to achieve acceptable sediment quality in a reasonable time frame." The PRPs have delayed cleanup far beyond what could be considered a "reasonable time frame." Because of this delay, the amount of sediments requiring remediation under the original cleanup level has doubled. The increase in cost of cleaning up these sediments led the PRPs to request a revision of the cleanup standard, and in 1997, the EPA did so. [86]

Response 144: *EPA agrees that the cleanup should not be further delayed and should proceed as quickly as possible. It is logical to conclude that as long as the contamination remains exposed and unconfined, some movement of the contamination can occur through natural processes and the navigational uses of the waterways. However, delay in getting to cleanup may not be the primary reason that the amount of sediment to be cleaned up is double that estimated in the ROD. The increase in sediment volumes is more likely due to the limited number of samples taken during the RI/FS, and a more detailed modeling effort to determine areas which would naturally recover in 10 years. The ROD directed that the area and volume of sediment requiring cleanup would be better defined in remedial design, which the studies undertaken by the City and the HCC have done. Expanded sampling in pre-design showed much more area of contamination than was thought during the RI/FS. Likewise, far less area is predicted to naturally recover than was estimated in the ROD. In addition, although Ecology's source control efforts have significantly reduced the contaminant loading and input into the waterway*

over the last 10 years, many sources of sediment contamination were not controlled until several years after RI/FS samples were taken in 1984, and have likely contributed to the increase in contaminated sediment volumes.

Comment 145: Some commentors were concerned that the revised PCB cleanup level violated the Washington State criteria established for protection of human health under MTCA; and increased the cancer risk to the Tacoma community through PCB contamination to more than 10 times the risk permitted under Washington State law.[39] [67] [86]

Response 145: *The PCB cleanup level is in compliance with Washington State Law, as discussed in the 1997 ESD. In addition, Ecology concurred with the 1997 ESD.*

Comment 146: Several commentors raised concerns that the amended PCB cleanup level is not protective of juvenile salmonids, which have been listed as threatened under the ESA since EPA's 1997 decision to raise the PCB cleanup level. They noted that the salmon migrate through the Hylebos Waterway to reach Hylebos Creek and that salmon using the Hylebos Waterway for feeding and rearing will continue to be harmed by the concentration of PCBs left in the sediments of the waterway. CHB and People for Puget Sound noted that studies completed by NMFS science staff has established that a pathway to PCB exposure does exist and have also demonstrated an effect to juvenile salmon exposed to PCB in the Hylebos Waterway. Some commentors noted that NMFS has established that PCB levels in excess of 200 μg/mg have been demonstrated to impair the health of juvenile salmonids and increase their susceptibility to disease, while others commented that these findings will be confirmed in the near future when NMFS releases its white paper on the PCB study. Commentors believe that unless the PCB cleanup standard is revised to reflect decisions in the 1989 ROD, this cleanup will obviously fail to protect human health and juvenile salmon, as well as all other fish and wildlife. This may fit the definition of "take" under the ESA.[36][39][86] [180]

NOAA commented that its staff are currently re-assessing the cleanup levels for the site, as defined in the 1989 ROD and the 1997 ESD, which modified the PCB cleanup level. NOAA is not convinced that the cleanup levels selected by EPA will protect NOAA trust resources, including chinook salmon. Because they are not discussed in the ESD, they did not provide specific comments on cleanup levels at this time, but want to make it clear that despite their generally favorable review of the ESD, they consider cleanup levels to be an issue open for continued discussion. [81]

Response 146: *See Response 143. EPA considers it essential to keep the cleanup process moving forward and to continue to make decisions based on available information. EPA has been in close contact with NOAA on this issue and understand that they are developing information that will undergo peer review in the near future. If NOAA submits its analysis to EPA and if NOAA's recommendation is that the current cleanup level should be changed, EPA at that time will determine whether a change to the PCB cleanup level is appropriate.*

Comment 147: USFWS noted that PCB levels at the site were generally estimated using Aroclor mixtures. Since PCB congeners have different potency factors (toxic equivalency factors) and elicit different responses on biological receptors, they believe it is essential for EPA to conduct congener specific analysis when determining risk to ecological receptors. [29]

Response 147: *The commentor is correct that EPA used Aroclor mixtures to measure and evaluate risks posed by PCB concentrations at the site. Congener-specific analysis is becoming an important component in new PCB risk assessments, and is becoming more accepted as a way to address risks that may not be addressed using the Aroclor approach. EPA is still in the process of developing guidance on measurement of congeners and on assessing risks posed by dioxin-like PCB congeners to human health and environment. However, EPA has decided that the delay to cleanup that would be caused by going back to old sites like CB/NT, where hundreds*

of samples were tested using the Aroclor approach, and collecting new congener-specific data, would result in greater harm to human health and the environment than going forward with the cleanup using Aroclor data.

Comment 148: The Ecology trustee representative commented that until cleanup and trustee objectives are met, institutional controls and natural recovery do not protect, but instead incur, ongoing injury to natural resources.[85]

Response 148: *The ROD and the Administrative Record, including ESDs, support EPA's determination that the remedy selected is protective of human health and the environment in compliance with CERCLA, the NCP, and EPA guidance. Natural recovery, in principle, allows contamination slightly higher than the SQOs to remain in the environment for a period of time to allow natural processes to degrade the contaminants to achieve the SQOs within 10 years of the beginning of cleanup. It is acknowledged that some ongoing natural resource injury may occur until the SQOs are achieved. However, EPA determined that the potential effects from allowing marginally contaminated areas to naturally recover was offset by the avoidance of impacts dredging can have on existing habitat and marine organisms.*

Comment 149: The City has questioned the validity of the BEP cleanup level for the Thea Foss Waterway. They cited a recent literature compilation of toxicity studies involving phthalate esters (Staples et al., 1997), where investigators found that high molecular weight phthalates such as BEP exceeded their solubility limit before toxic concentrations could be achieved in water. In addition, the City cited the results of their own toxicity study where three different types of organisms (adult amphipods, larval echinoderms, and juvenile polychaetes) were exposed to field collected sediments that had been mixed with clean sediments to achieve a range of sediment concentrations. In that study, significant toxicity (according to SMS criteria)was observed only at BEP concentrations above 5,300 µg/mg. (4 times the SQO). The City feels that the toxicity presently observed in the waterway is likely due to co-occurring chemicals such as PAHs and mercury, rather than BEP. Based on this, the City is requesting that DMMP guidelines (the screening level for open-water disposal is 8,300 µg/mg) be considered for management of BEP recontamination that has been predicted and that biological monitoring be relied upon to determine the significance of any post-remedial action BEP exceedances in the sediment.[156]

Response 149: *EPA has agreed that biological monitoring will play an important role in determining the ecological significance of BEP recontamination. Based on EPA's evaluation of the Round 2 biological data from Thea Foss Waterway SSMAs 2,3, 4, and 5 along with the Round 3 BEP laboratory toxicity study, EPA thinks that if a site-specific BEP criterion was developed, it would still be of the same order of magnitude as the SQO. As an example, if the amphipod results from the toxicity study were compared to controls (due to the high mortalities in the reference samples), significant toxicity occurred above 2,000 µg/mg BEP. Significant toxicity also occurred for combined echinoderm larval abnormality and mortality above 2,900 µg/mg . However, EPA intends to include biological monitoring and testing as a major component of the Operations, Maintenance and Monitoring Plan (OMMP) to be implement after the remedial action is completed.*

5.4 Performance Criteria

Comment 150: We are concerned that the cleanup plans for both the Thea Foss and Hylebos waterways call for dredging and capping in adjacent sediment management units, with resulting final elevations that are significantly different from one another. EPA should take special care during the design phase to ensure that differing elevations throughout a waterway do not result in slumping of capped areas into dredged areas, re-exposing or spreading contaminants through the waterway. [81]

Response 150: *EPA will require for the final design full assurance through performance and long-term monitoring to ensure that slumping of capped areas will not occur and that there are measures taken to ensure adequate protection from exposure or spreading of contaminants. Project stability is critical to the long-term effectiveness of any cleanup action.*

5.5 Natural Recovery

Comment 151: The Tribe feels very strongly that natural recovery is not applicable to remediation of the Hylebos Waterway, an active, industrial waterway where low levels of sedimentation will be disturbed by propellor scour, wave action, in-water construction and maintenance, dredging or other in-water activities. The Tribe further feels that natural recovery is neither protective nor a reliable component of the remedy for Commencement Bay cleanups and are concerned that a failure of natural recovery will result in further natural resource injuries, greater cost, longer duration before cleanup goals are met, and will likely require development of another disposal site in the bay.[56]

Both the USFWS and the WDFW are concerned with the potential lack of protectiveness of natural recovery in the context of the bay-wide cleanup. WDFW included enhanced natural recovery in that same concern. USFWS was particularly concerned about using natural recovery for bioaccumulative contaminants such as PCBs and mercury. Overall, these resource management agencies do not believe that natural recovery should be applied in Commencement Bay. However, if EPA chooses to include natural recovery as part of the remedy, then the resource agencies requested that an adaptive management plan be pursued, at a minimum, if natural recovery is implemented and that the plan include extensive monitoring to evaluate natural recovery effectiveness prior to the 10-year time frame and identification of appropriate contingencies if natural recovery fails to achieve the remediation goals. [28] [29]

In past reviews, NOAA has documented specific technical concerns with the estimation of sedimentation used by the HCC to predict natural recovery rates in the Hylebos Waterway. NOAA continues to contend that natural recovery will not occur as predicted in this waterway. NOAA is requesting that if there is some uncertainty as to the effectiveness of natural recovery at a particular location that EPA take a conservative approach and require active remediation now. NOAA is concerned that if additional cleanup may be required it will further disrupt the benthic community and, in general, have an unfavorable outcome. [81]

The public also had the expectation that natural recovery would have occurred by now if it was going to be effective. [82]

Natural recovery for PAHs in the Thea Foss Waterway was questioned by some commentors because of the outstanding disagreement with the City regarding the fate of PAHs in storm water. The City currently contends that PAHs are maintained in a dissolved state and do not readily partition to sediment due to the low levels of suspended particulate material. Thus storm water is considered by the City to have little impact on natural recovery or recontamination for PAHs. Some reviewers disagree that suspended material is limited. This affects the outcome of the recontamination potential in that PAHs may be subject to much slower rates of recovery if the input (sediment load) is greater than anticipated. One commentor suggested that additional review of the fate and transport of PAHs be examined prior to design.[151]

Although the CHB do not agree with the use of natural recovery in Commencement Bay, they recognize that it will be implemented as the remedy for some areas. They requested that EPA implement performance objectives for natural recovery areas with clear triggers for when contingency actions are required. They want a plan that will identify the frequency and timing of monitoring, triggers for contingency actions, timing of when natural recovery will be considered no longer viable, and consequences for the PRPs if they do not follow through. [39]

Response 151: *Natural recovery was determined in the ROD to be an appropriate remedy for marginally contaminated areas that are predicted to recover naturally within 10 years of sediment remedial action. Natural recovery was not anticipated to begin to occur until all sources were controlled and highly contaminated sediments were confined. About 20 acres are predicted to naturally recover out of the 120 acres that require remediation in Hylebos Waterway. In the Thea Foss Waterway, approximately 20 acres are predicted to naturally recover out of 80 acres that require remediation. An additional 4 acres in the Thea Foss Waterway will be subject to enhanced natural recovery by adding a thin layer of clean material to the sediment.*

Because of the limited use of natural recovery, minimal risk exists for exposure of mobile aquatic biota to bioaccumulative contaminants undergoing natural recovery. In addition, contaminant concentrations are low (typically between 1 to 3 times the SQO,). The majority of the locations in Thea Foss that will be allowed to naturally recover are contaminated with bis(2-ethylhexyl)phthalate and typically exhibited only minor adverse effects. Areas in Hylebos Waterway that will be allowed to naturally recover are contaminated with various chlorinated organics, including PCBs. Natural recovery areas were designated as such if biological test failures were below the minor adverse effects range in Hylebos Waterway. The exception to this was that areas with PCBs were not allowed to use bioassays to refute the need for remediation and exceedances were limited to 1.5 times the SQO (i.e., 450 μg/mg) for natural recovery designations. Based on the recovery factors calculated in the Hylebos Round 1 Data Evaluation Report, a number of locations contaminated with PCBs will undergo natural recovery in less than 10 years (e.g., 2 to 5 years).

Because natural recovery is predicted based on various models that inherently have some uncertainty associated with them, EPA will rely on monitoring during the recovery period to determine if natural recovery is actually occurring at the rate necessary to achieve recovery in the 10-year period following sediment remediation. Contingency actions and triggers for those actions will be identified in the Operation Management and Monitoring Plan (OMMP) for each waterway to address additional cleanup should natural recovery fail or not be achieved within 10 years. Those contingent actions could result in implementation of active remediation before the 10-year period has lapsed, if warranted. In addition, the OMMP will include a monitoring plan for the natural recovery areas, including enhanced natural recovery areas, that includes the type, frequency, and timing of such activities.

Comment 152: One member of the public asked for clarification of the enhanced natural recovery, as it appeared to be a thin-layer cap. The commentor raised the concern that this approach appeared deceptive and that it looked like a short cut for the City in an area that should probably be actively remediated. [82]

The CHB recommended that excess clean material excavated from the St. Paul Waterway be used to enhance natural recovery processes in areas currently designated for this remedial option. [39]

Response 152: *Enhanced natural recovery is not intended to confine sediment, rather it relies upon biological and physical processes to mix a thin (6 to 12 inches) layer of clean sediment with underlying marginally contaminated sediment to expedite reaching sediment cleanup goals in 10 years. Enhanced natural recovery is not a short cut for any party because it will be monitored to the same degree as other natural recovery areas and remediation will be required if SQOs are not achieved in 10 years. Material used for enhancing natural recovery will need to meet the sediment quality objectives. The material excavated from the St. Paul would qualify and may be available for capping or enhanced natural recovery. The amount of material available for beneficial reuse will be determined during construction of the St. Paul disposal facility.*

Comment 153: The City concurs with EPA's requirement for long-term monitoring to confirm the effectiveness of natural recovery and the need for active sediment remediation if monitoring indicates natural recovery is not viable within a reasonable time frame, which is specified in the ROD as ten years. The City also recognizes EPA's inclusion of enhanced natural recovery as a component of the remedy and has designated this remedy for portions of some SSMAs, as discussed below in the SSMA-specific subsections. [156]

Occidental agrees with the ESD's conclusion at page 19 that, at this time, sediment within and in front of the Chinook Marina (SMA 501) and an area near the 11th Street Bridge (SMA 502) are appropriate for natural recovery under EPA criteria. [148] Occidental further agrees with the ESD's conclusion that "enhanced natural recovery" is appropriate and consistent with the ROD remedy. [148]

Response 153: *Comments noted.*

Comment 154: The PCW is concerned that the draft ESD fundamentally changed the definition of natural recovery, resulting in near elimination of natural recovery as part of the remedy. The ROD estimated that 57 percent of the areas exceeding SQOs in the waterway would recover naturally, whereas the draft ESD applies natural recovery to only 17 percent of the Hylebos Waterway areas that require remediation. It is the opinion of the Partnership that this represents a fundamental change in the scope of application of natural recovery and requires a ROD amendment and evaluation of the nine CERCLA criteria in order to comply with the NCP. On the other hand, they feel that WRDA environmental dredging could cleanup the natural recovery sediment without any changes to the existing ROD. [150]

Response 154: *EPA's designation of natural recovery areas in the ESD is consistent with the 1989 ROD. The cleanup objective stated in the ROD is "acceptable sediment quality in a reasonable timeframe." (See Sections 10.1, 10.2.3 and 10.2.4 of the ROD). As stated in the ROD, natural recovery was to be applied to marginally contaminated areas where recovery can occur in a reasonable time period after source control and sediment remediation are completed. However, in more heavily contaminated areas, the predicted persistence of significant adverse impacts over long periods of time outweighs the potential short-term impacts from active remediation; therefore, as stated in the ROD and the Responsiveness Summary for the ROD, sediment remediation is warranted in order to be adequately protective of human health and the environment. Estimates of natural recovery in the ROD were based on limited data collected as part of the feasibility study. The ROD anticipated that natural recovery estimates would be refined as the result of additional source investigations, sediment sampling conducted as part of remedial design, and emerging information regarding recovery processes . See Sections 8.2.3 and 10.2.4 of the ROD. Additionally, the ROD stated that results of the sediment sampling during the remedial design phase would refine estimate of the areal extent and depth of contamination to be addressed by the sediment remedial alternative. See Section 10.2.4. of the ROD. Information gathered during pre-remedial design studies show that natural recovery is not predicted to occur in as many areas as originally determined. For a response to whether a ROD amendment or ESD is appropriate for documenting this decision, see response to Comment 40.*

5.6 ARARs

Comment 155: USFWS commented that the draft ESD accurately identifies the need to protect federally-listed endangered, threatened or proposed species under the ESA , but incorrectly identifies the ESA as an ARAR under the original ROD. USFWS and NOAA further commented that the ESA is a "stand alone" statute and was not included as an ARAR in the ROD. USFWS recognized the fact that EPA is in the process of consulting with the USFWS and the NMFS on potential impacts to federally-listed species and their habitats, and reminds EPA that adjustments to current mitigation and remedial action plans may result from the consultation. USFWS further

commented that it supported the current comprehensive, bay-wide approach to EPA's impacts analysis. [29][81]

Another commentor noted their belief that protection of endangered species will not be achieved by the proposed remedial action. The combination of dredging, capping, natural recovery and conversion of intertidal habitat to subtidal habitat will be difficult to evaluate under ESA. Consultation with the appropriate agencies may result in adjustments to remedial design as well as mitigation plans. [56]

Response 155: *The final ESD identifies the ESA as an ARAR for remedial actions taken in accordance with the CBN/T ROD. The 1989 ROD did not list ESA as an ARAR because at that time there were no listed species that was determined to be affected by the remedial action. On March 24, 1999, NMFS listed as threatened the Puget Sound chinook salmon in Washington. On November 1, 1999 the USFWS listed bull trout as a threatened species. Under CERCLA Section 121(d), 42 U.S.C. 9621(d), other environmental laws are complied with as ARARs. When a requirement is an ARAR, it means that EPA determines compliance with substantive requirements, but does not necessarily comply with procedural requirements. EPA's national policy on the ESA strongly recommends that we consult with the appropriate resource agency, which we are doing for Commencement Bay. EPA has submitted it's biological assessment to both USFWS and NMFS. Our biological assessment concluded that a few components of the remedial actions may likely adversely affect critical habitat, and mitigative measures have been incorporated so that the remedial actions contained in the ESD will not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of a critical habitat.*

Comment 156: NOAA and the Tribe noted that where remedial actions cause adverse impacts (during cleanup or disposal), mitigation for lost natural resources or their services is required. As a specific example, it was noted that objectives for the Hylebos Waterway intertidal cleanup should be expanded to include adequate compensatory mitigation; and ESA compliance. [56][81]

Response 156: *EPA agrees. Based on available information, the impacts from the cleanup plans for each waterway and proposed disposal sites have been evaluated for compliance with Section 404 of the Clean Water Act. Throughout remedial design, EPA will require that impacts are avoided and minimized, and any unavoidable adverse impacts as a result of the cleanup be compensated for by adequate compensatory mitigation. As discussed in response to Comment 155, EPA has conducted a biological assessment of the remedial action and will continue to evaluate ongoing ESA compliance in consultation with USFWS and NMFS as the design plans are prepared and more detail becomes available.*

Comment 157. The Mouth of Hylebos CAD site is identified in EPA supplementary documents as being in the S-12 shoreline area, therefore the CAD site is consistent with the Tacoma Shoreline Master Program and therefore SMA, an ARAR for this site. The CAD site is expandable to 33 acres. Won't the expansion push the site further into the S-13, which is not an urban environment but a conservancy environment where CAD's are not allowed? If the CAD site cannot be fully contained within the S-12, where, when, and how will EPA look for a new site? Or is it the intention of EPA to request a waiver of state law to place the CAD site at the Mouth of Hylebos location? [82]

Response 157: *See Response 1 for EPA's decision regarding use of the Hylebos CAD site.*

Comment 158: The Tribe also disagrees with EPA that the cleanup plan complies with Tribal ARARS. Changing the PCB cleanup level under a previous ESD was completely contrary to the goals of the Settlement Agreement of 1989 and continues to jeopardize the health safety and welfare of Tribal members and the natural resources upon which they rely for subsistence and spiritual and cultural use. [56]

Response 158: *There is no tribal standard for PCBs in marine sediments. In the absence of a promulgated standard, EPA conducted a human health and ecological risk assessment. The current PCB cleanup standard (a sediment remedial action level of 450 ppb, and an SQO of 300 ppb) were established in the 1997 ESD. These standards were based on a "high end" tribal fishing scenario and ecological risk assessment for the CB/NT site. As explained in EPA's 1997 ESD (see Section III), EPA believes that the cleanup standard for PCBs will result in substantial reduction in risk and be protective of human health and the environment.*

5.7 Institutional Controls

Comment 159: A number of diverse concerns were raised regarding the use of institutional controls as part of the remedy were raised. Members of the community stated a strong desire to have institutional controls (including deed restrictions) "firmly established in perpetuity to avoid future abatement or elimination from political or economic pressures that may not favor environmental quality or human health." [39] As an example, members of the community felt that institutional controls should be in-place to prevent damage to the surface of the subtidal disposal facilities [12]. However, some forms of institutional controls, such as fishing or seafood consumption advisories, were not seen as appropriate for long-term use. The public felt that the ultimate goal should be unrestricted water use. [39] NOAA also stated that use of fishing or seafood consumption advisories may constitute an on-going natural resource injury. [81]

Response 159: *Fish consumption advisories will continue to be necessary for a period of time after sediment cleanup to protect human health based on ingestion of older fish that were exposed to bioaccumulative contaminants prior to the cleanup. Advisories will be in place as long as it takes for fish to either lose their contaminant body burdens or be replaced by younger fish that have not been exposed. Long-term monitoring will be used to determine the period that fish consumption advisories need to be in effect.*

To increase the long-term protectiveness of the waterway cleanups, institutional controls are required to meet the following objectives:

1. *reduce potential exposure of marine organisms to contaminated sediments disposed of and confined in aquatic disposals sites or confined by capping; and*
2. *reduce potential exposure to marine organisms to contaminated sediments left on the CB/NT site.*

One institutional control mechanism that will be used to achieve these objectives will be governmental programs that regulate dredging, filling, or other development activities in the aquatic environment. As an example, designating the area over a submerged cap as a no anchor zone for large, commercial vessels would be implemented through the Coast Guard. Generally, recreational vessels are not precluded from anchoring on a cap because their anchors are not large enough to damage a cap. Such governmental permitting programs have been in existence for many years, and are expected to continue into the future. Land use restrictions implemented through an easement or restrictive covenant is another mechanism that may be used on private property if feasible. Restrictive covenants and easements run with the land and can bind future property owners to comply with the restricted uses. CERCLA requires that five-year reviews be conducted as part of the remedy where contamination remains in place. These reviews can include a review of institutional controls.

6.0 MISCELLANEOUS COMMENTS

Comment 160: EPA's proposed decision identifies the need for clean capping material for various cleanup and disposal actions in Commencement Bay. Although Puyallup River sediments have proven suitable without adverse effects to fish and wildlife in the past, there have been concerns raised about the use of large quantities of Puyallup River sediments in the future. [71]

Response 160: *Dredging of any material from the Puyallup River would require a lease from DNR. In addition, during remedial design, EPA will review PRP proposals to obtain clean sediments for the cleanup to ensure that any removal of sediments does not adversely affect fish and wildlife, and will not be contrary to efforts to support conservation and recovery of salmonid species. EPA will also consider other sources of capping material, including clean dredged material from sources such as Slip 1 and the St. Paul disposal site, and upland borrow materials.*

Comment 161: NOAA has consistently based comments on the Commencement Bay investigations and cleanup plans on five basic principles. These are:

1. Cleanups should progress sooner rather than later to reduce continued exposure of Trust resources to contaminants.

2. A preference for complete removal of contaminants from the aquatic environment (most contaminants originated from the uplands);

3. If the aquatic environment must not continue to serve as the repository for the contaminated sediments, we prefer that contamination not be transferred from impacted waterways to otherwise clean areas for disposal;

4. Where remedial actions cause adverse impacts (during removal or disposal), mitigation for the lost natural resources or their services is required; and

5. Cleanup and disposal decisions must be made under a bay-wide planning and evaluation effort, especially for threatened or endangered Trust resources and their habitats [81]

Response 161: *In response to the first comment, EPA agrees that the cleanups should proceed as quickly as possible. As to comments 2 and 3, EPA agrees, consistent with the principals of Section 404 of the Clean Water Act, that removal of contaminated sediments from the aquatic environment is preferred, where practicable, over in-water disposal. EPA also agrees that in-water disposal in contaminated areas is preferred over disposal in clean areas. However, as discussed in EPA's 404(b)(1) analysis for the Commencement Bay cleanup, EPA has determined that in this case, complete removal of almost 2 million cy of Commencement Bay contaminated sediments from the aquatic environment is neither practicable nor in the public interest. Based on this evaluation, EPA has determined that it is appropriate to use the St. Paul Waterway, Blair Slip 1 nearshore fill sites, and an upland regional landfill for disposal of Commencement Bay contaminated sediments. NOAA's 4th and 5th comments are addressed in Responses 156 and 129, respectively.*

Comment 162: The Port and Occidental Chemical suggested that the Hylebos cleanup be broken up into manageable pieces, with cleanup of contaminated sediments north of the East 11th Street Bridge being expedited and disposed of in Slip 1. [148][154]

Response 162: *The purpose of the ESD is to describe the specific manner in which the 1989 ROD is being implemented at the Thea Foss Waterway problem areas, the Wheeler-Osgood Waterway problem area, and the two Hylebos Waterway problem areas. Additionally, the ESD is selecting disposal sites for contaminated sediment that will be dredged from all of the problem areas listed above plus the Middle Waterway problem area, and which must be confined as specified in the ROD. EPA is not specifying that a particular disposal site must be used for a particular Waterway's sediment. EPA will seek comprehensive cleanup of all problem areas consistent with the ROD as supplemented or changed by the 1997 ESD and this ESD. It is expected that future negotiations with the potentially responsible parties will determine who will implement the cleanup and how.*

Comment 163: The majority of the area at the mouth of the Blair Waterway (slip 5) which has been proposed as a mitigation site is state owned aquatic lands managed by the port under a Port Management Agreement (PMA) with DNR. Under the PMA, the Port has decision authority for infrastructure development projects. The Port is obligated to remove any improvements if the area at some time in the future becomes ineligible for inclusion within the PMA, or if the PMA expires or is canceled. Due to the statutory limitations on the management control of this site, the Port cannot unilaterally guarantee the perpetual dedication of this site for habitat mitigation. [155]

Response 163: *Comment noted. EPA will work with the Port and other potentially responsible parties to evaluate the mitigation required for impacts resulting from the dredging, disposal, or other discharge of material into waters of the United States.*

Comment 164: Occidental agrees with the designation of Slip 1 as an appropriate disposal site for dredged sediment. However, Occidental objects to the extent that the ESD and EPA purport to designate particular sediment for disposal at a particular site or sites. Furthermore, Occidental objects to the extent that the ESD and EPA purport to require that particular disposal sites (and their owners or constructors) accept or reject particular sediment (for reasons other than those appropriate under CERCLA). Depending upon the circumstances, such action by EPA could improperly interfere with private contractual rights and/or constitute a taking "without just compensation" in violation of the United States Constitution. [148]

Response 164: *See Response to Comment 162.*

7.0 ALTERNATIVE DISPOSAL OPTIONS

Comment 165: Several commentors urged EPA to transport this toxic waste to an upland facility where they can be properly stored in a dry environment. [2][3] [5] [6] [7] [8] [9] [10] [11] [13] [19] [25] [26] [91] [94] [173] [175] [176] [177] Some of the specific comments in favor of upland disposal are listed below.

It makes no rational or scientific sense to transfer contaminants from one part of the waterway to another and call that a cleanup. HCC members should be willing (or required) to remove these toxic materials completely out of the aquatic environment. They need to move the materials to a dry site where they can be confined using well-established landfill techniques. [1]

Landfill disposal, in which all of the costs of disposal would be internalized instead of borne by the public, should be strongly considered until a "multi-user disposal site" (MUDS) can be built. A multi-agency study is in progress right now that looks at several different disposal options for contaminated sediments, however, the current assessment may not include Commencement Bay sediments. [12]

We believe the landfill alternative provides the best currently available alternative for disposal of sediments from the Hylebos Waterway. We would like EPA to develop a viable landfill disposal alternative for public review. [12]

In 1989, the Commencement Bay ROD was released by the EPA. It required that all sediments removed from the bay be disposed of in the immediate area. This mandate certainly reflected the technology and options of the time since disposal sites were not in operation and sediments were not treated. But this mandate does not reflect current, tested, and available practice. The better option would be to ship the contaminated sediment to the specialized landfill in Eastern Washington. Although this would add $7 million to the cost of the Hylebos clean up, it is, in light of the extensive potential ecological damage to the north shore area of Commencement Bay, the best option. [14]

The purpose of this letter is to request the decision to use the proposed disposal site in Commencement Bay that is directly in front of my home be changed to an upland site, preferably one that does not interfere with the quality of life along a waterfront in a residential community that has been in existence for well over 100 years. [16]

I am writing to you representing our 1500 member organization to let you know that we overwhelmingly object to this plan and hope that you will reject it in favor of removing the toxic substances from the sediments in question or disposing of them in a certified upland disposal facility. [84]

The EPA has chosen not to transport the contaminated sediments to a more stable upland site such as the Roosevelt Landfill. Transportation costs are high, but could be reduced by combined rail movement with the City. The Roosevelt Landfill would be permanent and protective and does not exploit the state-owned aquatic lands by using Commencement Bay as a dumping ground. [98]

Toxic waste, after treatment, should go to a licensed industrial upland facility for proper storage for continual testing and monitoring. A they should not, as in the case of Rayonier in Pt Angeles and elsewhere around the country, go to populated areas or around natural resources.[100] [105]

The commercial entities responsible for creating this pollution originally are, if I understand the situation correctly, responsible for the cost of cleaning up and REMOVING this toxic material. It didn't come from the bay, please don't put it back there!! Why is the EPA working so hard to minimize the cost to these commercial polluters at the potential expense of our community and of the entire ecosystem in this area. This proposal makes no sense whatsoever (except for the commercial businesses which will have to pay for it) and should be abandoned in favor of upland disposal in a controlled location or other safe site, using PROVEN disposal methods. [15]

Shipping the sediments by rail to eastern Washington to a landfill has been suggested as an option. Not only would this method provide a safe repository for the fill, it would, I believe, be less costly and cumbersome than trucking it to a closer landfill. This option deserves further investigation. [101]

I strongly urge you to consider treatment, or at the very least to upland storage of this material. Without special incentives and guarantees that this project will not adversely affect our quality of life or our environment, I can not imaging myself or any of my neighbors endorsing this bogus proposal. The problem with hiding something under the rug is it usually finds it way back out. [174]

WDFW continues to support removal of contaminated sediments from Commencement Bay as the best long term solution for protection fish and wildlife resources within the Bay. As indicated above, we believe that removal, coupled with the use of treatment technologies, can provide a viable alternative to the recommended use of three separate disposal sites as proposed in the ESD. [28]

Another option should be mandated, such as upland disposal or treatment of contaminated sediments. No one can create new aquatic lands to replace those destroyed by use as a toxic waste dump on public lands. [88]

Response 165: *EPA has selected the St. Paul Waterway fill site, the Blair Slip 1 fill site, and an upland regional landfill as the three disposal sites for contaminated sediment dredged in the CB/NT site. EPA has withdrawn the Mouth of Hylebos CAD. The Hylebos CAD site was inconsistent with the coastal zone management act designation and with other unresolved issues made this site impractical to select and move forward with cleanup in a timely fashion. Contrary to some of the comments, EPA does not consider disposal in an upland regional landfill to be*

more proven or protective than a properly designed in-water disposal facility (e.g., CAD or nearshore disposal). EPA has, however, determined that it is cost-effective to dispose of contaminated sediments in an upland site.

In remedial design, EPA will determine the volumes that require upland disposal. For example, the estimate of 300,000 cy identified for disposal in an upland regional landfill in the ESD assumes that the total volume to be dredged is 940,000 cy from the Hylebos Waterway, that Blair Slip 1 has a capacity of 640,000 cy, and that contaminated sediment from the Thea Foss and Middle waterways will be disposed of in the St. Paul Waterway. As part of the Merritt-Pardini recommendations, the Port indicated that Blair Slip1 may be expandable to 750,000 cy, and Kaiser Aluminum urged EPA to consider their property for upland disposal of approximately 100,000 cy. If one or more of these recommendations are implemented, the total volume of sediment sent to an upland regional landfill could be reduced. EPA will determine the configuration and capacity of the selected disposal locations during remedial design.

Comment 166: Some commentors suggested that EPA consider alternative in-water disposal options, including:

- A CAD facility at the head of the Hylebos Waterway, and a nearshore confined disposal facility at the end of the Hylebos/Blair peninsula [4][18][24][79] [93] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147]

- Deep-water disposal in Commencement Bay [36]

Response 166: *EPA considered a CAD at the head of the Hylebos Waterway and ultimately did not select it for the reasons described in the ESD. EPA also considered a nearshore fill at the head of the Hylebos/Blair peninsula. This alternative was not included in the final selection of disposal sites because of it's limited capacity, relatively high cost, and the potential loss of additional nearshore habitat. EPA did not include deep-water disposal of contaminated sediments in Commencement Bay in it's evaluation of disposal sites because deep-water disposal in Commencement Bay would occur outside of the Superfund site boundary, and would require a lengthy and involved permitting process, including DNR approval for use of state-owned aquatic lands, thus further delaying the cleanup.*

Comment 167: Several commentors supported one or both of the two nearshore confined disposal facilities proposed in the draft ESD, Blair Slip 1 and the St. Paul Waterway. [18][24][39][79] [93] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147] [148][154].

Response 167: *Comment noted.*

Comment 168: As previously noted, if EPA proceeds with Slip 1, it should be used to confine the highest priority sediments from the Hylebos. Such an action would provide the most immediate benefit to the public and the environment by expediting removal of the sediment of highest concern from Hylebos Waterway. That sediment, as defined by the ROD, is presented in the HCC draft Pre- Remedial Design Evaluation Report, May 1999, Figures 2-1 a, 2- 1 b, and 2-1 c. This expedited work can be conducted to meet the Port's development schedule. [150]

Response 168: *EPA agrees that Blair Slip 1 should be used for confinement of sediments designated as requiring action under Superfund. See Response 162.*

Comment 169: At the same time EPA should evaluate the option of increasing the capacity of Slip 1 by dredging out the bottom of the slip and/or increasing the height of the fill. This action has the potential to provide another 100,000 cy of storage capacity to get the maximum value from this readily implementable disposal site. The added capacity could contain other sediment that EPA considers a relative priority in Hylebos Waterway. A subsequent action could be pursued later to place the remaining lesser contaminated sediments from Hylebos Waterway into the Mouth of Hylebos site. This approach would be the most protective in that it would remove the most severely impacted sediments more quickly from the environment. It would also assure that only the least impacted dredged sediment would be placed at the Mouth of Hylebos site. [150]

Response 169: *EPA agrees that the capacity of Slip 1 should be expanded to the maximum extent practicable. See Response 162.*

7.1 Treatment Technologies

Comment 170: Several commentors believed that treatment is the best alternative for addressing for Commencement Bay contaminated sediments, and that treatment technologies were not given adequate consideration in EPA's selection process [23,28,29,100,174]. Specific concerns noted by commentors included:

- New methods of contaminated sediment treatment now exist that were not available a few years ago. DNR is sponsoring research on the availability and cost of treatment methods and should have results available by next summer. One example provided was the production of light-weight aggregate from contaminated sediments. [12]

- Treatment technologies to remove contamination from the sediments were written off too early in the selection process because they are considered to be too expensive. However the additional cost of treatment is worth it, considering the long-term uncertainties associated with confined disposal and the benefits of not having to monitor a confined disposal site forever. [23] [155] [29]

- EPA should consider approaching sediment treatment on a regional basis to achieve economies of scale in applying treatment technologies.[155]

- Sediment treatment is the only alternative that truly removes the existing contamination from the Bay and therefore avoids the uncertainty associated with leaving the contaminants in the aquatic environment for an extended period of time. At the very least, it would seem prudent that EPA strive to develop a pilot study utilizing treatment technologies for Commencement Bay sediments to fully evaluate its potential viability. [28]

Other commentors agreed with EPA's draft ESD that most treatment technologies are still in the research and development or pilot stage and, therefore, are not suitable for application to CB/NT sediments, and that confinement, rather than application of unproven and costly treatment technologies, remains the best option for addressing contaminated sediments in Commencement Bay. [57][154][148]

Response 170: *Treatment was considered, but ultimately not selected as a cleanup alternative, in the 1989 ROD. The basis for that decision may be found in the 1989 ROD, Responsiveness Summary to the ROD and the Administrative Record for the ROD. EPA reviewed current information on treatment technologies prior to issuing the draft ESD and concluded that the reasons stated in the ROD for selecting confinement over treatment are still valid. The more recent information confirms that while there have been several advances in treatment*

technologies since 1989, all current technologies evaluated would be cost-prohibitive, would cause substantial delays in the cleanup schedule to implement the technology, or have not been adequately tested to ensure their feasibility for a large-scale sediment cleanup project. EPA's disposal sites for Commencement Bay sediments were not selected solely based on cost.

Attachment 1

CB/NT ESD RESPONSIVENESS SUMMARY

LIST OF COMMENTORS

	NAME	AFFILIATION/ADDRESS
1	Strong, Janet	
2	Woolf, Yvonne	Tacoma, WA
3	Pieper, Teri J.	Moses Lake, WA
4	Althoff, Kim A.	Tacoma, WA
5	Nesheim, Sally A.	Tacoma, WA
6	Bailie, Rita	Rainier Audubon Society
7	Ornelas, Gabriel E.	Port Townsend, WA
8	Sunn, Maureen	Redmond, WA
9	Rothrock, Gayle	Tacoma, WA
10	Main, Faulene K.	Tacoma, WA
11	Grathwohl, Harrison	Redmond, WA
	Eide, Tracey J., Maryann	
12	Mitchell, Mark Miloscia	Washington State Legislature
13	Freeland, Adele	Federal Way, WA
14	Maxwell, Bill	Seattle, WA
15	Brevick, Jancie	Tacoma, WA
16	Hogman, Scott	Tacoma, WA
17	Rose, Leslie Ann	Tacoma, WA
18	Althoff, Kim A.	Tacoma, WA
19	Pedersen, Janet	Tacoma, WA
20	Evans, Bill	City of Tacoma, WA
21	Vigueries, Larry	Tacoma, WA
22	Persoon, Val	Tacoma, WA
23	Dinicola, Karen	Tacoma, WA
24	Jarmes, Lauren	Tacoma, WA
25	Sheldon, Jill	Jill Sheldon
26	*Schanfald, Darlene*	*Olympic Environmental Council, Port Angeles, WA*
27	Kolff, Kees	Port Townsend, WA
28	Carman, Randy	Washington Department of Fish and Wildlife
29	Jackson, Gerry A.	U. S. Fish and Wildlife Service
30	Engels, Tracy	Puyallup, WA
31	??, Irene	Tacoma WA
32	Wornell, Betty	Tacoma, WA
33	??, Lain	Tacoma, WA
34	Slaughter, Carol	Vashon Island, WA
35	Brurtchelt, Mary Ann	Tacoma, WA
36	Gaughnour, Dave	Tacoma, WA
37	Hovland, Jerry D.	University Place, WA
38	Giddings, Roxy	Tacoma, WA
39	Rose, Leslie Ann	Citizens for a Healthy Bay, Tacoma, WA
40	Valbert, Charlotte and Earl	Tacoma, WA
41	Edison, Larry and Diane	Gig Harbor, WA
42	Campbell, Tom	State Representative
43	Drake, Courtney	Tacoma, WA
44	Hansen, Ott M.	Tacoma, WA
45	Rose, ??	University Place, WA
46	Rose, ??	University Place, WA
47	Unknown	Tacoma, WA
48	Hefferna, Sandra	
49	Undis, Katherine J.	Tacoma, WA
50	Murray, Cindy	Tacoma, WA

51	Bock, Thais	Federal Way, WA
52	Baldwin, ??	Tacoma, WA
53	Hale, Steve	Tacoma, WA
54	Nole, Sally	Lakewood, WA
55	Bronson, Charles	Gig Harbor, WA
56	Puyallup Tribe of Indians	Puyallup Tribe of Indians
57	Middle Waterway Action Committee	Seattle, WA
58	Connelly, Jason	Tacoma, WA
59	Skelly, Bea	Tacoma, WA
60	Skelly, Dan	Tacoma, WA
61	Simon, Phillip	Tacoma, WA
62	Hill, Barbara A.	Elbe, WA
63	Murray, Christine	Tacoma, WA
64	Wagner, Carla	Carla Wagner
65	Hill, Michael R.	Mineral, WA
66	Henderson, Kalleen	Tacoma, WA
67	Broadhead, William	Citizens for a Healthy Bay, Tacoma Washington
68	Judge, Brandon	Tacoma, WA
69	Rockett, Richard and Margaret	Tacoma, WA
70	White, Dennis L.	Auburn, WA
71	McEntee, Dave	Simpson, Seattle, WA
72	Reisman, Barbara	Tacoma, WA
73	Gaines, Linda	Tacoma, WA
74	Meyer, Peter	University Place, WA
75	Record, Sydne	University of Puget Sound, Tacoma, WA
76	Eggers, Megan	University of Puget Sound, Tacoma, WA
78	Kalbfleisch, Jerry	University of Puget Sound, Tacoma, WA
78	Lowe, Kathleen	Tacoma, WA
79	Arbogast, Harold	Tacoma, WA
80	Smith, Dave	Washington Department of Ecology, Olympia, WA
81	Hillman, Helen	National Oceanic and Atmospteric Administration, Seattle, WA
82	Miller, Cheryl	Tacoma, WA
83	Austin, Judy	Gig Harbor, WA
84	Kirkland, Kirk	Tahoma Audubon Society, Tacoma, WA
85	Wilcox, Michelle	Washington Department of Ecology, Olympia, WA
86	Fletcher, Kathy	People for Puget Sound, Seattle, WA
87	Smith, Adam	Congress of the United States, Tacoma, WA
88	Giddings, William	Tacoma, WA
89	Preston, Charles L., Thomas D. Wright	Kaiser Aluminum
90	Johnson, Dr. Burton L	Lakewood, WA
91	Howard, Christopher	Blue Mountain Audubon Society, Walla Walla, WA
92	Matthias, Dixie	Tacoma, WA
93	Henningsen, Elic	Sumner, WA
94	Johnson, Merrill	Port Townsend, WA
95	Gilmore, Kevin	Tacoma, WA
96	Adams, David	Tacoma, WA
97	Dale, Mark and Lynn M. Nansen	Tacoma, WA
98	Quarto, Alfredo	Mangrove Action Project, Port Angeles, WA
99	Valeriano, Laurie	Seattle, WA
100	Schanfald, Darlene	Olympic Environmental Council, Port Angeles, WA
101	Lathrop, Elizabeth	Gig Harbor, WA

102	Hansen, Scott	Tacoma, WA
103	Dinicola, Rick	Tacoma, WA
104	Unknown	
105	Unknown	Lakewood, WA
106	Stewart, R. W.	Tacoma, WA
107	Keifer, Lynn J.	Tacoma, WA
108	Riftfort, J.	Burlington, WA
109	Krause, Morris	Tacoma, WA .
110	Leanderson, Phil	Belfair, WA
111	Evanger, Larry	Lacey, WA
112	Quam, D.	Spanaway, WA
113	Clark, Ken	Kent, WA
114	Brown, Michael E.	Spanaway, WA
115	Johnson, Tyler	Tacoma, WA
116	Johnson, Frederick	Puyallup, WA
117	Waugh, James B.	Tacoma, WA
118	Groom Richard	Graham, WA
119	Warmuth, Robert J. Sr	Spanaway, WA
120	Burkard, William	Covington, WA
121	Sevruk, Laura	Auburn, WA
122	??, Terry	Maple Valley, WA
123	Sevruk, Paul	Auburn, WA
124	Wilson, Leigh	Lakewood, WA
125	Mitts, Martin	Olympia, WA
126	Sortore, Tamara S.	Tacoma, WA
127	Vincente, David	Tacoma, WA
128	Carpenter, Bruce	Olympia, WA
129	William, John Sr.	Tacoma, WA
130	Collins, Harold	WA
131	Wagner, Kari L.	Tacoma, WA
132	Trigillo, Rudy	Puyallup, WA
133	Shepeerd, Cameron	Tacoma, WA
134	Unknown	Tacoma, WA
135	Carlton, Patricia	Federal Way, WA
136	Rosser, Randall E.	Tacoma, WA
137	Bean, William J.	Spanaway, WA
138	Mullins, Stephen	Lakewood, WA
139	Look, Michael	Tacoma, WA
140	Jacobs, John	Spanaway, WA
141	Cohen, Robert W.	Tacoma, WA
142	Morrison, Jeff	Sumner, WA
143	Hankinson, Don	Gig Harbor, WA
144	Battle, Robert S.	Tacoma, WA
145	Unknown	Tacoma, WA
146	??, Doug	Lakewood, WA
147	Roach, Randy D.	Tacoma, WA
148	Bakemeier, Robert F.	Seattle, WA
149	Mitchell, Marianne	Washington State Legislature
150	Partnership for a Clean Waterway	Spokane, WA
151	Chartrand, Allan B.	ENSR for Brown, Davis, and Roberts and Woodworth and Co., Inc
152	Middle Waterway Action Committee	Seattle, WA
153	Hylebos Wood Debris Group	Tacoma, WA
154	Port of Tacoma	Tacoma, WA

155	Turley, Charles W.	Washington Department of Natural Resources
156	Pugh, Bill	City of Tacoma, WA
157	Howell, Julie and Nathan Graves	Kennedy/Jenks on behalf of the Intra-Participants Group
158	Dunn, Loren	Riddell Williams, P.S. for Puget Sound Energy
159	Fossati, Frank R. and Ileana A. L. Rhodes	Shell Oil Company
160	Giddings, Winifred	Tacoma, WA
161	Brackett, Gary D.	Tacoma Pierce County Chamber of Commerce
162	Madison, Bartley R.	Northwest Steelhead and Salmon Council of Trout Unlimited
163	Vaughan, Skip	Tacoma, WA
164	McCord, Evan W.	Sewer Utility Customer Advisory Panel
165	Elrod, Tina	Agrilink Foods, Tacoma, WA
166	Metter, Sally	Wilson, Smith, Cochran and Dickerson, for J. M. Martinac Shipbuilding Corp.
167	Davis, Clark J.	Brown, Davis, and Roberts, PLLC for Eastman Chemical Company
168	Foster, William C.	William C. Foster or Danielson, Harrigan, and Tollefson, LLP for Marine Iron Works, Inc.
169	Davis, Gary W.	Sewer Utility Customer Advisory Panel, also Alpine Management, Tacoma, WA
170	Lawrence, Allen	Metro Parks of Tacoma
171	Carino, Anthony	Carino Homes
172	Andersen, Valerie	Tacoma, WA
173	Brown, Sydney	
174	Brown, David T.	
175	Tucker, Shelby	Tacoma, WA
176	Tucker, Irene	Tacoma, WA
177	Rhees, Irene M.	4728 Marine View Drive
178	Jacoby, Greg	for Norlund Boat
179	Dudziak, Suzanne	Port of Tacoma
180	Dalton, Matt	for Puget Sound Energy and PacificCorp Environmental Remediation Co., Tacoma, WA
181	Berntsen, Barb	Tacoma, WA