



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, Washington 98101

**ACTION MEMORANDUM**

**DATE:**

**SUBJECT:** Action Memorandum for a Removal Action at the Port of Portland Terminal 4 site within the Portland Harbor Superfund Site, Portland, Multnomah County, Oregon

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**Site ID:** CERCLIS – OR987172509

**I. PURPOSE**

The purpose of this Action Memorandum is to document the U.S. Environmental Protection Agency's (EPA) approval of the removal action described herein for the Port of Portland Terminal 4 site located within the Portland Harbor Superfund Site, Portland, Multnomah County, Oregon (the "site"). A removal action will be completed at the Terminal 4 site and will be conducted by the Port of Portland (the Port) pursuant to an Administrative Order on Consent (CERCLA 10-2004-0009). On October 2, 2003, EPA signed the Administrative Order on Consent (AOC) agreed to by the Port of Portland (USEPA 2003). A Statement of Work (SOW) was attached to the AOC and incorporated into it. The AOC requires the Port to conduct an Engineering Evaluation and Cost Analysis (EE/CA) for a non-time critical removal

action (NTCRA) at Terminal 4. Terminal 4 is within the boundaries of the initial study area for the Portland Harbor Superfund Site.

The Draft EE/CA was reviewed and approved by EPA. The EE/CA was finalized in May 2005 and initially put forth for a 30-day public comment period. Subsequent to the initial 30-day public comment period, the EPA granted an extension of 60 days for public review, ending on September 7, 2005.

By approval of this memorandum, EPA Region 10 determines that: 1) the conditions at the site may present an imminent and substantial endangerment to public health, or welfare, or the environment; and 2) the site conditions meet the criteria of the National Contingency Plan (NCP), 40 CFR Section 300.415, for a removal action. The removal action is required for immediate reduction of the risk to the public and the environment from uncontrolled hazardous substances at the Terminal 4 site. An administrative record has been prepared for this removal action. No obligation of funds is necessary as this action will be conducted by the Port of Portland under a CERCLA order.

## **II. SITE CONDITIONS AND BACKGROUND**

### **A. Site Description**

The EPA identification number for the Site is: CERCLIS – OR987172509. The Terminal 4 site is located at 11040 North Lombard in Portland, Oregon and is within the boundaries of the initial study area of the Portland Harbor Superfund Site. The Portland Harbor Superfund Site was listed on the National Priorities List (NPL), pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, on December 1, 2000. The Port of Portland was notified of its potential responsibility for response costs. The Port of Portland is one of ten parties that signed an administrative order on consent for Remedial Investigation/Feasibility Study (RI/FS) activities with EPA in September 2001.

The Port of Portland, a port district of the State of Oregon, owns the Terminal 4 uplands between River Miles 4.1 and 4.5 on the Lower Willamette River. The Port also owns a portion of the submersible and submerged lands in Slip 1 and Slip 3 located within the Removal Action Area (defined below). The remainder of the submersible or submerged land is owned by the State of Oregon and managed by the State of Oregon Department of State Lands (DSL). The location of the Terminal 4 site is shown on Figures 1 and 2.

The Removal Action Area is defined in the AOC as “that portion of the site adjacent to and within the Port of Portland’s Terminal 4 at 11040 North Lombard, Portland, Multnomah County, Oregon, extending west from the ordinary high water line on the northeast bank of the Lower Willamette River to the edge of the navigation channel, and extending south from the

downstream end of Berth 414 to the downstream end of Berth 401, including Slip 1, Slip 3, and Wheeler Bay.” The boundaries of the Removal Action Area are shown on Figure 3.

## **B. Site Background**

Terminal 4 is currently used as an operating marine facility with a variety of tenants and tenant operations, including importation of automobiles, exportation of soda ash, import and export of dry and liquid bulk cargo, associated rail intermodal facilities, and associated petroleum storage facilities. Adjacent property owners include Schnitzer Steel, Northwest Pipe and Casing, and the Burgard Industrial Park. The location of the site is shown on Figures 1 and 2.

There is a long tenant history at Terminal 4. Past tenant operations primarily involved the movement of bulk commodities such as grains and mineral concentrates. Operations at Terminal 4 have also included the storage and use of petroleum products such as diesel fuel, bunker C oil, and gasoline, which were typically stored in underground storage tanks (USTs) and above ground storage tanks (ASTs) at the St. John Tank Farm and at various discrete business locations. Many of these tanks have since been removed. Pipelines to move bulk liquids and to fuel locomotives and other equipment have been in use at the site. A fumigation facility was also operated at Terminal 4. In addition, pencil pitch, a coal tar distillate, was handled at Terminal 4 from approximately 1978 to 1998. Historically, Slip 1 has been used for bulk and break-bulk cargo loading and unloading operations, and Slip 3 has been used for loading and unloading dry and liquid bulk cargo such as Bunker C, diesel, pencil pitch and metal ores.

Investigations conducted by the Port of Portland as part of the Engineering Evaluation/Cost Analysis activities indicated that based on their differences in chemical, physical, and operational characteristics, five subareas within the Removal Action Area have been identified, which include:

- Berth 401
- Slip 1
- Wheeler Bay
- Slip 3
- North of Berth 401

Each of these subareas has site-specific chemical conditions, physical characteristics, or operations and logistical concerns which require different approaches for site remediation. These conditions were considered during screening of remedial technologies and selection of the preferred alternative.

## 1. Removal Site Evaluation

Past operations and waste disposal practices at the Terminal 4 site are considered to be the primary sources of the most significant contaminants found at the site. These past releases from the Terminal 4 site are the primary source of contaminants in the river sediments that are subject to this removal action. The Port of Portland has conducted investigations in upland areas of the site to evaluate whether there is an ongoing source of contamination to the in-water area and investigations are also being conducted as part of the Portland Harbor Superfund Site to evaluate contaminants in river sediments other than those addressed in this removal action.

Hazardous substances found in the Removal Action Area to date include: polynuclear aromatic hydrocarbons (PAHs), metals (mercury, cadmium, chromium, lead and zinc), pesticides (DDT, DDD, DDE), phthalates and polychlorinated biphenyls (PCBs). Many of the contaminants detected in sediments at the site are known or suspected human carcinogens. In addition, pencil pitch (coal tar), a main source of contamination in sediments is a suspected carcinogen that can harm humans through skin contact, inhalation, or ingestion. The contaminated sediments represent a potential continuing source to the river which have the potential to impact human health and/or ecological receptors. The EPA has determined that the presence of the contaminated sediments constitute actual and/or threatened “releases” as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

The EE/CA at Terminal 4 was initiated based on the presence of these organic chemicals and metals in sediments at concentrations that exceed risk-based sediment quality guidelines (SQGs), demonstrated toxicity of sediments to benthic macroinvertebrates, and presence of persistent, bioaccumulative, and toxic (PBT) compounds in sediments. SQGs used for the site include Threshold Effects Concentrations (TECs) and Probable Effects Concentrations (PECs) (MacDonald et al, 2000). The TEC is a low effects guideline that represents concentrations below which toxicity effects are unlikely to be observed in freshwater benthic invertebrates. The PEC is a probable effects guideline that represents concentrations above which toxicity effects are likely to be observed in freshwater benthic invertebrates. Chemicals in sediments exceeding SQGs include metals (copper, cadmium, lead, mercury, and zinc), PAHs, PCBs, DDT, DDD, and phthalates.

Persistent, bioaccumulative, and toxic (PBT) compounds including PCBs, DDD/DDE/DDT, and phthalates were also detected in some fish and crayfish samples collected from the Removal Action Area for the Harbor-wide RI/FS in addition to sediments. However, the relative risk from these compounds was not evaluated for the EE/CA because standard sediment quality guidelines are not available for assessing risks from bioaccumulation.

TEC exceedances are numerous and widespread throughout the Removal Action Area. PEC exceedances, representing the highest chemical concentrations, are significantly less but

have been identified in most of the subareas in one or more locations. PEC exceedance ratios (contaminant concentration divided by the PEC), summarized by sediment type, include:

**Surface sediment:** PAHs, DDT, and PCBs detected in Slip 1, with PEC exceedance ratios of less than 2. Lead and PAHs detected in Wheeler Bay with PEC exceedance ratios less than 2. Lead and zinc detected in Slip 3 with maximum PEC exceedance ratios of 5. PAHs detected in Slip 3 with a maximum PEC exceedance ratio of 26.

**Under-Pier Sediment:** Cadmium, lead, and zinc detected in Slip 1 and Slip 3 with PEC exceedance ratios between 1 and 15. PAHs detected in Slip 3 with a maximum PEC exceedance ratio of 18.

**Subsurface Sediment:** Lead, zinc, and DDD detected in Slip 1 with a maximum PEC exceedance ratio of 2. Lead, mercury, and PAHs detected in Wheeler Bay, with maximum PEC exceedance ratios of 24, 1 and 4, respectively. Mercury, PAHs, DDD, and PCBs detected in Slip 3 with maximum PEC exceedance ratios of 3.

The presence of these chemicals at concentrations in sediment exceeding probable effects guidelines supports the EPA-required removal action. See Section III for discussion of potential exposure and risk to site receptors.

In accordance with the AOC, the removal action focuses on in-water sediments extending west from the ordinary high water line to the edge of the navigation channel in the Willamette River and south from the downstream end of Berth 414 to the end of Berth 401. Other contaminated media, including surface water, groundwater, and soils, are being considered in other regulatory programs, which include the uplands investigation at Terminal 4 under oversight from the Oregon Department of Environmental Quality (DEQ) and the RI/FS for the Portland Harbor Superfund Site under the oversight of EPA.

## **2. Physical Location**

The Port of Portland, a port district of the State of Oregon, owns the Terminal 4 uplands between River Miles 4.1 and 4.5 on the Lower Willamette River. The Port also owns a portion of the submersible and submerged lands in Slip 1 and Slip 3 located with the Removal Action Area. The remainder of the submersible or submerged land is owned and managed by the State of Oregon, by the Department of State Lands. The entire Terminal 4 site is approximately 150 acres in size and is currently used as an operating marine facility with a variety of tenants and tenant operations. Land use within the vicinity of the site is primarily heavy industrial, commercial, and recreational (river). Adjacent property owners include Schnitzer Steel, Northwest Pipe and Casing, and Burgard Industrial Park. The location of the site is shown on Figures 1 and 2.

All of the work will be completed in near-shore sediments. The Removal Action Area is defined as “that portion of the site adjacent to and within the Port of Portland’s Terminal 4 at 11040 North Lombard, Portland, Multnomah County, Oregon, extending west from the ordinary high water line on the northeast bank of the lower Willamette River to the edge of the navigation channel, and extending south from the downstream end of Berth 414 to the downstream end of Berth 401, including Slip 1, Slip 3, and Wheeler Bay.” The Removal Action Area is shown on Figure 3.

### **3. Site Characteristics**

Terminal 4 is currently used as an operating marine facility with a variety of tenants and tenant operations, including importation of automobiles, exportation of soda ash, import and export of dry and liquid bulk cargo, associated rail inter-modal facilities, and associated petroleum storage facilities. Past tenant operations at Terminal 4 involved the movement of bulk commodities such as grains and mineral concentrates. Operations at Terminal 4 have also included the storage and use of petroleum products such as diesel fuel, bunker C oil, and gasoline, which were typically stored in USTs and ASTs at the St. John Tank Farm and at various discrete business locations. Many of these tanks have since been removed. Pipelines to move bulk liquids and to fuel locomotives and other equipment have been located at the site. A fumigation facility was also operated at Terminal 4. In addition, pencil pitch, a coal tar distillate, was handled at Terminal 4 from 1978 to 1998.

Past operations and waste disposal practices at the Terminal 4 site are considered to be the primary sources of the most significant contaminants found at the site. These past releases from the Terminal 4 site are the primary source of contaminants in the river sediments that are subject to this removal action. See discussion above regarding contaminants detected, concentrations, sediment quality guidelines, and site conditions and Section III for exposure and associated risk.

### **4. Release or threatened release into the environment of a hazardous substance, or pollutant, or contaminant**

The portion of the Terminal 4 site that will be addressed by the removal action primarily consists of contaminated river sediments. The contaminants of concern are certain PAHs, metals, PCBs, pesticides (DDD/DDE/DDT), and phthalates. Many of the contaminants found at the site are “hazardous substances” as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14) that may present an imminent and substantial danger to public health or welfare under Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1). Concentrations and analysis of contaminants in the river sediments are described in the EE/CA (BBL, 2005) and in the Site Characterization Report (BBL, 2004). The primary sources of these contaminants are from upland commercial facilities and uses that released the substances into the river. Based on

current upland source control efforts, it is believed that significant upland sources have been controlled or will be by the time the removal action is completed.

The presence of hazardous substances at the site, or the past, present, or potential migration of hazardous substances currently located at or emanating from the site, constitute actual and/or threatened “releases” as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22). See Section III for discussion of potential exposure and risk to site receptors.

## **5. NPL status**

The Terminal 4 site is located within the boundaries of the initial study area of the Portland Harbor Superfund Site, which was listed on the NPL on December 1, 2000.

## **6. Maps, pictures, and other graphic representations**

Relevant figures and tables are attached to this memorandum.

### **C. Other Actions**

#### **1. Previous actions**

Limited previous sediment remediation or removal actions have been completed in the aquatic portions of the Terminal 4 site. Approximately 35,000 cubic yards of pencil-pitch contaminated sediments were removed from Slip 3 in December 1994 through January 1995 under a federal Clean Water Act Consent Decree. Confirmation sediment sampling indicated significant PAH and metal contamination remained. Slip 3 is the location of a number of documented and undocumented releases of pencil pitch (a suspected human carcinogen).

RI/FS activities have been completed for upland portions of the Terminal 4 site above the ordinary high water line under the Oregon DEQ’s voluntary cleanup program (VCP). In 1993, an interim groundwater remediation system was activated along the eastern edge of Slip 3 to capture nonaqueous-phase liquid (NAPL) and contaminated groundwater from the upland area before it discharged to the river. Additional investigation and waste control/recovery activities have been completed since that time. Upland source control evaluations at Terminal 4 have indicated one area, east of Slip 3, where light nonaqueous-phase liquid (LNAPL) is present in the subsurface as a result of upland waste petroleum releases. In response to the presence of LNAPL, the Port completed a bank excavation and absorptive backfill remedial action in the area in 2004, which has mitigated the potential for LNAPL and dissolved-phase petroleum hydrocarbon seepage.

## **2. Current actions**

The upland source control work is ongoing under state authorities and has included some recovery and disposal of subsurface contamination in some portions of the site. Potential sources of post-removal recontamination have been considered during the EE/CA evaluation of alternatives. These include: potential upstream sources (resuspension of sediments, stormwater discharges, industrial discharges and over-water activities), groundwater discharges, direct runoff and bank erosion, existing structures and operations, and material handling and spills. A combination of sampling, historical data evaluation, and modeling will be used for future evaluations of the removal action.

In addition, the CERCLA RI/FS for the Portland Harbor Superfund Site has included a number of sediment cores and surface samples collected near and within the Terminal 4 site boundaries. The RI/FS will evaluate the threats posed by other media on the site and post-removal sediment concentrations to determine whether additional cleanup is required for long-term protectiveness.

### **D. State and Local Authorities; Tribal Consultation**

#### **1. State and local actions to date**

RI/FS and remedial actions have been conducted on the upland portions of the site under the oversight of the Oregon DEQ. The upland RI, risk assessment, and FS have been completed and a Record of Decision (ROD) was issued in April 2003. Remedial actions include removal of NAPL and contaminated groundwater through extraction wells, removal of contaminated soil at the Slip 3 riverbank, and continued monitoring. See the discussion above regarding in-water actions at the site.

The Oregon DEQ have participated in reviewing and commenting on documents associated with the Terminal 4 removal action and will continue to provide support to EPA as the project moves forward.

#### **2. Potential for continued State/local response**

The removal action at the Terminal 4 site will be conducted under CERCLA authority, with the state being given the opportunity to provide timely comments on project design documents and work plans. Coordination efforts with state and local authorities will continue throughout the project.

### **3. Tribal Consultation**

EPA coordinated with six tribal governments on this action through the technical coordination team established for the Portland Harbor site. Additionally, EPA consulted with tribes that requested government to government consultation to solicit their input on the proposed cleanup alternative. EPA will continue to coordinate, allow opportunities for review and comment, and consult, as appropriate as the project proceeds.

### **III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES**

A detailed risk assessment has not been conducted for the Terminal 4 site, however, a baseline risk assessment is being performed through the RI/FS for the Portland Harbor Superfund Site. A pathway analysis was conducted for this early action to expedite the removal of contaminated sediments through pathway elimination.

#### **A. Threats to Public Health or Welfare**

A detailed human health risk analysis is not necessary to allow selection of the preferred alternative, due primarily to the aggressive nature of the technologies proposed for the Removal Action, and the interim status of the Removal Action relative to the Harbor-wide ROD. The risk from direct exposure to sediments for humans will be assessed in the Portland Harbor RI/FS and any residual risk remaining from Terminal 4 will be evaluated using that assessment. However, a pathway analysis was completed to identify potential exposure pathways and potential contaminant sources, and to develop a geochemical conceptual model. These are shown on Figures 4 and 5.

Chemicals of potential concern for risk at the site include certain metals, PAHs, pesticides, phthalates, and PCBs. These chemical groups have been found to be present at elevated concentrations based on results of sediment sampling at Terminal 4. These chemicals are not the only analytes of potential concern at the site, but they are among the most important in terms of risk-based decision making and are good indicators of contaminant distribution at the site. Many of these compounds are known or suspected human carcinogens and known to bioaccumulate. In addition, pencil pitch, a main source of contamination in sediments, is a suspected carcinogen that can harm humans through skin contact, inhalation, or ingestion.

For human receptors, direct exposure results from activities that involve contact with sediments. Such activities include workers involved with operations or maintenance at Terminal 4, or fisherman that may contact sediments while retrieving traps or nets that have contacted contaminated sediment. In addition, potential exposure pathways for human health risks include ingestion of contaminated fish and dermal exposure to contaminated sediment at low tide. In particular areas, contaminated sediment is open and exposed in the Willamette River and on the

river bank, more so at low water levels. Trespassers on this and adjacent industrial property, transients camping nearby, recreational boaters, and workers all may be exposed by contact to site contaminants, especially during low water when more of the sediment is exposed.

Indirect exposure results from contact with contaminants that have been transferred from sediments to another exposure medium. Indirect exposure pathways may include ingestion of food that has become contaminated through contact with sediment contaminants. Humans that ingest fish or invertebrates taken from contaminated sediment areas may experience indirect exposure if contaminants have accumulated in tissues.

Persistent, bioaccumulative, and toxic (PBT) compounds including PCBs, DDD/DDE/DDT, and phthalates were detected in sediments, and were also detected in some fish and crayfish samples collected from the Removal Action Area for the Harbor-wide RI/FS.

Based on the concentrations detected in sediments at the site and the potential direct and indirect exposure pathways identified, EPA has determined that a removal action is required to mitigate impacts to public health, or welfare, or the environment.

## **B. Threats to the Environment**

There is an imminent and substantial endangerment to the environment in part through the actual or potential exposure of the river water, river sediment, surface soils and standing surface water to hazardous substances and pollutants or contaminants. Actual or potential exposure to contaminated sediments exists for fish, shellfish, and other aquatic biota, such as benthic organisms, and wildlife, such as piscivorous birds. Actual or potential exposure to site contaminants by aquatic species, although not quantified, would be expected to become part of the ecological food chain as wildlife consume such species.

For aquatic invertebrates and fish, external contact with sediment, including porewater, can be a significant risk for metals and organic compounds. Direct exposure pathways include contact between receptors' external surfaces and contaminated bed sediment; ingestion of contaminated sediment by receptors, either incidentally during drinking or eating or as part of the feeding process (e.g., filter feeders); and contact between the receptor and re-suspended sediment (e.g., ventilation of gill surfaces).

The Site Characterization Report (BBL, 2004) identified organic chemicals and metals that were detected in surface sediments of the Removal Action Area. The Site Characterization Report also identified the chemicals for which concentrations exceeded generally accepted sediment quality guidelines, such as TECs and PECs (MacDonald et al, 2000). The TEC is a low effects guideline that represents concentrations below which toxicity effects are unlikely to be observed in freshwater benthic invertebrates. The PEC is a probable effects guideline that represents concentrations above which toxicity effects are likely to be observed in freshwater

benthic invertebrates. TEC exceedances are numerous and widespread throughout the Removal Action Area. PEC exceedances, representing the highest chemical concentrations, have been identified in most of the subareas in one or more locations, including metals (copper, cadmium, lead, mercury, and zinc), PAHs, PCBs, DDT/DDD, and phthalates.

Persistent, bioaccumulative, and toxic compounds including PCBs, DDD/DDE/DDT, and phthalates were detected in sediments, and were also detected in some fish and crayfish samples collected from the Removal Action Area for the Harbor-wide RI/FS. The relative risk from these compounds to aquatic species that are exposed to them was not evaluated for the EE/CA because standard sediment quality guidelines are not available for assessing risks from bioaccumulation.

Data that directly addresses ecological stress attributable to chemical contamination of sediments was gathered as part of sediment toxicity tests conducted for the Terminal 4 Slip 3 RI/FS. Sediments from 16 locations within and near Slip 3 were collected. Samples from the outer half of Slip 3 (riverward) did not fail any toxicity tests. However, six of nine samples from the inland half of Slip 3 were toxic to *Chironomus tentans* and/or *Hyallela azteca* in standard laboratory toxicity tests. Additionally, data from the Portland Harbor RI/FS show potentially elevated concentrations of some Terminal 4 analytes, including PCBs, DDT, DDD, and DDE in crayfish and sculpin gathered from Slip 1 and Slip 3.

Contact with contaminated sediment could pose a risk to waterfowl that may use, rest, or feed in the area. Other animals may also be exposed if using this water for drinking. Uptake to aquatic species is likely but not quantified. The Willamette River is a transitory area for a number of ESA-listed fish species, including five salmonid species listed as threatened under the Endangered Species Act. Coastal cutthroat trout, steelhead, and chum and chinook salmon are also all considered sensitive species by ODFW. Pacific lamprey and river lamprey are recognized as species of concern at the federal level by the U.S. Fish and Wildlife Service (USFWS). Western toad, Cope's giant salamander, tailed frog, northern red-legged frog, northwestern pond turtle, and painted turtle are all considered sensitive species by ODFW. In addition, northwestern pond turtle, tailed frog, and red-legged frog are listed as species of concern by USFWS. Aleutian Canada geese and the American peregrine falcon are protected as state endangered species (ODFW). Nine wetland plants that occur in the Willamette Valley and may occur in the Portland Harbor Superfund Site are all species of concern by USFWS.

Based on the concentrations detected in sediments at the site (above TEC/PEC criteria) and known or potential ecological pathways identified, EPA has determined that a removal action is required to mitigate potential impacts to the environment.

#### **IV. ENDANGERMENT DETERMINATION**

Actual or threatened releases of hazardous substances from this site may present an imminent and substantial endangerment to public health, or welfare, or the environment.

#### **V. PROPOSED ACTIONS AND ESTIMATED COSTS**

##### **A. Proposed Actions**

This non-time-critical removal action at the Terminal 4 site will be implemented by the Port of Portland pursuant to an Administrative Order on Consent dated October 2, 2003. The removal action objectives (RAOs) established for the site are to: (1) reduce ecological and human health risks associated with sediment contamination within the Removal Action Area to acceptable levels, and (2) reduce likelihood of recontamination of sediments with the Removal Action Area.

These RAOs were further defined for evaluation of the alternatives to aid in understanding and achieving the RAOs. Reductions in human and ecological risks were further defined as reduction in contact for human health risks and attenuation of exposure pathways for ecological receptors. Reduction of the likelihood of recontamination within the Removal Action Area includes removal or capping of sediments as well as evaluation of potential ongoing sources.

As discussed in the EE/CA, all of the alternatives evaluated include monitored natural recovery, dredging, capping, and disposal components. The level to which these technologies would be employed was the basis for developing the different alternatives (see Section 2 below for description of other alternatives).

##### **1. Proposed action description**

The preferred alternative (Alternative C in the EE/CA) includes a combination of capping, monitored natural recovery (MNR), and dredging to achieve the objectives of the removal action. One or more of these technologies will be implemented in each of the subareas of the site dependent on nature and extent of contamination, associated risk and exposure, potential for transport, and engineering and operational considerations.

##### **a. Preferred Alternative**

The preferred alternative includes a dredge emphasis with confined disposal facility (CDF) disposal. The highest risk material (prevalent PEC exceedances) was selected for

dredging and incorporation into the CDF, and the lowest risk material was selected for MNR (generally at or below TECs). Capping will be used in areas with moderate levels of contaminants of concern where immobilization could limit risk to receptors or where it was deemed impractical to dredge, and port uses would not affect the integrity of a cap. See Figure 6 for configuration of the technologies in the various subareas of the Removal Action Area.

An at-grade CDF will be constructed in Slip 1 that would contain approximately 15.3 acres of contaminated sediments dredged from areas included in this remediation and potentially others in the Port or Harbor-wide cleanup actions. Dredging, capping, and MNR efforts will be implemented in affected areas to include Slip 1, Slip 3, Wheeler Bay, North of Berth 401 and Berth 401 itself.

Alternative C will meet the substantive requirements of the ARARs to the extent practicable and offers greater overall protection of human health and the environment than do the other alternatives, because:

- The most highly contaminated sediment will be contained in a CDF designed and constructed to be protective of human health and the environment.
- Handling and transport of the contaminated sediments are minimized and kept within the Terminal 4 site.
- The construction activities associated with implementation of the Preferred Alternative are essentially confined to the Terminal 4 site, with little impact to the local community.
- The short-term risk of recontamination during implementation is minimized because dredged sediment is moved over the shortest distance and because the contaminated sediment will be isolated from the Willamette River.
- The long-term risk of recontamination of Terminal 4 is reduced because Slip 1 is eliminated.

**b. Details of Preferred Alternative**

**(i). Details of the preferred alternative in each subarea.**

**Slip 1 – Full At-Grade Confined Disposal Facility**

An at-grade CDF will be constructed in Slip 1 and sediment dredged in Slip 3 will be disposed of in the Slip 1 CDF. A total of approximately 115,000 cubic yards of contaminated sediment will be disposed in the CDF (105,000 cubic yards from Slip 3 and 10,000 cubic yards

from beneath the CDF containment berm to provide a structural foundation). The CDF has excess capacity available for other dredged sediment from the Portland Harbor Superfund Site, should the CDF be selected as an appropriate disposal site through a separate removal or remedial action decision and provided the material is compatible with Terminal 4-specific waste acceptance criteria. Waste acceptance criteria will be developed during design. By constructing the CDF to an at-grade surface, the newly gained land can be used for water dependent commercial purposes. An earthen containment berm will be constructed at the mouth of Slip 1 to serve as an isolation/retaining structure for the dredged sediment. The Port would acquire State of Oregon property for the purpose of constructing the CDF. The Department of State Land (DSL) has indicated a willingness to sell its portion of the land to the Port.

### Slip 3 – Combination of Dredging, Capping, and Monitored Natural Recovery

The Removal Action in Slip 3 consists of a combination of dredging, capping, and a relatively small area of MNR (i.e., the under-pier area at Berth 410 below the finger pier portion). The area at Pier 5 will be capped, while the area between Pier 4 and Pier 5 will be dredged. Dredging will be performed in front of Pier 4 to remove contamination. Capping is impractical due to the need to maintain ship access to the actively used Berths 410 and 411. The nearshore slopes under Pier 4 at Berth 411 will be capped. Dredging under this pier is impractical due to the presence of riprap. Some dredging, but primarily capping, is used at a relatively small slope area at the head of Slip 3 below the existing pinch pile bulkhead. Dredging in this area would decrease the stability of the slope. Kinder Morgan's operations would be shut down during dredging of Slip 3, but for less time than the other alternatives. Dredged sediments from Slip 3 are disposed of in the Slip 1 CDF. Approximately 105,000 cubic yards of contaminated sediment will be dredged and disposed in the CDF.

### Wheeler Bay – Monitored Natural Recovery and Capping

The depth of detected sediment contamination in Wheeler Bay is varied, extending from the surface to beyond 22 feet below the sediment surface. Since contaminant concentrations identified in most of Wheeler Bay are low, MNR is used for the majority of Wheeler Bay. A portion of the slope is capped as shown on Figure 6 because of higher PAH concentrations in one sample location.

### North of Berth 414 – Monitored Natural Recovery

Similar to Wheeler Bay, low contaminant concentrations were found in the North of Berth 414 subarea up to 22 feet below the sediment surface. Therefore, MNR is used north of Berth 414.

## Berth 401 – Monitored Natural Recovery and Capping

MNR is used for the majority of the Berth 401 area because of low contaminant concentrations. A relatively small area in the northeast corner of the Berth 401 area would be capped because of marginal PCB concentrations in one sample location.

### **(ii). Institutional Controls and/or Other EPA Considerations**

The overall protectiveness of the alternative will be further enhanced by implementation of institutional controls for areas where contaminated sediment is contained in place with caps, where contamination resides at depth in MNR areas, and at the CDF. The primary removal action objective for the institutional controls for caps and the CDF will be to restrict and/or limit uses on or immediately adjacent to caps and the CDF to prevent accidental releases or unauthorized disturbances of contaminated sediment and ensure the long-term integrity of the containment. For MNR areas, the primary removal action objective for the institutional controls will be to restrict and/or limit uses of the MNR areas to prevent accidental releases or unauthorized disturbance of contaminated sediment that is at depth in those areas. Any future use or activities that may disturb contaminated sediment must be authorized and the sediment handled properly. For capping, proposed control mechanisms may include identification of the capped areas as no commercial vessel anchoring zones. These areas would be identified on U.S. Coast Guard navigational maps. In addition, the capped and MNR areas would be identified on Port maps/plans to ensure that the integrity is not impacted during future potential construction. Commercial activities by the Port and third parties may need to be limited above capped and MNR areas as well to ensure prop scour does not compromise the cap's integrity or disturb higher levels of contaminated sediment at depth in MNR areas. Proposed institutional controls for the CDF include the following: (1) notification to current tenants adjacent to the CDF of the CDF and any appropriate precautions they should take during its construction and/or completion; (2) specific lease language for future tenants who would occupy the land above the CDF notifying them of the CDF and restricting their construction activities based on the presence of the CDF; (3) including the CDF on Port plans/maps of the area with notation on limitations on use; (4) an easement, or if an easement is not possible, some other form of land use restriction that runs with the land that restricts activity below a specific elevation; and (5) registration of the CDF and associated appurtenances with the "call before you dig" utility location program. During design, further analysis of the most effective and implementable controls will be analyzed and implemented.

**(iii). Issues Evaluated For Protectiveness.** The Port, in consultation with EPA, considered the following issues in evaluating the protectiveness of the CDF over the long term:

- **Containment before, during and after an earthquake.** The evaluations support that the CDF can be designed and constructed to meet the structural strength and stability requirements for the Portland area. Because Portland is in a seismically active area, the impact of seismic events on structures needs special consideration. Preliminary analyses indicate that liquefaction occurs within the foundation soils below the berm and within the dredged fill, under seismic design events of operating level event (OLE) (72-year return) and contingency level event (CLE) (475-year return). For the OLE, the deformations should not immediately affect Port operations. More substantial liquefaction and resulting deformations of the berm are expected under the CLE. However, it is not expected that the berm deformation would lead to the release of contaminated sediment for either event. The CDF would have to be inspected following seismic events and any damage to the CDF berm or CDF cap would be repaired as soon as practicable.
  
- **Flood event impacts.** Concerns regarding the erosion potential of high velocity Willamette River flows and the potential impacts on the CDF stability and integrity were assessed. It was determined that while some sections of the channel may experience velocities faster and slower than the average, velocities above the average are typically located in the deeper parts of the mid-channel sections and not along the banks affecting the CDF. It was noted that propeller wash from tugboats and other boating activities have the potential to generate much higher velocities than flooding events, albeit for short durations. To address potential impacts to the CDF from flood events and boating velocities, the preliminary specifications of the CDF berm were designed to appropriate standards. The CDF berm will include placing clean sandy gravel fill with training terraces consisting of quarry spall rip-rap extending from the toe of the berm to the cap and along both the river and land sides of the berm. These are standard construction practices that have been successfully used along major river channels in the Northwest. The final berm design will consider the need for adequate toe protection for the alluvial materials on the channel bank and along the channel bottom, as well as over-excavation and installation of select fill and bank protection (rip rap) to protect the berm from undercutting by potential streambed scour and resulting toe scour. The final design will also consider long-term degradation (addressed through operations and maintenance); general scouring and potential for localized areas of scour (i.e., propeller wash); and estimates of the total depth of potential channel bed scour necessary to “key in” rip-rap to provide sufficient toe protection. Therefore, the erosion concerns regarding the slope face of the CDF berm will be addressed by covering the berm with erosion resistant rip-rap. During the design, the erosion potential will be evaluated and the rip-rap size selected according to standard design criteria. Potential short-term impacts of flooding and overtopping the berm during construction will be addressed by specifying construction techniques and by staging of the CDF berm construction. These details will be evaluated during final CDF design. The CDF would have to be inspected following significant flooding as soon as practicable.

- **Impacts from the CDF to the Willamette River's flood stage.** An assessment of potential impacts to the Willamette River demonstrated that no rise in the base flood elevations would result from the CDF and the action would comply with FEMA regulations. An assessment of the flood storage was also conducted. Although a portion of the CDF will be located above the non-storm winter stage and some flood storage will be lost from filling Slip 1, this volume of flood storage has an insignificant effect in reducing flood hazard. As a result, no noticeable increase in peak discharge is predicted and the loss of flood storage from the CDF would not have a noticeable impact downstream.
- **Long-term effects on the Willamette River from groundwater passing through the CDF and entering the river.** Preliminary fate and transport analyses show that water quality would meet the criteria for existing long-term water quality standards. As part of the design, EPA will require long-term monitoring to ensure that contaminants are not reaching the river in excess of pre-determined criteria. Acceptance criteria developed during the design process will ensure that only wastes with low leachability potential appropriate for a particular location within the CDF will be accepted.
- **Short-term effects to the Willamette River when sediment is being placed into the CDF.** The CDF may be filled with sediment delivered in slurry form if hydraulic or hydraulic cutterhead dredging is used, or it may be filled using barges and delivered to the CDF by hydraulic transport or double handling over the berm if mechanical dredging is used in Slip 3. Numerous re-suspension containment techniques, including controlled placement of the sediment and various containment structures (such as silt curtains and turbidity curtains), are available for minimizing water quality impacts to the extent practicable. Water quality monitoring criteria will be established for the CDF construction period to minimize water quality impacts to the maximum extent practicable.
- **Time required for sediments placed in the CDF to settle.** Because of the relatively high sand content of the Terminal 4 sediments to be placed in the CDF, consolidation will occur relatively quickly and is not expected to cause construction delays. Additional sediment or other material may be filled into the CDF over several construction seasons. It is expected that the settlement of these materials will develop during or shortly after placement. The design, construction, and scheduling of the final cap placement will take into account the consolidation of the fill and will include measures to ensure uniform settlement, representing little impact to the structural integrity of the cap over the sediment filled in the CDF.

- **Design components of the CDF.** As part of the CDF design process and follow on documents, the following will be outlined: Steps involved for post construction certification, final closure plan, temporary closure plan, and monitoring requirements.

(iv). **EPA Directed Modifications as a Result of Public Comment**

As a result of public comments received (see Section VIII Community Relations), EPA has identified additions and/or modifications to the Preferred Alternative which will be required to be implemented in the Removal Action design documents for EPA review and approval. These include:

**CDF Sediment Disposal/Acceptance Criteria.** Through the preliminary design process, significant care was taken to ensure that the methods of construction proposed would ensure effective containment of contaminants of concern in the CDF and below the cap. Models were tested to evaluate required cap thickness, dispersion of sediments, and integrity of the CDF during a variety of expected and extreme conditions. The design was modified in response to this evaluation. This program includes post-remediation monitoring of the CDF and capped areas to ensure that design criteria are maintained.

No sediment will be allowed into the facility which fails hazardous waste testing procedures (TCLP specifically). Materials that are generally leachable will not be accepted. Community review and comment will be solicited during the screening criteria development process for the CDF during design. No sediment will be accepted into the CDF other than the Terminal 4 materials without separate public review and comment on future proposed cleanup plans. The following sediment acceptance criteria will be used to determine suitability of any sediments proposed for placement in the saturated zone of the Terminal 4 CDF.

1. Only sediments from the Portland Harbor Superfund Site are eligible for placement in the saturated zone of the CDF.
2. No sediments that may be designated as characteristic hazardous waste or contain free-phase oil would be eligible for placement without treatment to control potential for release and migration of these substances.
3. Sediments must be of acceptable geotechnical character (to be defined during design) such that they do not impact the long-term performance of the CDF.
4. Sediments must undergo appropriate testing including bulk chemistry tests and pancake column leachate test (PCLTs) to document source characteristics acceptable for the CDF. Maximum chemical concentrations measured in representative PCLTs of the sediments must be protective (to be defined during design) of surface water quality criteria.

During the design of the CDF, the Port will be required to submit a detailed evaluation of the criteria for acceptance of sediment material into the CDF including methods for verification that sediment passes all criteria. The evaluation shall include proposed criteria (chemical and

physical), type and frequency of testing (i.e. analytical, leachability, etc.), detailed modeling results, and contingency factors. If sediment from another type of dredging project is proposed to be placed in the CDF, appropriate federal and state permits or approvals would be necessary.

**CDF Geotechnical Considerations.** The geotechnical seismic analysis shall be a component of design that establishes required construction materials, construction methods, and geometric aspects of the CDF containment berm to be appropriately protective of human health and the environment during an earthquake. Required design-level geotechnical seismic analysis for the Terminal 4 site and CDF containment berm stability are as follows:

1. Detailed characterization of seismic sources (known regional faults) in the vicinity of the Terminal 4 site for development of a site-specific seismic hazard analysis.
2. Development of input ground motions from seismic sources considering site-specific geotechnical considerations.
3. Evaluation of liquefaction potential for CDF containment berm, foundations soils, dredged material, and surrounding site soils potentially contributing to instability of the CDF during the design-level earthquake. This includes evaluation of liquefaction-induced deformations and lateral spreading.
4. Evaluation of slope stability and deformation, as appropriate, for critical cross-sections(s) including both pseudo-static and post-earthquake conditions.
5. Development of a contingency plan for post-earthquake inspection and repair.

**MNR Contingency.** MNR is proposed for certain portions of the Removal Action Area including along the Willamette River harbor line (Berth 401 and North of Berth 414) and Wheeler Bay. At these locations, MNR was determined to be highly probable within 5 years after removal action completion and during the projected timeframe for attenuation the removal would be protective. The areas selected for MNR exhibit generally low contaminant concentrations and the physical and chemical conditions are suitable for natural recovery processes to reduce the risk posed by surface contamination in sediment. EPA will require the Port to verify the progress and success of MNR through periodic monitoring consisting of sediment analysis to verify that sediment concentrations are decreasing over time. If after 5 years of post-removal action monitoring, concentrations are not consistent with RAOs for this removal or RAOs or remediation goals in a CERCLA ROD for the Portland Harbor Superfund Site, additional response actions will be evaluated and may be required by EPA, such as capping. The evaluation of MNR will be based, in part, on risk-based criteria and/or cleanup goals established by EPA through the harbor-wide RI/FS process for the Portland Harbor Superfund Site. MNR areas will also be subject to institutional controls, to be finalized during design, which will meet the objectives stated in the “**Institutional Controls and/or Other EPA Considerations**” Section above.

**Mitigation.** More specific mitigation goals and requirements are discussed in detail in the ARARs Section below.

## 2. Alternative Actions described in EE/CA

The EE/CA included the proposed action described above (identified as Alternative C in the EE/CA), and Alternatives A, B, and D. The No Action Alternative and Alternatives A, B, and D are described below.

- No Action Alternative: Provided for comparison purposes only, no activities would be implemented under this alternative and it does not meet the RAOs.
- Alternative A – MNR Emphasis: This alternative includes a small amount of dredging in Slip 3, but primarily MNR and capping.
- Alternative B – Cap Emphasis: This alternative includes a small amount of dredging in Slip 3, but primarily MNR and capping. This alternative is similar to Alternative A, but has a greater reliance on capping in some areas.
- Alternative D – Dredge Emphasis with Landfill Disposal – This alternative is similar to Alternative C, but involves landfill disposal of sediments instead of use of a CDF in Slip 1. This alternative differs from Alternatives A and B in that involves dredging in Slip 1 and a greater amount of dredging in Slip 3.

Alternatives A, B, C, and D all have MNR, capping, and dredging as components of the Removal Action, but vary in the degree to which they apply the technologies deemed feasible for Terminal 4. For instance, the estimated volume of dredged sediment ranges from 105,000 cubic yards under Alternatives A and B, which emphasize MNR and capping, to 204,000 cy under Alternative D, which emphasizes dredging as a principal component. Only Alternative C includes onsite disposal of the dredged material in a CDF.

Through an evaluation of effectiveness, implementability, and costs, the proposed action (Alternative C) was selected as the preferred alternative. Alternatives A, B, C, and D are all found to be effective and implementable and all are considered to meet the RAOs. The estimated costs (total net present value) of the alternatives are \$23,303,000 for Alternative A, \$24,627,000 for Alternative B, \$30,555,000 for Alternative C, and \$26,431,000 for Alternative D. The CDF in Alternative C offers excess capacity that could be used for the disposal of contaminated sediments from other sites within the Portland Harbor Superfund Site, as well as for the placement of suitable sediments or fill. The Port valued the excess capacity at \$10,000,000. Incorporating the estimated value of the excess capacity of the CDF, the net estimated cost of Alternative C is approximately \$20,555,000.

### **3. Contribution to remedial performance**

The Terminal 4 site is located within the initial study area of the Portland Harbor Superfund Site and is being investigated as part of the in-water Harbor-wide RI/FS. The Portland Harbor Superfund Site was listed on the NPL on December 1, 2000 and a Record of Decision is expected after the design of the Terminal 4 non-time-critical removal action. Due to the number of years remaining to select and implement a remedy Harbor-wide, this removal action is designed to immediately remove a large volume of contaminated sediments within the Terminal 4 site, reduce the risk of further migration of contaminants to adjacent sites, and reduce exposure to receptors to concentrations of chemicals that likely would require response action under any future remedial alternative.

Each of the Removal Action alternatives evaluated are expected to result in substantially cleaner sediments and reduce risk to the environment and human health. The Preferred Alternative is expected to provide an overall net benefit to the Portland Harbor Superfund Site by providing the opportunity to isolate and consolidate contaminated dredged materials on-site. In addition, a CDF with excess capacity may facilitate more expedited sediment cleanup in Portland Harbor by providing additional disposal options for future cleanup decisions. It is expected that establishing an in-water disposal site within the Portland Harbor Superfund Site would reduce the overall environmental impacts and potential public safety implications associated with transport of materials to offsite disposal facilities. Having one or more disposal options for the Portland Harbor Superfund Site also helps control the costs of disposal because it creates a more competitive market for disposal. This, in turn, makes dredging and removal of contaminated sediment a more cost effective remedy and encourages the consolidation of the contaminated sediments into a limited number of locations, which may reduce the area within the Willamette River where contaminated sediments would be contained in place.

This Action Memorandum only documents the EPA decision for the Terminal 4 Early Action. This decision is limited to MNR, capping, dredging, and disposal of sediments within the CDF which come from dredging within Terminal 4 to achieve the removal action objectives. Placement of additional material from any cleanup action in the excess capacity of the CDF will require additional EPA CERCLA decisions. Placement of dredged material as fill from another type of project will require appropriate federal and state permits or approvals. If future CERCLA decisions do not select the CDF as a disposal option, and/or if the Port does not secure federal or state approvals for filling Slip 1, the EE/CA and this Action Memorandum may require modification and amendment, respectively, to consider whether changes to the designed confinement facility in Slip 1 of the Terminal 4 dredged materials needs to be modified and/or the dredged materials removed to another disposal location.

#### **4. Description of alternative technologies**

Candidate technologies for sediment remediation were identified and screened prior to developing alternatives for further engineering analysis. General categories of remedial technologies considered at the screening stage included: capping, sediment excavation/removal, construction containment, and sediment transport, treatment, and disposal. Each of these candidate technologies were evaluated based on effectiveness, implementability, and cost. Technologies were eliminated from further consideration due to low expected technical feasibility or effectiveness. Technologies that were not cost-effective relative to other equally-protective options were also not retained.

#### **5. Engineering Evaluation/Cost Analysis (EE/CA)**

The Port of Portland prepared the EE/CA, which documents the development and evaluation of removal action alternatives, and discusses the rationale for the recommended alternative. The EE/CA was finalized in May 2005, and a copy of the Executive Summary of the EE/CA is provided in Attachment A. A 90-day public comment period on the EE/CA was held, and EPA prepared a response to public comments (Attachment B).

#### **6. Applicable or relevant and appropriate requirements (ARARs)**

For on-site activities, all state and federal ARARs will be complied with to the extent practicable. Preliminarily identified ARARs for the selected removal action are listed in Attachment C.

The Port prepared a Biological Assessment that evaluates the potential effects on threatened and endangered species from this removal action. The Biological Assessment is included in the EE/CA as Appendix P and consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service, was initiated.

A Clean Water Act 401 water quality certification will be issued for this project defining chemical and other monitoring requirements as well as limitations, best management practices, and reporting procedures for assuring compliance with state water quality standards. The point of compliance for monitoring parameters during dredging and construction likely will allow for a specific area where relevant standards may not be met. At this time it is our understanding that Oregon's water quality standards may not allow for mixing zones for dredging. EPA will coordinate with the State of Oregon on this issue. Any allowed mixing zone will protect beneficial uses of the river; however, it is not practicable to meet all water quality standards immediately adjacent to the dredge, or where cap material may be placed. Water quality impacts from the dredging, capping and construction of the CDF will be minimized to the maximum extent practicable.

As described in Appendix Q of the EE/CA (Draft CWA Section 404(b)(1) Analysis Memorandum), the Alternative C, including CDF disposal option, is an acceptable dredge and fill project consistent with the Clean Water Act for placement of fill in aquatic environments. The CDF would result in loss of aquatic habitat in Slip 1, but with adequate compensatory mitigation, no net loss of habitat quality and function will occur. Likewise, some temporal loss of habitat or function will result from dredging and capping areas which will require appropriate mitigation.

The CDF would result in loss of aquatic habitat in Slip 1, but with adequate compensatory mitigation, no net loss of habitat quality and function will occur. The preliminary evaluation indicates that construction of the CDF in Slip 1 would result in the loss of 15.3 acres of total aquatic area, including approximately 3.1 acres of shallow water (i.e., <20 feet deep), 11.5 acres of deepwater, 0.2 acres of vegetated shallows or wetlands, 3.5 acres of inundated piling areas, and 3,317 linear feet of shoreline which is comprised of various structures, unclassified fill, seawalls, and riprap. Temporal loss would occur when approximately 8.7 acres of cap are placed and 9.2 acres are dredged. Capped areas range from shallow water to deep water (though capped areas are primarily shallow water), while dredged areas are primarily in deeper water. A final approved mitigation plan is required prior to any loss of existing habitat. The assessment of habitat acreage and function lost and appropriate compensatory mitigation will be coordinated with the Tribes, as well as state and federal resource agencies, including through the ESA consultation process with NMFS. As part of the conceptual plan proposal for the mitigation project in the EE/CA, the overall objective for the mitigation project as well as specific, quantitative performance standards for both the construction and long term monitoring of the mitigation project will be established in development of the final, approved mitigation plan. However, some basic, general criteria are provided herein to address Lower Willamette River watershed issues:

- 1) All compensatory mitigation must be consistent to the maximum extent practicable with any established mitigation strategies or conservation initiatives supported by state and federal resource agencies for the Lower Willamette River basin
- 2) Preference will be given to compensatory mitigation plans that are consistent with habitat function.
- 3) All compensatory mitigation plans will include an assessment of how they contribute toward the conservation and recovery of ESA listed species.
- 4) Mitigation plans must include consideration for connectivity to existing habitat.
- 5) The potential success of the mitigation projects will be specifically factored into habitat plans.
- 6) All compensatory mitigation plans will include measurable performance objectives, management, monitoring and reporting requirements, responsibilities, and schedules.
- 7) Native species only will be utilized in any plantings to the maximum extent practicable.
- 8) 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 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.

9) Performance criteria will be developed that quantitatively relate to the above criteria. Potential performance criteria that will be used or considered include, but are not limited to: specific depth and acre size at specific depths (to be monitored over time), utilization surveys to verify the project objective is being met (e.g. diver surveys for juvenile salmonid use of the area), photopoint monitoring over time to ensure that percent coverage standards for flora, and maximum coverage ceilings for invasive species.

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 Removal Action Design. EPA may consider mitigation proposals that do not meet all of the performance criteria if the Port demonstrates that the proposal otherwise contributes to conservation and recovery of ESA listed species and/or other relevant conservation initiatives for the Lower Willamette River basin.

Off-site activities will comply with all applicable local, state, and federal laws, including the Off-Site Disposal Rule (40 CFR 300.440).

## **7. Project schedule**

The Terminal 4 Removal Action is an early action within the Portland Harbor Superfund Site. The construction sequencing for the Terminal 4 Removal Action was designed to be phased in order to maximize effectiveness and minimize other impacts. The anticipated schedule is dependent on the means of sediment transportation, which will be established in the design documents. The preliminary schedule is as follows:

For Barge transport:

- Year 1: Stage 1 berm construction and simultaneous capping in Wheeler Bay and at Berth 401. Miscellaneous other work such as demolition of piers and warehouses.
- Year 2: Dredging in Slip 3. Possibly placement of intermediate CDF cap.
- Year 3: Stage 2 berm construction and capping in Slip 3.

For pipeline transport:

- Year 1: Stage 1 berm construction and simultaneous capping in Wheeler Bay and at Berth 401. Miscellaneous other work such as demolition of piers.
- Year 2: Stage 2 berm construction, dredging in Slip 3 following completion of berm, and possibly placement of intermediate CDF cap.

- Year 3: Capping in Slip 3.
- Filling of the CDF will continue after construction year 3.

The estimated time to complete sediment remediation is 3 years. A monitoring program will be required which will include post-removal monitoring for monitored natural attenuation on an annual basis for the first five years. If after five years of post-removal action monitoring, concentrations are not consistent with the remedial action objectives, additional removal actions will be evaluated. Monitoring for capping and the CDF is proposed for years 1, 2, 5, 7, 10, 15, 20, 25 and 30.

### **B. Estimated Costs**

The removal action is being implemented by the Port of Portland. The projected costs to implement this non-time-critical removal action are estimated at \$30.6 million (see Appendix O of the EE/CA). However, due to projected value of the excess capacity of the CDF (\$10 million), the net cost to implement the action is \$20.6 million. Estimated costs for the other alternatives ranged from \$23.3 million to \$26.4 million.

## **VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

If the action is delayed or not taken, contamination will continue to adversely affect the environment at levels exceeding probable effect concentrations. Delayed action will increase environmental risks through prolonged exposure to contaminants present in the sediments.

## **VII. OUTSTANDING POLICY ISSUES**

There are no outstanding policy issues at this site.

## **VIII. COMMUNITY RELATIONS**

In July 2004, the Port initiated public outreach regarding the development of the Removal Action alternatives. Mechanisms used to solicit effective involvement of community members included project open houses, meetings with neighborhood associations, environmental groups, and community groups, project representation at community events, a project website for sharing information and deliverables with interested parties and project meetings at which community associations, government elected officials and staff, port stakeholders, government agencies, tribes, and rail roads are invited. On several occasions, EPA joined the Port of Portland project team when they made presentations at more than 20 neighborhood association and community group meetings. The Port also hosted a workshop and site tour in 2004 and hosted an open house at the Linnton Community Center during the comment period. In all, the Port has participated in and/or hosted 21 meetings and events attended by more than 275 people. An

effort has been made to meet with the groups more than once to provide updated project information.

The Administrative Record was prepared for the EE/CA and for this Action Memorandum. The Administrative Record is available at EPA, the Portland Central Library, St. Johns Branch Library, and the Northwest Branch Library.

The EE/CA for the Terminal 4 removal action was available for public review and comment from June 6, 2005 to September 7, 2005. Notice of a 30-day comment period was published in The Oregonian on June 6, 2005, and two notices of extension were published on June 20 and July 29, 2005. In addition, a postcard providing notice of the comment period start, followed by a May 2005 Fact Sheet summarizing the proposed EE/CA alternatives were mailed to over 900 addressees on the Portland Harbor project mailing list. The Administrative Record is available at EPA, the Portland Central Library, St. Johns Branch Library, and the Northwest Branch Library.

A public meeting was held on June 23, 2005 at the St. Johns Community Center to provide project information and accept spoken comments for the project record. EPA received 89 comment letters or spoken comments during the public comment period. EPA responded to all comment letters (see "Responsiveness Summary", dated March 7, 2006, in Attachment B).

In addition to the formal public comment opportunity, EPA provided routine monthly updates to the Portland Harbor Community Advisory Group (CAG) between May 2004 and July 2005. In addition, EPA met with the CAG Evaluation Committee to discuss the Terminal 4 EE/CA in July and December 2004.

## **IX. ENFORCEMENT**

This removal action will be implemented by the Port of Portland, pursuant to an Administrative Order on Consent (CERCLA No. 10-2004-0009). The order describes the environmental work to be performed for the removal action. The work to be performed by the Port of Portland includes preparation and submittal of project design and removal action documents, implementation of the removal action, submittal of a Removal Action Completion Report, and submittal of a Long-Term Monitoring and Reporting Plan to ensure that the removal action objectives are achieved at the site.

**X. RECOMMENDATION**

This decision document represents the selected removal action for the Port of Portland Terminal 4 site, located within the boundaries of the Portland Harbor Superfund Site, Portland, Oregon, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the site.

Conditions at the site meet the NCP Section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action. None of the removal project costs come from the Regional Removal allowance. Your approval or disapproval should be indicated below.

Approve: \_\_\_\_\_

Date: \_\_\_\_\_

Disapprove: \_\_\_\_\_

Date: \_\_\_\_\_

## **List of Figures, Tables, and Attachments**

### **Figures**

- Figure 1 Vicinity Map (Figure 1-1 from the EE/CA)
- Figure 2 Terminal 4 Aerial Photograph (Figure 1-2 from the EE/CA)
- Figure 3 Removal Action Area Plan (Figure 7-1 from the EE/CA)
- Figure 4 Potential Exposure Pathways
- Figure 5 Geochemical Conceptual Model
- Figure 6 Selected Alternative, Dredge Emphasis with CDF Disposal (Section 7.3.4 from the EE/CA)

### **Attachments**

- Attachment A Executive Summary for the Engineering Evaluation/Cost Analysis, Terminal 4 Early Action
- Attachment B Responsiveness Summary for Public Comments on the Engineering Evaluation/Cost Analysis, Terminal 4 Removal Action
- Attachment C ARARs