FINAL DESIGN STATUS REPORT
TERMINAL 4 PHASE II REMOVAL ACTION
PORT OF PORTLAND, PORTLAND, OREGON

Prepared for

Port of Portland

Prepared by

Anchor QEA, LLC

In Association with

NewFields

April 2010

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Addendum 1 Terminal 4 Removal Action Phase II Schedule, Approved February 19, 2010

LIST OF ACRONYMS AND ABBREVIATIONS

2-D	two-dimensional
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirements
BiOp	Biological Opinion
CDF	Confined Disposal Facility
City	City of Portland
CMPP	Conceptual Mitigation Plan Proposal
COPCs	chemicals of potential concern
CWA	Clean Water Act
DAR	Design Analysis Report
DDT	dichloro-diphenyl-trichloroethane
DEQ	Oregon Department of Environmental Quality
DSR	Design Status Report
EE/CA	Engineering Evaluation/Cost Analysis
ESA	Endangered Species Act
iAOPCs	initial areas of potential concern
IDR	informal dispute resolution
IMRP	Interim Monitoring and Reporting Plan
LWG	Lower Willamette Group
MET	modified elutriate test
MNR	monitored natural recovery
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NTCRA	Non-Time-Critical Removal Action
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
Port	Port of Portland
PRGs	Preliminary Remediation Goals
RAA	Removal Action Area
RAOs	Remedial Action Objectives

RI/FS	Remedial Investigation/Feasibility Study
RM	River Mile
ROD	Record of Decision
SAP	sampling and analysis plan
SBLT	sequential batch leachate test
SMA	Sediment Management Area
T4	Terminal 4
TCLP	toxicity characteristic leaching procedure
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

1 INTRODUCTION

The Port of Portland (Port) entered into an Administrative Order on Consent (AOC) with the U.S. Environmental Protection Agency (USEPA) in October 2003 to perform a Non-Time-Critical Removal Action (NTCRA) at the Terminal 4 (T4) site on the Willamette River in Portland, Oregon (Figure 1) (USEPA 2003). The AOC requires the Port to perform an Early Action to address known contamination found in T4 sediment samples during a remedial investigation directed by the Oregon Department of Environmental Quality (DEQ). USEPA, in consultation with its federal, state, and tribal partners, evaluated and selected a Removal Action for T4 that included a combination of monitored natural recovery (MNR), capping, and dredging with placement of contaminated sediment in a Confined Disposal Facility (CDF) to be built on site. The USEPA-selected Removal Action was detailed in an Action Memorandum prepared by USEPA in 2006 (Action Memo; USEPA 2006).

Implementation of the Action Memo (USEPA 2006) is occurring in phases because many of the design issues required for full implementation are linked to the overall Portland Harbor-wide Remedial Investigation/Feasibility Study (RI/FS) process, which is taking more time than what was anticipated when the Action Memo was issued. For this reason, in a letter to USEPA dated August 22, 2007, the Port requested that USEPA revise the schedule for implementation of the T4 Removal Action to realign the Early Action project with the harbor-wide RI/FS schedule. The Port also prepared an Abatement Measures Proposal in October 2007 (Anchor 2007a) to detail specific components of the Removal Action that could be implemented as Phase I to address conditions at T4 that posed an imminent threat to human health and the environment. In November 2007, USEPA approved the schedule realignment request on condition that the Port implement the abatement measures in the Abatement Measures Proposal, which split the project into two phases (letter dated November 15, 2007 from Deborah Yamamoto, USEPA, to Tom Imeson, Port of Portland; Appendix A). A Phase I final design was completed and implemented in 2008. Final design and implementation of Phase II (the final phase of the Removal Action) will be completed, according to the schedule provided as Addendum 1. This report provides a status update for the design of Phase II.

1.1 Selected Terminal 4 Removal Action

The T4 Removal Action, as described in the Action Memo (USEPA 2006) and the 60 Percent Design Analysis Report for the full Removal Action (DAR; Anchor 2006a), includes the following activities (Figure 2):

- Construction of a CDF in Slip 1
- Dredging in Slip 3 and north of Berth 414 with placement into the CDF
- MNR north of Berth 414, under the pier area at Berth 410 (below the finger pier) in Slip 3; within a majority of Wheeler Bay; and near Berth 401
- Capping within Slip 3—the area directly adjacent to and under the former Pier 5, the nearshore slopes under Pier 4 at Berth 411, and at the head of Slip 3 and in front of the pinch pile bulkhead; in Wheeler Bay; north of Berth 414; and on the downstream side of Berth 401
- Relocation of Berth 405 to the main river channel in front of Slip 1

1.1.1 Phase I of the Removal Action

Phase I of the Removal Action consisted of the following activities, as shown on Figure 3:

- Dredging and off-site disposal of sediment from within three areas exhibiting the highest chemical concentration at T4. Specifically, these areas were immediately adjacent to Berth 411, adjacent to Pier 5, and north of Berth 414. A portion of the dredge areas identified above could not be designed to achieve the planned removal depth due to the concern over slope stability and waterfront structures. Therefore, after completion of dredging, these select areas were covered with a thin layer of sand.
- Dredging and off-site disposal of contaminated sediment in an area adjacent to Berth 410 within Slip 3 to support water-dependent maritime use in a manner consistent with the Action Memo (USEPA 2006). Material was removed down to navigational depths of between -39.3 to -41.3 feet National Geodetic Vertical Datum (NGVD).
- Construction of a nearshore cap at the head of Slip 3 in front of and behind the existing timber bulkhead to isolate petroleum-contaminated sediment from aquatic receptors and control a potential ongoing source to nearby areas.
- Stabilization and capping of the Wheeler Bay shoreline to minimize contaminant migration to the river.

As mentioned in Section 1.1, these activities were all planned as part of the overall Removal Action at T4 as described in USEPA's Action Memo (USEPA 2006). The activities were implemented as part of Phase I because they addressed areas within the site that exhibited some of the highest concentrations, presented potential ongoing sources, and/or were not expected to be significantly impacted by the outcome of the harbor-wide RI/FS process. The remainder of the Removal Action will be implemented as Phase II after the information needed from the harbor-wide RI/FS process is obtained.

1.1.2 Phase II of the Removal Action

Phase II of the Removal Action consists of a combination of CDF construction, dredging, capping, and MNR in areas not completely addressed by Phase I. The head of Slip 3 cap and the Wheeler Bay shoreline stabilization activities are intended to be the final Removal Action for these areas, consistent with the Action Memo (USEPA 2006). The areas that were dredged as part of Phase I will be reassessed and, if necessary, addressed as part of Phase II along with the remaining areas at T4 including Slip 3, Slip 1, north of Berth 414, and Berth 401.

1.2 Phase II Design Status

Before the Removal Action was divided into two phases, the Port had submitted the 60 Percent Design for the full Removal Action to USEPA (Anchor 2006a). The Port received comments from USEPA in January 2007 and it was evident that additional collaboration needed to occur before the design could progress. Therefore, between January and November 2007, the Port and USEPA teams worked collaboratively through technical questions and issues associated with the 60 Percent Design for the full Removal Action as part of an informal dispute resolution (IDR) process. A summary of the documents that resulted from this process and the status of each technical issue are provided in Table 1.

Table 1

Status of Key Terminal 4 Removal Action Documents and Outstanding Issues from the IDR Process

Document Name/ Subject of Outstanding Issue	Date of Document Submittal	Description	Status[1,2]
Phase II and CDF Geotechnical and Structural Design Criteria and Performance Standards			
CDF Berm Erosion Protection	12/6/2006	CDF berm designed to withstand erosion from river currents associated with a 100-year flood, wind-induced waves typical of the T4 site, and propeller wash generated by the size of vessels that typically transit into and out of T4.	Resolved: USEPA approval of the performance standard proposed in the 60 Percent Design Analysis Report (Anchor 2006a) without comment based on comments provided on 1/15/07.
CDF Berm Static and Seismic Safety	12/6/2006	The CDF berm shall have a static safety factor of 1.5 or greater and a seismic safety factor of 1.1 or greater.	Resolved: USEPA approval of the performance standard proposed in the 60 Percent Design Analysis Report (Anchor 2006a) without comment based on comments provided on 1/15/07.
CDF Berm Seismic Event	12/6/2006	The CDF berm design seismic event shall correspond to a 10 percent probability of exceedance in 50 years.	Resolved: USEPA approval of the performance standard proposed in the 60 Percent Design Analysis Report (Anchor 2006a) without comment based on comments provided on 1/15/07.
Capping Layer (Armor) Erosion Protection	12/6/2006	The armor layer of the caps shall be designed to resist bed shear velocities induced by the largest of 100-year flood flow, 100-year waves, vessel-induced waves from typical passing vessels, and anticipated propeller wash from vessels that operate in the area.	Resolved: USEPA approval of the performance standard proposed in the 60 Percent Design Analysis Report (Anchor 2006a) without comment based on comments provided on 1/15/07.
Long-Term Groundwater Model			
Physical Model Parameters (K, TOC, porosity, density)	3/30/2007	Specification of physical input parameters for characterizing groundwater flow and chemical exchange properties of import material (berm, cap, dikes) and CDF fill material from T4 and Portland Harbor.	Resolved: Initial agreement on physical model parameters and sensitivity ranges occurred in 3/30/07 Groundwater Modeling Meeting (see meeting notes). Organic carbon content of import material was subsequently verified with analytical data from local quarries (see *Borrow Source Analytical Results,* below). Existing permeability measurements were determined to be representative of Portland Harbor sediments (see *Dredged Material Permeability Evaluation,* below).
Explanation of Effective Dispersion (NewFields 2007c)	4/20/2007	Compares the use of a steady-state versus transient groundwater flow solutions in long-term contaminant transport predictions. Similarities of approach are compared to previous CDF modeling studies, including St. Paul Waterway, Tacoma, Terminal 91, Seattle, and Blair Slip 1, Tacoma.	Resolved: Use steady state approach for long-term model. This approach was approved by USEPA during the 5/17/07 meeting (see meeting notes).
Dredged Material Permeability Evaluation (Anchor 2007b)	5/4/2007	Provide hydraulic conductivity (permeability) values for the long-term groundwater model for Portland Harbor material after it has been placed within the CDF and allowed to consolidate.	Resolved; 6/12/07 email from Sean Sheldrake.
Metal Partitioning Coefficients for Berm (NewFields and Anchor 2007)	6/20/2007	Provide partitioning coefficients for the berm for long-term and short-term groundwater model.	Resolved; final comments from USEPA on 7/12/07 via email from Sean Sheldrake.
SAP for Terminal 4 SBLT (Palermo and Anchor 2007b)	6/15/2007	Sampling and analysis plan to obtain more representative leachate testing of Terminal 4 dredge prism.	Resolved; USEPA approval of SAP on 6/19/07.
Portland Harbor Stats Summary	6/11/2007	Provides source concentrations for COPCs for Portland Harbor.	Resolved; PH concentrations settled on during 6/8/07 meeting. Concentrations for COPCs will be updated with new LWG bulk sediment data from AOPCs.
Portland Harbor Leachate Evaluation (Metals)	6/11/2007	Partitioning coefficients for metals derived from paired sediment porewater data (Portland Harbor Site Investigation, Weston 1998) for Portland Harbor sediment for groundwater model.	Unresolved: Port responded to USEPA's 6/20/07 comments on 7/19/07 during an IDR meeting. Concentrations will be updated with new LWG SBLT and bulk sediment data from AOPCs.
Portland Harbor Leachate Evaluation (Organics)	6/11/2007	Partitioning coefficients for organics derived from Region 10 leachability test data for organic constituents for Portland Harbor sediment for groundwater model.	Unresolved: Port responded to USEPA's 6/20/07 comments on 7/19/07 during an IDR meeting. Concentrations and partitioning coefficients will be updated with new LWG SBLT and bulk sediment data from AOPCs.
Response to USEPA June 20 Comments_PH Values	7/19/2007	Responses to USEPA's comments on metals and organics leachate values for Portland Harbor.	Unresolved. Concentrations will be updated with new LWG SBLT and bulk sediment data from AOPCs.
Biodegradation Rate Summary	7/17/2007	Input parameter for long-term groundwater model.	Unresolved: (From July 19, 2007 Meeting Summary): Port will review the references provided by USEPA (in 7/18/07 email) as well as degradation rates agreed upon for use in Portland Harbor (e.g., abiotic fate and transport model), and will update table as necessary. Proposed updated values will be provided in CDF Groundwater Input Memo.
T4 Biodegradation Comments	7/18/2007	Comments from USEPA on Biodegradation Values (not the same values as in the 7/17/07 document).	
Points of Compliance and Criteria	11/15/2007	Points of compliance and criteria necessary for evaluating model output.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A; see DAR Comment Nos. 24, 67, 96, 130, 133; and SACM Comment Nos. 31, 32. Final resolution dependent on harbor-wide RI/FS process.
Short-Term Groundwater Model			
Explanation of Effective Dispersion (NewFields 2007c)	4/20/2007	See description in Long-Term Groundwater Model.	Resolved: Use transient approach for short-term model. This approach was approved by USEPA during the 5/17/07 meeting (see meeting notes).
Short-term CDF Hydraulic Boundary Condition (NewFields 2007a)	4/30/2007	Methodology to estimate the short-term hydraulic head boundary condition during and following the CDF filling operation; boundary condition is input to short-term water quality model.	Resolved; 5/1/07 meeting.
SAP for Additional MET (Palermo and Anchor 2007a)	5/25/2007	Sampling and analysis plan to obtain more representative elutriate testing of Terminal 4 dredge prism.	Resolved; USEPA approval of SAP on 6/8/07.
Estimated Source Concentrations for Short-Term GW Model (Anchor and Palermo 2007)	4/27/07 revised 7/9/2007	Provide source concentrations for short-term groundwater model; subsequently updated with new MET data.	Resolved: USEPA sent the Port comments on the MET test results on 7/12/07; comments do not change the values provided.
T4 Kd Comments; New MET Comments	7/12/2007	USEPA's comments on Kd values and Short-term GW Source (MET).	

Document Name/ Subject of Outstanding Issue	Date of Document Submittal	Description	Status[1,2]
Metal Partitioning Coefficients for Berm (NewFields and Anchor 2007)	6/20/2007	See description in Long-Term Groundwater Model.	Resolved; final comments from USEPA on 7/12/07 via email from Sean Sheldrake.
Borrow Source Analytical Results	6/8/2007	TOC values from material collected at potential borrow source sites that could be used to construct the CDF berm to confirm model input parameter.	Resolved: During the 6/8/07 IDR meeting, Port proposed a mean value of 0.06% TOC and a minimum value of 0.02% TOC based on sampling results; USEPA agreed to proposed values.
Short-Term Water Quality Modeling (NewFields 2007d)	7/30/2007	Summary report of short-term model results.	Sent to USEPA on 7/30/07. Model will be updated if there are significant revisions to dredge volumes, dredge methods or production rates, or training dike geometries.
CDF Construction			
Chemical acceptance criteria for berm fill and verification testing frequency		To inform development of chemical criteria for cap and berm fill acceptance.	Partially unresolved: Port needs to provide a table of berm fill acceptance criteria. Verification testing frequency was resolved during the April 5, 2007 IDR meeting and includes initial testing of berm material once per 10,000 cy. If the first two sample results are consistent with the borrow source data, frequency would be reduced to one sample per 20,000 cy.
Import fill material placed in the CDF must meet same chemical acceptance criteria as established for cap material and berm select fill		Import fill material is the material to be placed in the CDF above the saturated zone of contaminated sediment.	Unresolved: During the May 1, 2007 IDR meeting, USEPA clarified that it is not the intent of the CDF that the import fill layer be a disposal facility for contaminated upland soils or contaminated dredged sediments. USEPA further required the Port to show that material being placed in this layer is protective of human health and the environment. Port contends that if material passes for upland disposal, it could be used as fill layer.
Weir Overflow Evaluation			
Estimates of Potential Weir Overflow (NewFields 2007b)	6/20/2007	Predict conditions under which no discharge will occur to inform construction management and scheduling.	Unresolved: Port submitted Technical Memorandum to USEPA on 6/21/07. Model analysis will be updated with new Phase II dredge inflow rates to determine conditions for no discharge.
Weir Discharge Evaluation WP (MFA 2007a)	6/8/2007	Provide a work plan for the approach to evaluating the CDF weir discharge.	Resolved: No discharge evaluation will be necessary as the Port will manage the dredging during Phase II to result in no weir discharge to the river.
Terminal 4 Early Action Weir Discharge WP (MFA 2007b)	6/18/2007	Supplemental information to the Weir Discharge Work Plan.	
T4; Weir Work Plan Comments	7/13/2007	USEPA comments on the Weir Discharge Evaluation Work Plan.	
Short-term Water Quality Monitoring			
Laboratory Turnaround Times	6/18/2008	Amount of time within which the lab must analyze water quality parameters and report results.	Resolved during Phase I design; USEPA approval of the Water Quality Monitoring Plan as Appendix B of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
Background WQ Monitoring Conditions	6/18/2008	Details related to how background water quality data is collected and applied before the project begins.	Resolved during Phase I design; USEPA approval of the Water Quality Monitoring Plan as Appendix B of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
Water quality monitoring compliance points and criteria for dredging and capping	6/18/2008	Specific location of water quality monitoring compliance points for laboratory parameters and field parameters.	Resolved during Phase I design; USEPA approval of the Water Quality Monitoring Plan as Appendix B of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
COCs to monitor for ponded water seepage through the berm during filling of the CDF	11/15/2007	COCs to monitor for ponded water seepage through the berm during filling of the CDF.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A; see DAR Comment No. 96.
Frequency and intensity of monitoring during construction	6/18/2008	Frequency and intensity of monitoring during construction.	Resolved during Phase I design; USEPA approval of the Water Quality Monitoring Plan as Appendix B of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
COCs to monitor dredging and capping activities	6/18/2008	COCs to monitor dredging and capping activities.	Resolved during Phase I design; USEPA approval of the Water Quality Monitoring Plan as Appendix B of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
Long-term Monitoring			
Monitoring of groundwater that moves through the berm after filling and during the dormant period--points of compliance and criteria	11/15/2007	Monitoring of groundwater that moves through the berm after filling and during the dormant period--points of compliance and criteria.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A; see DAR Comment Nos. 24, 67, 96, 130, 133; and SACM Comment Nos. 31, 32. Final resolution dependent on harbor-wide RI/FS process.
Cap monitoring criteria	11/15/2007	Cap monitoring criteria.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A; see DAR Comment No. 87. Final resolution dependent on harbor-wide RI/FS process.
Dredging			
Dredge Plan Approach	6/18/2008	Dredge cut depths, sequencing, etc.	Resolved during Phase I design; USEPA approval of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
Dredging BMPs (including overwater conventional bucket dewatering)	6/18/2008	BMPs to be implemented during dredging activities.	Resolved during Phase I design; USEPA approval of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
Dredging performance standards		Determining when additional removal in dredging areas will be necessary during construction (i.e., confirmation sampling results versus dredging criteria/performance standards).	It was agreed at the April 5, 2007 IDR meeting that the general rule will be to complete sampling after dredging is completed and that if the surface exceeds PEC criteria then additional dredging will be completed unless a compelling argument/justification can be made for why alternative factors/measures other than additional dredging should be considered or implemented. At the May 10, 2007 IDR meeting, USEPA and DEQ requested a revision to the footnote on the flow chart (Figure 11 from the DAR) defining "other considerations" for determining whether an additional removal action (dredging, capping, MNR) is necessary after post-dredging confirmation sampling. Specifically, USEPA and DEQ requested the "other considerations" to include the DEQ Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment (January 31, 2007, updated April 3, 2007). At the May 10, 2007 IDR meeting the Port Team could not agree to the request, but stated they would evaluate the suggestion and get back to USEPA.

Document Name/ Subject of Outstanding Issue	Date of Document Submittal	Description	Status[1,2]
Capping			
Cap design criteria	11/15/2007	Cap design criteria.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A. See DAR Comment No. 87.
Chemical acceptance criteria and verification testing requirements	6/18/2008	To verify quality of import material to be used for capping.	Resolved during Phase I design; USEPA approval of the Construction Quality Assurance Plan as Appendix A of the Final Phase I DAR (Anchor 2008) on June 18, 2008.
Sediment Acceptance Criteria			
Limitations on treatment methods that destroy or remove contaminants from sediment	11/15/2007	Limitations on treatment methods that destroy or remove contaminants from sediment.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A; see SACM Comment No. 16. Final resolution dependent on harbor-wide RI/FS process.
Habitat Mitigation			
Third Party Agreement	11/15/2007	Comment from USEPA stated that agreement needs to be reached between USEPA, the Port, and a third party where a third party will be responsible for the construction and long term monitoring and maintenance before USEPA can approve the Mitigation Plan. Additionally, the agreement details need to allow USEPA to comment on the final design (complete plans and specs) to ensure that ARARs are being met.	Addressed by the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port in Appendix A; the Port and USEPA agreed to defer resolution of mitigation comments until a final mitigation project has been defined for the realigned project.
Mitigation Project Timing	11/15/2007	Comment from USEPA stated that timing of the habitat loss versus timing of implementation of the mitigation project should be considered in determining how much mitigation is sufficient.	
Monitoring Timeframe	11/15/2007	Comment from USEPA stated that performance standards should be in force throughout the habitat mitigation lifetime, i.e., maximum invasive species percent cover that applies regardless of the monitoring year. At a minimum, annual monitoring over the first 5 years and every 5 years thereafter should occur.	
Performance Criteria for Fish Presence	11/15/2007	Comment from USEPA stated that the Port should include the following language in the text of the Mitigation Plan: After absence of fish over three consecutive seasons, USEPA may require corrective actions to be taken.	

Notes:

1. Status information was obtained from the T4 EA IDR Action Item Tracking spreadsheet dated July 10, 2007, IDR Meeting Summaries, the comment resolution table attached to the November 15, 2007 letter from USEPA to the Port, and project emails.
2. The site Record of Decision (ROD) will document the final performance standards to be applied to any CDFs, and additional performance standards may be established as part of the design of specific facilities.

Through the IDR process, a number of design issues had been resolved. When the Removal Action was divided into two phases, the remaining design issues were put on hold. Now that Phase I has been completed, USEPA requested a report documenting the status of the design for Phase II.

This Design Status Report (DSR) summarizes the status of the Phase II design considering the resolution of technical issues from the 2007 IDR process, the progress made in the harbor-wide RI/FS process, and implementation of Phase I activities. The status of key components supporting the Phase II design, as recommended by USEPA, is discussed in this document as listed below:

- New data
- CDF groundwater modeling
- Weir discharge evaluation
- Data gaps
- Habitat mitigation approach
- Sediment recontamination approach
- Potential Applicable or Relevant and Appropriate Requirements (ARAR) changes resulting from harbor-wide RI/FS process, and how they are to be utilized at this site
- Substantial cost changes

2 NEW DATA AND INPUT TO DESIGN

New data and other information that will be used in the design of the Phase II Removal Action includes:

- Phase I Removal Action post-construction surface sediment sampling results (Anchor QEA 2009). These results will be used to inform the Phase II dredge prism design.
- Phase I Removal Action background water quality data (Anchor QEA 2008, Appendix M). These data will be used to update 90th percentile ambient background water quality concentrations.
- Phase I Removal Action construction water quality data (Anchor QEA 2008, Appendix D1). These data will be used to inform design of Phase II water quality monitoring protocols and evaluation of needed best management practices (BMPs).
- Phase I pre-construction modified elutriate test (MET) results. These results will be used to inform the short-term CDF groundwater model as described in Section 3. These data were provided to USEPA during the IDR process and will be summarized in the CDF Groundwater Model Input Parameter Memorandum, which is scheduled for submittal to USEPA according to the schedule provided as Addendum 1. Further discussion is provided in Section 2.1, below.
- Phase I pre-construction sequential batch leachate test (SBLT) results. These results will be used to inform the long-term CDF groundwater model as described in Section 3. These data will be summarized in the CDF Groundwater Model Input Parameter Memorandum. Further discussion is provided in Section 2.1, below.
- Portland Harbor leachability (SBLT, toxicity characteristic leaching procedure [TCLP]) and elutriate (MET) data. These data will be used to inform the long-term CDF groundwater model as described in Section 3. These data were reported to USEPA by the Lower Willamette Group (LWG) in August 2009, and will be summarized in the CDF Groundwater Model Input Parameter Memorandum. Further discussion is provided in Section 2.2, below.
- Phase I Removal Action pre-construction column settling test results. These data will be used to inform the CDF design, specifically to assess short-term bulking and

settlement of the dredge slurry solids in the CDF (see Phase I Final DAR [Anchor 2008]).

- Portland Harbor Preliminary Remediation Goals (PRGs) for the FS. The PRGs may be used to inform the dredging, capping, and MNR design.
- New in-water survey data. In June 2009, the Port collected multi-beam bathymetry of submerged areas including areas proposed for Phase II Removal Action design. This up-to-date survey information will be incorporated into the Phase II design.

Section 2.1 provides additional discussion on the pre-construction MET and SBLT data collected from T4, and whether those data are representative of current conditions at T4 following the Phase I Removal Action. Section 2.2 provides additional discussion on the availability and use of Portland Harbor contaminant mobility data, including SBLT, MET, and TCLP data from representative initial areas of potential concern (iAOPCs) in potential remediation areas. Section 2.3 discusses the role of Portland Harbor FS PRGs in the T4 Phase II design.

2.1 Representativeness of Terminal 4 MET and SBLT Data

Following the submittal of the 60 Percent Design documents (Anchor 2006a) for the full Removal Action, and prior to the implementation of the Phase I Removal Action, updated MET and SBLT tests were conducted using sediments representative of the dredge prism in Slip 3 and parts of Berth 414. Although elutriate and leachate testing had previously been performed during the Engineering Evaluation/Cost Analysis (EE/CA; BBL 2005), those earlier tests were conducted before the T4 Removal Action Area (RAA) had been fully defined, and as a result, the composite sediment sample used for testing included significant areas outside the dredge prism. The sampling and analysis plans (SAPs) for the updated (2007) MET and SBLT tests were presented in Palermo and Anchor (2007a and 2007b, respectively), and were subsequently approved by USEPA on June 8 and June 19, 2007, respectively.

Since the updated MET and SBLT tests were performed, the Phase I Removal Action was completed. The Phase I Removal Action targeted the most highly contaminated sediments at T4, and may, therefore, have affected the overall sediment quality of the remediation areas remaining to be addressed during Phase II. A comparison of dredge prism quality before and

after the Phase I Removal Action is necessary to determine whether the 2007 MET and SBLT test results are still representative of the remaining Phase II Removal Action areas.

For this comparison, we used the database that was available at the time the 2007 MET and SBLT SAPs were prepared to establish pre-Phase I conditions. For post-Phase I conditions, several samples located within the Phase I Removal Area were removed from the database (including T4-B411-02, T4-B414-01, T4-S3-04, and T4-VC24), and the mean concentrations of the remaining samples were recalculated (see Palermo and Anchor 2007a, Appendix B for the methodology). The results are summarized below for several chemicals of potential concern (COPCs) in Portland Harbor.

Chemical	Units	Pre-Phase I Average Conc.	Post-Phase I Average Conc.	Difference
Pyrene	µg/kg	7,450	5,180	-30%
Benzo(a)pyrene	µg/kg	6,150	4,690	-24%
Total PAHs	µg/kg	50,850	35,530	-30%
Lead	mg/kg	184	186	NC
Copper	mg/kg	43	44	NC
Zinc	mg/kg	250	254	NC
4,4'-DDT	µg/kg	9.8	11.7	ND
4,4'-DDE	µg/kg	3.7	4.1	(NC)
4,4'-DDD	µg/kg	6.8	8.1	(NC)
Aroclor-1248	µg/kg	18	20	ND
Aroclor-1254	µg/kg	34	40	(NC)
Aroclor-1260	µg/kg	78	94	(NC)

NC = No discernible change in dredge prism concentration

(NC) =No substantive change in concentration is apparent, based on more limited dataset

ND = Not detected in the elutriate

Based on this comparison, the average polycyclic aromatic hydrocarbon (PAH) concentration in the remaining Phase II dredge areas has decreased by approximately 24 to 30 percent as a result of the Phase I Removal Action. This difference is within the range of analytical error, and not severe enough to invalidate the MET and SBLT results, although it should be understood that the PAH results from these tests are likely conservative (i.e., overestimated). No discernible differences were observed in metals concentrations. Although there is more

limited analytical data to evaluate dichloro-diphenyl-trichloroethane and its degradation products (DDTs) and polychlorinated biphenyls (PCBs), the difference between pre- and post-Phase I concentrations does not appear to be significant. Further, there is no reason to believe DDTs or PCBs would be unusually concentrated in the Phase I areas; i.e., PCBs and DDTs did not drive the Phase I Removal Action.

In summary, the MET and SBLT tests performed in 2007 are still considered representative of the Phase II remediation areas, although the elutriate and leachate results for PAHs are likely to be conservative (i.e., somewhat overestimated) because average sediment concentrations have been reduced as a result of the Phase I Removal Action.

2.2 Portland Harbor Contaminant Mobility Data

The LWG collected and tested composite sediment samples from 11 iAOPCs within Portland Harbor, as described in Anchor (2008). MET, SBLT, and TCLP tests were conducted on the iAOPCs listed below.

iAOPC	River Mile	Bank	Site Vicinity
1	2.2	E	Oregon Steel Mills
3	3.8	E	Schnitzer Slip
6	4.8	W	BP West Coast
7	5.7	E	Marcom
11	6.3	W	Gasco
13	6.8	E	Willamette Cove
14	7.1	W	Arkema
19	8.8	W	Gunderson
21	8.2	E	Portland Shipyard
23	9.0	E	Swan Island Lagoon
24	9.7	W	Fireboat Cove

E = East bank; W = West bank

It is anticipated that the harbor-wide FS will indicate that the iAOPCs listed above are the sites most likely to be addressed via active remediation, including dredging. These iAOPCs provide a representative cross-section of contaminated sites throughout Portland Harbor because they are from River Mile (RM) 2.2 to RM 9.7; half are from the east bank and half

from the west bank of the river, and they include a wide spectrum of COPCs. Therefore, sediments expected to be dredged from these iAOPCs represent potential fill material for the CDF at T4, Slip 1.

Analytical data from these iAOPCs (primarily SBLT results, as discussed below) will be used to help establish a representative range of leaching characteristics for the contaminated fill material in the CDF. The validated analytical results from this investigation were submitted to USEPA by the LWG in August 2009. The Port will evaluate the LWG data and present the CDF-specific modeling results in the CDF Groundwater Model Input Parameter Memorandum, which is expected to be submitted to USEPA according to the schedule provided as Addendum 1.

At the same time, consideration of these anticipated candidate sediment cleanup locations, and possibly others, within the Portland Harbor Superfund Site (both Port-related and non-Port related) for eventual placement in the T4 CDF will need to be initiated. It is important to initiate this consideration at this time for two reasons:

- First, USEPA acknowledged in its 2006 Action Memo that the T4 CDF will be designed in a manner such that the majority of its volume capacity will be for contaminated sediments from non-T4 locations (USEPA 2006). In addition, USEPA has indicated that the T4 CDF design must be consistent with the harbor-wide FS (e.g., deemed to be protective, effective, cost-effective, and implementable from the harbor-wide perspective). Early coordination between USEPA and the Port regarding potential other users is critical to ensure that the T4 CDF receives adequate consideration in the harbor-wide FS analysis, and ultimately, the Record of Decision (ROD).
- Second, one of the factors the Port and USEPA recognized in realigning the T4 CDF schedule with the harbor-wide schedule was reducing the financial risks to the Port as the owner, including eliminating the potential for the CDF to sit open and partially filled for several years until other sediment cleanups are at their final implementation state (i.e., after the harbor-wide ROD and detailed design phase). The Port, as a public entity, needs a high level of assurance that there will be an adequate number of users of the CDF prior to commencing construction.

SBLT Results. The SBLT data will provide an estimate of the porewater concentrations that are expected to equilibrate with contaminated sediments in the CDF. These data describe the maximum "source strength" of groundwater in the CDF and are a key input parameter for the long-term groundwater model. The ratio of the iAOPC bulk sediment concentration to the SBLT leachate concentration will be used to develop a site-specific sediment-to-groundwater partitioning coefficient. The partitioning coefficient describes how readily contaminants are desorbed from the sediments, dissolved in groundwater, and available for transport through the CDF.

MET Results. MET results are used to characterize the behavior of hydraulically dredged sediment slurry being discharged into an enclosed pond, typically regulated by a weir structure, during the filling of a CDF. Most of the iAOPCs in Portland Harbor are located too far from T4 (RM 4.3), and many are on the opposite bank of the river, for hydraulic dredging to be practicable. The Schnitzer Slip is located about a half mile downstream of Slip 1, but the next nearest iAOPCs on the east side of the river are about 1.4 miles upstream and 2.1 miles downstream of the CDF. As a result, it is expected that mechanical methods, rather than hydraulic, will be the preferred methods for dredging the ultimately-defined Sediment Management Area (SMA) and placement of the material into the CDF, and, therefore, the MET results will not be relevant to the T4 CDF project.

TCLP Results. TCLP results from Portland Harbor will be used to determine whether any of the sediment dredged from the iAOPCs will be excluded from the CDF if they are classified as hazardous waste on the basis of toxicity characteristics, unless treated or otherwise managed in a manner that eliminates the hazardous waste characteristic and as determined through the harbor-wide FS process. Aside from this specific regulatory application, TCLP results will not be used directly in the groundwater model.

In summary, SBLT data from the 11 iAOPCs in Portland Harbor will provide a representative cross-section of contaminants and leaching characteristics for potential fill sediments for the Slip 1 CDF. These data will be sufficient to characterize the chemical mobility of the contaminated fill layer in the long-term groundwater model. Bulk sediment concentrations and chemical partitioning coefficients derived from the SBLT data will be used as input

parameters in the long-term groundwater model. These data will be analyzed and presented in the CDF Groundwater Model Input Parameter Memorandum.

2.3 Preliminary Remediation Goals

USEPA and LWG will be refining the Remedial Action Objectives (RAOs) and developing related PRGs for use in the FS. The concept is that the FS will present a comparative analysis of alternatives based on agreed-upon PRGs. USEPA and LWG intend to resolve refined RAOs and PRGs for purposes of the FS evaluation this year. During development of the T4 60 Percent Design for the full Removal Action presented to USEPA in December 2006, the harbor-wide RAO and PRG processes were not as far along, and as such, the T4 design analysis and delineation of contaminated areas defaulted to utilizing conservative screening values (Anchor 2006a). To be consistent and integrated with the harbor-wide FS, the T4 Phase II design must incorporate the FS PRGs for sediment and surface water into the analysis. The schedule for submitting the Phase II 100 Percent Design is provided in Addendum 1.

3 CONFINED DISPOSAL FACILITY GROUNDWATER MODELING

This section discusses the groundwater modeling status and the next steps necessary to support the T4 Phase II design. The groundwater flow modeling is being conducted to support the CDF design by providing projections of chemical concentrations in groundwater moving through the CDF fill sediments and berm, and the potential effects on surface water quality in the Willamette River.

The following discussion provides a brief summary of the groundwater modeling that has been completed to date for the CDF, including model input parameters, approaches, and results that were completed as part of the 60 Percent DAR for the full Removal Action (Anchor 2006a) and various follow-on discussions and technical memoranda generated during the IDR process. The discussion is organized in the following sections: Previous T4 CDF Modeling, Current Modeling Approach, and Next Steps.

3.1 Previous Terminal 4 CDF Modeling

This section summarizes the groundwater flow and contaminant transport modeling work performed in support of the T4 CDF design.

3.1.1 Engineering Evaluation/Cost Analysis

The hydrogeology of T4 is described in detail in the T4 Early Action Characterization Report (BBL 2004). BBL (2005) summarizes the hydrogeology of T4 and the groundwater flow and contaminant transport model developed to support the EE/CA. The EE/CA selected the CDF as the preferred Removal Action alternative. The CDF alignment is coincident with the general groundwater flow direction. Therefore, BBL used a two-dimensional (2-D) cross-sectional modeling approach to conservatively estimate COPC concentrations in groundwater at the outside edge of the CDF berm. The EE/CA modeling analysis received few comments.

3.1.2 60 Percent Design Analysis Report for the Full Removal Action

Following the EE/CA (BBL 2005), contaminant transport modeling was performed as part of the 60 Percent DAR for the full Removal Action (Anchor 2006a). The modeling approach

was an extension of the BBL (2005) approach. A 2-D cross-sectional model was aligned along critical groundwater flow path to conservatively predict (i.e., tend to overestimate) COPC concentrations in groundwater at the point of entry to the Willamette River.

The 60 Percent DAR (full Removal Action; Anchor 2006a) model was expanded to include revised input parameters based on additional empirical data, including laboratory and field measurements. Model improvements included use of more accurate hydraulic conductivity values, media-specific partitioning coefficients, more representative river and upland hydraulic head boundaries, more conservative recharge (unpaved), an increased simulation timeframe, and an increased sediment fill elevation. A number of conservative revisions were made at the request of USEPA to minimize the chance that concentrations at points of compliance would be underestimated. As a result, the 60 Percent DAR (full Removal Action) modeling analysis resulted in more conservative predictions of COPC concentrations in groundwater compared to predictions in the EE/CA (BBL 2005). Anchor (2006a) concluded that short-term (initial filling operation) and long-term COPC concentrations at the point of groundwater discharge from the berm to the Willamette River were not likely to exceed acute or chronic water quality criteria.

3.1.3 Informal Dispute Resolution Process

In comments received on the 60 Percent DAR for the full Removal Action (Anchor 2006a) related to the groundwater modeling effort, USEPA questioned the appropriateness of most of the model assumptions and input parameters that were used in both the EE/CA (BBL 2005) and the 60 Percent DAR for the full Removal Action models. The disparity between the agency comments received during the EE/CA versus the 60 Percent DAR for the full Removal Action was a contributing factor leading to the IDR process, which involved technical discussions between USEPA (including its federal, state, and tribal partners) and the Port, and development of supporting technical memoranda regarding model input parameters and procedures.

Significant progress was made during the IDR process. Table 1 lists the various work products that were developed in consultation with USEPA to provide detailed explanations of specific data input parameters or modeling approaches and document resolution of issues.

Many of the input parameters and modeling approaches were approved for use by USEPA, as summarized in the table.

3.2 Current Modeling Approach

This section summarizes the current CDF modeling approach for the Phase II design, including a process overview and discussion of both short-term and long-term modeling.

3.2.1 CDF Modeling Process Overview

Figure 4 is a flow chart illustrating the CDF modeling process. The CDF modeling process is based on the progression of previous T4 CDF modeling efforts (BBL 2005; Anchor 2006a, Appendix I) and the resolutions achieved during the IDR process. As shown in Figure 4, short- and long-term modeling are the two primary steps in the modeling process.

Short-term modeling addresses the initial CDF filling operation. The short-term model will be implemented if hydraulic dredging is used to convey dredged material to the CDF. Hydraulic dredging entrains large quantities of water and creates a dilute dredge slurry. When discharged into the CDF, the dredge slurry is temporarily ponded behind the berm, but dredge elutriate water will eventually exit the CDF either through the berm or through an overflow weir.

Short-term modeling consists of three modeling analyses: CDF Hydraulic Boundary Condition (NewFields 2007a), Weir Outflow Analysis (NewFields 2007b), and Short-Term Groundwater Quality Modeling (NewFields 2007d). The CDF Hydraulic Boundary Condition has been approved for use, as summarized in Table 1. The Weir Overflow Analysis and Short-Term Groundwater Quality Modeling memoranda were submitted to USEPA but did not receive agency approval before the cessation of the IDR process. Short-term modeling analyses are described in more detail in Section 3.2.2.

Long-term modeling addresses groundwater flow and contaminant transport for conditions following the consolidation of sediment placed in the CDF. Under long-term conditions, groundwater entering the CDF from upgradient and lateral sources would flow through the CDF materials, and out through the berm. The focus of the long-term modeling is to

evaluate the potential for contaminants in sediments in the CDF to be carried in groundwater through the fill sediments and the berm and finally to the Willamette River. Several aspects of the long-term modeling analysis were resolved through the IDR process, including the following:

- Use of steady-state long-term modeling approach (NewFields 2007c)
- Permeability of dredge fill material (Anchor 2007b)
- Metal partitioning coefficients in berm material (NewFields and Anchor 2007)

Other issues remain unresolved, as listed in Table 1. New leaching test data from representative iAOPCs in Portland Harbor will help to resolve many of the outstanding issues regarding the source strength of the porewater in the CDF. Long-term modeling is described in more detail in Section 3.2.3.

Where concentrations predicted by short- or long-term modeling exceed applicable criteria (not yet determined, see Section 5), the modeling process provides a feedback loop to augment the analysis and/or incorporate design or operational modifications to reduce contaminant concentrations at key locations (see Figure 4).

3.2.2 Short-Term Modeling

Short-term modeling addresses the initial CDF filling operation if hydraulic dredging is used. It is expected that T4 is the only iAOPC located close enough to the CDF for hydraulic dredging to be practicable. However, if others determine that hydraulic dredging would be practicable, additional short-term modeling would be necessary prior to placement into the CDF. Short-term modeling consists of three modeling analyses: CDF Hydraulic Boundary Condition, Weir Outflow Analysis, and Short-Term Groundwater Quality Modeling. The following subsections describe each short-term modeling analysis for the T4 filling event.

3.2.2.1 CDF Hydraulic Boundary Condition

NewFields (2007a) describes the methodology to estimate the short-term hydraulic head boundary condition during and after the CDF filling operation. The methodology was responsive to USEPA comments requiring: 1) the duration of short-term water quality predictions to be extended (relative to the 60 Percent DAR for the full Removal Action

modeling analysis [Anchor 2006a]) to account for the recovery period (dewatering) after dredging stops, and 2) the use of resulting short-term predictions to be used as input to long-term water quality predictions. The transient CDF boundary condition provides the rationale for short-term simulation duration and an estimate of CDF ponded water elevation during and following the filling operation. Figure 5 (top) illustrates conceptual groundwater flow conditions represented in the short-term model. Data requirements for the analysis include dredge operation rate, duration, on-off cycle, and the Willamette River stage at the time of filling. USEPA approved the methodology described in NewFields (2007a).

3.2.2.2 Weir Outflow Analysis

NewFields (2007b) described the methodology to estimate the potential rate and duration of weir overflow during filling of the CDF. The analysis is similar to the CDF Hydraulic Boundary Condition analysis. The analysis revealed that overflow of the weir is highly unlikely at typical hydraulic dredge pumping rates, especially since fill rates are under control of the operators. However, extreme assumptions were applied to conservatively estimate (i.e., overestimate) weir overflow rates and durations in the unlikely event that overflow were to occur. Conservative data inputs (i.e., worst case scenario) for the analysis include a high dredge pumping rate, low dredging efficiency (i.e., high water content), long work days (i.e., 20 hours) and project duration, and a low hydraulic conductivity estimate for berm materials. This analysis was originally intended to support an evaluation of potential receiving water quality impacts and permitting requirements for CDF construction. USEPA approved the methodology described in NewFields (2007b).

Under the unlikely combination of conditions assumed, the water balance model indicated the pond might overtop the weir on Day 9 of an 11-day dredging project, and discharge to the river for about one and a half days. Using more reasonable and likely assumptions, overflow would not be predicted to occur at all. Further, the remaining dredge volume in Slip 3, and thus the duration of hydraulic dredging, should be reduced with the removal of the Phase I portion of the dredge prism. All things considered, it is reasonable to expect the hydraulic dredge slurry can be fully contained behind the weir, with no discharge, by appropriately managing dredge filling rates and construction work schedules if necessary. As a result, the weir overflow analysis will be redirected to determining any needed

construction modifications that may be required to prevent overflow of the weir, and the Port will no longer be pursuing regulatory authorization for a surface water discharge from the CDF for the T4 filling event (see Section 4 for further discussion).

3.2.2.3 Short-Term Groundwater Quality Modeling

NewFields (2007d) described the methodology, data input, and results of the short-term groundwater quality predictions for the placement of hydraulically dredged T4 sediment in the CDF. This technical memorandum was submitted to USEPA on July 30, 2007. The methodology and results were not approved by USEPA prior to the cessation of the IDR process (see Table 1).

As an input to the short-term groundwater quality model, the concentrations of sediment contaminants in CDF ponded water (dredge inflow) were estimated based on the dissolved fraction (plus 0.5 percent of total suspended sediment concentration to account for possible colloidal transport) of the MET. Lead, copper, total DDT, and total PCBs were selected as COPCs for short-term water quality analyses. COPC selection and methods to estimate COPC concentrations in CDF ponded water were developed cooperatively with USEPA. The following paragraphs summarize data input and results for the short-term groundwater quality model.

To estimate transport of COPCs through the berm, literature-based values for metal partitioning coefficients (K_d) were agreed upon with USEPA as described in NewFields and Anchor (2007). Organic carbon-based partitioning coefficients (K_{oc}) for organic compounds had previously been agreed upon with USEPA. The mean fraction of organic carbon (f_{oc}) in samples from potential quarry sites was assumed for the berm select fill.

The total simulation time for the short-term flow and transport model was 40 days, which corresponded to the time when the CDF ponded water elevation reached steady state following filling (i.e., the analysis described in Section 3.2.2.1, above). Based on this analysis, projected COPC concentrations in groundwater at the downgradient edge of the berm, adjacent to the Willamette River, did not exceed chronic water quality criteria. The

distribution of COPCs in the berm represents initial conditions for the long-term groundwater quality model.

3.2.3 Long-Term Modeling

Long-term modeling addresses groundwater flow and contaminant transport for conditions following the filling, capping, and consolidation of sediment placed in the CDF. Long-term modeling consists of two modeling analyses: Sediment Fill Elevation and Long-Term Groundwater Quality Modeling. The following sections describe each long-term modeling analysis.

3.2.3.1 Sediment Fill Elevation

One design goal of the CDF is to ensure that contaminated sediment layers in the CDF remain under saturated conditions. The goal of the fill elevation analysis is to identify the maximum elevation of contaminated fill in the CDF that corresponds to a minimum potential for this material to dewater during extended drought conditions. The analysis used conservative assumptions, including a relatively high value for hydraulic conductivity in sediment fill, zero recharge from precipitation, and annual low water levels (i.e., late summer – early fall) in the Willamette River. The analysis established an upper design elevation of +9.5 feet NGVD for placement of contaminated fill material under these relatively conservative assumptions. The 60 Percent DAR for the full Removal Action (Anchor 2006a, Appendix I) describes the analysis in more detail.

It should be noted that the physical properties of sediments in representative iAOPCs from Portland Harbor (averaging 12 percent clay and 2.3 percent organic carbon) are very similar to the physical properties of the sediments used to estimate the permeability of contaminated fill material for this analysis (i.e., fill material permeabilities were based on sediments containing 9 to 15 percent clay and 1.5 to 3.0 percent organic carbon). Thus, the model input assumptions and the resultant upper design elevation are still valid.

3.2.3.2 Long-Term Groundwater Quality Modeling

Long-term groundwater quality modeling addresses groundwater flow and contaminant transport for conditions following the consolidation of sediment placed in the CDF. Similar

to the short-term model, the long-term model is a 2-D cross-sectional model aligned along the groundwater flow path through the center of the CDF structure. The model alignment is coincident with the critical groundwater flow path, and represents the maximum groundwater COPC concentrations expected within the berm and at the point of entry to the Willamette River. Figure 5 (bottom) illustrates conceptual groundwater conditions represented in the long-term model.

Inputs for the long-term model were initially established in the 60 Percent DAR for the full Removal Action (Anchor 2006a) based on site-specific analyses from T4, other sites in Portland Harbor and Region 10, and appropriately conservative literature values. Several aspects of the long-term modeling analysis were further refined during the IDR process, including the following:

- Use of steady-state long-term modeling approach (NewFields 2007c)
- Permeability of dredge fill material (Anchor 2007b)
- Metal partitioning coefficients in berm material (NewFields and Anchor 2007)

In addition, new leaching test data from representative iAOPCs in Portland Harbor will help to resolve many of the outstanding issues regarding the source strength of the porewater in the CDF. The next steps in identifying specific inputs to the long-term model are described in Section 3.3, below.

3.3 Next Steps

Two modeling-related deliverables will be developed:

CDF Groundwater Model Input Parameter Memorandum. This technical memorandum will be submitted to USEPA according to the schedule provided as Addendum 1, and will summarize all of the proposed input parameters that were previously agreed upon with USEPA, as well as proposed values for those input parameters that were not agreed upon during the IDR process. Development of proposed input values will be performed in consideration of prior USEPA comments, as well as new leaching test data from the Portland Harbor and T4. Table 2 summarizes the modeling input data requirements for both the short-term and long-term modeling efforts.

Development of this memorandum is contingent on resolution of input parameters related to the chemical fate and transport modeling (QEA-FATE) effort between the LWG and USEPA, to ensure consistency between the T4 Phase II Removal Action and related evaluations for the Portland Harbor RI/FS.

CDF Groundwater Modeling Results Memorandum. This technical memorandum will summarize the short- and long-term modeling results. Development of this memorandum is contingent on USEPA approval of the CDF Groundwater Model Input Parameter Memorandum. Interpretation of groundwater modeling results is contingent on selection of appropriate compliance criteria, their basis for implementation (i.e., spatial and temporal scales of exposure), and points of compliance.

Table 2
CDF Groundwater Modeling Input Data Requirements Summary

Input Parameter		Short-Term Modeling: Transient CDF Boundary Condition	Short-Term Modeling: Weir Discharge Analysis	Short-Term Modeling: Groundwater Quality Modeling	Long-Term Modeling: Groundwater Quality Modeling	References
Material Properties						
K, porosity, f_{oc}, bulk density	Cap	NA	NA	NA	☒	Anchor (2007a, 2007c) NewFields (2007d)
	Sediment Fill	NA	NA	NA	☒	Anchor (2007b)
	Aquifer	☒	☒	☒	☒	Anchor (2006a) NewFields (2007d)
	Berm Select Fill	☒	☒	☒	☒	Anchor (2007a, 2007c) NewFields (2007d)
	Quarry Spall	☒	☒	☒	☒	Anchor (2006a) NewFields (2007d)
Boundary Conditions						
Hydraulic Head or Flow	Recharge	NA	NA	NA	☒	Anchor (2006a)
	Upland Head	☒	☒	☒	☒	Anchor (2006a) NewFields (2007d)
	Willamette River	☒	☒	☒	☒	Anchor (2006a) NewFields (2007a, 2007b, 2007d)
	CDF Ponded Water	☒	☒	NA	NA	NewFields (2007a, 2007b)
Contaminant Transport Parameters						
COPCs		NA	NA	☒	☐	Anchor (2006a) NewFields (2007d) LWG (in prep)
Source Concentration	Constant: MET+0.5%TSS	NA	NA	☒	NA	NewFields (2007d)
	Initial: SBLT Leachate	NA	NA	NA	☐	Anchor (2006a) LWG (in prep)

Input Parameter		Short-Term Modeling			Long-Term Modeling	References
		Transient CDF Boundary Condition	Weir Discharge Analysis	Groundwater Quality Modeling	Groundwater Quality Modeling	
Chemical Properties	K_{oc}	NA	NA	☒	☐	Anchor (2006a) LWG (in prep)
	K_d	NA	NA	☒	☐	Anchor (2006a) NewFields and Anchor (2007)
	Degradation	NA	NA	NA	☐	LWG (in prep)
Dispersivity		NA	NA	NA	☒	NewFields (2007c)

☒ Input data assumptions and/or data analysis approach resolved during 60 Percent DAR for the full Removal Action (Anchor 2006a) or IDR process.

☐ Proposed data values to be presented in CDF Groundwater Model Input Parameter Memorandum.

NA Not applicable.

4 WEIR DISCHARGE EVALUATION

A Draft Weir Discharge Evaluation Work Plan (MFA 2007a) was prepared before re-alignment of the project into two phases. It was expected that this document would be reviewed and updated consistent with current data for Willamette River ambient water quality, estimates for potential weir overflow rates, and USEPA comments (July 13, 2007). It also anticipated that a mixing zone study and reasonable potential analysis would be performed as part of the weir discharge evaluation, and that both the mixing zone study and reasonable potential analysis would be provided to USEPA. In addition, it was anticipated that the information provided and developed during the weir discharge evaluation would be utilized to establish weir discharge compliance criteria for the T4 filling event.

During review of the design status, the Port determined that completion of the Weir Discharge Evaluation is not needed based on the technical analysis to date. A cost-benefit analysis supported the determination that completion of the Weir Discharge Evaluation based on an unlikely future discharge scenario was not a worthwhile expenditure of financial and technical resources. Rather, it would be more cost-effective to commit to no discharge over the weir, and manage the ponded water by controlling the dredge activities as necessary. USEPA concurred with this recommendation on April 24, 2009.

As stated in Section 3.2.2.2, NewFields (2007b) described the methodology to estimate the potential rate and duration of weir overflow during filling of the CDF. The weir overflow analysis is based on an improbable combination of conservative assumptions (i.e., worst-case scenario), including high dredge inflow rates, inefficient dredge production rates (i.e., higher than expected water content in the dredge slurry), long work days (i.e. 20 hours), low hydraulic conductivity in the berm material, and no management intervention of construction activities. Under this unlikely combination of conditions, the water balance model indicated the pond might overtop the weir on Day 9 of an 11-day dredging project, and discharge to the river for about one and a half days. Using more reasonable and likely assumptions, overflow would not be predicted to occur at all. Further, the remaining dredge volume in Slip 3, and thus the duration of hydraulic dredging, should be reduced with the removal of the Phase I portion of the dredge prism. All things considered, it is reasonable to expect the hydraulic dredge slurry can be managed behind the berm with no discharge over

the weir, by appropriately controlling dredge filling rates and construction work schedules, if necessary.

While this analysis applies to hydraulic filling of the CDF with remaining sediment from T4, additional analysis of future filling events could be required as part of the CDF material acceptance evaluation if hydraulic dredging is the proposed method of placement in the CDF.

4.1 Determine Conditions for No Overflow

To support the project design and determine any needed construction modifications that will prevent any potential overflow of the weir, an analysis to determine conditions for no overflow will be performed. The analysis will follow the USEPA-approved methodology presented in NewFields (2007b) (see also Section 3.2.2.2). This analysis will provide input into design and construction parameters (i.e., inflow rates, production rates, work schedules, and other construction management approaches) that will result in no overflow of the weir, along with an adequate margin of safety to mitigate any unforeseen circumstances. A weir will be included in the design, however, as a contingency for emergency situations.

5 DATA GAPS

Potential data gaps related to the Phase II Removal Action design and groundwater modeling activities are summarized below.

5.1 Phase II Removal Action Design Data Gaps

The following potential data gaps are identified for the Phase II Removal Action design:

- **Portland Harbor FS RAOs and PRGs**. The FS-based PRGs will be used to refine the limits and methods of dredging, capping, and MNR. This input to the design will be developed as part of the harbor-wide process. The schedule for the Phase II 100 Percent Design is provided in Addendum 1.
- **Additional Sediment Quality Characterization of Phase II Removal Action Areas**. Additional sediment quality characterization data may be needed in advance of Phase II final design to refine the limits and depths of the Phase II Removal Action areas. The need for additional sediment characterization data will be evaluated in light of new information made available during the design process, including the planned bathymetric and topographic surveys of T4 and developments in Portland Harbor PRGs. If additional sediment quality work is proposed, the data would need to be collected, analyzed, and validated to allow sufficient time to be incorporated into the Phase II Design for dredging, capping, and MNR areas.

5.2 Groundwater Modeling Data Gaps

The following data gaps are identified for the groundwater modeling effort:

- **Portland Harbor FS-based RAOs and PRGs**. The FS-based PRGs will be used to interpret the results of the long-term groundwater model for the CDF. This input to the design will be developed as part of the harbor-wide process. The schedule for the Phase II 100 Percent Design is provided in Addendum 1.
- **Final List of Portland Harbor COPCs**. The list of COPCs for the long-term groundwater model will be consistent with the list of COPCs being evaluated in fate and transport models for Portland Harbor.
- **Biodegradation Rates**. Final biodegradation rates were not resolved at the conclusion of the IDR process. Biodegradation rates will be updated in consideration of additional references provided by USEPA, and in consideration of the values being

used in fate and transport models in Portland Harbor. Updated biodegradation rates will be provided in the CDF Groundwater Model Input Parameter Memorandum.

- **Training Dike Geometries**. Training dikes are comprised of extremely permeable riprap or quarry spalls and, therefore, control to a large degree preferential contaminant transport pathways and travel times through the berm. Both short-term and long-term groundwater model simulations will be very sensitive to the size and geometry of training dikes specified in the final design.

Another unknown input to the groundwater model is the exact configuration of contaminated fill layers in the CDF. The construction sequencing of fill events may not be known for several years. However, with the new Portland Harbor SBLT data, a range of leachate characteristics for a representative cross-section of remediation sites in Portland Harbor will be available for use in the model. Once the model is set up with generalized fill characteristics from Portland Harbor, it can be adapted if necessary to evaluate differential fill scenarios, for example, placement of the more contaminated material in the front versus the back of the CDF, or in the bottom versus the top of the CDF.

6 HABITAT MITIGATION APPROACH

As part of the Removal Action, habitat mitigation is required under the Clean Water Act (CWA) Section 404(b)(1) to offset permanent habitat impacts related to the discharge of fill material into aquatic areas, as well as under the Endangered Species Act (ESA) to offset permanent negative impacts to critical habitat. (Note that the Port will coordinate with the harbor-wide FS process to include the CDF as part of the harbor-wide CWA 404(b)(1) memoranda. Initial coordination is ongoing, and more specific coordination is expected to occur in the first and second quarters of 2010 through the development of the FS.) The Port's overall approach for compensatory mitigation is to adequately replace the habitat functions that will be lost in a manner that is consistent with statutory requirements. To the extent practicable, the mitigation will also be consistent with regional mitigation and restoration strategies for the Lower Willamette River. Consistent with discussions with the National Marine Fisheries Service (NMFS) and USEPA personnel (see Agency Habitat Meeting Minutes [June 12, 2006] in Appendix D of the Conceptual Mitigation Plan Proposal [CMPP; Anchor 2006b]), mitigation options will be identified based on qualitative characterization of habitat functions associated with candidate projects, rather than strict quantification and replacement of existing habitat characteristics in Slip 1 and replacement ratios. Currently, there is no standardized method for quantifying aquatic habitat for mitigation purposes, such as that available for wetland mitigation. Given this approach, the emphasis is to look for opportunities that create and/or restore shallow water off-channel habitat, since that is a well-established critical habitat that is limiting in the Willamette River system and is the focus of regional restoration planning documents. Habitat for other important fish species, such as sturgeon, pan fish, and other resident species, will be considered, but not necessarily targeted, as those species prefer deeper aquatic habitats that are plentiful in the Willamette River. The mitigation approach also includes following criteria provided in USEPA's Action Memo (USEPA 2006) and working cooperatively with stakeholders, including personnel from state and federal resource agencies, tribes, and local river stewards, to ensure an adequate mitigation project is selected that will replace lost habitat functions.

A summary of habitat mitigation requirements for Phase I of the Removal Action, along with the Port's approach for addressing habitat mitigation requirements as a part of Phase II, are provided below.

6.1 Phase I Removal Action Requirements

Through the Phase I ESA formal consultation process, NMFS determined that placement of armor rock, as part of the Wheeler Bay shoreline stabilization activities, over approximately 13,300 square feet (0.31-acre) of shoreline between elevation +10 and +30 NGVD would result in an adverse affect on the existing habitat and would, therefore, require compensatory mitigation. A portion of the 13,300-square foot (0.31-acre) area did not contain armor rock prior to implementation of Phase I; this amount was 7,000 square feet (0.16-acre). The Biological Opinion (BiOp; NMFS 2008) contains the following description of the Port's mitigation requirement for Phase I:

"*The Port will plan, carry out, and manage compensatory mitigation activities using performance standards and criteria described in 40 CFR Part 230 to compensate for the degradation or loss of 0.33 acres of shallow water habitat and other aquatic resources that will be adversely affected by the proposed removal action. Among other things the compensatory mitigation plan will be based on: 1)measureable, enforceable ecological performance standards, including a mitigation ratio of 1.5: 1.0 to offset resource losses due to the time lag between permitted impacts and completion of the compensatory mitigation actions; 2)regular monitoring to ensure completion; 3)assurances of long-term protection of compensation sites; 4)financial assurances; and 5)identification of the parties responsible for specific project tasks. The Port will submit the Plan to NMFS for approval or disapproval within 2 years of the start of operations, and complete all actions necessary to mitigate the adverse effects of operations within 5 years of Plan approval. As described in 40 CFR 232.3(f)(2), NMFS will consider any time lag between commencement of sediment removal and the start of compensatory mitigation activities that exceeds 2 years to be an additional temporal loss of aquatic resource function when determining whether to approve or disapprove the proposed mitigation ratio.*

The Port will also place sand and gravel over the riprap surface of the Wheeler Bay bank stabilization and cap to create a more natural habitat. The Port recognizes that the long-term viability of sand placement over a riprap surface depends on site-specific conditions such as wave action, the shape of the shoreline, nearby river activities, and river dynamics. The Port will place the sand at this location because the Wheeler Bay conditions may be conducive to sand staying in place. The Port will monitor the area as a pilot project to determine whether the site-specific conditions are conducive to maintaining a sand habitat layer over the riprap. If monitoring demonstrates that a sandy surface can be maintained long-term, this may be considered by NMFS and EPA when determining the appropriate mitigation project for the Wheeler Bay bank stabilization and cap."

As stated in the BiOp (NMFS 2008), the Port is required to submit a Mitigation Plan to NMFS and USEPA by August 5, 2010, which is 2 years from the start of Phase I construction. Prior to development of a Mitigation Plan, the Port plans to monitor the sand and gravel placed over the armor rock as part of the Interim Monitoring and Reporting Plan (IMRP; Anchor 2008, Appendix C) to determine if the conditions within Wheeler Bay are conducive to the sand and gravel staying in place. Monitoring will occur annually in October. After monitoring results are available in 2010, the Port will coordinate with NMFS and USEPA to determine if an appropriate level of mitigation to offset the Phase I impacts to habitat can be determined, or if additional sand and gravel monitoring results will be necessary to make that decision.

6.2 Phase II Removal Action Approach

The Port's approach to mitigation for Phase II is expected to be consistent with the approach described above that was used for the full Removal Action project prior to the project realignment. Through the EE/CA (BBL 2005) and design of the full Removal Action project (Anchor 2006a), USEPA determined that the sediment discharges associated with the construction of the CDF and cap areas were necessary to mitigate long-term effects of sediment contaminants, and that compensatory mitigation was necessary to replace the habitat function lost as a result of the filling of Slip 1. Capping and dredging activities will temporarily impact the existing benthic invertebrate communities. However, based on studies completed in the Columbia River estuary, the capping and dredging areas will quickly

(within months after the Removal Action) re-colonize with benthic invertebrates (Morton 1977 and McCabe et al. 1996; both as cited in NMFS 2005). Additionally, the long-term result of providing a clean sediment surface offsets the temporary impacts to the sediment. Although the need for mitigation will be determined through the Phase II design process in consultation with NMFS and others, the Port expects that the mitigation requirements will be related to long-term impacts associated with the construction of the CDF rather than short-term habitat impacts from dredging and capping activities.

As part of the full Removal Action 30 and 60 Percent Design phases, the Port completed and submitted a CMPP (Anchor 2006b) as well as a Draft Mitigation Plan (Anchor 2006c) to USEPA and its federal, state, and tribal partners. The CMPP represented the initial step in identification and documentation of compensatory mitigation activities proposed by the Port, and the Draft Mitigation Plan presented the proposed mitigation package, including on-site actions and the off-site project selected from the options presented in the CMPP. Additional details related to the mitigation activities the Port has completed to date related to Phase II are provided below.

6.2.1 Summary of Mitigation Activities through 60 Percent Design of Full Removal Action

The Port conducted mitigation activities through the 60 Percent Design phase of the full Removal Action project following the approach described previously, as well as the steps for identifying appropriate mitigation project(s) that was described in Appendix Q (Section Q-7.2.1) of the EE/CA (BBL 2005). The steps the Port followed and the results are described below:

1. **Conduct a habitat assessment of the RAA.** This was done to refine the characterization of affected habitat provided in Appendix Q of the EE/CA (BBL 2005) based on the design of the Removal Action by describing the biological and physical characteristics of the habitat in the RAA. The results of the habitat assessment identified that 13.98 acres of aquatic habitat would be lost in Slip 1 from construction of the CDF. Of the 13.98 total acres of aquatic habitat, only 1.09 acres, or approximately 8 percent of the total aquatic habitat, would be in the less than 6-foot depth range, which is the most important depth stratum for juvenile salmonids.

Within this 1.09 acres, over 85 percent is steep sloped, armored with large riprap, and/or covered with overwater structures. Additionally, a total of 2.19 acres would be within the 6- to 20-foot depth stratum, which represents about 16 percent of the total aquatic habitat impacted in Slip 1. Within this 2.19-acre area, there is a similar trend whereby approximately 85 percent of the area is either steep sloped, armored with large riprap, and/or covered with overwater structures. A total of approximately 10.7 acres, or about 75 percent of the total aquatic habitat that could be impacted at T4 from construction of the CDF is in the greater than 20-foot depth range, which is plentiful habitat in the Lower Willamette River.

2. **Identify options for proposed mitigation project(s) and determine feasibility of each option.** After meeting with USEPA and its federal, state, and tribal partners, three projects were identified as potential compensatory mitigation projects, including Swan Island; Ramsey Lake Refugia, Phase II (financial contribution); and Miller Creek (mitigation bank). In addition to the off-site options, on-site mitigation actions were also selected for inclusion in the proposed mitigation package. On-site actions included creating a habitat bench along the outer edge of the CDF berm face that would create shallow water habitat; removing approximately 1,800 treated wood piles covering 3 acres within Wheeler Bay and Slip 3; creating a small amount of shallow water habitat through capping; placing a sand and gravel layer over the armor layer of the cap in Wheeler Bay; and vegetating the slope in Wheeler Bay and placing large woody debris.
3. **Prepare a CMPP, which describes the identified off-site mitigation options listed above and evaluates the feasibility of each option.** The Port prepared and submitted a CMPP (Anchor 2006b) as part of the 30 Percent Design documents for the full Removal Action project.
4. **Identify the off-site mitigation project**. A project was selected based on a comparison of options that considered both habitat and programmatic details. As part of this step, the Port met with USEPA and its federal, state, and tribal partners. During the meeting, the Port presented conceptual details of the potential mitigation projects, including drawings and limited engineering characterization needed to support approval of a preferred project. Based on the results of the project comparison exercise, the stakeholder group discussed the scores and selected the Ramsey Refugia, Phase II project. This project will re-establish hydrologic connectivity to the Lower

Columbia Slough over 5-acres to reclaim and improve floodplain wetland functions (forested wetland and soft bottom, mud backwater sloughs) and to increase the amount and quality of off-channel rearing and refuge habitat. For this project, the Port would make a financial contribution to the City of Portland (City) to fund 2.5 acres of the 5-acre project.

The Ramsey Refugia, Phase II project was selected based on the habitat and scale of the project relative to the habitat that would be lost from Slip 1, the implementability of the project, the demonstrated success of the Ramsey, Phase I project in attracting a variety of fish species, including juvenile salmonids, and the desired characteristics previously communicated by resource agency personnel, particularly NMFS and the U.S. Fish and Wildlife Service (USFWS). In addition, the group of stakeholders asked the Port to further evaluate the feasibility of a second project, Miller Creek, since some members of the group favored Miller Creek over the Ramsey Refugia, Phase II project. In response, the Port initiated discussions with the landowner, but the landowner was unwilling to use the land as a mitigation site.

5. **Prepare a Draft Mitigation Plan.** This document (Anchor 2006c) was prepared after the mitigation project had been identified and was submitted to USEPA as part of the 60 Percent Design documents for the full Removal Action project (Anchor 2006a). The plan identified the on-site and off-site proposed mitigation actions, the potential benefits to salmon and other aquatic species, project logistics, and timing. As the selected project involves the Port providing a certain amount of funding for the implementation of the project, no specific design details were provided in the Draft Mitigation Plan. As part of the submittal, the Port provided semi-quantitative documentation of how the proposed on-site and off-site mitigation options offset losses of habitat in Slip 1, as requested by USEPA.
6. **Prepare a Final Mitigation Plan (100 Percent Design) once the Draft Mitigation Plan has been approved.** It is anticipated that the Final Mitigation Plan will be submitted along with the 100 Percent Design documents for Phase II of the Removal Action. The nature of this 100 Percent mitigation design submittal may vary depending on whether the mitigation action is a stand-alone Port project, or if the Port is contributing to another project in the region, like the Ramsey Refugia, Phase II project.

The CMPP document (Anchor 2006b) addressed steps 1 through 3 and the Draft Mitigation Plan (Anchor 2006c) addressed steps 4 and 5 in the process outlined above. The Port and USEPA and its federal, state, and tribal partners convened for a meeting in December 2006 to discuss the Draft Mitigation Plan. Comments discussed during this meeting resulted in the removal of the on-site mitigation activities, except for the vegetation planting and placement of large woody debris in Wheeler Bay. In addition, the Port received comments on the Draft Mitigation Plan in January 2007 as part of USEPA's 60 Percent Design comments for the full Removal Action. The comments received in meetings and on the Draft Mitigation Plan are summarized below:

- Final agreement between the Port, USEPA, and a third party needs to be reached before USEPA can approve the Mitigation Plan. Additionally, the agreement details need to allow USEPA to comment on the design to ensure that ARARs are being met.
- Consider the timing of the habitat loss versus the timing of implementation of the mitigation project.
- Include complete plans and specifications for construction in the Final Mitigation Plan.
- Address the temporal loss of habitat in dredging and capping areas.
- Consider species other than salmon.
- Address the replacement of the berth structure.
- Eliminate piling removal and habitat bench along CDF berm from the mitigation package.
- Refine performance criteria related to the acreage created as part of the project, topography, and fish presence.
- Update monitoring timeframes beyond 5 years.

6.2.2 Next Steps

The Port acknowledges that determination of final mitigation requirements for the Phase II Removal Action, and construction of the CDF, are uncertain at this time and will be established in cooperation with USEPA, consultation with NMFS, and coordination with other stakeholders. The determination of the final mitigation requirements for Phase II will consider the information provided in the Draft Mitigation Plan developed during the full

Removal Action 60 Percent Design phase, in which the Port prepared a quantitative analysis of a 5-acre area that creates and/or restores shallow water off-channel habitat as mitigation to offset impacts related to the full Removal Action, including construction of the CDF in Slip 1. The Port received initial feedback from NMFS on this document and was in the process of addressing those comments when the informal dispute resolution process began.

In addition, it is important to the Port to have agreement on the habitat mitigation requirements related to CWA 404(b)(1) and ESA compliance well in advance of the Phase II construction start date to avoid last-minute requirements, delays, and expenses.

7 SEDIMENT RECONTAMINATION APPROACH

The source control process is currently being implemented with the goal to prevent recontamination of the sediment remedy. The *Draft Sediment Recontamination Analysis Approach* (Recontamination Analysis Approach; NewFields 2009) was submitted as part of the Removal Action project to describe the approach for assessing the recontamination potential at T4. The document was submitted on September 4, 2009, and USEPA provided comments that the Port is still responding to. The Recontamination Analysis Approach will be used as a basis for the Draft Recontamination Analysis, currently scheduled for submittal as part of the Phase II 60 Percent Design deliverable for T4.

The recontamination analysis has assumed that there will be a CDF in Slip 1; this analysis would require modification if USEPA changes or replaces the CDF alternative with a different alternative in the ROD. The analysis will be consistent with harbor-wide FS modeling and data efforts. The recontamination analysis component of the Phase II 60 Percent Design will be specifically addressed and included in the overall schedule and coordinated appropriately with other Phase II work. The recontamination analysis will be prepared according to the schedule provided in Addendum 1.

8 POTENTIAL ARAR CHANGES

USEPA requested a summary of potential changes to ARARs from the harbor-wide process, if any. The LWG provided USEPA with a table of potential ARARs on March 19, 2009, and a table of proposed Points of Compliance on March 26, 2009. The LWG and USEPA (including its partners) met on April 13, 2009 to discuss the water quality ARARs. USEPA and LWG were focused on resolving the RAOs, from which the chemical-specific ARARs follow. On January 6, 2010, USEPA provided the LWG preliminary identification of ARARs for development of the harbor-wide FS. The LWG and USEPA have been undergoing a series of technical discussions regarding application of the ARARs for FS evaluation purposes. Therefore, discussions regarding ARARs that will be presented in the harbor-wide RI/FS are ongoing and no resolution or change has been made.

9 COST CHANGES

Costs were presented in an Engineering Cost Estimate document that was based on the 60 Percent Design for the full Removal Action in December 2006. This document was submitted by the Port to USEPA at the same time as the 60 Percent Design Submittal for the full Removal Action, but under separate cover as Confidential Business Information. The Port provided USEPA with an updated cost estimate in August 2007 (letter dated August 22, 2007 from Cheryl Koshuta, Port of Portland, to Deborah Yamamoto, USEPA), which showed that the cost estimate had increased by approximately 60 percent since the time of the EE/CA (BBL 2005) and Action Memo (USEPA 2006). This estimate did not include design changes discussed during the IDR process; however, a range of potential additional costs were presented that could result from resolution of the 60 Percent Design issues for the full Removal Action. Costs are not expected to be updated again until further into the Phase II Design when particular variables can be reduced or resolved. Without doing further design evaluations, there is no rationale for changing the basis on which the prior cost estimates were generated, except for changes in unit prices. It is anticipated that unit prices will continue to fluctuate between now and the Phase II 100 Percent Design; therefore, it is prudent to wait until closer to that milestone before updating costs.

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FIGURES

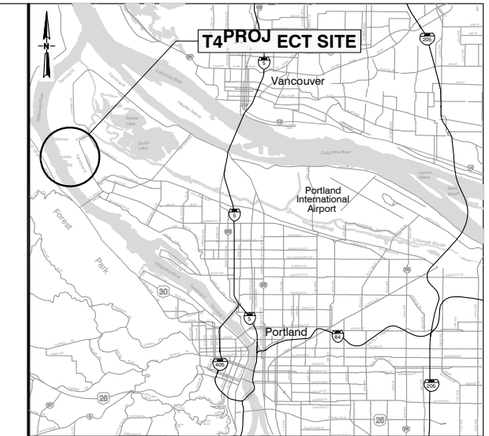

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Figure 1
Site Plan and Vicinity Map
Terminal 4 Removal Action - Design Status Report
Portland, Oregon

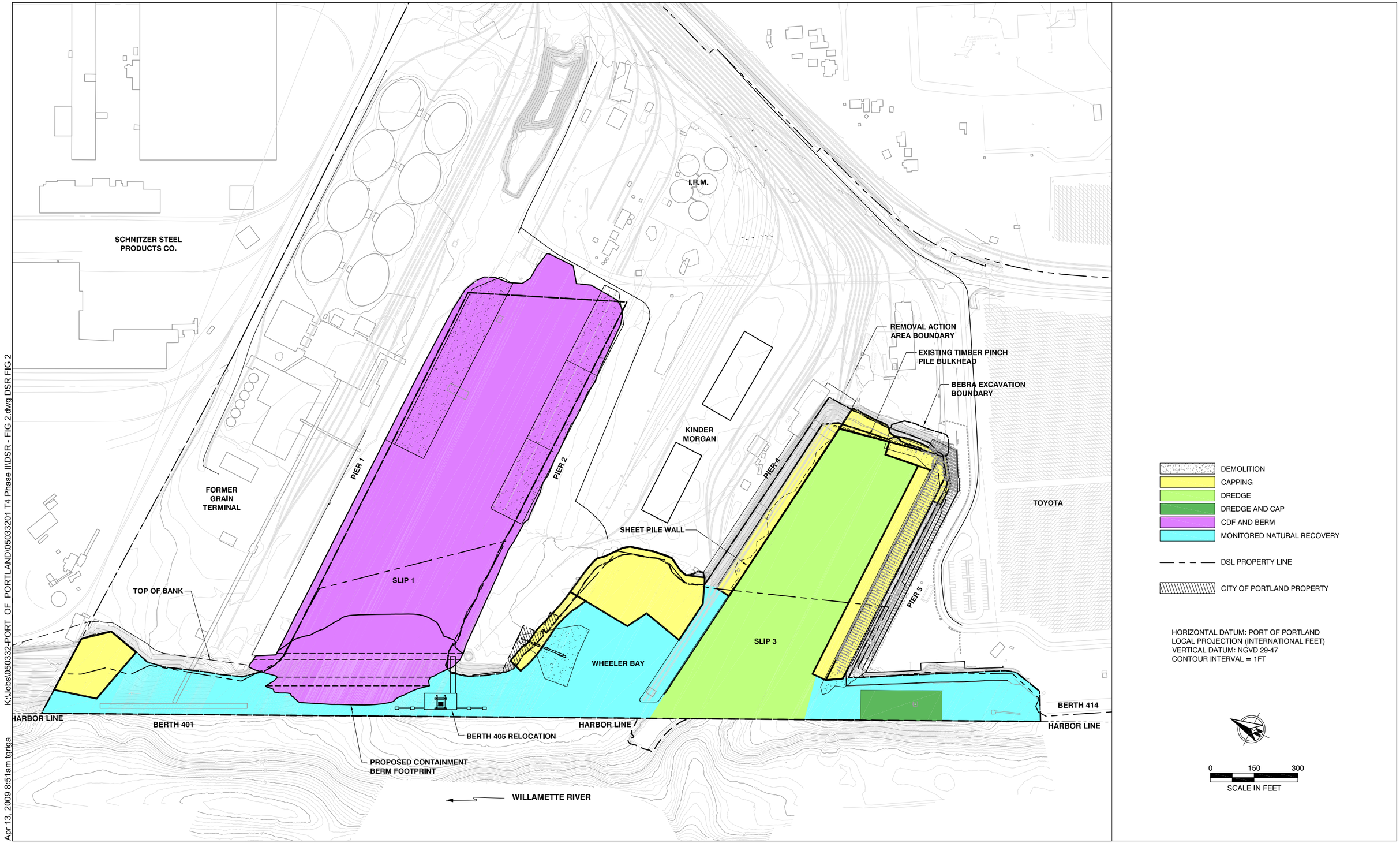

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Figure 2
Summary of Removal Action
Terminal 4 Removal Action - Design Status Report
Portland, Oregon

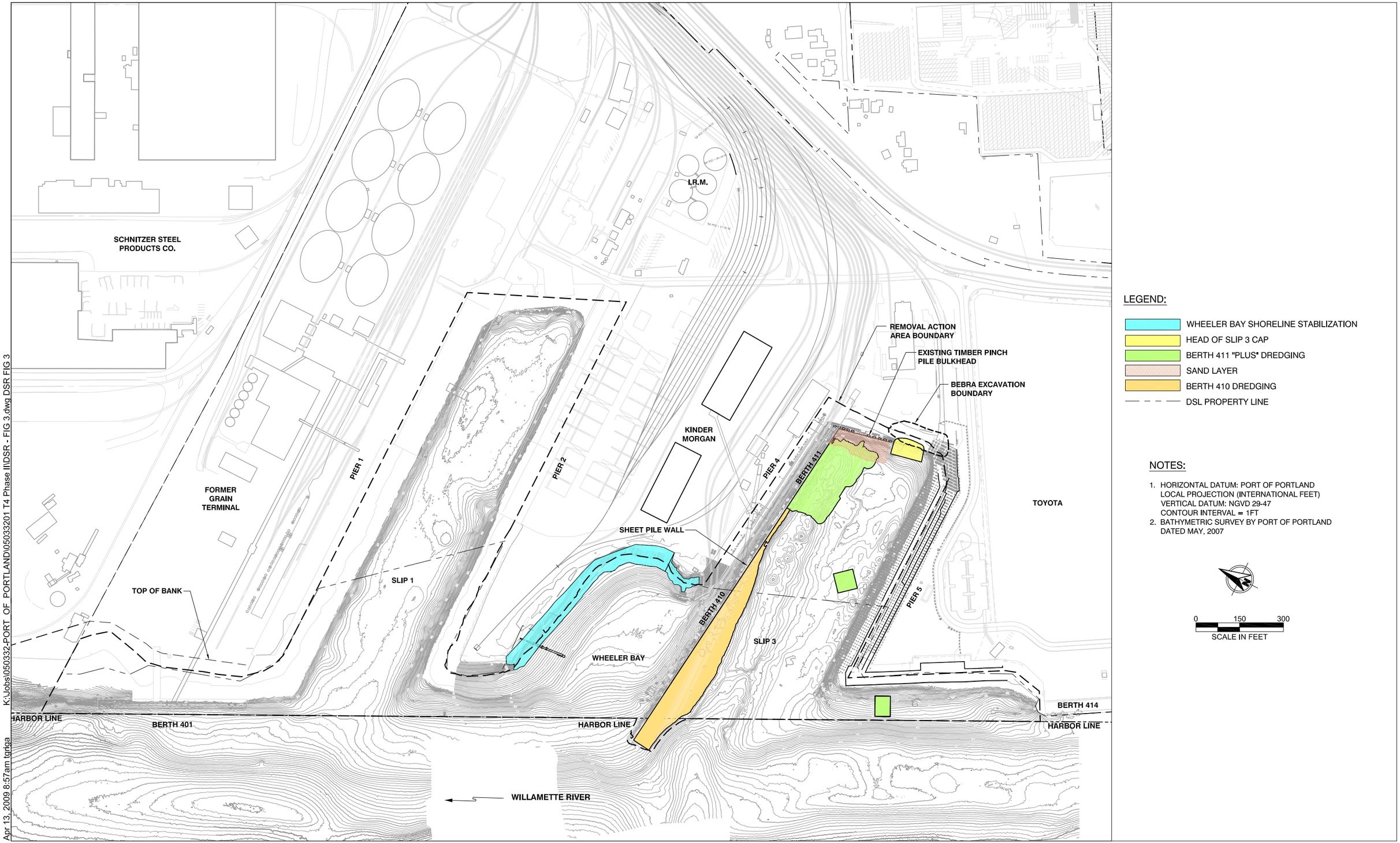

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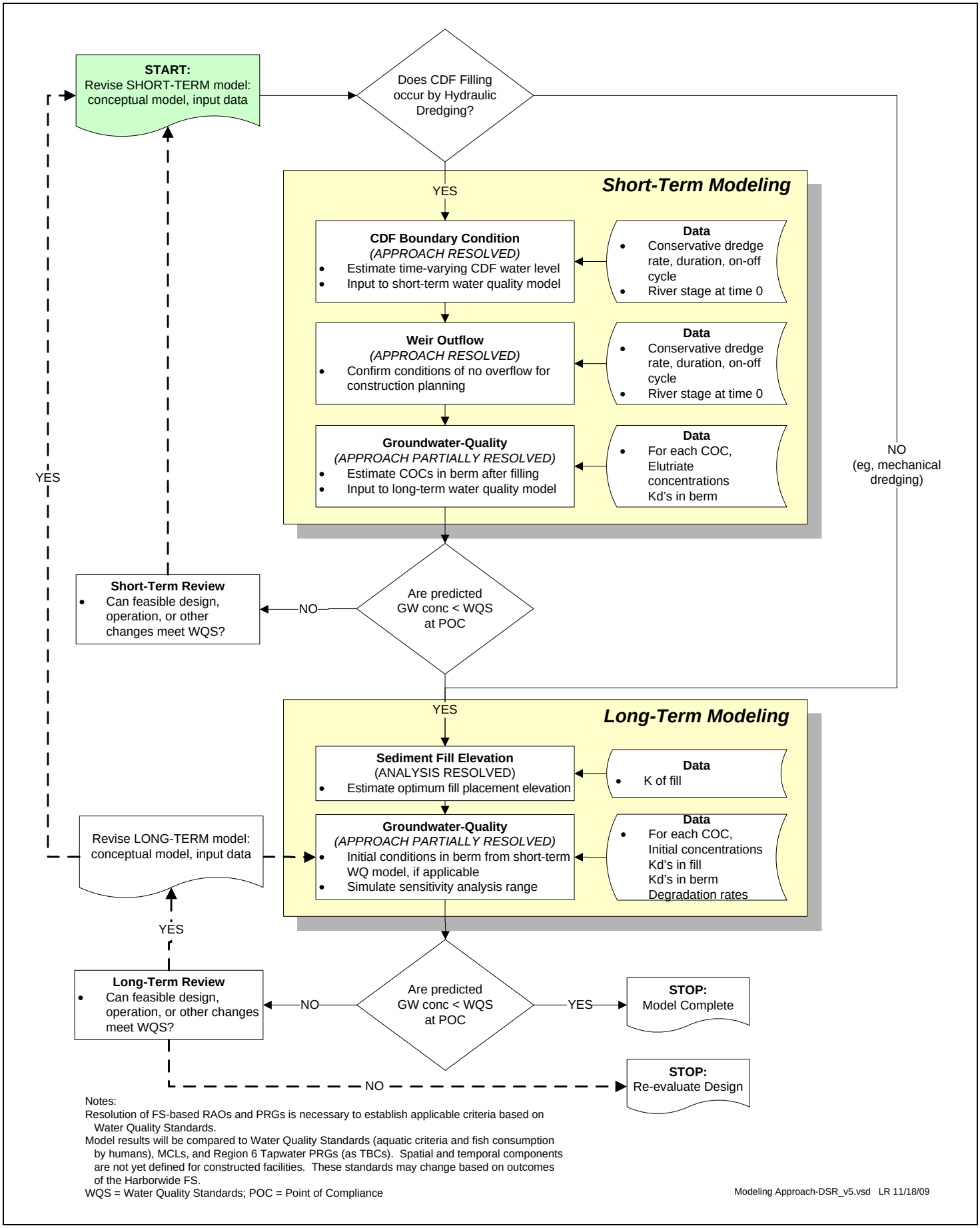
Figure 3
Summary of Phase I Removal Action
Terminal 4 Removal Action - Design Status Report
Portland, Oregon



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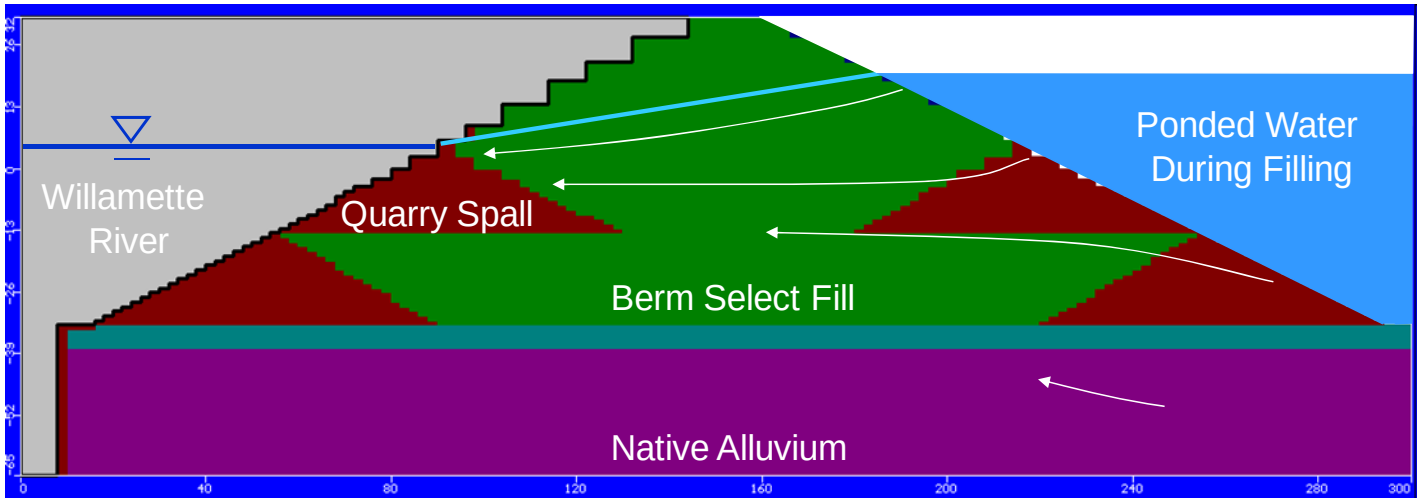
NEWFIELDS

Figure 4

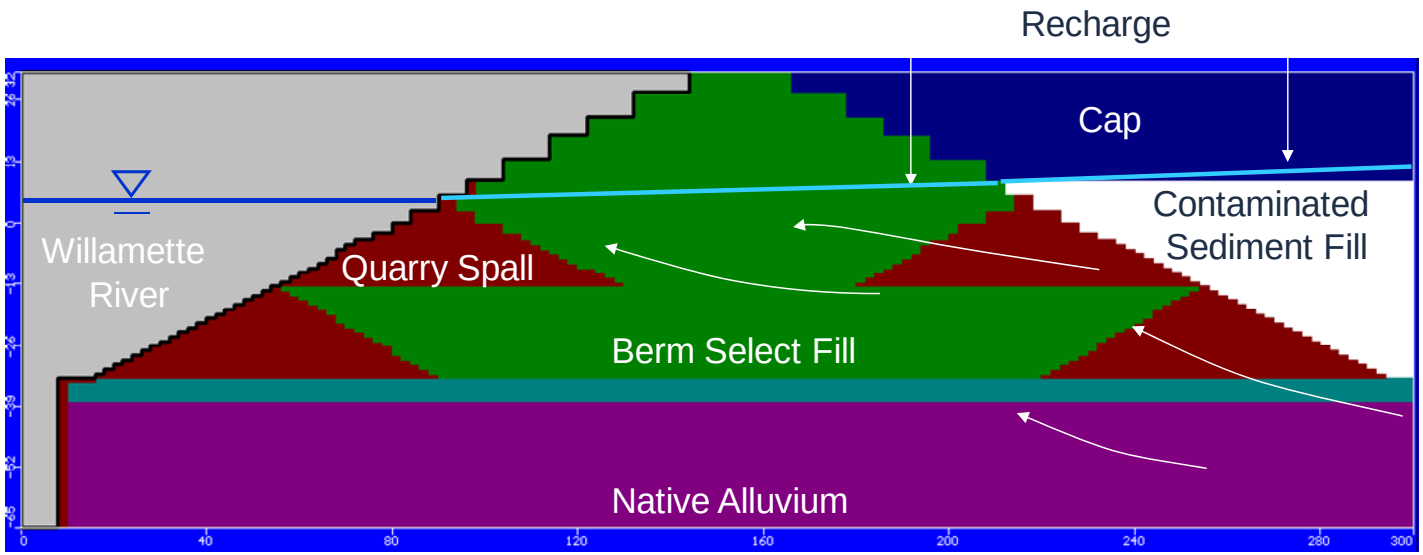
CDF Groundwater Modeling Process

Terminal 4 Removal Action Design Status Report

Short-term Model



Long-term Model



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NEWFIELDS

Figure 5

Conceptual Groundwater Conditions Represented in the Short- and Long-Term Models

Terminal 4 Removal Action Design Status Report

APPENDIX A
USEPA LETTER TO PORT AND ATTACHMENT (TABLE 1); NOVEMBER 15, 2007

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

November 15, 2007

Reply to
Attn of: ECL-115

Tom Imeson, Director
Public Affairs
Port of Portland
121 NW Everett
P.O. Box 3529
Portland, OR 97209

Re: August 22, 2007 Request for Realignment of T4 Removal Schedule; Resolution of 60% Design Disputed Comments; Administrative Order on Consent for Removal Action (AOC), Docket No. 10-2004-0009.

Dear Mr. Imeson:

EPA has reviewed the Port of Portland's (the Port) request for a delay of removal action implementation. As referenced in your August 22 request, this delay may afford more information from the Harborwide RI/FS process to ensure the Terminal 4 confined disposal facility design incorporates actual leachability data from harborwide sediments, and is designed consistently with Harborwide performance standards. EPA agrees to extend the schedule for implementation of the T4 removal action, with the following requirements:

- The Port shall continue design work, with the 100% design of the May 11, 2006 Action Memorandum completed by the third quarter of 2009 or before, or as otherwise approved by EPA in the schedule referenced below;
- The Port shall work with the LWG to gather necessary disposal option data is collected for the RI/FS.
- The Port shall ensure Slip 1 CDF data needs are obtained either through the Harborwide RI/FS and/or through this removal action;
- Acceptance of EPA's November 9, 2007 spreadsheet with resolutions of the 60% Design disputed comments;
- The Port shall implement an abatement action to reduce risks present at the T4 site during the 2008 fish window or as otherwise approved by EPA in the schedule referenced below, and with the Port's acceptance of the attached comments on the Port's October 25, 2007 proposal which were discussed with Port representatives on November 6, 2007;

- The Port shall deliver a comprehensive schedule for this deferral agreement including, but not limited to, the abatement work, and the selected removal action design and construction, for EPA review and approval within 20 days of this letter, based on the attached general schedule deadlines; and
- Upon request by EPA, the Port shall provide data necessary to evaluate the effectiveness of the abatement action taken and, if determined necessary by EPA, provide additional abatement measures pending completion of the May 2005 Action Memorandum .

EPA may revoke its agreement to the realigned schedule at any time if the above requirements are not met. In addition, if at any time EPA or the Port receives new information that may lead EPA to re-evaluate this realigned schedule or the May 2005 Action Memorandum, EPA may require a reassessment of alternatives for the Terminal 4 removal action area, including a revised EE/CA for public review.

If you have any questions on this extension, do not hesitate to contact me at (206) 553-7216, or Sean Sheldrake of my staff at (206) 553-1220.

Sincerely,

Deborah J. Yamamoto, Unit Manager
Site Cleanup Unit 2
Office of Environmental Cleanup

Enclosure

cc: Anne Summers, Port of Portland
Krista Koehl, Port of Portland
Sean Sheldrake, EPA
Lori Cora, EPA

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Comment No.	Page No.	Document	Section No.	Directed Comment	Comment Category	Comment	Port's Specific Concern with Comment (1)	Description of Solution
24		DAR		Yes	1	Design the CDF to achieve confinement of all hazardous substances disposed of in the facility through the groundwater pathway so that the CDF does not contribute any discharge and/or release of contaminants above applicable and relevant and appropriate requirements under federal or state law for surface water in the lower Willamette River. To meet this design criteria, the CDF shall be designed such that the quality of groundwater exiting the CDF will meet USEPA's national recommended chronic water quality criteria for both aquatic organisms and fish consumption by humans (17.5 g/day), Oregon water quality criteria, Region 9 PRGs, and relevant, promulgated drinking water criteria (otherwise known as Maximum Contaminant Levels). The LTMRP shall include monitoring for this design standard. If the existing design cannot meet performance standards in pore water of the exterior of the berm, the Port shall evaluate design changes that would meet the performance standards for the CDF at the compliance point. The Port shall report conceptual design and cost information of at least two approaches that would meet the performance standards that have been approved by EPA for complete analysis. Design changes could include reactive barrier technologies. Examples of barrier technologies could include an organoclay mat on the inside of the berm, an appetite layer, or some combination of these or other treatment material.	1. "Groundwater exiting the CDF" 2. Use of Region 9 PRGs as standards for design and monitoring 3. Comment refers to the OMMP/LTMRP 4. Preserving spatial/temporal averaging/scale that is associated with application of water quality standards pending outcome through harborwide RI/FS; also note potential issue with detection levels.	1. **Definition:** The Port and EPA understand that "groundwater exiting the CDF" is intended to mean "one foot into the berm as measured from the berm face," consistent with the other EPA statements throughout the comments, for example: a) "porewater of the exterior of the berm" (directed comment #24) b) "porewater" (directed comment #133) c) "in the face of the berm" (directed comment #138) d) "berm porewater (1 foot into berm face)" (EPA Table 1) e) "water/sediment interface (twelve inches inside berm)" (EPA Position Paper for T4). The fundamental intent is that the CDF design analyses and monitoring methods consider the quality of groundwater within the berm before dilution with surface water from the river. Detection limit and long-term monitoring and compliance issues remain to be resolved. 2. **Criteria--PRGs:** Region 6 Tapwater PRGs replace Region 9 Tapwater PRGs. These PRGs are not ARARs; they may be used for a limited list of chemicals as a "To Be Considered" after the following factors have been evaluated: • Is there a promulgated MCL for a compound? if not, use the PRG as a TBC; • Are other applicable water quality standards for a compound lower than the PRGs? If not, use the PRG as a TBC; and • If a site specific risk-based standard for ingestion is developed as part of the RI/FS and selected in the Record of Decision, the ROD standard would be applied. 3. **OMMP/LTMRP:** The long-term operation, maintenance and monitoring plan (OMMP) for the CDF is not due to be submitted until after the design is complete. EPA and the Port agree that the Port has the right to dispute comments and directions that EPA may make or give regarding the OMMP/LTMRP. 4. **RI/FS & Application of Water Quality Standards:** EPA and the Port agree that the Port reserves the right to engage in further discussions related to incorporating appropriate temporal/spatial averaging/scales in applying certain water quality standards as part of the harbor-wide RI/FS process, and that the outcome of these discussions will then be applied to T4, as appropriate. The Port and EPA also agree that currently available laboratory quantification limits and their ability to achieve all standards (especially human health criteria) is an issue that needs to be resolved as part of the 100% Design, OMMP/LTMRP and QAPP. 5. The Port accepts the performance standards specified in Comment 24 (Federal and State Water Quality Standards, MCLs) for design and function of the CDF except (1) as otherwise addressed in this written resolution, and (2) if specific CDF performance standards are updated or replaced by the harbor-wide Record of Decision.

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67.	48	DAR	5.1.1	Yes	1	Language in this section makes it unclear what the performance standards for CDF performance are – the language only refers to "CDF design performance standards are..." Language shall be changed to reflect that the performance standards are for design and facility monitoring purposes as well. Include the following, "The CDF will be designed and will be required to meet performance standards outlined here throughout its life, except as updated/replaced through the Harbor wide ROD process."	1. Same issues as above for Comment 24 2. Reference to "facility monitoring throughout its life"	Same proposed solutions as for comment #24 above. Port agrees with the phrase "except as updated/replaced through the Harborwide ROD process."
87.	81	DAR	6	Yes	1	It needs to be made clear that cap pore water monitoring needs to meet chronic water quality criteria, at a minimum, pending promulgation of the Harborwide ROD requirements that may supersede these requirements for monitoring long-term cap effectiveness both in terms of sediment concentration and porewater	1. Clarification needed as to what criteria are being required for cap design and function, and relationship to OMMP.	The applicable criteria for design and function of the T4 cap is chronic water quality criteria in the porewater in sediment that supports an active benthic zone. The harbor-wide process may develop cap performance criteria which, if different, would then apply to T-4. The long-term monitoring will be addressed as part of the OMMP/LTMRP EPA and the Port agree that the Port has the right to dispute comments and directions that EPA may make or give regarding the OMMP/LTMRP.
96		DAR	7 – General	Yes	1	WQ conditions defined in this section are not consistent with conditions defined in the WQMCCP (as clarified in Table 1, attached). Review the entire section for compliance with the WQMCCP, and include specific references to sections of the WQMCCP. Please be specific regarding any deviations from the WQMCCP to identify specific issues that remain to be resolved. EPA has prepared a summary (see attached Table 1) to clarify the monitoring to be performed for the CDF (berm and weir). EPA will update the WQMCCP to reflect the requirements in Table 1 (attached). Reference elsewhere in these comments to the WQMCCP shall be understood to include Table 1 requirements.	1. Weir discharge point of compliance at the end of pipe 2. COCs for weir discharge and ponded water seepage through the berm--all applicable T4 COCs > PEC, including pthalates, plus PCBs, DDT, and copper 3. Criteria includes Region 9 PRGs for dormant period and long-term monitoring and long-term monitoring points of compliance 4. Clarification as to how the dormant period monitoring specifics will be addressed	**1. Weir Discharge Point of Compliance**: EPA requested additional information from the Port related to the water quality of potential weir discharge. To this end, the Port prepared and submitted a "Weir Discharge Evaluation Work Plan" to EPA on June 8, 2007, and EPA has provided comments. This evaluation process will determine if and how a mixing zone would apply. The weir discharge evaluation will be completed as part of the 100% design of the berm, because berm design may have impacts on weir discharge assumptions. For example, treatment layers on the berm face have the potential to affect berm permeability, which in turn affects weir discharge (i.e. volumes and duration). Conversely, berm design changes that improve the quality of water discharged over the berm may be feasible. Please provide a schedule for completing work on the Weir Discharge Evaluation. **2. COCs**: The COCs will be derived from PEC exceedances at depths within the sediments that are likely to be disturbed by the EA construction activities, plus copper and additional parameters as identified and agreed to by EPA and the Port. Regarding the CDF COCs, in the April 20, 2007 IDR Meeting Summary, EPA clarified that for the long-term monitoring, footnote 3 in Table 1 is a list of potential COCs to be considered in long-term monitoring, depending upon what is ultimately disposed of in the CDF, not a fixed list of non-negotiable monitoring analytes. **3. Criteria and Points of Compliance:** EPA and the Port agree that relevant resolution of issues from Comment #24 apply to this issue.

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								4. Dormant Period Monitoring: Relevant resolution of compliance criteria issues from Comment #24 apply to the dormant period monitoring, and the monitoring details will be resolved at a later date, potentially as part of the OMMP/LTMRP or as part of an interim monitoring plan.
130.	104	DAR	7.1.2.1	Yes	1	Water quality criteria should be consistent with criteria defined in the WQMCCP as clarified by comments herein and Table 1 (attached), and the text should provide specific references (section/subsection) to the WQMCCP.	1. Same issues as above for Comments 24 and 96	EPA and the Port agree that relevant resolution of compliance criteria in Comment 24 apply to this issue.
133.	105	DAR	7.1.2.2	Yes	1	The compliance point will not be out in the river, rather in pore water to limit the dilution/mixing of the river itself. EPA will provide specific text to the Port for inclusion in the 100% DAR regarding this issue. See also attached Table 1.	1. Same issues as above for Comments 24 and 96.	EPA and the Port agree that relevant resolution of compliance criteria in Comment 24 apply to this issue.

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226.	11	DAR	Appendix B, Section 3.1.1.4	Yes	1	The 4-day period should apply as after 4 days for the duration of the project. Otherwise, this requirement will cause an incentive for short-duration high volume discharges to avoid triggering chronic criteria.	1. The Port agrees with the concept presented in the comment in that we do not want to create an incentive for short duration high volume discharges in order to avoid triggering chronic criteria. However we are concerned that over a several week period there could be multiple short-term exceedances of chronic criteria that cumulatively add up to more than 4 days. If some of these periods are reasonably short (less than 96 hours) and separated by several days, then a cumulative 96 hour exceedance will not be reflective of a typical chronic exposure nor consistent with the intent of State water quality regulations. 2. Inconsistent with EPA's Table 1 (Summary of T4 CDF Water Quality Monitoring Requirements).	**Use of Chronic Criteria:** As indicated in Table 1, acute criteria will be used to evaluate compliance, and chronic criteria will be used to guide the implementation of low-cost practical BMPs during construction activities. However, this does not preclude engineering controls/treatment from being considered during design. Given this resolution, comment 226 is no longer applicable.
384.		DAR	Appendix D, 5.2	Yes	1	Lab turn around times. As specified by EPA in the draft WQMCCP, lab turnaround times are from the time of sample collection to delivery to EPA. Samples that take longer than 72 hours from collection to verbal or electronic delivery to EPA will be considered out of compliance with this requirement.	1. 72-hour TAT from the *time of sample collection* to EPA. A 72-hour TAT from the time of sample collection is effectively a 48 hour TAT for the analytical lab. The shortest TAT that any reputable analytical laboratory has indicated they can provide is a 72-hour TAT from the *time they receive the sample*. This TAT is based on the assumption that there are no issues or problems related to the sample matrix, concentration, interferences, instrumentation, etc. Issues such as these commonly arise. A 72-hour TAT from the *time of sample collection* would be a challenge for any analytical laboratory despite the best advance planning, coordination, and management. Given the fact that missing a TAT may result in fines that the analytical laboratory may be responsible for, it is possible that no reputable laboratories would agree to accept the project. Conversly, while there may be an analytical laboratory that agrees to accept the project under these terms, the Port may still not have the confidence that the analytical laboratory will be able to meet the required TAT.	1. For the abatement action, the Port and EPA will have further discussions to establish a reasonable and appropriate TAT. The Port proposes a 72 hour TAT from the time the lab receives the sample. The Port will provide a memo to EPA that documents the basis for the 72-hour proposed TAT for EPA's consideration. The Port has generated a TAT memo and EPA has reviewed and commented on it. Final protocols for lab turn around times will be resolved through EPA's approval of the TAT memo. .The Port will work with the lab and EPA to establish a practical means to provide interim information to EPA to assist EPA with field management decisions during construction. 2. For subsequent removal action work, the appropriate TAT will be negotiated based on currently commercially available labs and techniques. The Port will consider the costs/benefits of using an on-site versus off-site laboratory.
1		Draft Mitigation Plan		Yes	2a	b. Before EPA can approve the Mitigation Plan that includes any project where a third-party will be responsible for the construction and long-term operation and maintenance, a final agreement between EPA, the Port, and the third party must be reached.	1. Final agreement needs to be reached between EPA, the Port, and the third party before EPA can approve the Mitigation Plan.	The Port and EPA agree to defer resolution of mitigation comments until a final mitigation project has been defined for the re-aligned project.

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1		Draft Mitigation Plan		Yes	2a	c. Also, the timing of when the Ramsey refugia project is constructed and completed, in relation to when the habitat is lost will be a factor in how much mitigation is sufficient to compensate for lost habitat. The Port's schedule for dredging and filling at T4 is within the next year or two, when will the city complete construction of the refugia?		The Port and EPA agree to defer resolution of mitigation comments until a final mitigation project has been defined for the re-aligned project.
1		Draft Mitigation Plan		Yes	2a	d. The final mitigation plan design needs to be included as an element of the 100% DAR, and must include complete plans and specifications for construction.		The Port and EPA agree to defer resolution of mitigation comments until a final mitigation project has been defined for the re-aligned project.
11		Draft Mitigation Plan		Yes	2a	PERFORMANCE MEASURES: Ending performance standards at year 5 is unacceptable. The Port shall propose performance standards that are in force throughout the habitat mitigation project lifetime, i.e. maximum invasive species percent cover that applies regardless of the monitoring year. Maximum invasive percent cover performance standards shall be developed. Minimum percent cover shall be specified for native species. A full list of quantitative performance standards are listed in the Action Memo. At a minimum, annual monitoring over the first five years and every five years thereafter shall occur. EPA will re-Evaluate the monitoring schedule periodically.	1. Mandatory monitoring for the lifetime of the project with no opportunity to end the monitoring if performance standards are consistently being achieved.	The Port and EPA agree to defer resolution of mitigation comments until a final mitigation project has been defined for the re-aligned project.
12		Draft Mitigation Plan	Section 5.4.2.2	Yes	1	Include the following language in the text, "After absence of fish over 3 consecutive seasons EPA may require corrective actions to be taken."	1. Performance standard based on fish presence.	The Port and EPA agree to defer resolution of mitigation comments until a final mitigation project has been defined for the re-aligned project.

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16	8	SACM	Section 3.2.1	Yes	2a	Treatment methods that destroy or remove contaminants from sediments may be acceptable; however, treatment methods that immobilize contaminants are not acceptable. Please revise the text accordingly.	1. The limitation presented in this comment is premature until the Harbor-wide process is further evolved.	The Port and EPA agree that the Harbor-wide process is the appropriate venue for determining acceptable treatment methods.
31		SACM	3.4.2.2	Yes		The text asserts that fish consumption criteria (i.e., fish consumption AWQC) "should be applied to conditions in the receiving water in consideration of the spatial and temporal scales of interest". The text also says 1) the "bioaccumulation-based discharge criteria would be temporally averaged over a 70-year human lifetime"..., and 2) that fish consumption criteria would be achieved 10 cm above the face of the berm...,, and 3) "achieving chronic water quality criteria at the point of groundwater release from the CDF will be implicitly protective of bioaccumulation exposures in the receiving water". To date, there is not general agreement for the Portland Harbor project that "spatial & temporal scales of interest" approach is reasonable and defensible. Retaining this approach in the T4 document potential establishes a precedence for the broader Portland Harbor project, which is premature at this time. Additionally, the approach may not be fully protective of benthic receptors. EPA has provided Table 1 attached to the DAR to clarify applicable requirements for the CDF discharge. This comment applies to Section 7.1.2.2 as well.	1. Need to preserve issue of spatial/temporal averaging pending outcome through harborwide RI/FS.	EPA and the Port agree this issue is resolved through relevant components of the resolution reached on comment #24.
32		SACM	Section 3.4.2.3.	Yes	1	Shall be completely rewritten. EPA directed the Port to use tap water PRGs, MCLs, and other levels as performance standards. This section is not written consistent with that directed comment and it is not relevant whether ICs will limit the use of groundwater in the area of the CDF. EPA will provide specific text to the Port for inclusion in the 100% DAR regarding this issue.	1. Use of Region 9 PRGs (see comment #24)	EPA and the Port agree this issue is resolved through relevant components of the resolution reached on comment #24.

Notes:

(1) The Port and EPA have been engaged in an Informal Dispute Resolution (IDR) process since January 2007 related to EPA's directed comments on the Port's 60% Design Submittal. Through the IDR, some comments required further clarification and information, while others required a discussion to resolve disagreements between the Port and EPA. Through the IDR process, the Port and EPA were able to resolve a majority of the directed comments. This table represents the remaining directed comments that were not resolved through the IDR process.

(2) The resolutions in the table are specific to the T4 Removal Action, and do not represent positions of the Lower Willamette Group.

(3) The Port has made a recommendation to EPA to realign the T4 Removal Action schedule with the harbor-wide Remedial Investigation/Feasibility Study (RI/FS) before completing the T4 Design (Letter to EPA from Port, August 22, 2007). Information from the RI/FS could then be incorporated into the T4 design, and vise versa. The Port's recommended path forward would also be a means to settle the current Informal Dispute Resolution (IDR) process. This table provides the Port's specific concerns with the 60% Design directed comments, based on the assumption that EPA accepts the Port's recommendation to realign the T4 project with the harbor-wide process. If EPA does not accept the Port's recommendation, the Port reserves its rights to re-evaluate its position on the directed comments.

Table 1 – 60% Design Analysis Report (DAR) Comments

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
1.		General		Provide cross-reference table in 100% design indicating location of comment response. Specific response to comments on directed comments.
2.		General		The following comments from the 30% Submittal appear not to have been addressed: 9, 16, 24, 27c, 29, 31, 32b, 33, 35c, 35d, 35e, 35g, 36, 37, 38, 46, 49a, 50b, 55, 56, 58a, 60b, 63, 70, 71, 72, 75, 81a.
3.		General		Any comments specifically referenced to either the design analysis document or a particular appendix also pertains to any other place in the design document or any appendices where that issue is discussed. To fully address a comment on any issue, the Port needs to conform the design analysis and, if applicable, any relevant appendix addressing the same topic.
4.		General		Has the Port acquired ownership of DSL lands needed to implement the action? If not, what outstanding process steps must the Port undertake and when does it project the acquisition will occur?
5.		General		Confined disposal facility design – the Port often refers to other CDFs, particularly those in Puget Sound, to provide support for decisions relating to the design of the CDF at T4. For example, Table 5 on page 47 (Section 5 Confined Disposal Facility Design) summarizes a number of characteristics of various CDFs, which is useful. However, no information is presented that indicates the performance of these CDFs. Please include such information or delete references to these projects as the basis for design decisions.
6.		General		Please make a global change to references in all documents regarding Port partnership with EPA to include all Government partners, including the Tribes, Oregon DEQ and NOAA. Please define abbreviations and acronyms as they appear in the text, and particularly please define them in each table. The Port has embarked on additional sampling along the sheet pile wall at Berths 410 and 411 because of a concern that removal of sediment near the wall may jeopardize its structural integrity. There is no indication that the Port has investigated and evaluated alternative methods of removal if contamination is deep, close to the wall. Given that the Port was aware that sediment removal was likely when the wall was installed, the Port should have taken precautions at that time. Additional comments below provide some suggested alternative means of removing this sediment.
7.			Yes	Long term cap performance standards shall be added to the performance standards section. Unless otherwise approved, language shall read, “Caps will meet ROD designated clean cap levels or SQGs, whichever is higher, which will be monitored over time.”
8.	1	1.1		The “Prefinal 60% Design Documents” are listed among deliverables that are yet to be provided. Please indicate that this is the document the reader is currently reading.
9.	8	2.2.2	Yes	Add the following: Dredge and dispose of sediments in a manner than minimizes dredging residuals and prevents recontamination of adjacent sediments.
10.	8	2.2.2		Item 2. Introduction: Clarify that these performance standards also apply to the upland banks that are to be pulled back.

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11.	8	2.2.2		First Bullet: Revise goal for sediment cap to not recontaminate versus TEC values rather than PEC values.
12.	8	2.2.2		Third Bullet: Provide specific chemical contaminant acceptance concentrations rather than just specifying the cap material be “clean”. Add the following: Place cap materials in a manner that minimizes mixing of cap material with underlying contaminated sediments.
13.	8	2.2.2		Item 3. Add the following: Design CDF berm face to resist erosion from 100-year flood event flow velocities, 100-year waves, vessel-induced waves from typical passing vessels, and anticipated propeller wash from vessels that operate in the area.
14.	8	2.2.2	Yes	Establish performance standards for stormwater flow reroute, at a minimum in terms of flow volume and line tightness to prevent inflow/outfall with respect to draining or recharging CDF groundwater. Suggest establishing stormwater contaminant goals to prevent recontamination or at least providing reference to the Recontamination Report and on-going source control process.
15.	8	Editorial comments		Fourth bullet, third sentence: “Total Effects Concentrations” should be “Threshold Effects Concentrations.”
16.	8	2.2.2		Please insure that any other reference and/or discussion in the design analysis or any appendices related to this performance standard for the CDF and the long-term monitoring is consistent with this comment.
17.	8	2.2.2		Please reference the Sediment Acceptance Criteria is part of the T4 design and demonstrate that T4 sediments meet these criteria.
18.	8	2.2.2		Please change action bullet to read “additional dredging to achieve targeted sediment chemistry levels” – “additional dredge pass” seems to indicate that if PEC levels persist, there will be 1 additional pass and then the action will be complete. Clarify how “other potential” actions will be triggered. Please be clear that the additional actions will be only triggered once sediment chemistry below PEC levels is achieved by dredging or if additional dredging is not technically feasible.
19.		2.2.2 and 4.1.1	Yes	For dredging performance criteria, anything above TEC levels will be, at a minimum, designated MNR. That is consistent with what we discussed with the Port. For capping, establish chemical specific acceptance criteria for cap materials that are below TEC levels. For chemical without TEC values, establish criteria based on reasonable alternate criteria. The design currently says cap materials only need to be below PECs. It would be inconsistent with the dredging standard to allow cap material to have levels above TEC levels.
20.	8	2.2.2		Please define TEC at first use; in addition, please define “high risk” and “low risk” sediment.
21.	8	2.2.2		Capping Performance Standards- The capping performance standards for the chemical isolation layer of the caps should also be protective of the drinking water pathway (MCL & tap water PRGs) & the bioaccumulation pathway (fish consumption AWQC).
22.	8	2.2.2		Capping - Please include a statement that indicates that all sediment caps will fully conform to USACE capping guidance.

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23.	8	2.2.2		CDF – Please clarify, are the static safety factor (1.5) and seismic safety factor (1.1) related to any specific standards or are they project specific, and have they been approved by EPA and the government partners?
24.		2.2.2 and 5.1.1	Yes	CDF, third bullet. This bullet does not accurately reflect the ARARs selected for the T4 action. See the Action Memorandum. The Port should insert the following statement: Design the CDF to achieve confinement of all hazardous substances disposed of in the facility through the groundwater pathway so that the CDF does not contribute any discharge and/or release of contaminants above applicable and relevant and appropriate requirements under federal or state law for surface water in the lower Willamette River. To meet this design criteria, the CDF shall be designed such that the quality of groundwater exiting the CDF will meet USEPA's national recommended chronic water quality criteria for both aquatic organisms and fish consumption by humans (17.5 g/day), Oregon water quality criteria, Region 9 PRGs, and relevant, promulgated drinking water criteria (otherwise known as Maximum Contaminant Levels). The LTMRP shall include monitoring for this design standard. If the existing design cannot meet performance standards in pore water of the exterior of the berm, the Port shall evaluate design changes that would meet the performance standards for the CDF at the compliance point. The Port shall report conceptual design and cost information of at least two approaches that would meet the performance standards that have been approved by EPA for complete analysis. Design changes could include reactive barrier technologies. Examples of barrier technologies could include an organoclay mat on the inside of the berm, an appetite layer, or some combination of these or other treatment material.
25.	10	2.2.3		Please make the bullets more specific as to how SQOs were used to determine the actionable areas.
26.	10	2.2.3		Please use a consistent format – all tables should either be included as part of the document text or separately at the end.
27.	11	2.2.4		Please clarify if the same cap design will be utilized at each site, or if the caps are designed for each area specifically. Are the design criteria for each cap the same?
28.	11-12	2.2.4.2		The first sentence refers to Berths 410 and 411 and references Figure 2. This Figure does not include identification tags for these berths, which would be helpful.
29.				North of Berth 414 – Did the June 2006 sampling effort define the extent of the elevated PAH concentrations? The area doesn't seem to be bounded based on the maps included here.
30.	2.2.4 4 2.2.4 5			Berth 401 – PCBs are mentioned here as the reason for requiring a cap in this area. However, a look at Table 4 shows that PCBs are below a PEC value that is used here for a trigger (Berth 401 at 250 ug/kg & PEC at 676 ug/kg). If a bioaccumulation trigger was used to determine the cap area then it should be clearly stated in the text & tables. In addition to PCBs, this area had significantly elevated phthalate concentrations. The objectives for capping should include phthalates as COCs. A review of the data should ensure that the capping effort adequately covers the nature & extent of phthalates in the area.
31.	23	3.6.1, Table 4		The use of "enrichment ratios" seems misleading and I suggest that something like "multiples of criteria" or "exceedances ratios" are a more realistic title for tables and description in text. Please revise the wording.

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32.	23	3.6.1		Reword the second to last paragraph to either list COCs in report or just reference table.
33.	23	3.6.1.		Existing Sediment Chemistry Data- Why were COCs only based on exceedances of PEC & values? There are some COCs that do not have PEC values, but should be included. Most notably for T-4, phthalates should be included. They are the highest mostly in the tip of Slip 1 & Berth 401, although concentrations are elevated throughout the T-4 site. Although PEC values do not exist for all COCs, Washington state has developed AETs & CSLs sediment management standards for many COCs. Samples at T-4 exceed these values, & given the high fish tissue concentrations in this area, phthalates should be considered COCs for the site. If these are not considered as COCs, they will not be factored into cap design & monitoring plans (e.g. cap designs at Berth 401).
34.	24	3.7		This section seems to be out of place. Please provide the results of the Hypack study in an appendix and indicate how the analysis was utilized in the cap design.
35.	24	3.7 General		Please specify that the contractor shall produce a spill response plan that must be reviewed and approved by ODEQ and EPA.
36.	26	3.8.3		Please elaborate on the current state of the BEBRA action and why additional organoclay may be necessary to provide additional source control. Is there a continuing diesel seep at Slip 3 below the BEBRA action site?
37.	26	3.8.3		Please provide additional detail on stormwater improvements, including an explanation of the past and future stormwater analyses.
38.	26	3.8.3		Will potential upstream sources, if found to be of concern, be addressed as part of the removal action? Please explain where this analysis will be reported to the public – perhaps in a recontamination report? When will this be issued? Please provide a summary section for source control activities and schedule.
39.	4			Residual Sediment Concentrations- During review of the EE/CA, DEQ commented on an attachment to Appendix M regarding the calculation of residual sediment concentrations for post-removal surfaces. The agreed on resolution was for revised modeling efforts to be included in the remediation design phase, & incorporation of post-remediation sampling to confirm the effectiveness of the early action. Post-remediation sampling is included in the 60% design document, & this will provide the definitive determination that sufficient excavation of sediment has occurred. However, for planning purposes, it would be useful to see the modeling conducted to decide on the areas & depths of excavation. We did not see documentation of the modeling in the report. If modeling was used to support the plan for over-excavation (which will likely address residual concentrations as a result of sediment suspension & settling), this should be explained.
40.	29	4.1.1		It is not appropriate to assume that PEC criteria are relevant for human health. Reference to protection of human health in this section and throughout the document (when discussing PECs) should be deleted.
41.	29	4.1.1		Please indicate the extra volume of material that would need to be removed to meet TEC or other standards.

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42.	29	4.1.1	Yes	See comments from Section 2.2.2 about dredging performance standards. Please be more explicit on how the decision-making tree will be utilized; i.e. it should be explicit that additional removal will be utilized for areas of with contamination exceeding PEC levels, and that additional verification sampling will be completed after each subsequent round of dredging until the surface is shown to be below PEC levels.
43.	29	4.1.1 and 4.1.2		Much of these Sections are redundant with discussion in Section 2. Make sure that any changes required due to these comments get reflected in all places that the issue is discussed.
44.	30	4.1.2		Please add the bracketed sentence after the sentence copied below: The removal of material in Slip 3 and Berth 414 must meet, to the extent practicable, the water quality criteria defined in the Water Quality Monitoring Plan and the USEPA-issued Water Quality Monitoring and Compliance Conditions Plan (WQMCCP). [The final USEPA-issued WQMCCP will take precedence if an inconsistency is found between the Water Quality Monitoring Plan and the final USEPA-issued WQMCCP in the future.]
45.	30	4.1.2		"The sediment quality objectives will ultimately comply with the ROD…" – This sentence is poorly worded. Please re-write to indicate that future site remedial measures will be used to comply with the ultimate ROD sediment quality objectives.
46.	32	4.2.1 and 4.2.3.1.2		Cores will be taken during the December sampling event to determine contaminant concentrations in the sediments near the sheet pile wall. In addition, an engineering analysis should be included in the determination of how close to the wall and how deep into the sediments the dredging can or should occur. Please provide this engineering analysis prior to the 100% design for the government team review. Please provide sheet pile wall study that analyzes potential deflection due to dredging. There is no discussion of how close dredging can occur to the wall, and no data to support claims of deflection due to sediment removal. Temporary [in-water or land-based] structural supports for the wall during dredging, or other alternative means of dredging around the sheet pile wall, such as staging dredging and backfilling to maintain structural support.
47.	32	4.2.1.1		The second sentence states "The US EPA Action Memorandum (USEPA 2006a) defines the sediment selected for dredging at Slip 3 as "that sediment with prevalent PEC exceedances." For purposes of clarification, it would be helpful to include here a very brief discussion of the criteria used to delineate those sediment extents with prevalent PEC exceedances, vs. those without prevalent PEC exceedances.
48.	32	4.2.1.1		The fourth sentence refers to Figure 5, which shows the bulk sediment concentrations for cores located within the Slip 3 dredge prism. It follows that "A statistical interpolation model has been used to create an elevation contour surface of the DOC." Unless I am mistaken, surface-only samples (e.g., HC and SD stations) were excluded from the model. I am not entirely clear on why this would be the case. A brief explanatory sentence would be helpful.
49.	33	4.2.1.2		Please describe how the historical maintenance dredging affected the determination of the dredge prism.
50.	33	4.2.1.2		Is there any analytical data from historical dredging efforts that may indicate the extent of TSS or turbidity during these dredging events?

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51.	34	4.2.2		Please remove statement about TEC values in native materials if there is no concrete data to support this assertion.
52.	35, 41	4.2.3 and 4.2.8	Yes	The proposed dredging design is inadequate because it does not actually provide a dredging design other than stating the neat line dredge prism. Please articulate the dredging approach articulating dredge cut depths, dredging approach by location (highest concentration areas first, etc.), multiple passes, etc., EPA previously made this comment on the 30% DAR, and it appears not to be addressed in the 60% design submittal.
53.	39	4.2.5		Please provide units on dredging volumes (assumed CY).
54.	41	4.2.8		This section should make it more clear that post-dredge sampling is required and that PEC exceedances are required to be removed.
55.	41	4.2.8		Please remove statement that residuals are not a concern for Berth 414 dredging. Please clarify the performance standards for dredging and capping at Berth 414. Is dredging to achieve PEC levels? If so, what is the purpose of the cap – is it designed to be protective if PEC level sediments remain underneath? What concentrations are assumed to remain? What is the groundwater flow in this area? Will post-dredge confirmation sampling be completed? Will the cap be monitoring during placement?
56.	41	4.2.8	Yes	Please clarify the logistics of post-dredge sampling with respect to when samples will be performed (after dredging each area, or the entire Slip 3, or other), turnaround times.
57.	42	4.2.9	Yes	If PEC exceedances in post-dredge sampling are indicated, additional dredging shall occur unless otherwise approved by EPA. Factors that may be considered in approving capping instead of additional dredging may include adjacent structural issues and depth of contamination.
58.	42	4.2.9	Yes	The section on off-site tracking of sediments needs further clarification. Please provide information on which sediments will be hauled offsite, and how this will happen (truck staging, hydraulic transport?). This can be part of the CQAP but should be referenced here. Off-site tracking data shall be made available to EPA within two weeks after removal actions are complete to ensure timely remediation of any noted statistically significant differences between the pre- and post-project samples.
59.	42	4.2.9	Yes	The goal to minimize short term water quality impacts should be rewritten to reference the full set of water quality monitoring parameters, specifically chemical parameters.
60.	42	4.2.9		If a cap is proposed for areas that remain over (PEC? TEC?) criteria after several dredging passes, it should be a designed cap. Please provide a design specification for the residual cap so it is protective and can be applied to any such area in the dredge prism.

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61.	4.2.9			Dredge Elevations- Evaluations to determine the completeness of dredging compared to design elevations are critical to the success of this Early Action in that disturbed & undisturbed residuals can result in unacceptable risk. The document discusses general approaches and objectives, but details are left to future documents and are dependent on contractor input. The document should specify that evaluations are conducted both during and after dredging and that surveys and sampling will provide sufficient detail (e.g., multi-beam) to evaluate dredge elevations & residuals. It is not clear if confirmation samples will be discrete or composites.
62.	5			Return Water- DEQ continues to be concerned that both particulate & dissolved contaminants will be discharged directly to the Willamette by implementing the proposed CDF design which relies on dilution in a mixing zone to meet water quality standards. DEQ continues to recommend that the elutriate from the barge and CDF be tested during construction and contingency measures be established for effluent treatment in an upland area adjacent to the CDF for further settling, evaporation, infiltration, or other treatment. These options should be considered in lieu of potential direct discharge of return water to the Willamette.
63.	47	5		The CDF offloading station and diffuser barge should be designed for the lifetime of the CDF to be used during all filling operations for this project and in the future.
64.	47	5		The offloading system should contain shutdown and isolation valves in order to isolate any portion of the pipeline to prevent leaks and be able to address pipeline clogging. Even if the system is contractor designed, the Port design documents should indicate the minimum standards for the system.
65.	47	5		Please clarify the water within the CDF during filling will be monitored for chemistry prior to and periodically during any releases over the weir. Indicate potential contingency actions that will be available in the event chemistry results exceed levels suitable for direct discharge to the river.
66.	48	5.1.1		Change throughout the document the monitoring reference to “outside of construction zone” to the terminology used in the EPA WQMCCP; i.e., compliance point.
67.	48	5.1.1	Yes	Language in this section makes it unclear what the performance standards for CDF performance are – the language only refers to “CDF design performance standards are...” Language shall be changed to reflect that the performance standards are for design and facility monitoring purposes as well. Include the following, “The CDF will be designed and will be required to meet performance standards outlined here throughout its life, except as updated/replaced through the Harbor wide ROD process.”
68.	48	5.1.1		Third bullet. Change consistent with Comment on Section 2.2.2. CDF, third bullet.

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69.	48	5.1.1 and 5.1.2	Yes	Section 2.2.2, 5.1.1, and 5.1.2 identify ambient background conditions as ARARs. Please separate discussion of background from ARARs. Background values are not promulgated standards. In discussing background concentrations, please clarify how background concentrations will be evaluated and considering in the water quality monitoring, both for T4 COCs and other regulated contaminants. EPA understands that WQC apply but higher concentrations could be allowed in accordance with results of an approved background sampling event. If a WQC exceedance occurs during monitoring, background concentrations will be considering in evaluating the response the exceedance. The Port shall submit a sampling program to document background conditions. The program SAP must be approved by EPA and incorporated in the WQMCCP.
70.	50	5.1.3		Additional considerations should include the number and type of institutional controls required.
71.	51	5.2		Given that groundwater releasing to the river is predicted to not meet WQS within the berm, please estimate how much additional clean fill or organic material would be required to be placed on the inside of the CDF berm to provide additional attenuation of contaminants so that groundwater discharging from the CDF would meet WQS.
72.	60	5.2.5.1		Please re-write the last paragraph for clarify. The paragraph appears to be saying that contaminated sediment placed in the CDF will consolidate, allowing additional contaminated sediment to be placed. The last paragraph states “As can be seen on Figure 15, if 670,000 cy of in situ contaminated sediment were placed within the CDF, the top of this layer would be between 0 to – 9 feet (should this say elevation 0 to +9 ft?) NGVD after the import fill and cover layers were placed. This indicates that an additional 9 to 18 feet of contaminated sediment could be placed within the CDF and still be below elevation 9.5 feet NGVD.” The figure is somewhat confusing in that it provides no specific information on relative volumes of sediment. Is it possible to incorporate this information? Additionally, please be specific regarding the monitoring and decision making process for placing the additional contaminated sediment. The text appears to imply that the CDF will be filled to elevation 9.5 ft, then an additional 9 to 18 feet of sediment will be placed in anticipation that it will consolidate down to elevation 9.5 feet at some future time. Please be specific regarding how much the Port is proposing to “overfill” the CDF in anticipation that future consolidation due to placement of the clean cover layers will compress contaminated sediment to achieve the elevation 9.5 ft performance standard. Please describe the timing for these events how indicate if substantial drying of sediments will occur in the interim period such that the contaminated sediments will not longer be kept saturated, and what effects this will have on contaminant migration from sediments.
73.	60	5.2.5.3		The issue of settlement should be discussed also as a potential to release additional dissolved material from the sediment, by the increase in pressure, into the other formations. Note that this may force much of the contaminant mass out of the low permeability sediments, where it is presently being modeled with a long travel path, along the axis of the assumed flow path through fine sediments. It is unclear how this would impact the results of the modeling and flow through the long axis of the contaminated fill formation, rather than out of fill and into the other formations within the CDF (Appendix I), which are more transmissive to water.

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74.	65	5.2.6		4th paragraph: Figure 16, referenced in this paragraph, depicts a depression in the cap. As stated in the final sentence of the paragraph, the "current surface of the CDF is being designed to be pervious and minimize stormwater discharge to the Willamette River." NOAA recognizes and appreciates the importance of minimizing stormwater discharges to the river. However, the design as currently presented will undoubtedly result in rainwater moving down and through the cap, with some portion of that volume ultimately discharging through the face of the berm. This has implications for the transport of contaminants through the face of the berm. What has been done to determine the impact of pooled rainwater moving through the CDF and out the berm relative to stormwater discharge options? Given that it is likely that CDF site will be paved at some point in the future, please confirm that the contaminated sediment saturation elevation in the modeling was completed with no recharge, and that the contaminant migration modeling considered recharge. The Port might benefit from planning to pave the CDF site and maintaining institutional controls for a site cap, because then groundwater modeling for contaminant migration could assume no recharge.
75.	65	5.3		Fish Removal: This section describes efforts that will be undertaken to remove fish from within the bermed area once construction has isolated the slip from the river. What, if anything, will be done to encourage fish to leave the slip prior to initiation of construction? Please consider and discuss practicable alternatives or provide a brief explanation if no feasible options exist for chasing fish out of the slip prior to construction. The effort seems to focus on the removal of salmonid species from Slip 1, and would likely leave many other species in the CDF.
76.	68	5.4.1	Yes	Please be more specific in the estimate of water to be discharged over the weir during CDF filling. Why will the CDF water level be near 0 ft elevation at the time that filling starts? Appendix I Figure 4-2 provides figures of the mean daily stage of the river and the minimum value is well above zero. Appendix I Section 4.1.2 indicates a mean monthly low elevation in September of 4.5 ft. Therefore, with weir elevation at 15 ft, the net storage volume for hydraulic dredge slurry is about 250,000 CY. The berm seepage is indicated to be 10,000 CY per day (head unspecified). Given that the hydraulic dredging will produce 880,000 CY to 1,800,000 CY (at 5% solids) of slurry, and over 14 days 140,000 CY of water may seep out with 250,000 CY to seep out later (for total of 390,000), then as much as 500,000 to 1,400,000 CY of water will leave the CDF by flowing over the weir. Given the possible high TSS and contaminant concentrations in the discharge (see comment on Page 114, Section 7.3.4), a substantial mass of contaminants will be discharged to the river during CDF filling. Additional BMPs shall be provided to minimize contaminant discharges.
77.	67	5.4.1		The estimated volumes of sediment and water which will be placed into the CDF should be used in the modeling to estimate how much water has to be released through the berm before the CDF reaches hydraulic equilibrium with the river. The stated total range of slurry volumes of 400,000 to 800,000 cubic yards, and the estimated daily 50,000 to 100,000 cubic yards should be used to calculate the flux out of the CDF.
78.	69	5.4.1		A weir discharge TSS concentration of 15 mg/L does not agree with the Appendix N or Section 7.3.3. Please clarify.

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79.				Hydraulic Filling of CDF- The hydraulic dredge pipeline should not be located on top of the BEBRA to protect its Integrity. Earlier project discussions described placement of more highly contaminated sediment at the head of the CDF to increase potential migration pathways/times, such strategy appears to be absent in this document.
80.	76	5.4.1 5.9.9		Reference appropriate permit application/status for the construction of new facilities not directly related to the CERCLA activity, or outside the scope of the CERCLA permit exemption (e.g. facility construction siting, electrical, structural review of plans, city inspections, etc. must still occur as they would for any new facility construction. A list of permits that will be obtained from the city and others should be explicitly listed in the next design deliverable to highlight that electrical, structural construction of IRM appurtenances are reviewed and approved by the appropriate regulatory body, such as the city. For example, CERCLA project oversight will not ensure proper electrical wiring of the new berthing facility for IRM).
81.	77	5.10		What type of public process is the Port doing on the sediment acceptance criteria? The Port previously indicated that that some process for community discussion would be undertaken.
82.	77	5.10.1		Paragraph after list of criteria. The Port should add this sentence to the beginning of the paragraph. “If EPA has determined that the CDF is an acceptable disposal option for dredged sediment from another cleanup project through an Action Memorandum or Record of Decision, then the following design process at a minimum would be required prior to dredged sediment being disposed of in the CDF.”
83.	77	5.10.1		Please elaborate on the potential for conflict/involvement with the Corps of Engineers if maintenance dredge material were accepted for filling the CDF (either as part of contaminated sediment layer or cover layer). For maintenance dredging under a Corps permit, it appears the Corps would need to permit the disposal in the CDF.
84.	79	5.10.2	Yes	Reference the depth above which temporary CDF closure covers will be employed. This depth needs to be reviewed by an appropriate biologist during the design process. Address in groundwater modeling if the interim cover layers will create preferential flow pathways that need to be addressed in the modeling.
85.	81	6.		General Comment. a. Please clarify the use of Base Cap Type 1, 2, and 3 materials. What is the purpose for each material and how was its grain size determined? b. All of the caps at the site consist of a base layer of sand with various types of heavy armor riprap. Only the Berth 401 Cap and head of Slip 3 cap have gravel armor surfaces. All of the Wheeler Bay cap is armored. This seems inconsistent with the characteristics of existing sediments and detrimental to fish habitat. Consider that some instability in cap material is tolerable or place habitat mix over the entire capped area.

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86.	87			Last bullet: Please elaborate on likelihood of substantial biological degradation of contaminants under capped sediments. Numerous studies, including several by Anchor Environmental, have demonstrated that temperatures of sediments under sediment caps are sufficiently low to reduce and/or eliminate biological activity that might cause biodegradation. The use of generic biodegradation factors in this environmental setting are likely overestimates the biodegradation that will occur.
87.	81	6	Yes	It needs to be made clear that cap pore water monitoring needs to meet chronic water quality criteria, at a minimum, pending promulgation of the Harborwide ROD requirements that may supersede these requirements for monitoring long-term cap effectiveness both in terms of sediment concentration and pore water.
88.	81	6		Typo- The reference to “Section 2.4.4” should actually be Section 3.6.2.
89.	82	6.1.1		Second criteria. This says that sediment quality at surface needs to be below PEC. All cap material must have chemical concentrations below TEC levels.
90.	89	6.2.1		Please be clear where organoclay will be used or how field decisions will be made during construction. The texts states that the contractor will be required to have enough organoclay present at the site to supplement caps as needed. EPA suggests that due to the small volumes and cap areas involved, the Port plan in advance to place organoclay amended caps in potentially affected areas.
91.	95	6.2.3		Please review Portland Harbor CERCLA site studies to date to provide a site specific bioturbation depth value. Note comment 42a on 30% DAR.
92.	96	6.2.4		Consolidation should be monitored after construction and during future cap monitoring events, especially in areas with organoclay, to ensure that modeling correctly predicted final cap elevations.
93.		Section 7. General Comments		Monitoring – Monitoring for leachate quality should be performed in the berm and below the fill. Modeling water quality - Consolidation of the fill material and resulting water quantity and quality should be considered in the modeling. Sensitivity analyses should be performed on selected parameters using the model. The Kds and DAFs appear to be incorrectly calculated and not appropriately used in the models (see specific comments below). The model uses Kd values from the fill material and attenuates chemicals in the fill. However, the fill material is the source and actual leachate concentrations from the fill material should be used in the model and directly transported into the berm material. Because of the problems associated with the modeling, the conclusions concerning predicted concentrations may not be correct. More detail concerning the calculations, modeling procedures and results could be provided to enable a better understanding and review.
94.		7 – General		Include a discussion to summarize (consider a table) monitoring activities and objectives.
95.		7 – General		Please include a subsection to define what DAR documents/appendices specify various BMPs and monitoring requirements associated with the various RA activities in compliance with the WQMCCP Section 4.1.7, etc.

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96.		7 – General	Yes	WQ conditions defined in this section are not consistent with conditions defined in the WQMCCP (as clarified in Table 1, attached). Review the entire section for compliance with the WQMCCP, and include specific references to sections of the WQMCCP. Please be specific regarding any deviations from the WQMCCP to identify specific issues that remain to be resolved. EPA has prepared a summary (see attached Table 1) to clarify the monitoring to be performed for the CDF (berm and weir). EPA will update the WQMCCP to reflect the requirements in Table 1 (attached). Reference elsewhere in these comments to the WQMCCP shall be understood to include Table 1 requirements.
97.		7 – General		Please develop a table that depicts specific RA activities and the associated monitoring proposed (intensity, parameters, etc.).
98.		7 – General		Please verify that water quality monitoring locations, depth intervals, and frequency are compliant with the WQMCCP and Table 1 (attached).
99.		7 – General		Ultimately, this section should include Tables 4-1 and 4-2 from the Final WQMCCP.
100.		7 – General		Section 7.8, which is referenced w/in the text, does not exist. Please fix this discrepancy.
101.		7 – General		Please discuss the on-site lab, the scope of lab services to be provided in the field, and demonstrate that it will have the capacity to perform the planned analyses and to achieve necessary turn-around times (location, staffing, hours of operation, equipment, etc.).
102.	106	7 – General		Modeling at a point “10 meters from the berm” is not consistent with the draft WQMCCP. Also, see attached Table 1. Modeling should indicate the expected concentrations in the berm close to the inside of the CDF to understand the expected concentrations and fluxes prior to the berm dilution, and then the compliance monitoring should be done inside the berm from wells or in the berm from transition zone pore water (per Table 1 requirements), not in the water column away from the berm as proposed.
103.	99	7.1		Table 6, referenced in the last sentence in this section, includes no acute AWQ value for total PCBs. Please note that recently updated NOAA SQuiRT Cards include an acute AWQ value for total PCBs of 2.0 ppb (See http://response.restoration.noaa.gov/).
104.	99	7.1		The last sentence should be modified by ending after the word exposure. Previous projects in the state of Washington are irrelevant as there are different regulatory standards applicable or relevant and appropriate to this action, and the receiving water is different and listed as impaired for different things.
105.	99	7.1		Water quality criteria used to regulate these various activities will be consistent with the scale and duration of exposure.
106.	99	7.1		1st PP, last sentence: “Water quality criteria… will be… consistent with, but not limited to, the regulatory conditions imposed at other recent Region 10 Superfund projects…” This removal action should incorporate the lessons learned from previous projects and not be constrained by these previous actions.

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107.	99	7.1		Last PP: This paragraph should summarize the WQ standards defined in the WQMCCP Section 4.2.2 (as clarified by comments of the 60% Design), and Table 6 should also reflect these conditions. Also, please reference OAR 340:041, as defined in the WQMCCP.
108.	99	7.1.1		Please revise the first paragraph to clarify short-term, dormant periods between fillings, and long-term consistent with Table 1 (attached).
109.	99	7.1.1	Yes	Exceedance of chronic levels will be used to trigger some BMPs (such as verification of dredge operator procedure) for all construction activities, not acute only as described here.
110.	99	7.1.1		Although turbidity can be an appropriate surrogate for TSS, TSS should still be measured along with turbidity to corroborate the CST regression instead of estimating first and then measuring periodically. Analysis of both TSS and turbidity should still be conducted throughout the project. Use of TSS as a surrogate for turbidity may be a reasonable approach, but it does not address the issue that ARARs for water quality are based on turbidity, not TSS. Please elaborate. Oregon has a turbidity standard that does not allow more than a 10% increase above the turbidity already occurring at a location upstream of the source. This turbidity standard is not the same as total suspended solids. Please provide an interim submittal prior to the 100% Design Submittal assessing the impacts of TSS to fish, considering at a minimum the following evaluation. Literature is available that allows prediction of TSS effects on fish. Adverse effects from TSS is based on a combination of TSS concentration and exposure duration. Most fish can tolerate a short duration exposure to very high TSS concentrations with no adverse effects, but exposure to lower TSS concentrations over a long period of time can adversely affect fish. Newcombe (2003) and Newcombe and Jensen (1996) have developed regression equations relating the severity of effect to the combination of TSS concentration and exposure duration. Newcombe and Jensen's 1996 regression for TSS effects on sensitive juvenile and adult salmonids predict the following estimates of lethal TSS concentrations for the following exposure durations: 1 hour - 22,026 mg/L TSS 3 hours - 2981 mg/L TSS 7 hours - 1097 mg/L TSS 24 hours - 148 mg/L TSS 144 hours (6 days) - 55 mg/L TSS The regressions are of the form SEV = b + m1(ln ED) - m2(ln TSS) In the regressions, SEV is the severity of the effect concentration of TSS, ED is the exposure duration in hours, TSS is the concentration of TSS in water (mg/L), and b, m1 and m2 are taxa specific slope and intercept values for the regression. Newcombe's work has a whole series of adverse effects on salmonids, ranging from low levels of behavioral changes, through various levels of effects on feeding, physiology and condition factor, up through reproductive effects and various levels of mortality.

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				The citations are: Newcombe, C.P. 2003. Impact assessment for clear water fishes exposed to excessively cloudy water. J. Amer. Water Resources Assn. 39:529-544. Newcombe, C.P. and J.O.T. Jensen. 1996. Channel suspended sediment and fisheries: A synthesis for quantitative assessment of risk and impact. J. N. Amer. Fish. Manage. 16:693-727. Review of Figure 28 indicates that TSS and turbidity have some correlation, but the correlation primarily exists in the turbidity range of 500 to 10,000 NTU, which is well above the turbidity levels of interest in the river. The Figure indicates no data is available for turbidities less than 600 NTU. On what basis is the Port proposing to establish a correlation between TSS and turbidity for turbidities in the 10 to 500 NTU range?
111.	99	7.1.1		Please clarify the expected discharge volumes and water quality of discharges for 1) through the berm, and 2) over the weir. Section 5.4.1 the text indicates that during the dredging of Slip 3 and filling of the CDF there is no expected discharge through the weir, which conflicts with statements elsewhere that large volumes of water will flow over the weir.
112.	99	7.1.1	Yes	The intensity of monitoring will not depend only construction activity, but also the degree of detection in actual samples, as modified by EPA during the project.
113.	100	7.1.1		Please include references to the applicable sections of the WQMCCP.
114.	100	7.1.1		If continuous dredging is proposed such that work will occur continuously for 4+ days, then chronic criteria will apply.
115.	100	7.1.1		Please define “discharges occur continuously”. Does this apply to brief interruptions in CDF discharge if work stops for the night, equipment maintenance, or weekends?
116.	100	7.1.1.1		The WQMCCP specifies that turbidity should not exceed 3 NTUs above background if background is less than 50 NTUs. Please make sure that the DAR is consistent with the WQMCCP.
117.	101	7.1.1.1		Please specify what constitutes a “fast turnaround” to verify initial regression-based estimates for TSS-turbidity correlation.
118.	102	7.1.1.1		Please include more detail under DO, and define parameters for pH and temperature. All conventional parameters should be consistent with conditions defined in the WQMCCP.
119.	102	7.1.1.1		Text inaccurately cites 5 NTUs as the threshold not to be exceeded. Although this may be acceptable as it is the proposed unit in the revised turbidity standard, that standard has not been approved by EPA (or the IMST) & the current standard (10% above background) should be used, or the site to the current standard should be removed.
120.	102	7.1.1.2		Ambient Background Concentrations – The last paragraph states “Two background reference stations will be established upstream and across the river from the RAA. Both stations will be monitored during the pre-construction background survey, and one or both of these stations will continue to be monitored during construction to detect any excursions of ambient river conditions … that are not caused by the Removal Action, but which may nevertheless affect water quality in the vicinity of the construction activities.” [Emphasis added.] NOAA recommends that both stations be monitored during construction. In addition, please include a reference in this paragraph to the appropriate background monitoring station location figure.

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121.	102	7.1.1.2	Yes	In discussing background concentrations, please clarify how background concentrations will be evaluated and considered in the water quality monitoring, both for T4 COCs and other regulated contaminants. EPA understands that WQC apply but higher concentrations could be allowed in accordance with results of an approved background sampling event. If a WQC exceedance occurs during monitoring, background concentrations will be considering in evaluating the response the exceedance. The Port shall submit a sampling program to document background conditions. The program SAP must be approved by EPA and incorporated in the WQMCCP.
122.	102	7.1.1.2		The WQMCCP specifies that background conditions will be represented by the 95th percentile upper confidence limit. Please make sure that this section is consistent with the WQMCCP.
123.	102	7.1.1.2		Please specify the interval, number of studies, flow events, etc. that are being proposed for the “pre-construction background survey.”
124.	102	7.1.1.2		Please provide more specific information regarding monitoring proposed at the “two background reference stations.”
125.	103	7.1.1.3 – General		Please include Table 4-1 from the Final WQMCCP, and make sure that all criteria/guidance values are explicitly stated and consistent with the Final WQMCCP.
126.	103	7.1.1.3		PAH Guidance Values- The referenced text states that “Aquatic life criteria for PAHs are not available in either federal or state standards”. DEQ's Table 20 AWQC lists both freshwater acute & chronic AWQC for several of the PAH species. Until EPA accepts DEQ's new Table 33 AWQC, Table 20 values are appropriate to use.
127.	103	7.1.1.3		Please re-write this section so it does not say that TSS and turbidity may be reliable surrogates for chemical analysis. This has not been shown to be true at other sites along the river. The chemical analysis should be conducted separately from the physical parameters. The EPA and government partners have indicated that a tiered approach to sampling may be administered once it has been shown that construction activities are not having a negative water quality affect outside the compliance zone. Chemical sampling should continue throughout construction, but may be scaled back as the construction methods are shown to be protective. If the Port wishes to conduct a study to correlate physical and chemical water quality parameters to aid future projects at Portland Harbor, it may do so, but in no way should physical parameters be used as surrogates for chemical parameters during water quality sampling on this project.

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128.	103	7.1.1.3		Chemical Parameters, PAH Guidance Values – This paragraph states "Aquatic life criteria for PAHs are not available in either federal or state standards. However, acute and chronic guidance values for PAHs have been developed by USEPA for use in deriving sediment quality benchmarks (USEPA 2003a). These PAH values, listed in Table 8, may be used as guidance values during the monitoring program to assess the effectiveness of construction BMPs for controlling releases of PAHs." The EPA PAH values referred to here are first presented in Table 6, "Water Quality Criteria Guidelines", along with acute and chronic values for other PAHs, and the source, USEPA 2003a, is referenced in the footnotes to this table. These values are apparently then carried forward to Table 8, where they appear in the bioaccumulative chemicals of concerns portion of the table. Though these chronic values for benzo(a)pyrene and chrysene are presented here, they are not referenced to USEPA 2003a. This is confusing and hard to follow. Please include the reference in the footnotes to Table 8. I also suggest revising the language for the third paragraph as follows: "These PAH values, listed in the bioaccumulative chemicals of concerns portion of Table 8, shall be used as compliance values during the monitoring program to assess the effectiveness of construction BMPs for controlling releases of PAHs."
129.	104	7.1.2 – General		Please include a discussion of individual RA activities' cumulative effects on the river water quality.
130.	104	7.1.2.1	Yes	Water quality criteria should be consistent with criteria defined in the WQMCCP as clarified by comments herein and Table 1 (attached), and the text should provide specific references (section/subsection) to the WQMCCP.
131.	104	7.1.2.1		Water Quality Criteria Applicable to CDFs – The last sentence states: "Applicable chronic criteria include National Recommended Water Quality Criteria for metals (USEPA 2006b) and PAH guidance values (USEPA 2003a) as presented in Section 7.1.1.3 and Table 8." Please see comments on Section 7.1.1.3. PAH values are compliance values not guidance values.
132.	104	7.1.2.1		Bioaccumulation- The ambient water quality criteria, with a few exceptions, do not address bioaccumulation for aquatic receptors. The chronic data are based on 96 hour direct toxicity endpoints. Bioaccumulation to fish to unacceptable levels (to fish or wildlife) is also possible in addition to fish consumption numbers. These numbers can be developed using BAFs / BCFs for fish & wild life receptors & acceptable fish tissue residue concentrations (for protection of fish themselves & wildlife consumption). In addition to water monitoring, the Port should consider sediment (at key locations) or biota tissue monitoring. This will ensure there is not accumulation in sediment in the vicinity of the berm that may also be contributing to fish tissue concentrations through the diet. We would be missing this by only looking at water concentrations. SPMDs could also be deployed to quantify accumulation over time in a fish surrogate.
133.	105	7.1.2.2	Yes	The compliance point will not be out in the river, rather in pore water to limit the dilution/mixing of the river itself. EPA will provide specific text to the Port for inclusion in the 100% DAR regarding this issue. See also attached Table 1.
134.	105	7.1.2.2		For NPDES permits, fish consumption WQS are monitored at end of pipe, and bioaccumulative standards are not treated differently than other water quality criteria. Table 1 (attached) provides requirements for the weir discharge.

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135.	105	7.1.2.2		Table 1 (attached) indicates applicable requirements. The 4-day discharge period for applying either acute or chronic criteria no longer applies.
136.	2, 7	7.1.2.3	Yes	The first paragraph and first two bulleted items should be deleted as inaccurate and irrelevant to the T4 project. EPA identified the Safe Drinking Water Act and national drinking water standards as relevant and appropriate, chemical-specific ARARs for performance criteria for the confined disposal facility's containment of hazardous substances. See page 2 of 10 of the ARARs table attached to the Action Memorandum. Drinking water supply is a designated beneficial use of the Willamette River. The CDF is a disposal facility of contaminated sediment, are permanent, and the groundwater moving through the disposal facility and releasing to the Willamette River cannot contribute to exceeding of chemical-specific ARARs. No ARAR waiver has been justified.
137.	106	7.1.2.3		EPA supports that institutional controls and use restrictions should be placed on groundwater running through the CDF to be protective of human health. However, this bullet and topic is not relevant in this discussion of water quality criteria.
138.	106	7.1.2.3	Yes	The compliance point for performance standards will be in the face of the berm, to minimize dilution related effects of sampling in the river. For Superfund cleanups and as a relevant and appropriate requirement for groundwater or surface water protection, MCLs are applied in ground/surface water. ICs do not regulate the beneficial use of the aquifer/surface water. MCLs do not rely on tap water treatment as written. See also Table 1 (attached). Sampling shall be completed using the appropriate methodology (i.e., bottle sampling at the face for short term [no setback], or porewater of one-foot depth for dormant/long term.) EPA will provide specific text to the Port for inclusion in the 100% DAR regarding this issue.
139.	107	7.1.2.4	Yes	EPA required that 303d listed chemicals and their discharge be related to the design to show that the design took all reasonable/practicable steps to minimize discharge of these chemicals to the river. The Port shall provide an interim deliverable which addresses this issue, and include the information in the 100% DAR. Please include a table of 303(d) list parameters and the associated CDF berm/groundwater model output. In the future, groundwater modeling analyses must be completed for 303d listed chemicals in sediments from other sites are that proposed to be disposed of in the CDF.
140.	107	7.1.2.4		Per the WQMCCP, mercury is a COC that must be analyzed within T4. Please correct this statement.
141.	107	7.1.2.4		Dioxin TMDL- A 4th TMDL for the Willamette River, dioxin, was established in 1991. 303(d) List- The 303(d) listed parameters should be presented to avoid confusion & add clarity.
142.	108	7.2	Yes	This section evidently addresses short-term compliance boundaries, rather than also long-term performance standard boundaries. This should be made clear. Please revise requirements consistent with Table 1 (attached). In addition, the compliance boundaries for the construction activities (other than the CDF berm and weir discharges) need to be related to a distance from the construction activity rather than a static boundary, to ensure protectiveness. The specific disturbance location associated with the various construction activities needs to be identified. Verify and indicate with specific references that these are consistent with the WQMCCP.

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				Separate the compliance boundaries into two sets, one for the dredging of Slip 3, and another for the CDF weir/berm discharge. Note that for both short-term and long-term, the compliance point for the berm discharge is at the berm face. See also Table 1 (attached).
143.	109	7.2.2		Please articulate that this "trade-off" does not excuse requirements to employ BMPs to reduce short-term impacts.
144.	110	7.2.4		The concept of measuring turbidity may make some sense when used near the dredging equipment in Slip 3; however, it does not make sense in the berm effluent from the CDF, where the compliance should be based on actual contaminant concentrations. Only if there is discharge from the weir, would turbidity be a potentially useful parameter. Even in the case where turbidity is used for compliance, it should have been correlated with water quality parameters based on contaminants.
145.	111	7.2.6		Minimal Salmonid Exposures – This section provides information on juvenile salmonid travel rates and suggests that, if they are present at all, individuals are not expected to remain in the area for more than one day. While this may be true, NOAA notes that juvenile Chinook salmon collected by the Lower Willamette Group in 2005 showed tissue concentrations of various contaminants that were clearly associated with sites in the vicinity of the areas where these fish were captured. This suggests that these fish were remaining in these areas for at least enough time to accumulate site-related contaminants. Hence, it is possible that fish in the area of construction could be subject to increased and potentially significant exposures to contaminants mobilized as a result of construction activities.
146.	112-113	7.3.1 and 7.3.2		Dredging and Modified Elutriate Tests – Please ensure that tables are correctly referenced. It appears the relevant tables for these two sections are Table 9 and Table 10 for DRET and MET results, respectively. However, section 7.3.1 (DRET) refers the reader to Table 8 and section 7.3.2 (MET) refers the reader to Table 9.
147.	112	7.3.2		Dilution within the compliance zone is not appropriate for the elutriate flowing over the weir. Water quality should be analyzed prior to and periodically during release of effluent during CDF filling. Water from the CDF should not be discharged without analysis. See Table 1 for weir discharge requirements.
148.	114	7.3.3		Per Figure 28, at 2000 NTU the measured TSS was 50% greater than predicted by the power function. Please articulate how the proposed correlation between TSS and turbidity described in this section will be applied to monitoring weir overflow water quality. Please also see related comment on Section 7.1.1.
149.	114	7.3.4	Yes	A weir discharge having 1900 mg/L TSS and 94,000 ug/kg benzo(a)pyrene (per Table 4, for Slip 3) would be expected to have a benzo(a)pyrene concentration of 1900 mg TSS/L x 94 mg BaP/kg TSS x 1 kg TSS/106 mg TSS x 1000 ug/mg = 180 ug/L BaP vs. acute water quality criteria of 4.0 ug/L per Table 6. Therefore, it appears that discharges over the weir would cause substantial releases of contaminants to the river. Please quantify the magnitude of contaminant releases. See Table 1 (attached).
150.	115	7.4	Yes	ENTIRE SECTION – Specified sampling frequency and constituents are unclear. Berm construction/key deposition activities need explicit mention. Demolition activities are not adequately discussed. Rapid turnaround sampling is not adequately discussed. Please see Table 1 (attached).

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151.	115	7.4		Please include additional sections (7.4.7, etc.) to address additional removal action elements (stormwater outfall decommissioning and construction, CDF berm construction, ship traffic during construction/dredging, etc.).
152.	116	7.4.1		Given all the input DREDGE input parameters that may be significantly different from actual field conditions (water depth, bucket size, cycle time, etc.), please discuss which input will have the greatest impact to model results, and articulate how the model results will be applied to this project. Please provide specific references where dredging BMPs will be found within the water quality monitoring plan and construction specifications.
153.	116	7.4.2		Please provide more information regarding the results from the two examples cited (how far did resuspended material travel, how do example characteristics compare to T4 setting, etc.), and describe what is meant by a “run”.
154.	116	7.4.2		Please provide specific references where dredging BMPs will be found within the water quality monitoring plan and construction specifications.
155.	117	7.4.3		Please clarify this section. Please discuss in detail monitoring of the discharges over the weir and through the CDF berm. Please include specifics on the proposed sampling approach, well design, monitoring methods and frequencies, and analytes. Paragraph three implies that diluting TSS in the CDF discharge to background is all that is required. It does not appear that TSS is the determining parameter as the text indicates. A weir discharge having 1900 mg/L TSS and 94,000 ug/kg benzo(a)pyrene (per Table 4, for Slip 3) would be expected to have a benzo(a)pyrene concentration of 1900 mg TSS/L x 94 mg BaP/kg TSS x 1 kg TSS/106 mg TSS x 1000 ug/mg = 180 ug/L BaP vs. acute water quality criteria of 4.0 ug/L per Table 6. Therefore, required dilution ratios are 180/4 = 45 for acute WQ criteria and 180/0.96 = 188 for chronic WQ values. Please explain how this is acceptable based on a proposed dilution ratio of 37:1 to 39:1. It appears some type of additional water quality treatment is needed prior to discharge of water over the weir. Discuss the “active water treatment system” to treat excess water in the CDF. Identify potential treatment processes (filters, settling, flocculation, etc.) and flow rates. Discuss potential schedule impacts for implementing these contingency measures. Water treatment will likely be required if water quality parameters are not met at the compliance boundary; this should be noted in the project design and contractor implementation documents.
156.	118	7.4.3.1		Please define “MGD”. Table 1 (attached) does not allow a mixing zone.
157.	118	7.4.3.1		Please define the parameters in Table 15.

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158.	118	7.4.3.1		CST results are cited for the "mean retention time", however consideration should be also given to the worst case scenario. Please discuss conditions for the shortest realistic retention time, such as well the diffuser is located near the weir overflow structure. Note the construction specifications indicate the contractor is to place the sediment uniformly throughout the CDF.
159.	118	7.4.3.1		Please clarify the "accelerated settling caused by large-scale flocculation and density stratification." Lacking specifics based on published design guidance or literature, EPA cannot agree that this effect will be substantially beneficial to the project.
160.	119	7.4.4		Please include a direct reference to a specific section of the WQMCCP to demonstrate that the monitoring proposed is consistent with EPA requirements. Please provide specific references where dredging BMPs will be found within the water quality monitoring plan and construction specifications.
161.	120	7.4.5		Please clarify the statement "collection of field parameters every 6 hours and one laboratory sample to be analyzed for COCs."
162.	120	7.4.5		Please provide specific references where dredging BMPs will be found within the water quality monitoring plan and construction specifications.
163.	120	7.4.5		Please summarize the anticipated water quality impacts (debris, dust, sediment disturbances, etc.)
164.	120	7.4.6		Please clarify the statement "collection of field parameters every 6 hours and one laboratory sample to be analyzed for COCs."
165.	120	7.4.6		Please provide specific references where dredging BMPs will be found within the water quality monitoring plan and construction specifications.
166.	120	7.4.6		Please summarize the anticipated water quality impacts (debris, dust, sediment disturbances, etc.)
167.	120	7.5	Yes	See comments on Appendix I and SACTM regarding water quality impacts from CDF. Please make this section consistent with related supporting documents.
168.	120	7.5.1		Please summarize the model and describe how is has been applied/verified previously. How confidently can model output be expected to predict field conditions?
169.	121	7.5.1		A material type of the CDF is described as a model input parameter. Please articulate how these input will be compared to actual construction materials (once they are selected), and how great a discrepancy must exist between model input and actual materials before the model will be re-run. Specific examples include height of training dikes, berm fill TOC concentration, and berm fill grain size and hydraulic conductivity and filtration properties (d10, d15, etc.). TOC and hydraulic conductivity and other relevant parameters of several candidate berm fill materials should be tested and results included in the 100% DAR with corresponding material procurement requirements added to the specifications.
170.	122	7.5.1 Figure 32		Please define all parameters and abbreviations ("FYI: JSCS BAC SLV) cited in the figures, and please maintain consistency among figures (parameters, legends, etc.).

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171.	122	7.5.2		Please revise the modeling as necessary to reflect the final berm section (i.e., without the habitat bench if applicable).
172.	125	8		Habitat Mitigation. The first paragraph needs to be revised to be consistent with the Action Memorandum and preliminary 404(b)(1) analysis. Particularly, it should briefly discuss that dredging and capping, along with filling of the CDF, will result in loss of habitat for which compensatory mitigation is required.
173.	125	8		Will the final approved Habitat Mitigation Plan be added as an appendix to the final design? Either the design analysis or a separate Mitigation Plan needs to contain the analysis done for how it is determined how much mitigation is sufficient compensation.
174.	125	8		Since the analysis for valuing how much loss will occur and how much habitat of varying function types has not been completed, it is not possible to provide comments on Section 8 at this time.
175.	126	8.2		If a component of the mitigation plan will be performed by a third party, the agreement for how the Port, City, and EPA will coordinate, cooperate, and who takes the long-term responsibility for O &M, and/or failure needs to be in place by the time the final design is approved.
176.	127	9 - General		Basic information about regional hydrogeology, groundwater flow, and the major aquifers should be summarized in this section so as to provide support that the CDF location is suitable for this type of facility.
177.	127	9.1 and 9.2	Yes	Most of the text in these sections are general paraphrasing of the statute and/or NCP and substantively irrelevant to the T4 design analysis. The EE/CA and/or the Action Memorandum discusses the general concepts of ARARs. Only project-specific ARAR discussion should be in the design analysis. Delete all of Section 9.1, and a portion of 9.2 starting at the beginning until the paragraph that begins: “EPA identified location-, chemical-, and action-specific ARARs…”
178.	131	10 – General		Please provide references (section, page) where details are provided about the various construction activities (pier demo/construction, CDF construction, dredging, debris sweeping, capping, etc.).
179.	131	10 – General		Please discuss the likelihood that construction activities will occur 24 hrs/day and/or 7 days/week.
180.	131	10 – General		Please organize the construction components chronologically.
181.	131	10.1		Please provide a brief explanation why capping will occur before dredging to relieve concerns that dredging residuals may contaminate capped surfaces.
182.	132	10.1		Please provide Figure 35 as an interim deliverable.
183.	132	10.1.1		Over water activities may or may not need to take place during the fish window. The Port should discuss this issue with NMFS to ensure consistency between the design and the BiOp. Short term impact monitoring will occur regardless of when activities occur, though water quality impacts outside of a work window may require project shutdown until appropriate BMPs are in place and/or an appropriate construction window.
184.	132	10.1.1		In water work associated with stormwater line that actually occurs in water will require short term impact monitoring (real time and lab field parameters).

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185.	132	10.1.1		1st PP: Please be more specific so that "The work" is clearly understood to be the relocation of the IRM berthing facility (as opposed to demolition/construction of other structures).
186.	133	10.1.1		The stormwater outfalls must be rerouted prior to disposal of contaminated dredged material from the berm key, or please discuss capping of the berm key deposits to provide erosion protection. At a minimum, stormwater outfalls must be rerouted prior to dredging of Slip 3. GW modeling and hydraulic discussions for the weir do not appear to address continued discharge of stormwater into the CDF.
187.	133	10.1.2		The design decision regarding terrace height must be finalized for the 100% Design, and applicable analyses (seismic, groundwater modeling, etc.) updated to reflect the final design conditions.
188.	135	10.1.3		Please elaborate on the schedule and sequencing of dredging, sampling for residuals, re-dredging, re-sampling, etc.
189.	135	10.1.4		The capping sub-section is located after the dredging section; however, capping is scheduled before dredging. Please organize the sub-sections chronologically (see Section 10 General comments). In general, EPA believes all capping except the Wheeler Bay bank cap should be performed after completion of the dredging.
190.				Containment Berm- What are the contaminant concentrations in the 25,000cy of proposed over-excavated sediment for the berm footprint? Where will this material be placed?
191.	136 10.2.2	10.3		Please discuss potential sources of clean dredged material to be used as the import fill layer. Discuss placement of this material in additional detail and possible effects on the CDF. At some point, make up water for pumping sediments into the CDF will not be able to be drawn from within the CDF.
192.	139	11		Before the removal action work begins, the Port needs to provide to EPA copies of all access agreements with other landowners or lessees for conduct of work on their properties and that access is provided to the regulatory agencies and other stakeholders as provided in the AOC. Also, when the Port acquires the land currently owned by DSL, EPA would like copies of the document(s) that evidence the Port's ownership.
193.	141	12		Property Record Notice. Why is just a notice proposed? Why not a real property easement that is enforceable by the Port and the easement holder if violated? EPA prefers property restrictions that run with land and are enforceable against future property owners. Property easements are appropriate to ensure in a legally enforceable manner that ICs take place. Changes to these notices must require EPA notification and approval. Also, "call before you dig" registration should be accomplished, or explanation included on why this cannot be accomplished, and how alternate measures will be as or more protective; review the EPA Action Memo for a full list of ICs required for evaluation. Property record notices are like fact sheets and can be removed or changed without EPA notice, and as such are not a significant or binding IC.
194.	141	12	Yes	List of IC objectives. Given the CDF is a waste disposal facility, it is assumed groundwater in the CDF that is in contact with the contaminated sediment may not meet drinking water standards or be protective for dermal contact. Therefore, another institutional control objective is needed, e.g., Prohibit ingestion or dermal contact with groundwater in or adjacent to the CDF that is in contact with contaminated sediment.

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195.	141	12		Institutional Controls- In Section 7.1.2.3, the text describes institutional controls the Port plans on putting in-place to preclude water intake in the RAA. There is no mention of these institutional controls in Section 12 "Institutional Controls".
196.	141	12.1		Regarding notice to tenants about the capped areas. How frequently will this notice be provided? If just once, is that considered sufficient for long-term purposes? Can existing leases be amended or supplemented to provide more affirmative notices and commitments by the lessees that their use and their ship traffic will not affect the caps? If not, then annual notice to existing tenants should be considered.
197.	141	12.1 and 12.2		The design should provide more detail as to how the T4 Base map is implemented, who is responsible for approving activities under it, how is it assured personnel follow it, and generally how it can be relied on as an effective institutional control.
198.	143	12.2		Review by Marine Environmental. Is this part of the T4 Base-map process? Please provide more details about how this review will be an effective institutional control in the long-term. What consequences may occur if not followed?
199.	143	12.2		EPA expects that leases with tenants occupying property on or adjacent to the CDF will have affirmative commitments and agreements by the tenants that for all below grade excavation, construction, or any activity that may disturb the containment must be approved by the Port's Marine Environmental, and if necessary, EPA prior to any such work. Also, a groundwater use prohibition must be placed in the leases as well. Such restriction must prohibit extraction of groundwater from the CDF for ingestion and dermal contact.
200.	143	12.2		All use of groundwater within 1000 feet of the CDF should be restricted by institutional controls. Verify Port land ownership within this distance or identify adjacent land uses. Provide figure showing locations of all groundwater wells within 1 mile of CDF, and specifically identify any major wells such as municipal water supply wells.
201.	143	12.2	Yes	A restrictive covenant or easement that runs with the land and is enforceable against future landowners must be recorded on the title of the property containing the CDF that places the land use and excavation restrictions and groundwater use restrictions discussed above on the property.
202.	143	12.2		Future Construction on CDF Berm- While this section discusses restriction of future construction on the CDF, the document shows (Figures 14 and 16) planned or future grain elevator towers on the CDF berm. It is not clear how those structures would impact the berm's integrity.
203.		Figure 17		The cross-section showing the weir discharge pipe is not consistent with the corresponding plan sheet. Please make consistent. EPA suggests that the discharge pipe be run through the berm above the saturated zone to avoid providing a preferential flow pathway for contaminants at pipe joints or in pipe bedding.
204.		Figure 25		BEBRA Cap- The BEBRA cap detail should be enlarged so that the interface between the BEBRA toe & cap are clearly defined. It appears that a portion of the BEBRA toe will be removed & it is not clear what the new replacement cap material is (rip-rap only?). Contaminated sediments immediately riverward of the BEBRA toe should be capped to prevent migration of petroleum contaminants. Berth 411 under pier detail: Clarify if existing sheet pile wall is fully submerged.
205.		Figure 31		Please provide a descriptive header on the top graph, and define Kd.

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206.		Figure 33		Please define the solid line on the figure.
207.		Figure 33		Figure 33 shows grain size (not permeability as the title cites). Please correct the title or articulate how permeability is related to grain size.
208.		Table 3		Terminal 4 Sediment Quality Guidelines, Draft Portland Harbor Screening (Level 2). Please note that ultimately the lower of either PEC or the Portland Harbor values will apply in the ROD. For the record, NOAA does not currently concur with all of the draft Portland Harbor sediment quality guidelines. In particular, NOAA rejects the proposed value for total PAHs (1,270 ppm) as not protective of aquatic resources. Additionally, as an example, the 1400 ppb value for PCBs is not applicable to this project because it is substantially higher than the PEC value. Please add a footnote indicating the Portland Harbor values are based on (date and reference) and subject to change.
209.		Table 9		Please add a column to list Chronic Water Quality criteria.
210.		Table 13		Please correct typo (“Tupical”) in column heading.
211.		Table 17		Please correct all references cited within the table (for example, Section 7 of the DAR is incorrectly referred to as Section 6). The following changes should be made to the chart and any text in the DAR or appendices that conflicts with the ARAR’s table as revised should be revised to conform to the Table. 1. ESA. Add back to Criteria/Standard and Applicability column that it is an “action-specific” ARAR. 2. Executive Order for Wetlands Protection – The Compliance Reference column states that no wetlands will be affected by the removal action. Is this true for all of the mitigation sites? 3. Oregon Hazardous Substance Remediation Action Law and Regulations. Revise Citations and Criterion/Standard and Applicability columns to be consistent with the Action Memo for accuracy. 4. State Removal Fill Law and Regulations. Delete following citation: OAR 141-85-0004, et. seq. The remainders of the specific citations to this regulation are the identified ARARs.
212.		Appendix A, General		a. In general, there are no critical flaws in the geotechnical evaluation of the CDF berm. Some minor technical issues as addressed below herein should be considered prior to issuing a final design. b. It is likely that material placed below the water level that is not compacted would have a lower friction angle than the compacted material placed above the water level (actually water level plus 5 feet per the specifications). Either the specification should be amended to ensure proper compaction of materials below water, or the slope stability analysis should consider the effect of a lower strength material in the lower portion of the berm. Currently, the berm analysis appears to indicate that both uncompacted and compacted portions of the berm will have similar strength properties. c. Please revise final analysis consistent with final CDF berm configuration and material selection, including presence/absence of habitat bench and final training dike height. The final training dike height must be specified in the 100% DAR.

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213.		Appendix A, Section 2.0		This section references Appendix E for post-earthquake inspection and repair issues. At this time, Appendix E is not complete and cannot be addressed until a future release of the document.
214.		Appendix A, Table 4.0a		It is not clear if the Peak Horizontal Ground Acceleration (PGA) values presented in this table have been adjusted for Topographic Amplification. Please clarify.
215.		Appendix A, Section 4.0, and 6.4,4.0		Appendix A, Section 4.0 and Section 6.4: Section 4.0 of the report indicates that a topographic amplification factor (TAF) of 1.25 should be applied at the crest of the berm, and a TAF of 1.1 should be applied at the bench. Section 6.4 indicates that the PGA values computed using the 1-D site response analysis were increased by 15 percent and applied uniformly throughout the model. It appears that uniform application of the TAF may be conservative for deeper slip circles and less so for shallow circles. Further discussion should be considered to evaluate the relative impacts of this analysis method on the final design. In addition, for the sake of clarity, the PGA value used in the analysis should be explicitly stated.
216.		Appendix A, Table 6.1, Figures 2 – 5		Table 6.1 indicates that a cohesion value of 9 psf was used for the quarry spalls. Figures 2 through 5 indicate that a value of 0 psf was used. The correct cohesion value should be reported in both places.
217.		Appendix A, Section 6.0, Appendix F, Sheet C-26		The Berm Cross Section presented on Sheet C-26 indicates that the berm crest will be used as a roadway and that a future grain conveyor is to be built on the face of the berm. The impact of surcharge loads should be evaluated to determine if additional long-term slope stability analyses is required for the final design. In addition, if the future use of the remainder of the CDF is known, appropriate surcharges should be added to the entire CDF.
218.		Appendix A, Section 6.0, Appendix F, Sheet C-26		The note accompanying the Berm Cross Section on Sheet C-26 indicates that the training terraces used to construct the berm can range from 3 to 20 feet in height at the contractor's discretion. In the slope stability analysis, the training terraces are assumed to be 20 feet high. Since the training terraces are to be constructed of a stronger material, smaller training terraces would result in lower factors of safety for berm stability and should be considered in the analysis or the specifications modified.
219.	1	Appendix B, Section 1		This plan should apply to filling the CDF with T4 sediments as well as future filling events with sediments from other sites. What is the logic behind having two separate plans for the same activity (i.e., filling the CDF)?
220.		Appendix B, Section 2.1	Yes	CDF Management Plan – Survey, using standard land survey techniques, the berm annually for the first 5 years, and after seismic events, to assess any long-term settlement or failure. The survey should include the berm crest and other key points accessible above water. Complete an evaluation based on the results of each survey to determine if repairs are required to maintain berm integrity. Visual only post-seismic surveys are unacceptable, as would gps surveys, etc. The surveys must be accurate to 0.01 feet for X, Y, and Z axes.
221.		Appendix B, Section 2.1	Yes	CDF Management Plan – After 100 year flooding events, side scan surveys shall occur to evaluate damage to the berm below ordinary low water/berm toe, in addition to the "visual" surveys specified in the current draft.
222.		Appendix B, Section 2.3	Yes	Diving depths of piscivorous birds are well known. A tech. memo shall be delivered to specify the nominal closure depth of sediments above which a temporary cover will be required for EPA review (as well as USFW).

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
223.	9	Appendix B, Section 3.3		a. Monitoring of ponded water release through the berm will be required at some frequency regardless of head difference between the CDF and River, due to the presence of tidal water exchange that will move water into, and contaminants out of the ponded water stage of the CDF. See Table 1 (attached). b. Filling the CDF will occur during a relatively short time frame. Monitoring should be completed at all times, not just when the height of the water in the berm is 10 feet above river levels. See Table 1 (attached).
224.		Appendix B, Section 3.3	Yes	As directed by EPA, monitoring may only be reduced with EPA approval, after monitoring results have been appropriately reviewed. Language shall be revised throughout the design to indicate that reducing monitoring will be "proposed" to EPA at the timeframes noted.
225.	10	Appendix B, Section 3.3.1.1	Yes	TSS vs. turbidity. Coordinate this text with comments on Section 7 DAR.
226.	11	Appendix B, Section 3.3.1.4	Yes	The 4-day period should apply as after 4 days for the duration of the project. Otherwise, this requirement will cause an incentive for short-duration high volume discharges to avoid triggering chronic criteria.
227.	12	Appendix B, Section 3.3.2.1		The compliance boundaries for this project remain to be negotiated. See comments on Section 7 DAR.
228.		Appendix C		Construction Quality Assurance Plan – Document should include role of non-EPA government partners, and procedures for site visits for government team members.
229.	3	Appendix C, Section 2	Yes	Please re-write the project roles and responsibilities. Per the AOC signed by the Port of Portland, the Port of Portland is ultimately responsible for all aspects of implementing the early action, including conducting all construction activities and monitoring and reporting, and achieving all RAOs, performance standards, compliance with ARARs and other goals, objectives and legal requirements. Currently, the Port's responsibilities are passively phrased, i.e., "the construction project will be managed by the Port….", whereas the Project Engineer is actively "responsible" and the CM/GC will have "total authority and responsibility… …to ensure that the work complies with" virtually everything. As written, the Port seems to have little responsibility and other entities have great responsibility. This is not an accurate portrayal of project responsibilities. Specifically, the Port is responsible for the CM/GC's work and actions, and is also responsible for checking and auditing all lower tier CQA activities to ensure that these activities are being performed satisfactorily. It is NOT up to EPA to "identify unforeseen issues or problems", that is the Port's responsibility along with notifying EPA of these issues or problems. EPA may make the final decision on certain issues, but it is the Port's responsibility to identify, investigate, report, and make recommendations to EPA. The Port is responsible to ensure that the early action is implemented in a manner consistent with applicable state and federal laws and regulations. It is EPA's responsibility to oversee the Port's activities in implementing the early action.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
230.		Appendix C, Section 3		Please explain the qualifications for Port-held positions.
231.		Appendix C, Section 4		Please explain the Port's responsibilities in the QA program. The responsibility for these activities ultimately resides with the Port.
232.		Appendix C, Section 4	Yes	Please expand the QA program to reflect the additional performance measures required per comments on the 60% DAR (i.e., minimize dredging residuals, prevent mixing of cap material with contaminated sediments, etc.).
233.	15	Appendix C, Section 4.2.3.1		Please clarify the requirement for adding fill to the berm is for correcting berm settlement during the early action T4 construction phase. At the completion of the early action T4 construction, and again at completion of CDF filling, the Berm should be restored to its full elevation per the design.
234.	16	Appendix C, Section 4.2.3.3	Yes	Please provide a table listing chemical specific acceptance concentrations for berm fill material. Please revise this section to require that import material be tested for gradation, chemistry, and TOC at least every 5000 CY. One sample per 20 percent of the import volume is inadequate.
235.	17	Appendix C, Section 4.3.2	Yes	Second Bullet. Please revise the dredging objective to achieve the desired final substrate quality for chemical contaminants. Achievement of sediment removal to the design dredge prism is merely a useful guideline as to when the Port might find it useful to begin testing of exposed sediment surface, but it is not an objective in its own right.
236.	26	Appendix C, Section 4.4.3.1	Yes	Please provide a table listing chemical acceptance criteria for cap material. Please revise this section to require that import material be tested for gradation, chemistry, and TOC at least every 5000 CY for sandy materials (not riprap). One sample per 20 percent of the import volume is inadequate.
237.	42	Appendix C, Section 5.1.1 and 5.1.2	Yes	The Work Plan and CQC plan should address each individual performance standard and objective and indicate specifically how it is to be achieved.
238.	47	Appendix C, Section 5.3		Please revise this section to be consistent with EPA Guidance for Close-Out Procedures for National Priorities List Sites, EPA 540-R-98-016.
239.		Appendix C, Table 1		Please revise the CDF Construction Element to discuss verification of removal of soft sediment for berm key dredging, berm fill placement, weir/outfall structure, survey of training dikes and berm crest (initial, incremental for settlement, and final), etc. Please elaborate on Item 3.4.K for cap monitoring, particularly methods and frequencies. Provide criteria for disposal of berm key dredge material.
240.		Appendix C, Figure 2		Clarify the sequence and schedule for post-dredge monitoring of individual dredging units vs. overall dredging.
241.		Appendix C, Figure 3		Suggest showing sample locations on this Figure, including sampling locations in area 18 and 19 and additional area south of 19 to assess for dispersal of dredging residuals.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
242.		Appendix D	Yes	WQMP – Directed change; Monitoring only at a point 100m beyond the mouth of the slip is not reasonable. This shall be changed to some distance riverward of the activity (e.g. 300 feet), or similar such distance if it can be appropriately supported by the Port. Monitoring only at the head does not protect sufficiently for short term impacts within the slips. Consideration will be given to making this a compliance point only for DO, temperature, TSS and chemicals of concern (rather than including turbidity). In water work that is involved with stormwater line work will also require field and chemical monitoring.
243.		Appendix D		It has been noted several times that the proposed monitoring is more protective than at other sites. The relevance of this statement is not clear. The monitoring itself cannot be more protective. The monitoring is an indicator of a lack of protection, but does not itself provide ANY protection against recontamination.
244.		Appendix D, Section 2.1	Yes	Directed change; Tier 1 monitoring activities will continue until EPA approves a change to Tier 2. The change to tier 2 will not be automatic.
245.		Appendix D, Section 2.2		Have true background values been established upstream of the Superfund site? Is background sampling to take place during the same time of year as anticipated construction activities?
246.	6-7	Appendix D, Section 2.2		Background Survey – In the sub-section on the “Pre-Construction Survey”, it is stated that the “Background survey will consists of four sampling events” and that “five monitoring stations will be sampled during each of the background events.” The next paragraph goes on to state that “three of the five stations will be monitored only during the background survey.” The following paragraph states “the other two stations will be monitored during the background survey and, in addition, one or both of these stations will continue to be monitored during over-water and in-water work.” My understanding of these statements is that all five stations will be used to collect data during the background survey and that one or two of these stations (upstream and/or opposite river bank) will also be used to monitor construction activity. I suggest modifying the wording in these paragraphs to clarify the proposed approach and clearly present how the stations will be used. Also, is there a reason why no downstream station has been identified for the background survey? Please provide a brief explanation.
247.		Appendix D, Section 2.3		Discharges from long-term operation of the CDF will need to meet chronic water quality standards in pore water at the face of the berm. The point of compliance for all post-construction activity should be at the face of the CDF, as described multiple times in the DAR. See Table 1 (attached).
248.		Appendix D, Section 2.5	Yes	Tier 1 monitoring shall resume if a (one) detection above chronic levels is detected, or if otherwise required by EPA.
249.	12-13	Appendix D, Section 2.6.1		Turbidity and TSS – The Port proposes using turbidity and total suspended solids, or TSS, for evaluating water quality at the compliance boundary. Page 13 lists several reasons as justification for why TSS is an acceptable surrogate for turbidity. Can the use of TSS be supported by regulatory requirements? Is there precedent for using TSS in the lower Willamette River to evaluate water quality during in-water construction? If so, how well did it perform as a surrogate for water quality?
250.		Appendix D, Section 2.6.5	Yes	Rather than as indicated, chemical monitoring will be required throughout all project aspects, though at a “maintenance level” if no detections occur initially, as approved by EPA.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
251.		Appendix D, Section 3		This has not been shown to be true at other sites along the river. The chemical analysis should be conducted separately from the physical parameters. The EPA and government partners have indicated that a tiered approach to sampling may be administered once it has been shown that construction activities are not having a negative water quality affect outside the compliance zone. Chemical sampling should continue throughout construction, but may be scaled back as the construction methods are shown to be protective against recontamination. If the Port wishes to conduct a study to correlate physical and chemical water quality parameters to aid future projects at Portland Harbor, it may do so, but in no way should physical parameters be used as surrogates for chemical parameters during water quality sampling on this project.
252.	20	Appendix D, Section 3.2		Pile and Structure Demolition – The second to last bullet states "Most piles will be cut at the mudline or broken off at the mudline, which causes less disturbance than pile pulling." Can this statement be supported with a reference? If not, can it be supported with anecdotal evidence?
253.		Appendix D, Section 3.2/3.3	Yes	Monitoring for COCs will occur daily during the first 3 days, at a minimum for demolition and berm key activity. EPA will review and evaluate this data to determine if once per week monitoring is acceptable. COC monitoring on some basis will be required throughout all site over and in water activities. Monitoring will continue if CHRONIC values are exceeded (not acute) at the tier one level for all site activities. It should also be noted that the PRP has not complied with a directed comment in this case, i.e. maintenance monitoring was clearly articulated as a minimum requirement for all project activities, including COC monitoring once per week for over and in water demolition activity, berm key work, and other activities. EPA expects that comments will be complied with, rather than ignored, if the project is to remain on schedule.
254.		Appendix D, Section 3.3		Monitoring shall be specified in accordance with the comment above for berm key placement at the head of Slip 1.
255.		Appendix D, Section 3.7		Monitoring shall occur at all times and be evaluated by EPA for whether tier 1 or tier 2 sampling is appropriate. Unless approved by EPA, tier 1 sampling applies to all activities. See Table 1 (attached).
256.		Appendix D, Section 3.8	Yes	Tier 1 sampling shall continue for any chronic exceedance, regardless of whether the chronic trigger applies. Detection at or above chronic is an early warning for higher detections, should operator error occur, etc. See Table 1 (attached).
257.	20	Appendix D, Section 3.8		CDF Effluent Discharge – In the subsection on the monitoring schedule for CDF effluent discharge, it is stated that "If no exceedances occur [for three days], chemical monitoring will be scaled back to once per week (Tier II)." NOAA is concerned that effluent discharges from the CDF, if they occur, carry with them a relatively high probability of chemical exceedances. Considering that any such effluent discharge will be originating from an enclosed facility containing contaminated sediments, NOAA believes the Tier I monitoring regime should be maintained at all times in the event of effluent discharge.
258.	20	Appendix D, Section 3.8		CDF Effluent Discharge – Last paragraph, the first sentence states "Additionally, a monitoring station within the CDF will be sampled when the CDF is operational … and the ponded water elevation is such that overtopping of the weir is expected. Monitoring should occur regularly during CDF filling and draining, both over the weir and through the berm. See Table 1 (attached).

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
259.		Appendix E		Appendix E, Long Term Monitoring and Reporting Plan, has not been completed. This is an important appendix and should be completed and submitted for review as soon as possible.
260.		Appendix E, Section 1.1		Please include monitoring of dredged area for recontamination.
261.		Appendix E, Section 4		Physical monitoring of the upland CDF area should be included as well.
262.	C-1	Appendix F		Show outfalls to be plugged and/or demolished.
263.	C-9	Appendix F		What is the purpose of this sheet? No information other than the photo is apparent.
264.	C-10	Appendix F		Please correct this sheet: A. Irrigation line at STA 11+04 appears on profile but not plan. B. Show CDF berm fill where applicable at outfall. C. MH C1: Verify 72″ dia MH is structurally capable of accepting three 36-inch dia pipes. D. MH C1 shows an inflowing pipe from the north on the profile but not the plan. E. Provide reference to outfall structure details.
265.	C-12	Appendix F		Indicate connection to existing pipe. Show existing pipe on plan with note indicating size, invert, etc. Show pipe to be plugged and abandoned.
266.	C-13	Appendix F		Plan: Show existing pipes to be plugged and abandoned. Verify 10-foot separation between parallel SD lines A & B is constructible; consider spacing lines either closer together or farther apart to aid constructibility.
267.	C-13	Appendix F		Profile: Provide reference to outfall structure details, indicate incoming 24″ SD at MH A1, label SD lines A and B, show CDF berm fill, and verify MH spacing (Section 5-8 of the DAR indicates 400 LF maximum).
268.	C-14	Appendix F		Label SD lines A and B and verify MH spacing (Section 5-8 of the DAR indicates 400 LF maximum).
269.	C-15	Appendix F		Label SD lines A and B and verify MH spacing (Section 5-8 of the DAR indicates 400 LF maximum). Add a note to define “firewall”.
270.	C-16	Appendix F		Indicate existing pipes to be plugged and abandoned.
271.	C-17	Appendix F		MH B5 appears to have 3 pipes in the plan vs. 2 pipes in the profile. Indicate existing pipes to be plugged and abandoned.
272.	C-18	Appendix F		Please add a note requiring design of outfall structure by professional engineer registered in Oregon and requiring submittal and approval of shop drawings, or note referring to such requirements in the specifications.
273.	C-18	Appendix F		Detail 2: Reference to COE Class I riprap adds another material to the project; can one of the cap materials be used?
274.	C-19	Appendix F		Please clarify where this detail is applicable.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
275.	C-23	Appendix F		Placement of outfall structures on CDF berm complicates construction and schedule coordination. Suggest moving outfalls off CDF berm. Additionally, location of southern outfall conflicts with replacement berth piling for access ramp.
276.	C-24	Appendix F		Provide rationale in DAR for not dredging side slopes for berm footprint. Have all portions of side slopes been verify to be suitable material? Please discuss in DAR.
277.	C-25	Appendix F		Suggest re-considering the location of the weir overflow pipe. What is a "drop inlet spillway drain" at the pipe outlet? Please provide a detail for it. If the habitat bench is deleted, please revise this plan accordingly.
278.	C-26	Appendix F	Yes	Provide cross section of the weir overflow structure, discharge pipe, and outlet structure. Use consistent terminology: CDF Berm vs. Containment Berm. Section 1, Note: The height of the training dikes must be finalized for the 100% design and coordinated in the plans, seismic analyses, and GW modeling. This important design decision should not be made by the contractor.
279.	C-29	Appendix F	Yes	a. Dredging shall occur to the daylight boundary on the south side, digging and sloughing is not allowed. b. The no dredging area along the south side of Slip 3 is a substantial deviation from the 30% DAR and what has been discussed at working meetings leading up to the 60% design. Please justify exclusion of this area from the dredge plan. c. Please accurately depict the limits of dredging, specifically indicating the limits of both the dredging target elevation and the dredging target elevation plus overdredge allowance. For instance, the dredge unit AT-AU-BK-BL has virtually no dredging because the target elevation is above the actual sediment surface elevation over about 75% of the unit. Similarly, dredging appears to be limited to about 50% of unit AT-AS-BF-BG. d. Please indicate sample/core locations and names on plan sheet for future reference during construction to aid in understanding the design basis when making field decisions about additional dredging. e. Please indicate the southern slope to daylight (2:1, 3:1, etc.).
280.	C-30	Appendix F		Please indicate the side slope along the south side along the southern dredging boundary on the sections.
281.	C-34	Appendix F	Yes	Please indicate sample/core locations and names of plan sheet for future reference during construction to aid in understanding the design basis when making field decisions about additional dredging. Please indicate the proposed confirmation sampling locations.
282.	C-35	Appendix F		Please explain in the DAR the limits of the Berth 401 cap area. The cap area appears arbitrary as it is shorter N-S than shown in the EE/CA and longer E-W than in the 30% design. Similarly, please expand the Wheeler Bay cap to the end of the peninsula as shown in the 30% DAR, and enlarge the south side of the western leg to approximately elevation 5 ft as shown in the 30% DAR. Also, the Berth 411 cap appears to shrink from AK-AL-AM vs. the 30% DAR. Please justify the smaller cap or restore cap to prior dimensions. The cap for Pier 5 should extend to the remediation boundary along AA-AQ. Please add a general note describing feathering cap edges at a 5H:1V slope or similar and add dotted line to the plan sheet showing the pay limit for capping, as the pay limit should be outside the minimum neat line boundary to create a feathered transition zone to minimize future erosion of the cap edges.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
283.	C-36	Appendix F		(Supplemental): Please insert a new sheet with plans/sections for earthwork associated with construction of the riparian buffer. Sheet L-6 indicates the buffer will have 1 foot of topsoil for plantings, which is marginal considering the low quality subsoils in the area and the large trees proposed. Suggest excavating 2 feet of soil in the riparian area, scarifying or tilling to a 12-inch depth, and backfilling with 2 feet of high-quality topsoil (developed based on a professional mix design).
284.	C-37	Appendix F		Per comments on the cap modeling, Appendix J, please increase the cap thickness in the Berth 411 area to 15 inches. Please clarify Section 4, what are the two parallelogram areas on the rightmost side of the section (one with diagonal line hatch, one blank)? Section 4: The extent of the Base Cap Type 3 is insufficient. It should provide continuous coverage upgradient from the bulkhead. Please justify the top elevation of the cap in the 100% DAR. How is Base Cap Type 3 material to be placed under existing materials?
285.	C-39	Appendix F		Suggest that Sections 1 and 3 have armoring up to the ordinary high water mark of 16.6 feet elevation. Please coordinate these sections with the landscape sections on Sheet L-2 as there are some discrepancies. Section 4: Indicate fill in upper portion of bank.
286.	L-1	Appendix F		Please add section callouts for Sheet L-2. Coordinate plan with Sheet C-39 as the plan area boundaries are different. Please provide habitat log anchor details.
287.	L-2	Appendix F		Sections: Mulch placed below OHWM (16.6 ft) will float likely away. What is the basis for mulching to elevation 15 feet? Please extend the cross-sections to show the soils preparations/earthwork for the adjacent riparian area. Provide erosion protection measures such as coir log or other material to reduce erosion over the bank lip. The note to amend existing soils with compost should refer to Specification Sections 329113 and 329119. Plantings would benefit from using a high-quality natural imported topsoil or a professionally designed topsoil mix rather than a recipe blend of materials of unknown quality. Mixing materials on the bank is poor practice. Topsoil based on a professional mix design could be blended off site or on-site, but should not be blended on the bank.
288.	L-4	Appendix F		The 11/6/06 letter from USFW requires the riparian habitat include cottonwood trees. These trees are shown on this sheet; however, please correct the legend/symbol for cottonwood trees for consistency. Additionally, please provide discussion in the DAR regarding rooting needs and structural stability needs vs. topsoil and subsoil preparation requirements to ensure that soils are capable of sustaining and supporting large trees such as Cottonwoods and Douglas Fir. Placing 6″ of topsoil is insufficient for ensuring successful growth and health of mature large trees. Revise the landscape plans and specifications accordingly.
289.		Appendix G, General		Numerous references and descriptions conflict with the DAR. Please review and correct the entire Specifications document for these inconsistencies. The specifications should be reviewed for grammar and typos. Please provide specific references for all drawings discussed in the Specifications.
290.	3	Appendix G, Sect. 011100		Paragraph 1.5A and 1.5B. The Port shall include copies of all specifications that are incorporated by reference to EPA as part of the 100% Design Submittal.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
291.	1	Appendix G, 013100	Yes	Please add the following: "The United States Environmental Protection Agency has legal authority over the project work and the Contractor shall allow unrestricted access to United States Environmental Protection Agency employees and its contractor staff (collectively referred to in the remainder of this paragraph as EPA) to observe the work. The Contractor shall coordinate and cooperate with EPA to the maximum extent possible. The Contractor shall neither temporarily nor permanently withhold any relevant data, observations, or information from EPA. EPA shall not provide, nor shall the Contractor accept, verbal direction regarding the means and methods of the work, except that the Contractor shall immediately heed EPA upon EPA's direction to the Contractor to shut down the work and standby until further notice. Other than shutting down the work, EPA shall communicate all direction regarding means and methods and other contractual issues relevant to the Contractor through the Port of Portland.
292.		Appendix G, 013100, General	Yes	1. The Port shall ensure that final early action contract construction documents are stamped by appropriate professionals. 2. The Port shall issue conformed contract construction documents after the bid period that incorporate all addenda issued during bidding. 3. Changes to the contract documents during construction shall be documented using standard construction documentation methods (field orders, change orders, etc.) to provide a complete record of final construction requirements. Undocumented field changes shall be not allowed. 4. For all surveys that require comparisons to design boundaries and grades and thicknesses (cap limits and thicknesses, dredge limits, berm heights, etc.), the Port shall provide to EPA, in a timely manner, coordinated drawings showing both the survey results and the design requirements in the same datum, units, and scales to allow for a direct visual assessment of the quality and completeness of construction. 5. The Port shall provide one complete final conformed set of post-construction contract documents to EPA at the end of the project.
293.	3	Appendix G, 013200	Yes	Paragraph 3.2. Please add the following: The Contractor shall provide the Port 6 hard copy schedules, initially and monthly, in color and on oversize sheets as applicable.
294.	1	Appendix G, 013300	Yes	Paragraph 1.2A. Provide EPA with 3 original copies of each submittal for review. Please include EPA and EPA's consultant on the General Submittal Transmittal Review Form.
295.	1	Appendix G, 014500	Yes	Paragraph 1.1. Please verify that all elements of the project performance standards for capping, dredging, etc. are accurately called out in this section as an element to be addressed in the Contractor's CQC plan.
296.	4	Appendix G, 024113		Paragraph 3.4C (5). Dry brushing tires will likely be inadequate to remove wet sediments from tires. Add requirement for street sweeping using non-compressed air type sweeper. Additionally, provide a disposable pad for any material loadout areas in order to keep the driving surface clean, as decontamination of truck tires is very difficult.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
297.	3	Appendix G, 312319		3.2A (1) (b,c). Please provide justification/discussion of this issue, at a minimum, compare groundwater concentrations to water quality criteria. Please discuss this issue in the DAR, providing an estimate of areas to be dewatered, dewatering depths, durations, flow rates, volumes, and water quality.
298.	4	Appendix G, 312319		3.2B (2). All discharges of dewatering effluent to the stormwater system require chemical monitoring. Discharges under 2 weeks duration must be monitored, not allowed based on visual observations that "look clean."
299.	2	Appendix G, 329113		Paragraph 3.1F. Adding 4 inches of additional imported fill soil per 329119 (i.e., Columbia river sand) will make a poor topsoil that is highly erodible. Use a high quality professionally designed topsoil mix rather than a recipe blend of material of uncertain quality. Placing, blending, tilling, and smoothing all these materials (subsoils, 2 compost layers, sand, and fertilizer) on a 3:1 slope directly adjacent to the river seems like a poor approach.
300.		Appendix G, General 352023		Overdredging at the base of a slope in anticipation of sloughing shall not occur. The contractor will not be allowed to drag dredged areas to even out high or low spots.
301.		Appendix G, 352023	Yes	General. This section is incomplete because it fails to identify the purpose of dredging (i.e., achieve cleanup levels rather than dredge a predefined prism). Please include a new section identifying the project goals, confirmation sampling approach, schedule, likely need for iterative sampling and dredging, and dredging standby measurement and payment. Inclusion of Figure 11 from the DAR will greatly aid the Contractor in understanding the true nature of the work.
302.	2	Appendix G, 352023, 1.3B5		The text refers to "subsequent remedial actions" that can occur outside the 10-day window, however the referenced section does not clearly articulate these. Please include more specific information about activities that may take longer than the specified 10 days.
303.	2	Appendix G, 352023, 1.3C		Part 1.2.B does not define time frames. Please correct this reference.
304.	2	Appendix G, 352023, 1.3C3		The description of scheduling is in conflict with the DAR. Please correct this reference.
305.	3	Appendix G, 352023, 1.3F		Please provide more information regarding how debris will be located and handled.
306.	3	Appendix G, 352023, 1.4		Please specify when soundings will be measured with respect to initial dredging, post-residual dredging, dredging to remove high spots, etc. Please articulate how soundings will be measured in the event that construction equipment or other obstructions prevent immediate access to any area within the project site.
307.	6	Appendix G, 352023, 1.6G2a	Yes	Add the following "specifically including the horizontal and vertical approach to performing the work in a manner that will minimize the dispersal of contaminated sediment/dredging residuals."

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
308.	3	Appendix G, 352025, 1.4C1		Clarify that Phase 1 capping in Wheeler Bay and Berth 401 is allowed prior to Slip 3 dredging, but that Wheeler Bay Phase 2 capping, and all other capping, is not allowed until after Slip 3 dredging is complete. Coordinate terms with the Drawings (i.e., Phase 1, Phase 2, etc.).
309.		Appendix G, 352025, 2.2	Yes	Add that all cap material shall be igneous or metamorphic type rock, sedimentary rock shall not be allowed. Provide chemical specific acceptance concentrations for cap materials. Please revise this section to require that import material be tested for gradation, chemistry, and TOC at least every 5000 CY. One sample per 20 percent of the import volume is inadequate.
310.		Appendix G, 352025, 2.6-2.10		Please clarify where Armor Types 2 and 5 are used. They do not appear on the plans or in Section 6.5 of the DAR.
311.		Appendix G, 352025, 2.11		Please provide a specification for the percent passing the No. 200 sieve.
312.	11	Appendix G, 352025, .2C2	Yes	Can cores likely be driven through Base Cap Type 2 material containing up to 4-inch diameter stones? Please clarify. Please also clarify the sequencing, as this paragraph begins with the Contractor notifying the Port when capping is complete, yet then reverts to discussing coring the base cap. Coring of base caps will not be able to be completed once armoring is placed.
313.	10	Appendix G, 352025 3.2G		Please include specifications for cycle times or bucket velocities as part of WQ BMPs, and articulate that barges shall not be overfilled. Dredging for quality rather than production should be emphasized.
314.	12	Appendix G, 352025, 3.4		Please specify that barge draft should be verified as sufficient to place dredged material within the designated area.
315.	12	Appendix G, 352025, 3.4.A		Please verify that “GPS” as opposed to “EPS” will be used to confirm the positioning of dredged material.
316.	12	Appendix G, 352025, 3.4 I	Yes	A capping tolerance of +/-0.5 ft is unacceptable. The Base Cap is only 0.5-foot thick in some places, which would imply a cap thickness of 0.0 ft (none) is acceptable. Please clarify that the cap thicknesses on the drawings are minimums to be achieved in all areas, subject to a specified overplacement allowance.
317.	12	Appendix G, 352025, 3.4 O		This requirement is unreasonable, as cap material will spread somewhat beyond the neat line cap areas. As written, this requirement creates a strong incentive for the contractor to place minimal material at the cap boundaries resulting in thinner than desired cap. Additionally, the cap edges should be feathered somewhat in a transition zone beyond the neat line cap boundaries in order to minimize future erosion of the cap edges.
318.	12	Appendix G, 352025, 3.6		Please specify the method proposed to screen debris from the dredged sediment and indicate applicable BMPs for sediment and water management and housekeeping.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
319.	13	Appendix G, 352025, 3.6.D		Please provide specifics to ensure that the sampling should be consistent with objectives described in the DAR and other sampling plans.
320.		Appendix G, 352025, 3.8C		The contractor shall maintain records of the number of bucket cycles per hour during the first week of operation to track cycle times for subsequent correlation with water quality monitoring results.
321.	10	Appendix G, 352025, 3.2C	Yes	Revise cap thickness requirements to clarify that cap thicknesses on the Drawings are minimums and any areas of the cap thinner than the minimum thicknesses shall be corrected to achieve the minimum thickness.
322.	2	Appendix G, 352027, 1.4.E		Please include potential conflicts associated with construction of the replacement berth.
323.	5	Appendix G, 352027, 1.6.H.2		Please verify that “EPS” rather than “GPS” was intended, and correct if appropriate.
324.	6	Appendix G, 352027	Yes	Paragraph 2.2. Add that all cap material shall be igneous or metamorphic type rock, sedimentary rock shall not be allowed. Provide chemical specific acceptance concentrations for cap materials. Please revise this section to require that import material be tested for gradation, chemistry, and TOC at least every 5000 CY. One sample per 20 percent of the import volume is inadequate.
325.	6	Appendix G, 352027	Yes	Paragraph 2.3. Add a requirement for minimum 0.1% TOC in select fill for containment berm to provide consistency with groundwater modeling analyses. Establish a maximum TOC concentration as well.
326.	9	Appendix G, 352027	Yes	Paragraph 2.6. Revise this section to require import fill to meet the same chemical specific acceptance concentrations as established for cap material and berm select fill. EPA and the Port have specifically agreed that contaminated material cannot be placed above the saturated zone (now established at elevation 9.5 ft) and this specification negates this agreement.
327.	10	Appendix G, 352027	Yes	Paragraph 3.1A. Revise to establish requirements that contractor designed facilities must be designed by a qualified professional engineer registered in Oregon to meet established code requirements. A submittal with stamped drawings and calculations shall be required.
328.	10	Appendix G, 322027	Yes	Paragraph 3.2A. The height of the training dikes must be finalized for the 100% design and coordinated in the plans, seismic analyses, and GW modeling. This important design decision should not be made by the contractor.
329.	10	Appendix G, 322027	Yes	Paragraph 3.2C. Compaction of fill should begin at soon as practical, which may be lower than 5 feet above water level. The specification indicates the construction method to use on the berm when the berm is more then five feet above the river level (i.e., placed in lifts, compacted, etc.). However, no direction is given for construction methods below this point. Please coordinate the design with the geotechnical analysis in Appendix A. The height of the training dikes must be finalized for the 100% design and coordinated in the plans, seismic analyses, and GW modeling.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
330.	10	Appendix G, 322027		Paragraph 3.2E, 3.2F. These requirements conflict with each other, please revise for clarity.
331.	10	Appendix G, 322027		Paragraph 3.2. Suggest overbuilding the berm initially to have it settle to the desired elevation. Elaborate on the process for periodically surveying the berm after initial construction and adding additional fill to correct for settlement. Consider that the berm crest should initially be built wider than desired to accommodate narrowing during subsequent fill placement to correct settlement. For example, if the berm settles 4 feet, at 2:1 side slopes, adding more will to restore the original elevation will narrow the berm crest by 8 feet. Immediately prior to completing the project and demobilizing, the contractor should complete a final survey and top off the berm crest to the final elevation.
332.	10	Appendix G, 353200		Paragraph 2.1. Please use consistent terminology: large woody debris vs. habitat logs vs. rood wads. Drawing L-1 indicates habitat logs.
333.		356216 General		Steel Pipe Piles: All debris shall be removed and a spill response plan shall be prepared for materials falling into the water. Spills shall be reported immediately to the Port. Pile driving and other construction procedures shall be consistent with all water quality standards imposed on the project.
334.	Section	Appendix H-5		Column Settling Test for T4-Comp-2. This test appears to confirm that TSS concentrations in the CDF at 132 hours will be about 2000 mg/L.
335.		Appendix I, General Comments		Please clarify the origin and use of the Dilution Attenuation Factors (DAFs), including the range of DAFs that might occur based on the sensitivity analyses.
336.		Appendix I, General Comments		Please clarify the general assumptions about the hydraulic conductivities and the discharge of contaminants from the finer sediments. As presented the flow appears to be all along the least permeable contaminated fill material, which is probably unrealistic. If some gradients were to allow contaminants to migrate into the more permeable zones above or below these sediments (such as in interim capping layers), rather than to assume perfect flow along the least permeable zone, the contaminant flux getting to the river would probably be much greater, and the time of travel to the berm shorter than now predicted. The main report should provide a summary of the main assumptions used in the modeling to highlight what went into reaching some of the key report conclusions on travel time and concentration, rather than leave that type of information in the appendix which many readers may not read.
337.		Appendix I, General Comments		Please address these issues based on the January 11, 2007, conference call regarding the groundwater modeling: 1. Provide more detail and discussion of input parameters, sensitivities, and results. 2. For short-term modeling, the analysis should be run out longer, results reported for more locations within the berm, and results put into context with information on transport pathways and velocities. Discuss if the berm “fills up” with a highly contaminated first flush that is then ignored in restarting the long-term model with a clean berm. 3. Provide additional discussion of berm input parameters such as TOC in sand/gravel. The modeling for metals used TOC as a surrogate for removal of metals by clays, iron, etc., which needs to be

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
				discussed and justified with actual and/or literature data, and confirmed by testing in actual berm fill soils. Additional riprap quarry spalls for training dikes will likely have zero TOC or clay. 4. The issue of conservation of contaminant mass in sediments in CDF is unclear. Please double-check. How are bulk sediment concentrations included/used in this analysis? Please discuss in the text. 5. For long-term modeling, the assumption of using only T4 sediments is not reasonable. Provide a review of other Portland Harbor sites and use available PCLT data or estimate PCLT results from literature. The concern is the T4 sediment PCLT data indicate very "clean" leachate. Other sites likely won't be so clean. Based on a review of other PH sites, PCBs, PAHs, DDT, and TPH are of major concern. Metals appear to be less of a concern. EPA's concern is that the Port is building a regional disposal facility and, as such, only establishing a process for making determinations for sediment acceptance is insufficient, the design needs to anticipate sediments that are likely to be accepted and demonstrate that accepting these sediments will be feasible. However, it is acknowledged that use of "maximum" concentrations from other sites will unreasonably bias the analysis. Instead, representative data should be used. 6. See Table 1 (attached) for applicable COCs, standards, etc. The modeling should be consistent with Table 1. 7. Define critical flow path. Rerun model with final training dike height and inform design engineers if smaller training dikes would aid WQ compliance. 8. Provide additional discussion of biodegradation parameters, temperature effects, etc. based on literature and discuss sensitivities in model. Include limiting case of non-degraded chemical tracer for comparison. Include evaluation of contaminant degradation daughter products.
338.		Appendix I, Section 2.0		Please revise discussion of short-term discharge consistent with Appendix I General Comments.
339.		Appendix I, Section 2.0		The groundwater flow model (MODFLOW-2000) and contaminant transport model (MT3DMS) do not account for the fact that the fill material will be undergoing consolidation. This process may release additional contaminant load from dissolved and total material into the other formations and into the water column during filling process for CDM. Please discuss the significance of sediment consolidation.
340.		Appendix I Section 4.1.2		The use of wells MW-09 and MW-10 may be fine, but there should be a discussion as to how these wells and their respective water elevations related to other wells further inland. It may be that the inland wells would provide indications of a higher gradient once the facility is filled to capacity and the system becomes a relatively steady state ground water system in the long term.
341.		Appendix I, Table 4-1		It is good to have this table of parameters, but there should be more explanation for key parameters. Some of these include the hydraulic conductivity of the aquifer, berm, and sediment fill layers. What is the uncertainty of any of those values, and how would that affect the results of the model? As presented the value for the fill 0.0013e-3 ft/day seems too small (even if that is the value for the long term after settling), and the value for the berm 280 ft/day seems a bit too optimistic for the berm. Since these values will control much of the flow and contaminant transport, they need to be tested for the level of uncertainty that they will create in the modeling. It is not clear why there are two different berm material sections, or which one is considered in the model.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
342.		Appendix I, Section 4.1.4		The list of COPs seems too limited. The model should consider any of the contaminants which are detected in the DRET or MET, and to include potential contaminants expected from other areas in the Portland Harbor sites. It seems that large areas of Portland Harbor sediments have much higher levels of PCBs, TPH, ΣDDTs, PAHs, and to a lesser extent metals than what has been modeled as expected in the CDF. Imported sediments may also contain or further affect the CDF sediment geochemistry and cause changes which release iron or manganese, which already appear to be a likely problem in the river. Many of those issues would make likely that those sediments unacceptable for the CDF unless the modeling and design are done to include them now. It would be better to do some estimate of those now, or to over-design the CDF with some safety factors, than to allow those concerns to become apparent after the CDF is constructed. Please update the modeling based on data from other PH sites likely to dispose of sediments in the CDF, using literature values for leachability, if actual PCLT data are not available.
343.		Appendix I, Section 4.1.4		While use of column leaching results is appropriate, the specific results of the PCLT tests should be reviewed in more detail. The results provided in Table 12 of the main text of the DAR do not follow typical results observed in column studies and in the field. That is, large decreases in concentrations during the initial pore volumes followed by leveling off in later pore volumes should be observed. Actual results are extremely variable. Results may indicate that the tests were not performed correctly or under incorrect conditions. In addition, only one sample was tested. More tests should be performed to adequately characterize the leachate concentrations or results should be compared to literature values to assess whether they are reasonable. In addition, see comments on the 30% design concerning use of the PCLT method (Comment #57 on 30% DAR, and Comment #15 on the 30% Sediment Acceptance Criteria Tech Memo). More PAHs should have been selected for evaluation. The use of MET is not appropriate for evaluation of water quality through the berm. See previous comments on the 30% design. In particular, the use of a 4:1 liquid to solids ratio dilutes the leachate concentrations. If the porosity is 33 %, then a concentration measured in a 4:1 leachate represents the average concentration in the first 12 pore volumes of leachate. This concentration will be much less than that in the first pore volume. Please discuss this in the text and apply a correction factor as appropriate.
344.		Appendix I, Section 4.1.5		The fill material is the source material. The concentrations from column tests on the source material should be used directly in the model as the source concentrations. These concentrations leach directly into the berm. Retardation in the source material should not be used in the model to decrease the concentrations before the chemicals reach the berm. This does not represent actual conditions. The source term concentrations can be decreased with pore volumes by using direct results from the column leach tests. However, the column leach tests do not show uniform decrease in concentrations with pore volumes (see previous comments); therefore, constant source term concentrations should be used. More appropriately, the column tests should be run again to obtain more representative results. Only the Kd values of organic compounds are controlled by the foc. Therefore, adjustment of Kd values for metals based on foc is not appropriate.
345.		Appendix I, Section 4.1.5.3		Justification of the use of one value for the half life should be provided. Complete literature review and provide sensitivity analysis. An infinite half-life should be used as an upper limit in the sensitivity analysis.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
346.		Appendix I, Section 4.1.5.1		The discussion of Kd should discuss the fact that this calculated parameter is very difficult to define accurately, and that it can range over many orders of magnitude. As such it is very important to allow sufficient margins of safety since an underestimate can alter the resulting calculations significantly. Also, as in previous comments, the use of the Kd has to be framed in levels of uncertainty (probably of factors of 10 or 100 rather than 2 or 3 times). Furthermore, the Kd values that have been calculated are for the ground water flow system of the Slip 3 sediments, which are only a subset of the expected sediments in the CDF. As such, the modeling has to provide potential ranges which go beyond what was measured calculated for those sediments to provide an understanding of the uncertainties from the model calculations which are presented. The report should also discuss how bringing other sediments, with other contaminants and geochemical characteristics could affect any the calculations presented, and how contaminant discharges from different disposal units could alter the calculated Kd rates presented in Table 4-4.
347.		Appendix I, Section 4.1.5.1		I suggest that the report also consider other EPA publications related to Kds, such as Understanding Variation In Partition Coefficient, Kd Values, Volume I: The Kd Model, Methods of Measurement, and Application of Chemical Reaction Codes, EPA402-R-99-004A, August 1999. This report has much valuable information, and includes Table 3.3 which lists advantages, disadvantages, and assumptions of the methods which are used to determine Kd values. The 100% design should include some of those limitations in the selection of the modeling parameters, and use the concepts to provide some description of the expected uncertainty in this critical parameter which then becomes a major driver in the modeling solutions.
348.		Appendix I, Section 4.1.5.2		Dispersion. The concept of dispersion should again be separated into its two distinct phases. First there is the short term filling and how dispersion will occur inside of the berm when there is a surface water impoundment with turbid water, and then there is the long term ground water flow regime that will exist when the CDF is filled. In the long term ground water regime, there is very limited practical ways to get dispersion, as can be observed by the many skinny contaminant plumes that have been documented. The other issue of the dispersion, within the berm area is that it is just an indication of the mixing that will be occurring from the pumping action of tides and river stages, which are simply diluting the overall plume concentrations, not the flux to the river. The modeling should attempt to model to the inside of the berm face, to fully inform everyone what can be expected to be discharging to the river. The present modeling with the dispersion within the berm is simply confusing the issue of what concentrations can be expected and what contaminant loading is moving to the river. It is unclear how the dispersion calibration at the river/berm interface was done, what the impact of different model parameters are, and whether the proposed results can be trusted for the long term concentrations leaving the CDF. It may be that the issue is just not having enough detail, but most likely the problem is that more supporting work would be required to fully document the validity of those results.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
349.		Appendix I, Section 4.1.5.2		"Simulating the seasonal and daily tidal influences on the Willamette River for long periods is not practical, however. Thus, a steady-state flow field with dispersion characteristics that approximates peak concentrations and mass flux through the berm is the desired solution." – Disagree that this modeling is not practical. Considering the potentially complex oscillatory flow field in the CDF that might be established through the proposed permeable berm, I think that it is essential that dynamic modeling be performed. The approximations made to account for this introduce too much uncertainty into the model results, and as such, should not be used.
350.		Appendix I, Section 4.1.5.3		The use of degradation half-life values are not clear. When the sediments are placed in the CDF there will be major aeration of the materials for the short term, and when the CDF is filled, there will probably be aerated ground water flowing through the material from the uplands. Please revise the modeling to omit the half-life degradation rate, to be conservative, and add this result to the graphs as the most conservative case. Please discuss the appropriateness of the selected half-life values for the CDF and give expected temperature, redox potential, pH, etc. based on available literature data. Complete a sensitivity analysis.
351.		Appendix I, Section 4.2.2		It is assumed that only dissolved contaminants will pass through the CDF; therefore, only dissolved contaminant levels were modeled. EPA agrees that the berm fill material will provide some filtration, but is not convinced the berm will provide complete removal of all particulate-borne contaminants. Please clarify the flow time through the berm. Please also complete a sensitivity analysis for a case where a fraction of fine sediment passes the berm, such as 1% of material passing the #200 sieve.
352.		Appendix I, Figure 4-6		The figure seems misleading or incorrect. Note that the flow lines (vectors?) inside the CDF (right side from berm) are much longer and flow upward at the berm face. Since the berm is also saturated and of much higher hydraulic conductivity (orders of magnitude?) than the fill it is unclear why the flow vectors do not continue parallel across the berm. Please explain in detail or correct the figure. A related issue is the hydraulic conductivity for the training dike material (riprap or quarry spalls) appears to be substantially underestimated. A value of 10 times the selected value appears more reasonable. It appears reasonable to conclude that the training dikes provide no flow restriction or contaminant attenuation/reduction at all. The modeling would appear to be more accurate if the point of discharge to the river was taken to be after the flow leaves the bulk berm fill, as if the training dikes do not exist.
353.		Appendix I, Figures 4-14 to 4-17		The figures should be redone when some of the comments on the modeling and conceptual assumptions have been reconsidered and rerun.
354.		Appendix J, General		The analysis appears to be based on the assumption that groundwater exiting through the cap is completely free of contaminants. Please provide a table summarizing shoreline groundwater concentration data.
355.	6	Appendix J		Revise cap thicknesses to be based on zero biodegradation. Biodegradation rates are not reasonable for capped sediment which little biological activity is to be expected, due to temperature and lack of food sources. Section 5 notes that biodegradation rates are one of the most sensitive parameters in the model.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
356.	9	Appendix J		Please double check the last section of bullets regarding biodegradation. Previously in the document, for Berth 411, the text stated the assuming zero biodegradation changed the cap thickness from 12 to 15 inches. The last bullet appears to discuss partitioning instead of biodegradation.
357.		Appendix J, Table 2		Please clarify the thickness of the bioturbation layer in the analysis. Consider this factor in the sensitivity analysis. Please note comment 42a on the 30% DAR.
358.		Appendix L, Figures		The notations of the figures appear behind the aerial photos, making them impossible to read. Please correct.
359.		Appendix L		Prop-Wash, Wind and Vessel Wave Analysis – Please include a justification for using average prop horsepower in the evaluation (25% of max for one tug, 50% for another). This does not seem to be a conservative assumption – the modeled conditions should include assumptions that reflect high-end prop-wash forces.
360.		Appendix L		Prop-Wash, Wind and Vessel Wave Analysis – Please include an analysis that presents potential cumulative effects of wind, vessel waves and prop-wash, as all three are likely to work on the cap area at the same time.
361.		Appendix L		Prop-Wash, Wind and Vessel Wave Analysis – Please include a table that presents the potential forces on the various cap components and the proposed cap geotechnical properties for each site.
362.		Appendix M	General	FEMA usually likes to see a copy of their FIRM included in the report with the project location shown and associated cross sections identified. FEMA will also want to see the modeling data, surveyed base map, and the proposed project design.
363.	2	Appendix M		The report notes state minor floodway encroachments from capping at Berth 401. It would be helpful to show this on a figure and/or quantified this a little more.
364.	3	Appendix M		FEMA will probably want to see a table that compares the 1979 HEC-2 model results with the HEC-RAS model, this is called a duplicate effective model, and generally shows any difference between water surface elevations between the two models - These are rarely the same (but that is ok). FEMA will want a comparison of the HEC-RAS model (duplicate effective model) and the existing conditions model with the new cross sections to show and changes in WSE from the new cross sections. Then existing conditions should be compared to proposed conditions.
365.	4	Appendix M		Table 1 - Suggest adding the appropriate FEMA cross section label to the corresponding sections - FEMA generally only regulates changes in WSE at these cross sections.
366.	5	Appendix M		Add a brief methods section explaining development of the floodway boundary at the new cross sections.
367.	5	Appendix M		Same comment as Table 1
368.		Attachment K-2		Please rename as this is part of Appendix M. Suggest reorganizing to put the Portland PCC 24.50.060.F.8 regulations up front to explain the context of this analysis - The Port is requesting an exemption from the compensatory storage requirement, but, as written, that is not clear until the very end of the report

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
369.		Appendix N	Yes	Please revise Appendix N to address chemical contaminant discharges over the weir, and discuss available BMPs to minimize contaminant discharges. The memorandum is incomplete is addressing only TSS. Hydraulic dredging can have solids contents of 5% or lower, please justify the stated solids content of 10 to 25% which seems optimist. Please reconcile the various dredge slurry volumes to provide a more accurate estimate of the amount of water that may go over the weir. At 10% solids, the volume would be about 900,000 CY. At 5% solids, the volume would be about 1,800,000 CY. Based on running the dredge for the specified duration, pipe size, and velocity, the volume would be about 1,400,00 CY. Please see related comment on DAR Page 68, Section 5.4.1.
370.		Appendix O, General Comments	Yes	The QAPP is too generic and does not adequately address project specific issues. Please revise the QAPP to specifically address quick turnaround requirements for laboratory analyses, use of any on-site labs, initial data QA/QC procedures, rapid reporting of data to EPA and final data QA/QC and reporting procedures. Rapid TAT analyses may be used for water quality analyses, post-dredge sampling, and perhaps even cap material characterization. Please indicate how many samples of various matrices and analytes might be generated per day and the expected TATs required. The QAPP should clarify the proposed project requirements (e.g., evening/weekend work?), the approaches to the used to meeting these requirements, and contingency actions to be implemented in the event of problems. How will the Port deal with final results that differ from initial results? What instructions will be given to the lab(s) regarding initial data QA/QC before release of draft data, approach for re-extractions/re-analyses, etc. relative to meeting analysis TATs? The labs should be specifically instructed to report problems encountered in a timely manner.
371.		Appendix O, General Comment		For sediments, the methods, detection limits, and QA review should be those used for the PH RI risk assessment, as the sampling results will ultimately be used for assessing risk for the RI. For the water samples, the methods used and detection limits will depend on the criteria that the water sample results are being compared to (i.e., aquatic acute or chronic or human health), so these need criteria (as well as the list of COCs) need to be determined before a final QAPP/FSP can be developed and approved.
372.	7	Appendix O, Section 3.1.1		Please add data use bullets for characterization of CDF berm fill material and sediment cap material.
373.		Appendix O, Section 3	Yes	The decontamination plan shall be modified to include steps to decontaminate divers at a minimum with potable water to remove sediment containing COCs and bacterial contamination present in the Willamette River.
374.		Appendix P		For sediments, the methods, detection limits, and QA review should be those used for the PH RI risk assessment, as the sampling results will ultimately be used for assessing risk for the RI. For the water samples, the methods used and detection limits will depend on the criteria that the water sample results are being compared to (i.e., aquatic acute or chronic or human health), so these need criteria (as well as the list of COCs) need to be determined before a final QAPP/FSP can be developed and approved.
375.		Appendix P, HASP 3.3.1.3		Language should explicitly include properly zipping or securing the flotation device; simply wearing a PFD is inadequate (i.e. if unzipped). USCG fatality reports cite improperly secured PFD's as a contributing factor in safety incidents. Vessel operators should be appropriately licensed in the State of Oregon/this should be noted in the text as a vessel operation requirement.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
376.		Appendix P, 3.3.2.1	Yes	The diving safety manual shall be made available to the EPA project manager for review, as well as project specific dive plans, at least 2 weeks before initiation of diving operations.
377.		Appendix P, 3.3.2.2		This section is incomplete and should address the number of divers in a given crew (e.g. Dive master, Tender/standby diver, line tended diver or two divers in the water, a standby diver, a dive master tender, etc.). Procedures should be outlined to specify the minimum crew for line or surface supplied solo diving (3 recommended) versus buddy diving (4 recommended). All solo diving activities should entail use of a pony bottle ("bailout bottle") and constant surface communications.
378.		Appendix P, 3.3.2.3		Divers should possess training beyond recreational training (i.e. professional, commercial, or military dive training) and experience appropriate for the dives at the site. NAUI, PADI, YMCA training is "recreational" training.
379.		Appendix P, 3.3.2.3		Divers should also possess training in oxygen administration.
380.		Appendix P, 3.3.2.4	Yes	Minimum diver dress. Divers shall be completely separate from the river environment. At a minimum, divers shall utilize a full face mask that seats to a dry suit, a slick (rubber) dry suit suitable for decontamination (rather than crushed neoprene), and dry gloves. Procedures should be in place for decontamination of a diver with a glove or suit leak and specified in the HASP. A decontamination procedure shall be added consisting of, at a minimum, potable water rinse of the diver before removing mask and gloves.
381.		Appendix P, 3.3.2.7		A submerged pressure gauge should be employed also for all reserve cylinders, in addition to the SPG for the primary gas supply.
382.		Appendix P, 3.3.2.7		A 30-minute supply of oxygen for two divers should be carried aboard the diving platform at all times, in addition to a first aid kit stocked specifically for dive operations.
383.		Appendix P, 3.3.2.9	Yes	A J valve reserve air supply is not acceptable. Divers shall have a true reserve breathing supply available on their person. Additional dive specific safety information and recommended minimum procedures are posted on the Portland Harbor Technical Documents page.
384.		Appendix P, 5.2	Yes	Lab turn around times. As specified by EPA in the draft WQMCCP, lab turnaround times are from the time of sample collection to delivery to EPA. Samples that take longer than 72 hours from collection to verbal or electronic delivery to EPA will be considered out of compliance with this requirement.
385.		Appendix P, 6.1	Yes	Notification of the EPA RPM and WQS are required. Not "either" as specified. In all cases, the design needs to be consistent with the final WQMCCP. On the same day, the same message shall be communicated in writing via email to confirm all verbal communications.
386.		Appendix P, 6.2.3		It remains to be proven that TSS and turbidity will adequately predict for chemical constituents. This theory will be evaluated on the basis of data collected during the project.
387.		Appendix P, 6.3	Yes	BMPs. Overwater conventional bucket dewatering will not be allowed. The bucket should be quickly moved once out of the water to the barge, and not drained over-water. This BMP shall be listed as mandatory for dredge operations.

Comment No.	Page No.	Section No.	Directed Comment (Yes/No)	Comment
388.		Appendix P, Table 1, 2, 3, 4	Yes	Please replace these tables with the tables attached to the Action Memo. Numerous changes are apparent, but not justified. Please cite any deviations from the Action Memo requirements.
389.		Appendix Q, Section 3.3		The description of chemical hazards appears to be incomplete as it does not address all chemicals of concern in sediments nor does it indicate concentrations that are likely to be encountered.

Table 1. Summary of T4 CDF Water Quality Monitoring Requirements

Parameter	CDF Weir Discharge Pipe for T4 Early Action	Berm – Short-Term for T4 Early Action	Berm –Dormant Periods Between Sediment Disposal Events (See Note 2)	CDF Weir Discharge Pipe for Future Fillings	Berm – Short-Term for Future Fillings	Berm – Long-term OMMP (See Note 4)
Point of Compliance	End of Pipe	Ambient water column as close as practical to berm face	Berm porewater (1 ft into berm face)	End of Pipe	Ambient water column as close as practical to berm face	Berm porewater (1 ft into berm face)
Monitoring Method	Sampling in CDF at weir	Bottle type whole water sample	Diver sampling with probes or monitoring wells or other method as approved by EPA.	Sampling in CDF at weir	Bottle type whole water sample	Diver sampling with probes or monitoring wells or other method as approved by EPA.
COCs	All applicable T4 COCs>PEC including phthalates, plus PCBs, DDT, and copper (see Note 1)	All applicable T4 COCs>PEC including phthalates, plus PCBs, DDT, and copper (see Note 1)	All applicable COCs>PEC including phthalates. Also, copper and additional soluble and bioaccumulative chemicals as approved by EPA (see Note 3).	All applicable COCs>PEC including phthalates. Also, copper and additional soluble and bioaccumulative chemicals as approved by EPA (see Note 3).	All applicable COCs>PEC including phthalates. Also, copper and additional soluble and bioaccumulative chemicals as approved by EPA (see Note 3).	All applicable COCs>PEC including phthalates. Also, copper and additional soluble and bioaccumulative chemicals as approved by EPA (see Note 3).
Standards	Acute Water Quality Criteria & Water Quality Standards. Chronic Water Quality Criteria, Water Quality Standards to be used as action levels for additional BMPs.	Acute Water Quality Criteria & Water Quality Standards. Chronic Water Quality Criteria, Water Quality Standards to be used as action levels for additional BMPs.	EPA National Recommended Chronic Water Quality Criteria for both aquatic organism and human health, Oregon Chronic WQS, Region 9 PRGs, MCLs, and PH site ROD requirements.	Acute Water Quality Criteria, Water Quality Standards. Chronic Water Quality Criteria, Water Quality Standards to be used as action levels for additional BMPs.	Acute Water Quality Criteria, Water Quality Standards. Chronic Water Quality Criteria, Water Quality Standards to be used as action levels for additional BMPs.	EPA National Recommended Chronic Water Quality Criteria for both aquatic organism and human health, Oregon Chronic WQS, Region 9 PRGs, MCLs, and PH site ROD requirements.

Notes:
1. All COCs present above PEC levels in Slip 1 berm key dredged material and Slip 3 dredged material, plus PCBs, DDT, and copper.
2. Dormant period monitoring will begin when water level in CDF equilibrates with river water level within 1 foot.
3. All COCs present above PEC levels in any dredged material placed into the CDF, plus PCBs, DDT, and copper, plus other bioaccumulatives and solubles (e.g., perchlorate, cyanide, volatiles, etc.) as approved by EPA.
4. OMMP period to begin after final disposal of contaminated sediment to CDF.

Prepared by: Parametrix, Inc. 1/8/07

ADDENDUM 1
TERMINAL 4 REMOVAL ACTION PHASE II SCHEDULE
APPROVED FEBRUARY 19, 2010

Addendum 1
Terminal 4 Removal Action Phase II Schedule
Approved February 19, 2010

Item	Date
General	
• Port submits an updated Terminal 4 Phase II Removal Action Schedule • EPA Approval of the updated Terminal 4 Phase II Removal Action Schedule[1] • EPA provides CDF Performance Standards to the LWG (and Port)[2] • Meeting with the Port and EPA teams to discuss CDF 60% Design Approach (including sensitivity analysis)	• February 16, 2010 • March 2, 2010 • February 22, 2010 • First half of March, 2010
CDF 60 Percent Design	
• Port submits a groundwater model input parameter memo to EPA including: a). Preliminary conclusions comparing Portland Harbor leachability data with previously used data extrapolated from Thea Foss and other sites; and b). The proposed input parameters including those that were not agreed upon during the informal dispute resolution process for the groundwater model • EPA reviews and comments on the groundwater model input parameter memo	• April 1, 2010 • 14 days after the Port submits the groundwater model input parameter memo
• Port submits a memo to EPA summarizing the groundwater modeling results • EPA reviews and comments on the groundwater modeling results	• 60 days after receiving EPA comments on the groundwater model input parameter memo[3] • 14 days after the Port submits the memo summarizing groundwater modeling results
• Port submits CDF 60 Percent Design and Cost Estimate to EPA	• 60 days after receiving EPA comments on the groundwater model results[3]
Ancillary Submittals	
• Port submits a Draft Final Design Status Report (DSR) to EPA • Port submits a Final DSR to EPA	• 30 days after EPA approves the updated Terminal 4 Phase II Removal Action Schedule • 30 days after EPA approves the Draft Final DSR
• Port submits a Final Recontamination Approach Report to EPA	• 120 days after approval of the updated Terminal 4 Phase II Removal Action Schedule
Phase II Completion	
• CDF final design (90 and 100 percent) and construction	• Post-ROD; To-Be-Determined by EPA in consultation with the Port
• Design and construction of combination dredging, capping, and monitored natural recovery (MNR) in Slip 3, Wheeler Bay, Berth 401, and North of Berth 414 areas	• Post-ROD; To-Be-Determined by EPA in consultation with the Port
• Recontamination Analysis for dredge, cap, and MNR areas to EPA	• Post-ROD; Part of the Design of the dredge, cap, and MNR areas

Notes: [1]This schedule is presented based on the Port's understanding of how the CDF 60% Design could move forward to meet a target submittal date of September 1, 2010. The schedule may need to be refined based on receiving the proposed CDF Performance Standards from EPA and the meeting with EPA and Port teams to discuss the design approach.

[2]The schedule assumes the CDF Performance Standards will be provided by EPA on February 22, 2010 and significant issues are not raised on the proposed CDF Performance Standards.

[3]The schedule of interim deliverable submittals assumes significant issues are not raised and/or resolution of those issues will occur in a timely manner.