Portland Harbor Superfund Site
Frequently Asked Questions (FAQs) on Confined Disposal Facilities
January 14, 2013 (revised December 2013)

Three confined disposal facilities (CDFs) are currently being considered to contain contaminated sediments removed through dredging or excavation at the Portland Harbor Superfund Site. The three CDF locations being considered are situated at Terminal 4 (T4) Slip 1, the upper end of Swan Island Lagoon, and offshore of the Arkema site. This handout presents responses to questions regarding these CDFs. Questions have been organized into the following categories:

Section 1 - Purpose and Usage 1
Section 2 - Acceptance Criteria.....3
Section 3 - Contaminant Characteristics and Mobility 4
Section 4 - Design.....6
Section 5 - Owner/Operator Information.....9
Section 6 - Environmental Protectiveness.....10
Section 7 - Filling Operations 13
Section 8 - Monitoring and Maintenance Requirements.....16
Section 9 - Public/Community Input 18
Section 10 - CDF Experience.....19

Section 1 - Purpose and Usage

1. Who will be able to deposit materials in the three possible CDF locations? Will wastes from outside the Portland Harbor Superfund Site be accepted in these CDFs?

Response: The proposed T4 and Swan Island Lagoon CDFs would allow multiple Potentially Responsible Parties (PRPs) to dispose of sediments if those sediments meet the established acceptance criteria. As currently designed, the T4 CDF could accommodate approximately 670,000 cubic yards of contaminated sediments, of which approximately 10 percent may originate from the T4 site. Approximately 1,400,000 cubic yards of contaminated sediments could be accommodated at the Swan Island Lagoon CDF based on the current conceptual design. The Arkema CDF is intended only for Arkema material that meets the established acceptance criteria; no other sediment would be placed in this CDF.

It is unlikely that there would be sufficient demand or ability to bring sediment material from other sites outside the Superfund site to place in the T4 or Swan Island Lagoon CDFs. However, suitable dredged sediment from navigation or maintenance dredging projects may be considered for use as part of the CDF cover.

2. Is the purpose of the CDFs strictly for containment of contaminated sediments or are there other purposes and/or benefits of constructing the CDFs?

Response: The CDFs are being designed and constructed first and foremost for containment of contaminated sediments. However, there is an ancillary benefit of creating developable land for economic growth.

3. What happens if more contaminated sediment is dredged from Portland Harbor than can fit within the planned CDFs?

Response: CDFs have a finite capacity. The capacity of a CDF is determined in design and is largely dictated by the geographic constraints of the site. Once it is filled to capacity and covered, a CDF cannot be expanded at a later date. Should cleanup activities at the Portland Harbor site generate volumes of sediment greater than the capacity of the CDF, other disposal options will need to be considered (e.g., upland disposal in a commercial landfill).

4. Have other treatment technologies been considered for dealing with the contaminated sediments? If other technologies have been considered, have cost comparisons been prepared to evaluate the CDFs against these other technologies?

Response: The draft Portland Harbor Feasibility Study (FS) contains an analysis of a variety of remedial technologies for addressing the wide range of contaminated sediments in the harbor. The options evaluated included in-situ (in-place) treatment (e.g., introduction of sorbent amendments such as activated carbon into contaminated sediment), sediment capping, monitored natural recovery, disposal in upland landfills, use of CDFs at T4, Swan Island Lagoon, and Arkema; and treatment of contaminated sediments prior to disposal. Cost comparisons for viable sediment remediation technologies were included in the Portland Harbor draft FS.

5. If waste water or contaminated sediments generated during the Portland Harbor cleanup are sent to the municipal waste treatment plant or landfill, will it be using capacity targeted for municipal wastes?

Response: The amount of waste water generated from sediment dewatering activities is small in comparison to the capacity of the Columbia Boulevard Wastewater Treatment Plant in north Portland, which handles over 100 million gallons a day. It should not affect the capacity of the wastewater treatment plant. On the other hand, dredged sediments from Portland Harbor could take up a significant amount of capacity in a regulated landfill. Therefore, the use of a CDF for disposal of contaminated sediments will ensure that more landfill capacity remains for municipal solid waste.

Section 2 - Acceptance Criteria

6. What concentration of contaminated sediments will ultimately be placed in the CDFs?

Response: The concentration of contaminated sediments to be placed in any CDF has not been determined yet. The acceptable concentration is a function of contaminant type, mobility and toxicity. Acceptance criteria will be specified to ensure that each CDF is protective of human health and the environment.

The acceptable concentrations will be determined through detailed contaminant fate and transport evaluations based on contaminant properties and the site-specific conditions in and around the CDF. The goal is to determine the concentrations of material that can be placed within the CDF while still being protective of the surrounding environment. The acceptable concentrations of contaminants may vary depending upon where in the CDF the material is placed, the characteristics of the material itself, and surrounding soil and groundwater conditions at the site.

7. What level of contamination can be effectively contained by a CDF?

Response: The concentration will depend on the contaminant type. The acceptable concentration for a highly mobile and/or toxic contaminant will be lower than for a less mobile and less toxic contaminant. The sediments will need to meet established acceptance criteria.

Contaminant fate and transport evaluations were performed for the T4 CDF using sediment contaminant data from a wide range of Sediment Management Areas (SMAs) across Portland Harbor. The T4 CDF was found to effectively contain the contaminant levels in these sediments.

It should be noted that EPA has already determined that sediments from certain highly contaminated areas such as the Gasco and Arkema sites, may not be disposed of in the T4 CDF due to elevated concentrations of more highly mobile and toxic chemicals such as benzene and chlorobenzene, unless it can be shown through more detailed testing that contaminant concentrations are lower in specific areas, or if sediment is first subjected to a treatment process prior to disposal. EPA would need to specifically approve the volumes of dredged sediment from each source area that is proposed to be placed into any CDF.

8. How will EPA be able to verify what is being placed into the CDFs?

Response: Sediment testing will be required by EPA to determine if sediment is suitable for placement in the CDFs. The testing will include bulk sediment chemistry, leachability testing for metals and organic contaminants, geotechnical properties, and hazardous waste characteristics (any sediments designated as a hazardous waste are prohibited). As noted in response to Question 7, the Portland

Harbor draft FS has conducted sediment testing on a wide range of SMAs which has been used to evaluate the potential suitability of placing sediment in the T4 CDF. Detailed sediment acceptance criteria, analytical parameters, detection limits, and sediment testing frequencies will be developed during final design if one or more CDFs are selected as part of the remedy for Portland Harbor.

9. The Portland Harbor draft FS indicates that "imported materials" will be used to construct the CDF berms. Are there any standards that imported material will need to meet in order to be used for construction of the CDF berms?

Response: EPA has developed performance standards for the berm material to ensure that the CDF functions properly:

> "Construct the CDF berm with acceptable material. For cost estimating purposes, acceptable material should be based on requirements established in the December 2003 Technical Plans and Specifications (Ecology and the Environment 2003) for the McCormick & Baxter sediment cap located within the Willamette River. Materials will generally be imported clean granular material, but typically all materials shall be free of roots, inappropriate organic material, contaminants, and all other deleterious and objectionable material. However, CDF berm construction material shall have an organic fraction meeting minimum specified values consistent with contaminant transport modeling."

Section 3 – Contaminant Characteristics and Mobility

10. How many pounds of contaminants of concern (COCs) will each CDF contain?

Response: The environmental effectiveness of a CDF is best determined through measures of concentrations within the CDF and an evaluation of contaminant transport through the CDF berm face, rather than just a measure of their total weight or mass. As noted in the responses to Questions 6 and 7, CDF acceptance criteria will be developed for each COC based on its toxicity and mobility such that the concentrations placed within the CDF will be protective of the surrounding environment.

The mass of COCs that will be disposed of at each CDF is unknown at this time. The approximate sediment volume, sediment density, and chemical concentration are needed to estimate the mass of COC.

11. What contaminants will bind with the soil in the CDFs?

Response: The majority of contaminants detected in Portland Harbor sediments (e.g., PCBs, dioxins and furans, polycyclic aromatic hydrocarbons [PAHs], pesticides, metals under reducing conditions) tend to remain bound to sediments and typically exhibit limited mobility in water or groundwater. Fundamentally, it is this property that causes these COCs to accumulate in river sediments and also makes them suitable for confinement in a CDF facility. This behavior is well documented in the geochemical literature, although there is site-specific variability. The T4 60 percent design evaluated the mobility of chemicals expected to be disposed of in the CDF including the uncertainty in the binding capacity of these chemicals.

12. Will contaminant concentrations increase over time during construction and after closure?

Response: The CDF model predictions and evaluation indicate no significant concerns with buildup of contamination over time for many centuries into the future. In particular, concentrations of organic contaminants (e.g., PCBs, pesticides, PAHs, etc.) will reduce at some rate over time due to biologic activity within the CDF. Biodegradation of some organic contaminants is well documented but varies based on the specific contaminant. For example, certain PAH compounds or PCB congeners will degrade more quickly than others. Metals are natural elements that do not degrade and, as a result, the concentrations of metals in the dredged material are expected to be relatively stable over time.

13. Will the concentration of contaminants in sediment allowed within the CDFs result in contaminants being released to the river?

Response: The CDF acceptance criteria will ensure that sediments with high concentrations of mobile contaminants will not be placed in the CDFs without treatment, thus ensuring that the CDFs do not release contaminants to the Willamette River at levels greater than acceptable criteria.

The evaluations and analysis conducted for the T4 and Swan Island Lagoon CDFs indicate they could be designed and built to adequately control the mobility and concentration of contaminants at potential points of exposure. The potential for toxicity to aquatic life and to humans via drinking water and fish consumption exposure routes were all considered in these evaluations.

Section 4 - Design

14. Will caps be placed on top of the CDFs when completed?

Response: The T4 60 percent CDF design indicates the T4 CDF would have a surface cover layer. The surface cover would consist of two layers. The lower layer, located above the confined contaminated sediment, would consist of suitable fill or dredged sediments that meet EPA's "imported material" requirements established in the December 2003 Technical Plans and Specifications for the McCormick & Baxter sediment cap. The top layer is the surface cover layer and assumed to be compacted crush rock in the current design.

The surface layers to be utilized at the Swan Island Lagoon and Arkema CDFs have not been designed yet. However, both sites will include a cover that prevents exposure to contaminated sediments placed within the CDF.

15. Will the CDF designs include a liner or dikes?

Response: All CDFs must have dikes, berms, or similar containment systems. If liners are needed to ensure that chemicals will not enter the Willamette River at concentrations greater than acceptable criteria, then liners will be considered. The T4 60 percent CDF design does not require a liner for it to be protective of humans and aquatic life.

16. Why were smaller CDFs not considered? Section 7.4 of the draft Portland Harbor FS discusses the selection of upland disposal options and states that, "The total number of in-water CDFs/CAD was generally minimized, such that if a larger CDF/CAD could handle the capacity of multiple smaller ones, then the larger CDF/CAD was selected."

Response: The CDFs considered are a function of the available space for a CDF. The optimal location for a CDF is an existing slip such as those at T4 and Swan Island Lagoon. The conversion of slips to CDFs minimizes the potential for releases from the CDF and reduces the cost of CDF construction and, ultimately, disposal cost.

17. Will the Arkema CDF undergo a comparable analysis to T4, as it is included as a potential disposal option in the FS? Section 1.0 of the draft Portland Harbor FS Appendix Jb states that "…the Arkema CDF preliminary design option has some simplifying characteristics in terms of both short- and long-term water quality impacts…" and was therefore not discussed further in this section.

Response: Yes. An appropriately robust evaluation will be used to evaluate a CDF at the Arkema Site.

18. How much sediment will be removed in order to build the containment berm for the T4 CDF on a more solid surface?

Response: The T4 CDF 60 percent design incorporates the removal of loose surface sediments under the outer toe of the berm structure. For the T4 CDF, the current design assumes that 5 to 10 feet will be removed below the outer toe of the berm. This approach is typical of CDF berms (and all waterfront berms) and results in significant improvements in seismic and static stability.

19. Will the erosive force of the flow of the Willamette River have an effect on the CDFs?

Response: Because CDFs will generally be constructed in off channel areas, river flow is not expected to be a concern. In addition, the following CDF performance standard is expected to address flow issues at the Arkema CDF and off-channel CDFs:

> "Be resistant to erosive forces 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."

For the T4 CDF, potential erosive forces including river currents, waves, and propeller wash on the outward berm face were evaluated. The findings of the evaluation indicate that armoring of the berm face could be designed to resist these erosive conditions occurring on the river.

20. What assurances are there that the CDFs will remain stable during earthquakes? Will the CDFs be able to withstand a magnitude 9.0 earthquake as is predicted for the Cascadia Subduction Zone located off the California, Oregon, and Washington coast?

Response: EPA has established performance standards that CDFs located within the Portland Harbor Superfund Site must meet. One of these performance standards addresses seismic design. The seismic performance standard is:

> "Provide a static safety factor of 1.5 or greater and a seismic safety factor of 1.1 or greater. The design seismic event shall correspond to a 10 percent probability of exceedance in 50 years."

This standard is expected to ensure that the CDFs will remain stable during a magnitude 9.0 earthquake.

Analyses completed for the design of a CDF at T4 indicate that the structure can be designed to function under a Cascadia Subduction Zone earthquake event of magnitude 9.0 and a relatively near field magnitude 6.2 crustal event. Under the design events, the analyses indicate that the outer face of the berm will be subject to some sloughing, but the berm structure will retain the contaminated sediments.

In Appendix Jc of the draft Portland Harbor FS, a qualitative review of conditions at the Swan Island Lagoon CDF was conducted to determine if the detailed seismic evaluation performed for the T4 CDF could be reasonably extended to the Swan Island CDF location. The evaluation concluded that the Swan Island Lagoon CDF location was similar enough to indicate the Swan Island Lagoon berm, as currently conceptualized, should satisfy the seismic performance standard. A more detailed seismic design analysis would be conducted for the Swan Island Lagoon CDF if it moves into the remedial design phase.

No seismic evaluation has been conducted for the Arkema CDF conceptual design.

21. Appendix Jc of the draft Portland Harbor FS states that detailed analyses of certain seismic hazards, such as "liquefaction, lateral spreading, volumetric settlement…" for the Swan Island Lagoon CDF option "would be addressed during detailed design." Why were detailed designs not provided for all the proposed CDFs for all parameters in the draft Portland Harbor FS?

Response: The purpose of an FS is to identify, screen, and evaluate remedial options. The Superfund law requires each cleanup alternative (including disposal options) undergo an evaluation on the basis of nine criteria. These nine criteria include: overall protection of human health and the environment, compliance with applicable relevant and appropriate requirements (ARARs), long-term effectiveness, reduction of mobility, toxicity, and volume through treatment, short-term effectiveness, implementability, cost, state acceptance, and community acceptance. The objective of the evaluation is to compare and contrast the alternatives so that decision makers may select a preferred alternative.

The Portland Harbor ROD will identify which sediment may be disposed of where in consideration of contaminant concentration, leachability, potential to degrade over time, and hazardous waste characteristics. Details regarding CDF construction will be developed during remedial design. All CDFs must comply with applicable performance standards. EPA currently has a list of 25 performance standards that apply to any CDFs that are carried forward into remedial design including a performance standard which specifies a seismic safety standard.

22. If a CDF slumps during an earthquake, will it impact the communities downstream such as Sauvie Island, Scappoose, St. Helens, Warrenton, or Rainier?

Response: As noted in the response to Question 20, the CDFs will be designed to meet the EPA's CDF seismic performance standard. This standard is expected to be adequate to protect downstream communities.

The slumping that is expected during T4 CDF design earthquake events would involve the outer face of the berm only, and would not affect the confined contaminated sediment from Portland Harbor. The berm is composed of imported,

suitable sand and gravel. As a result, the sloughing of this material would cause no discernible increase in the contaminant load in the river or transport of contaminated sediments to downstream communities. The outer face of the berm, if disturbed, would be reconstructed after the earthquake. Loss of bank material along waterfront slopes within the whole of Portland Harbor is expected during extreme earthquake events, and the berm material would be just one of many such events needing repair.

23. A study by the engineering firm Golder Associates was submitted to the EPA as part of the public review of the Interim Draft version of the T4 Engineering Evaluation/Cost Analysis (EE/CA). The August 3, 2005 Golder Associates report is a critique of some of the technical information contained in the Interim Draft T4 EE/CA. Has the T4 CDF been redesigned since the Golder Associates report pointed out some potential flaws in location of the CDF and seismic performance?

Response: The Golder Associates report, like the EE/CA, was based on relatively preliminary information. The current T4 design effort has not only addressed the issues raised by Golder Associates but has significantly advanced the understanding of these issues as they relate to the T4 site. Throughout the design process, the seismic design of the structure has been updated to reflect state of the practice information available to EPA and the design team.

Section 5 - Owner/Operator Information

24. Who will own or be responsible for the CDFs?

Response: The Port of Portland would own and operate the T4 CDF, if selected by EPA in the Record of Decision (ROD) and implemented. Legacy Site Services LCC (LSS), agent for Arkema, would own and operate the Arkema CDF, if selected as part of the Portland Harbor remedy. The owner/operator of the Swan Island Lagoon CDF, if selected by EPA in the ROD and implemented, is still to be determined.

25. Who will pay for the construction, monitoring, and maintenance of the CDFs?

Response: Typically, funding for construction of the CDF comes from the owner and from other parties who wish to place sediments in the CDF (e.g., through disposal fees). The owner is responsible for the monitoring and maintenance of the CDFs with EPA oversight.

26. With regards to liability management, who is responsible for the bonding of the T4 CDF during construction and the final structure? Who will provide financial assurance that the CDF will be properly maintained and monitored for effectiveness?

Response: These considerations are dependent on many factors. However, in general, the owner is responsible for proving financial assurance that the CDF will

be properly maintained and monitored for effectiveness. See also the response to Question 24 above.

Section 6 - Environmental Protectiveness

27. Are the environmental risks for near-shore disposal (e.g., cap disturbance, seismic disturbance, potential infiltration by boring organisms) greater than the environmental risks posed by other disposal or treatment options?

Response: This is a primary question evaluated in the harbor-wide Remedial Investigation/Feasibility Study (RI/FS) process. All disposal options involve some risk. For example, there is a risk of spills during transport to an upland disposal facility. The CDF will be designed to address the risks associated with seismic disturbance and infiltration by boring organisms. Institutional controls will be utilized to ensure that the cap is not disturbed. Institutional controls are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy.

In the case of a CDF, boring organisms are merely superficial and cannot penetrate the width of the berm (e.g., the T4 berm is more than 100 feet wide at the water line). The draft FS concludes that the example CDFs evaluated could be engineered to minimize these risks to levels commensurate with other disposal options (e.g., commercial operating landfills) and treatment options. EPA is currently reviewing this information. It should also be noted that by confining the contaminated sediment within a local facility, the transport and disposal risks, the release of particulates and other air pollutants, and the carbon footprint (i.e., greenhouse gas emissions) of the remedial action will be significantly lower than hauling the material long distances by truck or rail to a commercial landfill.

28. Will CDF construction and long-term use be protective of human health and the environment?

Response: Modeling was conducted as part of the Portland Harbor draft FS to evaluate potential water quality impacts associated with the construction and long-term use of the T4 and Swan Island Lagoon CDFs. Parameters and hypothetical characteristics of the T4 and Swan Island Lagoon CDFs were used in the model. The modeling results, provided in Appendix Jb of the Portland Harbor draft FS, indicate that construction and long-term use of these CDFs will be protective. However, EPA is still reviewing the results of the model to ensure that CDF construction and long-term use will be protective of human health and the environment.

29. Will the area be in compliance with an approved water quality program?

Response: The CDFs will be designed to ensure that all ARARs, including the State of Oregon water quality standards, are met.

30. Will any water quality program requirements be waived?

Response: Although EPA has the authority under the Superfund law to waive compliance with ARARs, this authority is limited to specific sets of circumstances such as technical impracticability. It is unclear at this time whether EPA will waive any ARARs such as State of Oregon water quality standards due to technical impracticability or any other reason.

31. What are the potential impacts to Sauvie Island well water and groundwater?

Response: Given the distance of Sauvie Island from any CDFs under consideration at the Portland Harbor site, no impacts on Sauvie Island groundwater are expected.

In the specific case of T4 (the closest proposed CDF to Sauvie Island), groundwater in the T4 CDF would discharge to the Willamette River. The CDF is being designed so that groundwater will comply with state and federal water quality criteria at the face of the berm, including drinking water criteria. Sauvie Island is 1.4 miles downstream from the point where drinking water quality criteria will be met. Therefore, Sauvie Island groundwater will be unaffected.

32. Will a pre-construction habitat assessment be performed?

Response: A habitat assessment has been conducted for the T4 removal action, including the CDF. Similar assessments would be conducted for the Swan Island Lagoon CDF and Arkema CDF if the designs for these disposal options progress further.

33. Do the CDFs prevent some future aquatic land use?

Response: Yes. However, the loss of future aquatic land use (i.e., aquatic habitat) will be addressed to be consistent with Clean Water Act (CWA) Section 404 mitigation for the discharge of fill or dredged material into navigable waters.

The proposed site of the T4 CDF (Slip 1) is surrounded by maritime and industrial operations and currently provides relatively low-value habitat. However, the CWA Section 404 mitigation requirements associated with the placement of fill and dredged material into navigable waters and the subsequent loss of aquatic habitat at the site of the T4 CDF is likely to result in significant habitat improvements elsewhere in the river.

34. What is the plan to mitigate the uncontrolled use of the CDFs by wildlife (e.g., bird/animal foraging) prior to final closure?

Response: Efforts will be taken to ensure that wildlife do not come into contact with contaminated material during filling. For example, upon disposal, the sediments would reside below the surface of a pool of water that would be maintained in the CDF, which limits the potential for direct contact with contaminated sediments. In addition, fish exclusion and fish salvage after berm construction will be performed to minimize the amount of fish in the pool that could attract fish eating birds and mammals further limiting the potential for exposure. Finally, when the water depth in the pond is sufficiently shallow, a thin layer of “clean” sand will be placed over the dredged material between construction seasons to reduce potential wildlife exposure.

35. What implications does the T4 CDF have on habitat? For example, approximately 10,000 sturgeon winter in a location adjacent to T4. Will this wintering habitat be disrupted during CDF construction? Will releases from the CDF contaminate clams and other food sources?

Response: Construction of the T4 CDF will result in the loss of some off channel habitat. Impacts to aquatic habitat must be evaluated as part of the CWA Section 404 Analysis and any loss resulting from the discharge of fill or dredged material must be compensated for through mitigation.

Sturgeon tend to congregate in the deep water within the main channel of the Willamette River adjacent to and upstream of the T4 CDF location and are not expected to be impacted by the construction of the T4 CDF. The T4 CDF berm would be constructed at the mouth of and within Slip 1, so any habitat in front of T4 is not expected to be directly impacted by the CDF construction; no sediment disturbing activity would occur in the area waterward of Slip 1. The CDF at T4 is being designed so that groundwater moving through the CDF and exiting through the berm will comply with state and federal water quality criteria at the face of the berm, including aquatic life criteria. Therefore, no contamination of either sturgeon or their food base is expected.

Section 7 - Filling Operations

36. How will air quality be addressed during construction?

Response: Air emissions may be addressed through monitoring and implementation of best management practices (BMPs) to limit emissions. Fugitive dust emissions from construction vehicles during CDF construction would be controlled through BMPs such as wetting of traffic areas. Fugitive dust from placement of contaminated sediment is not expected due to the wet conditions present during CDF filling.

37. Are there evaporation concerns related to volatile contaminants during filling of the T4 CDF?

Response: Chemicals of concern identified in most Portland Harbor sediments do not evaporate readily, and generally do not include volatile compounds such as gasoline, benzene, or chlorinated solvents, which would be more likely to evaporate into the air. Further, dredging and sediment handling operations at other Superfund sites in the Pacific Northwest with similar contaminants have found no substantial adverse impacts to air quality.

Also, volatile chemical concentrations that would cause a volatilization issue during sediment placement would also not likely be deemed suitable for disposal in the CDF based on other considerations. For example, sediments with high concentrations of benzene or chlorobenzene would not likely be suitable for placement within the CDF as a result of chemical mobility and toxicity considerations (see also answer to Question 7 above).

38. What happens if contaminants are released during placement within the CDF?

Response: Any short term releases during placement are expected to be minimal and not present a risk to human health or the environment.

CDF filling procedures are carefully designed and monitored to minimize the potential for spillage or other types of releases outside the perimeter berm. In the unlikely event that such a release were to occur, typically construction would be halted and spill control, containment, and recovery efforts would be immediately implemented. The best management practices used to minimize such releases would be re-examined and refined as necessary to further reduce the potential for ongoing releases. These details would typically be addressed in the monitoring and contingency plan developed during design.

39. What assurances are there that water quality criteria will be examined and corrected if an overflow during filing of the CDF occurs?

Response: EPA has developed CDF performance standards for avoiding short-term overflows:

> "Plan and manage the CDF filling to avoid any short-term overflow(s), or minimize the overflows to the extent possible. If a CDF overflow during filling cannot be avoided, complete an analysis of overflow discharge rates and duration, contaminant concentrations, and ability to meet water quality criteria at end of pipe. Evaluate best management practices (BMPs) and treatment options needed to meet water quality criteria at the end of the pipe. If EPA agrees that criteria cannot be met at the end of the pipe then a dilution zone modeling analysis of the discharge impacts shall be completed to demonstrate compliance with water quality criteria. Overflows must meet acute water quality criteria. Chronic water criteria will be used to guide implementation of BMPs to minimize contaminant loadings to the river. The design shall consider engineering controls and treatment options needed to meet chronic discharge criteria at end of pipe."

40. How are potential releases prevented when moving contaminated sediment from the river bottom to final placement in the CDF?

Response: The use of on-site disposal through a CDF is expected to result in less handling of contaminated sediments, and thus less risk of release, than transport to an off-site landfill for disposal.

The Portland Harbor draft FS presents an overall discussion on the potential for releases during dredging, removal, and disposal of contaminated sediments, including transport to CDFs. The draft FS found that although the overall potential for releases is low, this potential is likely highest for disposal at commercial upland disposal facilities, which requires rehandling and transport over large distances prior to disposal.

41. Will any of the following features be utilized in the CDFs?
    a. A leachate collection system
    b. Collection and filtration of runoff/effluent
    c. Interim covers
    d. Wind barriers
    e. Use of a dust suppressant
    f. Fencing

Response: The items identified above are expected to be evaluated in the overall design as necessary for all CDFs in Portland Harbor.

Leachate Collection: With regards to the T4 CDF, the T4 60 percent CDF design would effectively confine contaminants over the long term without the need for a leachate collection system. The evaluation presented in the T4 60 percent design demonstrates that infiltration of surface water does not adversely impact the groundwater quality discharging at the berm face.

Collection and Filtration of Runoff/Effluent: With regards to collection and filtration of runoff/effluent, the T4 CDF design for the surface of the CDF will be underlain by approximately 20 feet of cover material and surface ballast. Therefore, rain water will not come in direct contact with the contaminated sediments that are confined deeper in the facility. In addition, EPA has developed CDF performance standards for minimizing flow into and out of the CDF:

> "Minimize water flow into and out of the CDF, including preventing or restricting preferential flow paths of clean or contaminated groundwater into or out of the CDF. The evaluation should include identifying, removing or modifying utilities trenches, storm drain lines, wells, and other conduits within 500 feet of the CDF (or other distance as determined to be appropriate). Utilities, storm drain lines and other conduits are not allowed under or within the contaminated sediment fill prism."

Interim Covers: The T4 CDF design anticipates the potential need for interim covers between filling seasons as a wildlife protection measure when the water depth in the CDF is shallow. The interim cover would be composed of suitable sand. Further details of interim covers would be provided as part of the 100 percent design submittal.

Wind Barriers: The need for wind barriers would be determined during further design or during construction.

Dust Suppressant: Fugitive dust emissions from construction vehicles during CDF construction would be controlled through BMPs such as wetting of traffic areas. Fugitive dust from placement of contaminated sediment is not expected due to the wet conditions present during CDF filling.

Fencing: Fencing would likely be required during the construction of any CDF within Portland Harbor.

42. What is the expected timeframe to fill and close the CDFs?

Response: The timeframe for filling the CDFs is unknown at this time. Site preparation and construction of the T4 CDF berm is anticipated to take approximately two years before filling could begin at the T4 CDF. Based on construction time estimates presented in the Portland Harbor FS, this two year period does not appear to be an issue. The filling process of the T4 CDF is estimated to take up to 4 years to complete, although it could take more or less time depending on the schedule of dredging and/or excavation activities.

43. Will construction stop during a major storm? Will construction be avoided during storm events?

Response: Major storm events will likely trigger a shutdown of any dredging and CDF filling activities. In general, dredging will not be taking place during the fall and winter when major storm events are likely. These types of decisions, as a result of weather conditions, would typically be part of the monitoring or contingency plan developed during design and based on safety concerns during construction.

44. At the Erie Pier CDF located in Duluth-Superior Harbor in West Duluth, Minnesota, sediment is processed and hydraulically sorted. Are there any plans to sort sediment prior to placement in the CDF as was conducted at the Erie Pier CDF?

Response: The Erie Pier CDF was originally designed to contain both “clean” and contaminated sediment dredged from the Duluth-Superior Harbor area. As the CDF was nearing its capacity, the U.S. Army Corps of Engineers (CDF operator) and the Duluth Seaway Port Authority (CDF owner) decided to convert the CDF into a Processing and Reuse Facility (PRF) in order to extend the life of the CDF. Only sediments identified as “clean” using Minnesota and Wisconsin criteria are processed and sorted for potential beneficial reuse at locations outside the CDF.

The CDFs under consideration at the Portland Harbor Superfund Site are being designed specifically to contain contaminated sediments, so the purpose of these CDFs is different than the Erie Pier CDF. There are currently no plans to perform sediment sorting at these CDFs as the material cannot be beneficially reused as it is contaminated.

45. Are there plans to utilize the municipal waste water treatment plant if contaminated water is generated during CDF filling operations?

Response: Discharge of water to the river during CDF filling is not expected to occur for the T4 CDF. If it is determined that water treatment is needed, it would most likely take place at the CDF with specific equipment or procedures designed for that purpose.

Section 8 - Monitoring and Maintenance Requirements

46. What contingency plans will be in place if something goes awry during construction?

Response: Both short-term (i.e., during construction) and long-term (i.e., after construction) monitoring and contingency planning is anticipated for the construction of the CDFs. Potential contingency measures include spill response and shutting down operations until such time that corrective measures have been implemented.

Specific contingency plans during CDF construction would be developed as part of the final design for each of the CDFs.

47. Appendix Jb of the Portland Harbor draft FS indicates that during berm construction "water quality monitoring would likely occur…" Will the water quality monitoring occur or not? Will air quality monitoring occur?

Response: Water quality monitoring will occur to ensure that construction activities do not adversely affect water quality. At this stage of the feasibility study, it is unclear whether air quality monitoring will be required, given the nonvolatile nature of the contaminants and the general handling of sediments in a wet state. Water quality monitoring will be required during dredging and disposal operations as necessary to fulfill the substantive requirements of the CWA Section 401 Water Quality Certification process. The specific details of water quality and any air monitoring are typically determined during remedial design. Air monitoring is a less common requirement because the handling of wet sediment does not create a dust hazard, and the COCs that tend to concentrate in river sediments are generally not volatile.

48. Will long-term monitoring of the CDFs be required?

Response: Yes. Detailed long-term monitoring plans will be developed during final design to ensure that CDF facilities are meeting their performance criteria (including compliance with applicable aquatic and human health water quality criteria) and are functioning as intended.

49. What type of monitoring will be conducted?

Response: Routine inspections of the physical integrity of the CDF will be conducted. The berms will be inspected to check for any consolidation, loss, or movement of the berm material (e.g., gravel and stones). Special surveys would also be conducted to check for damage after extreme flood events, earthquakes, or other natural disasters.

In addition, groundwater contaminant concentrations within the CDF and the berm will be carefully monitored over time, and compared to their respective toxicity threshold concentrations for protecting humans and aquatic life at the point of compliance (i.e., the face of the berm). These criteria are of course specific to each chemical.

50. Will the CDF caps be periodically replaced?

Response: The T4 CDF design does not anticipate replacement of caps (i.e., cover layers). The physical features of the CDF (cover and berm) are anticipated to function for their entire design life (i.e., hundreds of years).

Section 9 - Public/Community Input

51. Appendix Jb of the Portland Harbor draft FS states, “The final application of ARARs related to surface water will be established by EPA for the Portland Harbor Superfund Site in the Record of Decision (ROD), and the determination of how water quality standards and associated performance standards are applied to a Portland Harbor CDF facility will be finalized at that time.” Why were these not established in the FS? Will there be any opportunity for public input during this process?

> **Response:** Under the Superfund law, all remedies must meet ARARs unless waived. Further, the ability for EPA to waive ARARs is limited. As a result, any CDF construction at the Portland Harbor Superfund Site will generally have to meet ARARs such as ambient water quality criteria at the appropriate point of compliance. In addition, EPA developed and directed use of CDF performance standards in the FS. The various CDF options are to be evaluated against these performance standards in the FS in order to provide the information needed by EPA to evaluate potential use of one or more CDFs in a cleanup remedy. Based on the evaluation of the information provided in the FS, EPA will select a cleanup remedy. The selected remedy will be provided in a Proposed Plan, which will be made available for public review and comment. After consideration of any comments received on the Proposed Plan, EPA will finalize the remedy in the ROD. The determination of how water quality standards and associated performance standards are applied to a Portland Harbor CDF may be modified and finalized in the ROD in consideration of comments received on the Proposed Plan.

52. Appendix Ja of the Portland Harbor draft FS states, “As with the Swan Island Lagoon CAD (described in Section 2.2.5), the concept for the Swan Island Lagoon CDF is subject to change.” If the concept changes, what will be the protocol for establishing the changes? Will there be opportunities for public input?

> **Response:** Community acceptance is one of the nine evaluation criteria under the Superfund law. In addition, Superfund requires that all proposed cleanup actions have a public review and comment period to solicit public input.

53. Many of the assumed CDF characteristics described in the draft Portland Harbor FS Appendix Jb could be modified or refined in remedial design for the Portland Harbor proposed cleanup. If these disposal options are changed, will there be opportunity for the public to comment on these changes?

> **Response:** If the design characteristics change significantly, EPA will issue an Explanation of Significant Difference or ROD amendment and provide an opportunity for public review and comment.

54. Appendix Jc of the Portland Harbor draft FS indicates that it will be in the remedial design stage when seismic hazards, such as liquefaction, lateral spreading, volumetric

settlement, will be addressed. When will the public be informed of the final plan for the CDFs and will the public be able to comment?

Response: For the potential CDF at T4, the issues noted in the question have been addressed in the 60 percent design documents. Those documents are available for review by the public. Items typically subject to modification during final design include Remedial Action Work Plans and Water Quality Monitoring Plans (for implementation during construction). EPA would make these documents available for public review.

Section 10 - CDF Experience

55. Can any examples be cited of river CDFs that are successfully functioning as designed?

Response: There are a number of examples of CDFs on rivers and lakes that have been built and monitored and are functioning as intended in the Great Lakes region and other parts of the country. CDFs constructed along rivers include the Grassy Island (Toledo, Ohio) and Windmill Island (Holland, Michigan) CDFs. Information on CDF performance in the Great Lakes region is available from the U.S. Army Corps of Engineers at the following web address:
http://www.lrd.usace.army.mil/Portals/73/docs/Navigation/GL-CDF/GL_CDF.pdf

56. Is this the first time in the Western United States that a CDF or CDFs would be constructed in a riverine environment?

Response: We are unaware of any CDFs in the Western U.S. constructed in a riverine environment. However, there are a number of marine examples of CDFs in Puget Sound (Washington State) that have been built and monitored and are functioning as intended, including some near major rivers. For example, the Milwaukee Waterway CDF in Commencement Bay was constructed adjacent to the mouth of the Puyallup River. Although CDFs constructed in Puget Sound are not along rivers, they are subjected to significant tidal currents as well as waves from ship traffic. A summary of Puget Sound CDFs is provided below.

Puget Sound CDF Summary

Site Name	Operator	Year Built	Capacity (cubic yards)	Land Use Notes
Milwaukee Waterway Fill, Tacoma, WA	Port of Tacoma	1993-1995	2,600,000	Formed part of an existing marine container cargo facility
Eagle Harbor, Bainbridge Island, WA	Washington State Ferries	1997	20,000	Developed for use as a ferry maintenance facility
St. Paul Waterway, Tacoma, WA	Simpson Tacoma Kraft Company	2003-2005	650,000	Accepted sediment from the Thea Foss Waterway Superfund Site
Slip 1 CDF, Tacoma, WA	Port of Tacoma	2002-2003	1,000,000	Accepted sediment from multiple users including various Tacoma Superfund sites
Terminal 91, Seattle, WA	Port of Seattle	1985	600,000	Marine Terminal

57. Is the tidal influence present in the Lower Willamette River a concern for the performance of the Portland Harbor CDFs?

Response: The tidal influence in Portland Harbor is less than typically seen at other constructed CDFs. Tidal fluctuations in Portland Harbor are typically in the 2 – 3 foot range which is much lower than tidal fluctuations in Puget Sound which are on the order of 10 feet or more. The Puget Sound CDFs are examples of facilities that have been constructed and are performing as intended under a variety of conditions. In Portland Harbor, a greater concern may be seasonal changes in river stage and short term high-flow events (i.e., floods), both of which were considered in the T4 CDF design process.