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

OFFICE OF
ENVIRONMENTAL
CLEANUP

JAN 21 2016

MEMORANDUM

SUBJECT: Region 10 Responses to National Remedy Review Board and Contaminated Sediments Technical Advisory Group Recommendations for the Portland Harbor Superfund Site

FROM: Sheila Fleming, Acting Director Carni Grandinetti for SF
Office of Environmental Cleanup

TO: Amy R. Legare, Chair
National Remedy Review Board

Stephen J. Ells, Chair
Contaminated Sediments Technical Advisory Group

The National Remedy Review Board (the Board) and the Contaminated Sediments Technical Advisory Group (CSTAG)(the boards) completed their review of the proposed cleanup action for the Portland Harbor Superfund site, in Portland, OR and provided advisory recommendations to Region 10 (the Region) in a memorandum dated December 31, 2015.

The Region greatly appreciates the boards' thorough review and thoughtful comments on the proposed remedial action for the site, which was discussed during the boards' November 18-19, 2015 meeting. Our specific responses to the boards' advisory recommendations are provided below. For convenience, each recommendation is presented in the order identified in your memorandum, followed by our response.

Institutional Controls

***Recommendation**: In the package and presentation to the boards, several stakeholders, including ODEQ, advocated that EPA should pursue the most active alternatives (in terms of mass removal/dredging) because of the challenges in enforcing ICs. The boards note that these challenges generally are true for fish advisories that may need to address human health risks over long time periods in a very large, extensively used water body like the site's study area. The boards recommend that the Region clearly communicate to the local community and other stakeholders the anticipated timeframe needed to carry out the cleanup's active phase (e.g., construction), including the time needed to undertake the remedial design (RD) and remedial action phases, and to clearly describe the anticipated recovery time needed after completion of the selected remedy's active phase, such as the time aquatic receptor tissues will need to recover. The boards note that over this extended time period, vigilant efforts to encourage river users to adhere to fish consumption advisories likely will be needed;*

in this regard, the boards recommend that the Region consider a program similar to the Fish Contamination Education Collaborative implemented through the IC program at the Palos Verde Shelf Superfund site.

In addition, the boards recommend that the Region consider whether any specific ICs will be needed to protect caps from activities such as tug maneuvering and anchoring. The boards further recommend that the Region consider explaining in its decision documents how it would approach modifying the selected remedial actions if EPA determines that implementation of ICs is not effectively protecting human health at this site.

Response: Fish consumption advisories will be required during and post construction activities until RAO 2 is achieved. Post construction fish tissue monitoring will be conducted to determine if fish advisories can be relaxed/decreased over the course of remediation time. It is important to note that the dredging, capping, enhanced natural recovery, in-situ treatment, and monitored natural recovery remedy components will not achieve sediment concentrations that can reduce contaminant levels in resident fish to protect all consumers. Specifically, for the infant breastmilk exposure pathway, background sediment contaminant concentrations are not expected to achieve protective levels in resident fish. Therefore, the remedy will include institutional controls to ensure protectiveness in the long term. As such, the Region anticipates working with the Tribes, State, local government and communities to develop outreach activities and informational materials to educate the public about the fish consumption advisories. Specifically, the Region plans to focus extra outreach and educational activities to women of child bearing years, as this subset of the population is at greater risk from consuming contaminated fish

In addition, the Region is currently reviewing the Palos Verde Shelf Superfund Site IC program to identify components/activities that may be useful or appropriate at Portland Harbor and inform development of site specific activities to ensure that fish consumption advisories at Portland Harbor are effective.

The Proposed Plan (PP) and Record of Decision (ROD) will provide estimated time frames for the construction and recovery periods for all remedial alternatives. However, given that this is a large and complex site, it is difficult to estimate the time to conduct the remedial design. The implementation of the preferred alternative will dictate how the design will be conducted. It is unlikely that design and construction activities will be conducted in a single phase. Therefore, part of the post ROD activities will include remedy implementation planning to consider at a minimum source control actions, scope (size) of the actions across the site, impacts to river users and the community, seasonal weather impacts, fish windows, and responsible party participation. Although the Feasibility Study (FS) discusses some of these issues, more detailed work will be conducted after the remedy is selected. This work will be conducted and coordinated with stakeholders. The Region will continue to conduct community involvement activities that will keep the community and stakeholders engaged in the process and involved in the cleanup activities. Language will be included in the decision documents that will address this issue.

The Region agrees with the Boards and therefore, language will be included in the decision documents to reflect that institutional controls will be used to prevent or limit exposure to contaminants and insure integrity of caps on both a short-term and long-term basis, during construction and post construction. Where caps will be utilized to contain contamination, waterway use restrictions or Regulated Navigation Areas (RNAs) will be necessary to ensure the integrity of the cap. This may include prohibiting vessel

anchoring or spud usage to stabilize vessels in capped areas. RNAs have been successfully used in the past to protect caps from vessel activities at the McCormick and Baxter Superfund site and the interim action at Gasco. Additionally, the Region anticipates working with the Oregon Marine Board to post signs and buoys to warn vessels from the area. Land use or access restrictions may be implemented in nearshore areas and riverbanks to maintain cap integrity.

Monitoring of all ICs will be key to remedy effectiveness and protectiveness. Typical of any remedial action, should monitoring show that remedial components, including ICs, are not effective or the remedy is not protective of human health and the environment additional measures may need to be taken. Language will be included in the ROD to explain that such measures will be addressed in future decision documents.

Human Health and Ecological Risk

Recommendation*: The package provided to the boards summarized a human health risk assessment exposure pathway that quantitatively evaluated infants' exposure through breastmilk ingestion. This approach is consistent with EPA/540/1-89/002, December 1989, Risk Assessment Guidance for Superfund Volume I (Human Health Evaluation Manual (Part A), Interim Final, which recommends that the exposure assessment identify subpopulations of potential concern, including pregnant and nursing women. This pathway's evaluation identified unacceptable non-cancer health hazards, which are a significant risk contributor at this site. The boards note that the Region's package did not include a detailed discussion of some of the uncertainties associated with this pathway (such as exposure assumptions, toxicity information associated with this health endpoint, and properties, including partitioning and biological half-life). The boards recommend that the Region provide information on these uncertainties in the proposed plan and record of decision (ROD).*

Response: The Region appreciates that the submittal to the boards did not contain a detailed discussion of the uncertainties associated with the risk estimates, and in particular, infant exposure to contaminants via breastmilk. Consistent with the boards' recommendation and EPA's Guidance for Preparing Superfund Proposed Plans and Records of Decision (EPA 540-R-98-031), the summary of the risk assessment results in the ROD will include a summary discussion of the significant sources of uncertainty inherent in the risk assessment; indicating whether the uncertainties are expected to underestimate or overestimate the potential risk. A more detailed discussion of the relevant uncertainties is included in the Baseline Human Health Risk Assessment for Portland Harbor and in other supporting documents in the administrative record, such as ODEQ's Human Health Risk Assessment Guidance (10 LQ 023).

Recommendation*: Furthermore, based on the information presented to the boards, some conclusions about risk did not fully communicate the risk characterization (the severity, spatial, or degree of confidence in the risk estimate) and how the remedy components will address site risks. In addition, the Region stated its intent to present COC-specific preliminary remediation goals (PRGs). The boards support the effort to identify a single PRG for each COC in each media (as appropriate), along with the justification for these PRGs. The boards recommend that the Region clearly and concisely summarize in both the proposed plan and ROD the risk characterizations from both the human health and ecological risk assessments, as well as the basis for the cleanup levels identified. The boards recommends that the Region refer to EPA 100-B-00-002, December 2000, Science Policy Handbook "Risk Characterization" and the associated the 1995 policy memorandum from Administrator Browner, Policy for Risk*

Characterization, Appendix A of the Science Policy Handbook, when preparing the future decision documents.

Response: The Region agrees with the boards that the decision documents should clearly communicate the risk characterization. The Region will concisely and clearly summarize the human health and ecological risk assessments in the PP and ROD consistent with the recommended approach in *"A Guide to Preparing Proposed Plans, Records of Decision , and other Remedy Selection Decision Documents" July 1999*. The primary focus of the summary will be on those exposure pathways and chemicals found to pose actual or potential risks to human health and ecological receptors. As noted in the recommendation, the Region intends to select a single PRG for each COC whenever appropriate, and will clearly provide this information in the decision documents.

***Recommendation**: The Region's presentation to the boards included a discussion of the State of Washington Sediment Management Standards (SMS) and those standards' role in developing the PRGs for remedial action objective (RAO) 5 (reduce risk to ecological receptors from ingestion of and direct contact with COCs in sediment to acceptable exposure levels). The boards understand that the potentially responsible parties (PRPs) developed the site-specific sediment quality values (SQVs) within the site's approved Final Baseline Ecological Risk Assessment (BERA; Appendix G to the Remedial Investigation, December, 2013). The PRP-prepared BERA stated that:*

> *A floating percentile model (FPM) and logistic regression model (LRM) (both of which are presented in BERA Attachment 6) used site-specific synoptic sediment toxicity chemistry data to develop SQVs that provided relatively reliable predictions of sediment toxicity test results at 293 sediment sampling locations for which sediment toxicity tests were conducted.*

The boards recommend that future decision documents contain a clear explanation as to why the Region did not use the BERA's SQVs to develop the PRGs, and why the Region plans to propose the use of the Washington SMS values as sediment cleanup levels in the ROD.

Response: After further evaluation, the Region will use the BERA SQVs in finalizing the PRGs for the revised FS. If the Region uses values other than those developed in the BERA, there will be a clearly stated rationale for not using the value in the BERA and using a different value. The revised PRGs will be clearly explained in the revised FS and will be included in the decision documents.

Principal Threat Waste

***Recommendation**: In the package presented to the boards, the Region identified the existence of PTW at this site. However, the Region did not clearly explain, for eight of the COCs, the basis for determining that specific concentrations posed a cancer risk of 10^{-3} or greater. In addition, the Region did not clearly explain its approach for identifying PTW and pursuing treatment "to the maximum extent practicable" for all of the PTW (e.g., why "reliably contained" was a consideration in identifying PTW). The boards note that OSWER Directive No. 9380.3-06FS, November 1991, A Guide to Principal Threat and Low Level Threat Wastes, provides guidance on identifying PTW, as well as on the statute's preference and the NCP's expectations for treatment of PTW. The boards recommend that the Region fully explain in its decision documents how its PTW approach at this site is consistent with CERCLA and the NCP, including, specifically, CERCLA § 121(b)(l)'s preference for treatment "to the maximum extent*

practicable;" CERCLA § 121(d)(l)'s requirements regarding selection of remedies that ensure protectiveness of human health and the environment and achieve (or where appropriate, waive) applicable or relevant and appropriate requirements (ARARs); 40 CFR § 300.430(a)(l)(iii)(A)'s expectation that "treatment [be used] to address the principal threats posed by a site, wherever practicable;" and 40 CFR § 300.430(f)(l)(ii)(E)'s preference for treatment "to the maximum extent practicable," while protecting human health and the environment, attaining ARARs identified in the ROD, and providing "the best balance of trade-offs" among the NCP's five balancing criteria.

Response: Consistent with CERCLA and the NCP, the Region expects to use treatment to address the principal threats posed by a site, wherever practicable, and use treatment to the maximum extent practicable throughout the site.

Consistent with the NCP and EPA guidance, PTW was identified based on a 10^{-3} risk, source material (NAPL) within the sediment bed, or on an evaluation of mobility of contaminants in the sediment. "Reliably contained" was not used in identifying PTW, but rather was used to determine what concentrations of PTW could be reliably contained.

Source Material: NAPL has been identified in subsurface sediments offshore of the Arkema and Gasco sites (RM 6 through RM 7.5) as globules or blebs of product in surface and subsurface sediments. NAPL observed offshore of the Arkema site contains chlorobenzene with DDT (dissolved). NAPL observed at the Gasco site contains aromatic hydrocarbons and PAHs. FS Figure 3.2-1 identifies locations where NAPL was observed in sediments offshore of the Arkema site and Figure 3.2-2 identifies the NAPL observed in sediments offshore of the Gasco site.

Highly Toxic: Contaminated sediment concentrations that exceed a 10^{-3} risk level based on the fish consumption pathway was identified for PCBs, cPAHs, DDx, and dioxins/furans. This PTW evaluation focused on surface sediments.

The Region expects to use treatment to address the principal threats posed by the Site, wherever practicable, consistent with the NCP (40 CFR §300.430) and EPA guidance. However, based on the technology assignment process, if sediment classified as containing PTW is located in an area designated for capping, then a reactive cap will be assumed for that area to meet the preference for treatment and meet applicable or relevant and appropriate requirements (ARARs). As such the Region determined what PTW could be reliably contained by modelling representative site conditions and capping options to determine the maximum concentrations of PTW material that would not result in exceedances of human health based AWQC in the sediment cap pore water after a period of 100 years. A description of this modeling effort is provided in Appendix D of the draft FS.

Organoclay reactive caps are also assumed at locations where NAPL is present and where containment is assigned. It has recently been used as an amendment in the capping of NAPL at the McCormick and Baxter Superfund site in the Willamette River within the Portland Harbor Site.

Alternatives B and D do not address all PTW. Alternatives E through G address all PTW through treatment as appropriate or required for disposal. The preferred alternative provides the best balance of trade-offs, utilizes treatment to maximum extent practicable and attains ARARs. The majority of the PTW will be addressed through treatment. In-situ treatment will also be used in groundwater plume areas and under structures. *Ex-situ* treatment will be used based on the disposal decision tree. Institutional controls will assure protectiveness until RAOs are achieved and in the long term.

Remedial Action Objectives/Preliminary Remediation Goals

Recommendation*: Based on the information provided, the Region has identified nine RAOs. The boards recommend that the decision documents clearly explain how the proposed remedial action would achieve each RAO. The boards further recommend that this explanation include a description of the media to be addressed and the PRGs that must be met to achieve each of the nine RAOs. This explanation is especially important for media listed in the RAOs that will not be directly remediated, for example, biota for RAO 2.*

Response: The Region agrees with the boards' recommendation and will clearly explain how the proposed remedial action would achieve each RAO in the decision documents, including a description of the media to be addressed and the PRGs that must be met to achieve each of the nine RAOs.

Recommendation*: The boards note that the Region's preferred alternative's anticipated effectiveness appears to be directly related, in part, to reductions in the bioaccumulation and food chain transfer of polychlorinated biphenyls (PCBs) to fish. The boards acknowledge that the Region's preferred alternative is designed to reduce both the human health and ecological risk present at the site. However, it is unclear to the boards how fish tissue concentrations will be used to help determine RAO achievement. The boards recommend that the decision documents explain the role of fish tissue concentrations as a means of measuring achievement of health-based and eco-based RAOs and as a remedy effectiveness evaluation tool.*

Response: The Region agrees with the boards' recommendation and will include language that identifies long-term sampling and monitoring requirements in the decision documents for sediment, surface water, pore water and fish tissue to determine whether the RAOs have been achieved. In addition, the decision documents will identify the PRGs/cleanup levels that relate to achieving each RAO and any other metrics (fish tissue) needed to measure remedy performance and effectiveness.

Remedy Performance

Recommendation*: The materials the Region presented to the boards included habitat mitigation and associated costs. The boards note that there are potential distinctions between Clean Water Act section 404 (CWA 404) mitigation carried out as part of the cleanup (e.g., actions taken pursuant to an ARAR like CWA 404) and the role of restoration as part of addressing natural resource damages. The boards recommend that the Region explain in its decision documents the relative roles and responsibilities of EPA and natural resource trustees in addressing this site's contamination through cleanup/mitigation, as opposed to natural resource restoration activities. The boards further recommend that the decision documents clearly state what components of the preferred alternative, and in what site specific areas, may impact or result in loss of aquatic habitat that would require environmental mitigation pursuant to CWA 404.*

Response: The Region agrees with the boards' recommendation that the decision documents clearly state what components of the preferred alternative, and in what site specific areas, may impact or result in loss of aquatic habitat that would require environmental mitigation pursuant to CWA 404.

CERCLA requires all selected remedial actions comply with ARARs of federal and state laws. 42 U.S.C. § 9621(d)(2)(A). Section 404 of the Clean Water Act and its implementing regulations (known

as the 404(b)(1) guidelines) are potential ARARs for CERCLA cleanups. The 1988 Manual describes in detail what the substantive requirements of the 404(b)(1) guidelines are and, in particular, states that mitigation is a substantive requirement. CERCLA Compliance with Other Laws Manual: Draft Guidance August 1988. Thus, mitigation measures must be taken to minimize adverse impacts resulting from the remedial action that significantly degrade the aquatic environment, and if there is unavoidable loss from the remedy, mitigation is appropriate. Whereas, the natural resource trustees seek to restore, replace, or acquire the equivalent of natural resources that are injured, destroyed or lost as a result of the release of hazardous substances at a site. 42 U.S.C. §§ 9607(a)(4)(C) and 9607(f)(1). The federal natural resource damage regulations provide that natural resource trustees may recover damages "calculated based on injuries occurring from the onset of the release through the recovery period, less any mitigation of those injuries by response [and remedial] actions taken or anticipated, plus any increase in injuries that are reasonably unavoidable as a result of response [and remedial] actions taken or anticipated." 43 C.F.R. § 11.15(a)(1).

The revised FS will include an initial 404(b)(1) analysis of the potential impacts to the aquatic environment resulting from the alternatives and how such impacts may be avoided, reduced and/or mitigated. A final determination on the impacts and amount of mitigation required will be made with remedial design level information.

Recommendation*: One tool that appeared useful to the Region in the development of alternatives was the remedial action level (RAL) curve using predictions of surface weighted average concentrations (SWAC) of contaminants in sediment at the end of construction versus the number of acres remediated. However, it was not clear to the boards how the Region used this tool in the process of selecting the preferred remedy. Furthermore, the boards recommend that this analysis should be expanded by graphing each SWAC prediction for a given alternative-specific number of acres removed versus the RAL associated with the alternative. The boards also recommend that the Region calculate a confidence band (e.g., 95 percent confidence interval) for the current and predicted end-of-construction SWACs to quantify and address uncertainty in the SWACs as related to the spatial extent (i.e., acreage) of the remedial footprint. This will increase transparency of the alternatives analysis and the selection of the preferred alternative.*

Response: The Region agrees with the boards' recommendations and will conduct the analysis recommended. If the resulting analysis provides useful information in evaluating the alternatives, the Region will include it in the revised FS. Otherwise, the analysis will be included in the Administrative Record.

Recommendation*: The boards note that several stakeholder comments indicated that Portland Harbor releases are contaminating the Columbia River downstream of the site. The boards recommend that the decision documents contain a clear explanation as to how the Region believes effective remediation of Portland Harbor sediment should reduce contaminant loading to the Columbia River's surface water, sediment and biota.*

Response: The preferred alternative will remove and/or cap the areas of highest contaminant concentrations in sediments at the Site and therefore will have a substantial positive impact downstream, including the Columbia River. Although reducing loading to the Columbia River is not a direct objective of this action, it is an ancillary result of achieving the other remedial action objectives. As

such, the Region will include language in the ROD that ties the impacts of achieving the surface water and sediment RAOs to the Columbia River.

Recommendation*: The information the Region provided to the boards conveyed Portland Harbor's importance to the local economy. The boards also understand that a congressionally authorized navigation channel, to a depth of 40 feet, runs throughout the length of the site and that channel maintenance dredging is generally performed without some of the safe guards for managing sediment resuspension and contaminant releases that are associated with environmental dredging. Furthermore, navigation dredging is likely to take place in parts of the study area where the Region is currently anticipating the use of MNR. It is unclear to the boards how an expectation of ongoing MNR can be combined with a reasonably anticipated expectation of comprehensive channel dredging. In addition, some of the contaminated sediment that would be addressed through this remedial action is located in the navigation channel. The boards recommend that the Region explain in its decision documents: (1) other federal and state agencies' and other stakeholders' (e.g., Port Authority) role in the river's maintenance dredging, (2) how potential authorized channel-depth (e.g., deepening) changes could affect the remedy, and (3) how maintenance dredging or channel-deepening activities could impact and/or be undertaken in a manner consistent with the remedy selected.*

Response: Future maintenance dredging actions in the federally-authorized navigation channel will be conducted by the U.S. Army Corps of Engineers Portland District. Proposed dredging actions, including deepening, will require permitting to ensure environmentally safe assessment, characterization, and disposal of sediments. The Sediment Evaluation Framework (SEF) for the Pacific Northwest guidance is used by the interagency Portland Sediment Evaluation Team (PSET) to evaluate the suitability of dredged material for unconfined aquatic disposal or other disposal options. The PSET agencies include the Portland District, Environmental Protection Agency, Oregon Department of Environmental Quality, Washington Department of Ecology, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. The PSET evaluates dredging and habitat restoration projects in the Portland District. This process includes consideration of materials removed during dredging (including resuspended materials) and the sediments that will be exposed by the dredging action. CERCLA coordination on future maintenance dredging within Portland Harbor will ensure the PSET/ SEF approach is consistent with the requirements established in the ROD.

Additionally, future navigation dredging by individual parties must be permitted and EPA will use the existing Memorandum of Understanding process we have with the Portland District for coordination on such dredge projects to assure the dredging is consistent with the ROD.

Recommendation*: In the presentations made to the Board, the Region discussed monitoring with respect to fish tissue contaminant levels. The boards note that at many large contaminated sediment sites, monitoring plays an important role in remedy performance evaluation. The boards also note that the fish tissue data currently available at this site are somewhat limited, and that additional data (for example fish tissue data, following OSWER Directive No. 9200.1-77D, July 2008, U.S. EPA Sediment Assessment and Monitoring Sheet #1 "Using Fish Tissue Data to Monitor Remedy Effectiveness") could help measure remedy performance. The boards note that a monitoring plan prepared in the RD's initial phase could allow existing fish tissue data to be assessed for use as baseline data or could help the Region evaluate whether additional baseline data collection would be useful (which also might help refine risk estimates over time). Existing EPA guidance (see EPA/600/R-96/055, September 1994,*

Guidance for the Data Quality Objective Process) may be helpful. The boards recommend that the Region address and clarify the role of a monitoring plan in site decision documents.

Response: The Region agrees with the importance of monitoring in assessing remedy performance, and the need for an adequate baseline data set to serve as a metric to assess remedy effectiveness over time. Fish tissue was collected as part of the remedial investigation (in 2002 and 2007) for multiple species and multiple contaminants. In 2011 and 2012, a smaller data set was collected focusing on smallmouth bass and PCBs to provide updated fish tissue contaminant concentrations and assist in developing natural recovery trends (only a portion of the site was sampled in 2011). As discussed in OSWER Directive 9200.1-77D, generally at least two species of fish should be collected in a monitoring program and sampling should be conducted for all bioaccumulative COCs at multiple time points to support contaminant trend analyses. The Region agrees that existing data are insufficient to serve as a proper baseline tissue data set. Section 3.3.3.6 of the FS discusses the need for a robust baseline and long-term monitoring program, and the decision documents will include a monitoring program as part of the selected remedy.

Recommendation*: As part of the information provided to the boards, the Region included decision trees (Figures 3.3-40, 3.6-1a, 3.6-1b and 3.6-1c of the package), but it was unclear to the boards what role the decision trees play in the remedy selection process (for example, for purposes of evaluating technologies in the FS or as part of the ROD's remedy decision criteria). The boards understand that RD sampling results will be used to identify the proposed alternatives' final RAL-based footprints, and, in light of that use, the boards recommend that the site's decision documents provide clarification as to how the Region intends to use the various decision trees in remedy selection and implementation.*

Response: The remedy for Portland Harbor includes the use of various technologies to address sediment contamination within the Willamette River. The use of different technologies must consider the impact of the dynamic system on the remedy and how that remedy will perform over time. Additionally, the contamination within the site has likely moved and will continue to move within the river system in the time between when sediment samples were obtained and the time that the cleanup occurs. Therefore, it is not possible to identify on a map or figure in the PP or ROD the exact location of where the appropriate cleanup technology should be applied. Consequently, the remedy for the site will be defined with the use of decision trees, which are logic flow diagrams that describe what technology will be implemented under different environmental conditions; such as contaminant concentration, river hydraulics, location of the navigation channel, depth of water, and other factors. The decision trees will be used during design to define what actions should be taken in different areas of the site based on the most recent design data. Once the data and river factors are evaluated within the context of the decision trees, a final design for construction can be completed. This design will then dictate cleanup construction. The decision trees are intended to provide clear direction on what actions should be taken under the different environmental conditions. Based on the comment by the Boards, the Region will include more information in the PP and ROD on how the decision trees are to be used in further defining the remedy during design and construction.

Cost

Recommendation*: The package the Region presented to the boards included a detailed cost estimate for each alternative, including unit costs and supporting documentation. The boards' review of this information suggests that many of the cost assumptions and resulting total costs (e.g., dredging unit*

cost) are generally consistent with those at other sediment sites. However, the boards recommend further evaluation of several line items:

- *mitigation cost (including number of acres),*
- *professional technical services percentage assumption, and*
- *offloading and dewatering costs.*

Response: The Region agrees with the boards' recommendations and is currently evaluating these cost line items to determine that the underlying assumptions are appropriate. The results of this evaluation will be shared in the revised FS and adjustments will be made to the assumptions as necessary.

***Recommendation**: The boards recommend that the Region consider mechanical offloading to minimize disposal/dewatering costs, as well as to minimize the volumes and unit cost for the Resource Conservation and Recovery Act (RCRA) Subtitle C and D landfill estimates. The boards note that at some sites, it may be consistent with state and federal ARARs (for example the Toxic Substances Control Act and its implementing regulations published at 40 CFR §761) to use material as daily cover at a RCRA Subtitle D facility, which may result in lower disposal costs.*

Response: The Region has considered and retained the mechanical offloading process option in the draft FS for possible utilization by EPA or a PRP once more information is collected in the remedial design phase of remedy implementation. For the purposes of the draft FS and to remain consistent with the current cost estimating methodology, the Region utilized unit costs previously developed by the PRP group in instances where the unit cost were deemed reasonable compared to those at other sediment sites. As a result, the Region applied the offloading technology chosen by the early action sites (hydraulic offloading) to remain consistent with those previously established unit costs. The evaluated use of hydraulic offloading as a representative approach in the draft FS does not preclude the use of mechanical offloading during remedy implementation.

The Region concurs with and recognizes this potential for the noted use of contaminated material, where appropriate, as a daily cover at RCRA Subtitle D facilities which may result in disposal cost savings. However, the decision to use contaminated material as daily cover is made by the receiving Subtitle D facilities and previous discussions with the representative facilities indicated that they were not in a position to make conclusive determinations about waste acceptance and uses at this time. During the remedial design phase, additional information will be provided to the selected Subtitle D facilities regarding the nature of the waste as generated, and unit costs for disposal or use as daily cover will be subsequently negotiated. For purposes of the draft FS a reasonably conservative assumption will be made that contaminated material taken to Subtitle D facilities would require disposal with the associated tipping fees.

***Recommendation**: Based on the Regional package and presentation, the boards understand that the non-aqueous phase liquid waste, if not a listed waste, may fail one or more RCRA characteristic waste tests. Given that potential failure, the boards recommend that the Region evaluate whether treatment with a water absorptive agent, such as cement or corn cobs, may render the dredged sediment non-hazardous for RCRA purposes.*

Response: The Region has retained absorptive agent process options such as cement and absorptive clay in the draft FS. In order to evaluate the efficacy of these technologies, additional characterization of

contaminated materials will be analyzed during the remedial design phase after remedy selection. The Region will evaluate potential application of the process options for contaminated materials, such as NAPL containing RCRA characteristic hazardous waste, based on information presented in available documents such as the draft EE/CA for the previous Removal Actions at the GASCO property. Adsorptive agent technology should provide potential cost savings afforded by these technologies if used for treatment prior to disposal at RCRA facilities.

Cost Effectiveness

Recommendation*: According to the site information package and Regional presentation, the Region's preferred alternative entails dredging many acres in the intermediate and shallow zones to the lesser of RAL concentration or 15 feet in the intermediate zone and 5 feet in the shallow zone. The boards note that these areas' residual contamination would be covered by either an engineered cap or a dredge residual cap. The boards further note that at some other CERCLA sediment sites, the cleanup may involve dredging just enough material (2 – 3 feet) to place a cap. The boards recommend that the Region include in its decision documents an explanation as to why, at this site, the preferred approach would involve dredging up to a depth of 15 feet.*

Response: The Region agrees with the boards that the decision documents should clearly explain the rationale for dredge depths under various site conditions. The decision documents will include a detailed description and logic tree for how areas within the site will be assigned a remedial technology. Determining the appropriate remedial technology is dependent on a number of site-specific characteristics and environmental conditions. These factors include current and reasonably anticipated future land and waterway use, areas of erosion/deposition, sediment bed slope, infrastructure such as docks and piers, and physical sediment characteristics, including the presence of PTW. In addition to the site-specific environmental and anthropogenic reasons, the Region has also considered the state's preference to minimize future encumbrances on current and future uses by keeping the area of capping to a minimum.

As the technology assignments have been developed and presented to the boards, dredging is assumed to the lesser of RAL concentration or to 15 feet in the intermediate zone. However, the majority of the RAL concentrations will be met at a depth of six feet. The only time a cap will be placed after dredging to 15 feet is when PTW that is not reliably contained or NAPL still remain. The 15-foot cutoff is based on engineering constraints and to limit the removal of surrounding sediment (2 horizontal:1 vertical slopes on dredge prism cuts are estimated to maintain the stability of dredge prisms). This requirement is for all areas of the site. In these instances, the area will be dredged to 15 feet and a significantly augmented reactive cap will be placed.

The shallow areas are critical for habitat, therefore, adding necessary remedial cap material to a depth of 3 feet on the top of the existing substrate most likely will adversely impact the aquatic environment by exposing the area at low tides or other conditions which should be avoided. To simply cap or dredge in this area would degrade shallow water habitat and require additional mitigation. These technologies may also affect the flood storage capacity of the river which also would need to be mitigated. To reduce the need for mitigation, the Region has a net-zero elevation change objective for the shallow areas of the site. Therefore, to put in a 3 foot thick cap, a dredge prism of 3 feet will first be removed. However, much of the contamination is shallow (<5 feet) and could be removed without the long-term monitoring

requirements of a cap, even though the dredge prism is backfilled with material (sand) typically used for caps.

In other areas of the site, the decision to place a residual layer after one dredge pass was to reduce the number of dredge passes during construction, thus reducing residual generation, sediment resuspension, and contaminant release during dredging as well as time and cost for implementation. The residual layer is not a cap and therefore will not require long-term monitoring.

Remedy Effectiveness

Recommendation*: Based on the site information package and the presentations to the boards, it appears that there are point and non-point sources (particularly of PCBs) present upgradient of RM 11.8. Because the Region is considering MNR as a remedial component, the boards recommend that the Region consider undertaking efforts to better characterize and control or remediate, if necessary, upgradient sources to improve natural recovery's viability.*

Response: The State has been working with responsible parties to clean up contaminated sediments in the Downtown Reach since the late 1980s. The most significantly contaminated sites have been identified and are being addressed by the State. Stormwater discharges have been reduced or eliminated from municipal outfalls in the area. Suspended sediment contaminant concentrations are currently much lower than the RALs in Portland Harbor and are expected to decrease toward background as the last cleanups are completed and natural recovery continues. Baseline sampling and comprehensive long-term monitoring will be conducted after the Portland Harbor ROD is issued to evaluate the potential for recontamination and the need for further source control measures.

Recommendation*: The information it provided to the boards conveyed the Region's extensive, ongoing efforts to work closely with the State to ensure that upland contaminant sources are sufficiently controlled to reduce the risk of sediment recontamination after remedy completion. Consistent with OSWER Directive No. 9285.6-08, February 2002, Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites, source control can play an important role at a contaminated sediment site. The boards recommend that the Region work with the State to establish a timeline for upland source control of contaminants to the Willamette River so that upland remediation can take place before or at the same time as in-water treatment and dredging/capping of the river sediment. The boards further recommend that the Region work with the State to ensure that surface water/groundwater discharged into the river from all of the more than 100 contaminated upland locations meet the relevant maximum contaminant levels. In addition, the boards recommend that the Region consider including in its decision documents clear criteria for evaluating when source control is sufficient to start remedial action, and that EPA continue to work with the State to ensure that source control actions are completed in a timely fashion. The boards also recommend that the Region consider whether undertaking source control actions using CERCLA or other federal authorities might be appropriate to ensure the EPA-selected remedial action's integrity. The boards note that there are a number of proven and established methods (such as permeable reactive barriers, bio-walls, in-situ chemical reduction and in-situ chemical oxidation) for groundwater/soil remediation and that these technologies have been used successfully to treat polycyclic aromatic hydrocarbons, PCBs, pesticides, and Chromium (VI).*

Response: DEQ and the Region are working closely together and have developed the Portland Harbor Joint Source Control Strategy in December 2005. It outlines a framework for making upland source

control decisions wherein DEQ began implementing a timeline by which, unless an upland facility is recalcitrant, the goal of screening, identifying, and evaluating areas needing source control should be complete by the time the ROD is issued. Since then, DEQ has screened approximately 500 potential upland sources and evaluated and prioritized 168 upland sources by level of threat. Each source control decision is based on facts determined through upland remedial investigations and weight of evidence. The Region plans to include clear criteria in the ROD for evaluating when source control is sufficient to start remedial action. The Region is working closely with the State to ensure that surface water/groundwater discharged to the River meet MCLs and other ARARs. The Region has made it clear that EPA has the option of using its CERCLA or other federal authorities to undertake source control actions to ensure the remedial action's integrity. The Region agrees that PRPs should be encouraged to use the best available technologies in selecting the appropriate remedy for their source control measures.

Modeling

Recommendation*: The information presented to the boards included outputs from models prepared as part of the remedial investigation/feasibility study. The boards note that models were developed to aid the Region in predicting, among other things, natural recovery effectiveness. The boards further note that models can be valuable tools in projecting changes in baseline conditions and in assessing remedy performance over time; however, existing models' potential deficiencies may limit their value. The boards identified the following issues as constituting their most significant concerns with the models used as part of the RI/FS:*

> *Model Domain: The model domain for Portland Harbor included the Willamette River, the Multnomah Channel and a very short reach (2.5 kilometers) of the Columbia River that centered on the confluence with the Willamette River. The hydrodynamic boundary conditions that were applied at the upstream and downstream boundaries of the Columbia River reach were extrapolated from gaging stations more than 25 kilometers upstream and downstream. Experience with other models of this scale would indicate that this is too short a reach of the Columbia River, especially with the use of the extrapolated boundary conditions, to accurately represent the Columbia and Willamette rivers' dynamic interaction. The selected model domain's limitations would be expected to be most pronounced during the following flows: (1) high flow in the Columbia and low flow in the Willamette, and (2) low flow in the Columbia and high flow in the Willamette.*
>
> *Model Framework: The existing model framework consists of decoupled hydrodynamic, sediment transport and contaminant transport models. As such, there is no dynamic feedback between the hydrodynamic and sediment transport models. This limitation of the model's framework means that river morphology changes, simulated by the sediment transport model, do not result in updated hydrodynamic simulation to account for bathymetry change. This limitation's consequences can be dramatic; for instance, there were locations in the model grid where the sediment transport model inaccurately predicted net deposition by several meters. Without the feedback to the hydrodynamic model, which would have resulted in some scour of the deposited sediment due to the higher velocities, the sediment transport model simulated excessive net deposition in some areas over a 30-year natural recovery simulation. The excessive areas of cleaner sediment net deposition, when inputted into the decoupled contaminant transport model, resulted in unrealistic decreases in surface contaminant concentrations over the simulation period.*

<u>Grid Resolution:</u> The model grid is too coarse, in both the lateral and longitudinal directions, in some reaches where COCs are present. This coarseness results in less accurate simulated flows and sediment transport in these areas.

<u>Bedload Transport:</u> The existing sediment transport model did not include simulation of the movement of non-cohesive sediment via bedload transport. Given the reaches along the Willamette River where non-cohesive sediments are dominant, including reaches where dunes are known to form during some flow conditions, not simulating bedload transport further limits the sediment transport model's ability to accurately simulate the study area's sediment dynamics.

The boards recognize that the Willamette River system poses unique model development challenges and that, at this time, the Region is not relying on a model to predict various aspects of hydrodynamics, sediment transport, food chain/bioaccumulation and sediment deposition. The boards believe that a remedy may be selected at this time without completing additional modeling but recommend that the Region continue to evaluate a set of site-specific predictive tools (such as fish tissue trend data) to aid in site management during the Portland Harbor's proposed remedy implementation.

Response: The Region understands the boards' concerns and is continuing to explore the use of site-specific predictive models that will aid in the management during remedy implementation. Some of those tools will include fish tissue trend data, sediment fate and transport models, or sediment trend data.

<u>Monitored Natural Recovery</u>

***Recommendation**: The Region presented to the boards a strong case for addressing Portland Harbor's most highly contaminated portions. The boards note that the Region's preferred approach is likely to result in meaningful risk reduction at the completion of the remedial action and that it is likely to support further recovery of the river through natural recovery processes. However, based on the information presented to the boards, there is some uncertainty surrounding MNR's effectiveness as a remedial component at this stage in the remedy selection process. For example, the Region provided relatively limited, qualitative evidence for natural recovery. Furthermore, the modeling information was incomplete (as discussed above). In addition, the boards note potential uncertainties regarding the: (1) upland source control measures' effectiveness (soil and groundwater) over time, (2) impact of future reductions in background and upgradient loading, (3) effect of ongoing navigational dredging on MNR, (4) deposition rates across key areas of the site, (5) fish tissue data trends, (6) ecological risk, and (7) overall long-term data trends.*

The boards recommend that, in light of these uncertainties, the Region consider selecting an interim remedy for the MNR component at this time. Such an approach could include a robust performance monitoring and assessment program that could provide additional lines of evidence to support the supposition that MNR will continue after active remediation. Such a continuation could lead to RAO achievement in areas outside of the SMAs. The boards note that, under this approach, a final remedy would be informed by the robust monitoring program and any additional modeling. Further, the boards note that, should monitoring data and any reliable future modeling suggest that the remedy's MNR component needs to be augmented with additional active remediation, the Region could propose

additional remedial work as part of a final remedy selection process. Undertaking such additional work would help ensure the remedy's overall effectiveness and protectiveness.

Response: The Region believes there is enough information to support a final remedy at this time and will include this information in the decision documents. Although the predictive model was not relied upon to support natural recovery, the Region used several other lines of evidence that indicate natural recovery is occurring at different rates within the study area and therefore supports including natural recovery as a remedial component. As discussed previously, the Region is also working with DEQ to ensure their source control actions are sufficient at this time to select a cleanup for the river. The Region will also include information that describes what risk reduction will be achieved at the end of construction as another basis for making a final cleanup decision. Additionally, the Region will include a robust performance monitoring and assessment program (as acknowledged in Section 3.3.6 of the draft final FS) during remedy implementation to ensure that natural processes are occurring at a rate to meet the remediation goals in a reasonable time frame. The Region will be doing periodic reviews as required under CERCLA and should the data indicate that the MNR component of the remedy is not functioning or occurring as necessary, there are mechanisms built in to the CERCLA process to revisit this component of the remedy.

Stakeholders

Recommendation*: Based on information presented to the boards, this site's contamination impacts tribal subsistence and ceremonial fishing rights. The boards recommend that the Region explain how existing tribal treaty rights have been considered as part of the remedy selection process (See Memo from Gina McCarthy, December 2014, Commemorating the 30th Anniversary of the EPA's Indian Policy).*

Response: Throughout the last 15 years, including the remedy selection process, the Region has meaningfully engaged with the affected tribes; has recognized and honored tribal treaty rights; and has encouraged and facilitated tribal involvement. The Region has communicated at least monthly with and obtained input from the tribes on numerous issues including the decision to list the site on the National Priorities List and development of the Human Health Risk Assessment. In determining tribal risk related to fish consumption, the Region used consumption survey results obtained from the Columbia River Inter-Tribal Fish Commission in order to ensure protection of tribal fishing rights. In 2001, EPA entered into a Memorandum of Understanding with the Oregon Department of Environmental Quality, the tribes, two other federal agencies, and one other state agency, who have all participated in providing support for and development of the RI/FS. The Region recognizes that the remedy addresses contamination at the lower Willamette River site and does not solve all problems associated with the greater Columbia River system. However, the cleanup will significantly reduce contamination in the system and greatly improve the overall health of the regional waterway, including the affected tribal resources. In January and February, 2016, tribal consultations have been or will be held between EPA and the tribes in order to further obtain tribal input on the proposed alterative. The Region takes its trust responsibility to the tribes seriously and will continue to involve the tribes and honor existing tribal treaty rights as the remedy selection process moves forward. The Region has provided and will continue to provide the tribes opportunities to discuss their treaty rights with regards to the remedy selection process for Portland Harbor.

Recommendation*: The boards recommend that the Region consider going beyond meetings to engage the public on the this cleanup's complexities and that it consider approaches such as mini-workshops and/or a public charrette similar to those held by Region 1 for the Housatonic River site.*

Response: The Region agrees with the boards and has not only offered community meetings, but has utilized other community involvement tools to engage the public in dialogue about the cleanup. Alternative community communication tools were designed based on community input of ways to help them better understand the complexities at the site and to better communicate their values and concerns to EPA. The community also expressed the desire for EPA to conduct targeted outreach to communities with EJ concerns. Based on this input, the Region went beyond the basic public meeting and offers alternative engagement such as, but not limited to the following:

- **Community Technology Talks**- The Region held a 4 month series of talks/community discussions on contaminated sediment cleanup technologies presented in the FS. Each of the "Technology Talks" followed a basic format to help the audience compare and consider how each technology could be used at Portland Harbor. The format included technology overview, successful use at other contaminated sediment sites, and advantages/ disadvantages. The presentations were shared electronically with community groups. In addition to the live "Talks", short animated and narrated mini presentations for each technology are near completion and will be made electronically available to the community.
- **Superfund / Portland Harbor 101 Information Sessions**- The Region has and continues to provide interactive information sessions to help community members understand both the Superfund process and history, and also Portland Harbor background, risks, and why EPA is taking action. The sessions include hands on activities and audience dialogue with Regional staff. Participants discuss new information gleaned from the class, offer suggestions on cleanup-alternatives, and how to best keep the public informed and involved.
- **Dialogue/FAQ Sessions with Spanish speaking communities**- The Region partners with non-profit organizations to hold community dialogues translated in Spanish by community members. Along with the discussions, the Region provides information cards (Spanish) and utilizes an information display (Spanish) to discuss the chemicals, site location, health impacts associated with the site, future cleanup and how to stay involved. The participants provide feedback on fishing locations, ideas for outreach to the Spanish community, and health concerns related to the site.
- **Community Café with graphic facilitator**- As a result of community members' request to have an alternative platform to learn about health risks and cleanup options, the Region utilized a graphic facilitator to capture the EPA/community dialogue in an illustrative format rather than written text. The illustrations also captured values and concerns the community would like EPA to consider as EPA prepares the PP. Some of the concerns captured during the first Café were expressed in the CAGs' recommendations presented to the NRRB in November 2015. The Region is planning a second Café which will be held prior to the release of the PP.
- **Earth Care Summit**- The Region participates in the annual Summit of multifaceted faith based organizations who are concerned about the environment and health. The Region has provided presentations to classes with 50+ attendees and hosted table discussions about the environmental and human health impacts from Portland Harbor contamination, possible cleanup methods, and cost.
- **A Portland Harbor Youth activity book** was specifically developed to teach 6-12th grade students about Portland Harbor history, contamination, health effects, exposure,

bioaccumulation, and fish advisories. The Region visits area schools and the Native American Youth Association to teach lessons from the book to help educate this vulnerable population.

- **Sierra Club, Audubon Society and League of Women Voters** are organizations the Region visits during regularly scheduled meetings to participate in roundtable discussions, provide Superfund/Portland Harbor 101 training and dialogue about sediment decision units, impacts on human health and wildlife, and hear their questions and concerns about cleanup options in the FS.

Policy and Guidance

Recommendation*: Based on the information provided to the boards, the Region's preferred approach involves the use of RALs, SMAs and SDUs. To ensure transparency, provide clarity and help facilitate meaningful public participation, the boards recommend that, consistent with the NCP and existing EPA CERCLA guidance (e.g., OSWER Directive No. 9200.1-23P, July, 1999, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents; OSWER Directive No. 9355.3-01, October 1988, Guidance for Remedial Investigations and Feasibility Studies under CERCLA), the decision documents clearly explain: (1) the basis for the RALs, SMAs and SDUs; 2) how RALs, SMAs and SDUs fit into the existing CERCLA remedy selection framework, specifically their role in relationship to the PRGs and cleanup levels' development; and 3) clarify the role of the RALs, SMAs and SDUs in evaluating and selecting alternatives across different decision units (for example, the factors used to decide area and depth of dredging based on RALs).*

Response: The Region agrees with the boards' recommendation that terminology in the decisions documents be consistent with existing EPA CERCLA guidance. The Region will clearly explain all components of the proposed remedy in the decision documents, including (1) the basis for the RALs, SMAs and SDUs; 2) how RALs, SMAs and SDUs fit into the existing CERCLA remedy selection framework, specifically their role in relationship to the PRGs and cleanup levels development; and 3) clarify the role of the RALs, SMAs and SDUs in evaluating and selecting alternatives across different decision units.

As stated in the information presented to the boards, Sediment Management Areas (SMAs) and Remedial Action Levels (RALs) have a direct relationship and are used together to delineate areas where MNR, ENR and in-situ treatment are not considered to be effective enough in reducing concentrations of COCs. Therefore, containment (capping) or removal (dredging) technologies were considered in these areas to reduce concentrations and risks throughout the site. RALs are contaminant-specific sediment threshold concentrations used to identify areas of surface sediments where capping and/or dredging were evaluated and are the basis of the SMA boundaries. The RALs were developed considering the relationship between the spatial extent of contamination exceeding the RAL concentration (acres of capping or dredging) and the surface-area weighted average concentrations (SWACs). RALs were developed only for the focused COCs, those that were the most widespread and pose the highest risks. However, RALs are based on engineering rather than risk based criteria; higher RAL concentrations define smaller SMAs. The amount of active remediation (dredging/capping) has a direct impact on achieving PRGs/cleanup levels, which are based on risk or promulgated standards. RALs are simply a pragmatic tool for delineating areas of active remediation, they are not PRGs/cleanup levels that the remedy must meet to be protective.

Due to the size of the site and the breadth of contamination, the evaluation of remedial alternatives needed to be conducted on an appropriate spatial scale relative to the receptors at the site. Those areas of the site with the greatest contaminant levels were identified as sediment decision units (SDUs). The concept for the development of the FS was to focus on maximizing risk reduction at the site by focusing on those areas posing the greatest risk through reducing exposure to contaminated surface sediment. SDUs were developed and used only to evaluate the effectiveness of each alternative by comparing the alternative's post construction surface-weighted average concentration (SWAC) and the PRGs for each RAO in the SDUs. This identifies the relative effectiveness between alternatives in reducing concentrations and risk throughout the site. Thirteen individual regions within the Site were designated as SDUs: the remainder of the site was combined into a fourteenth region (noSDU) for evaluation.

Recommendation*: In its presentation to the boards, the Region identified two alternatives for dredge spoils disposal: off-site disposal at a commercial landfill and on-site disposal in a confined disposal facility (CDF). The preferred alternative does not identify which of these disposal options is preferred. The boards' review package included several references regarding the use of ex-situ treatment for excavated sediments, riverbank soils and PTW but provided only general statements regarding treatment. The boards recommend that the proposed plan identify a preference for either off-site or CDF disposal and the specific nature of any on-site treatment that is part of the preferred alternative. The ROD that follows should make a final selection of the remedy's disposal and treatment components. The boards further recommend that the decision documents contain clarification regarding whether there will be on-site treatment for dredged material.*

Response: The Region agrees that the PP should include a preference for the disposal location of dredged material (either off-site or CDF disposal) and should specify the nature of any ex-situ treatment needed. The PP will include a preferred disposal option that the public will comment on and the ROD will include a final disposal option selection. The PP and ROD will include a disposal decision tree with an explanation of when to use ex-situ treatment for dredged material, the nature of the treatment based on multiple criteria, and the appropriate facility. All dredged material requiring ex-situ treatment will be sent to and handled at an off-site facility, so no on-site treatment of dredged material is expected for this site.

Recommendation*: The boards recommend that the Region give consideration to climate change's potential impacts on the remedial action. The boards note that remedies such as MNR and ENR are typically anticipated to operate over an extended timeframe during which increasingly frequent high rainfall events may occur. The boards also recommend that the Region identify hazards by undertaking a climate-change exposure assessment, which evaluates a wide range of climate change scenarios, including, but not limited to, major flood events (100-year flood, consistent with OSWER Directive No. 9355.0-85, December 2005, Contaminated Sediment Remediation Guidance for Hazardous Waste Sites) and how such events might rework the river's contaminated sediment. The Region should thoroughly evaluate the sediment caps' design prior to implementation to prevent scouring and redistribution of materials.*

The boards further recommend that the Region consider Executive Order 13690, January 2015, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, when preparing its decision documents.

Response: The Region agrees that climate-change exposure needs to be assessed, particularly prior to implementation of the response action. Under the location-specific ARARs section of the information package, the Region included the Federal Emergency Management Act (FEMA) regulations at 44 CFR 9 which set forth the policy, procedure and responsibilities of federal agencies to implement and enforce Executive Orders 11988 (Management of Floodplain), as amended by E.O. 13690, and E.O. 11990 (Wetlands Protection) and the FEMA regulations. Since the response action could potentially impact flood storage capacity without mitigating measures, EO 13690 and EO 11990 are expected to be identified as to-be-considered. (Executive Orders are not promulgated and enforceable and therefore, do not constitute ARARs.) Portions of the FEMA regulations requiring projects not adversely impact existing flood storage capacity without appropriate mitigation are ARARs. Likewise, the FEMA regulation ARAR requires that any action (such as sediment cleanup) that encroaches on the floodways of United States waters cannot cause an increase in the water surface elevation of the river during a 100-year flood event.

Flood rise, extreme weather events, and climate change concerns were considered in remedial technology assignment and cap design in the draft FS and will be given further consideration in remedial design. In shallow areas, placement of capping material will result in a positive change in the bathymetry that would require mitigation under Section 404 of the Clean Water Act, and would also affect the flood rise capacity of the river. In order to limit the need for mitigation and flood rise analyses, equivalent cap thickness is dredged prior to placement to allow for a net zero bathymetry change in shallow areas. Certain areas in the river would require armoring on caps to reduce erosion, particularly after large storm events which may increase in frequency and duration with climate change. Caps will be designed to withstand a 500 year flood event in accordance with the EO.

The Region appreciates the boards' assistance on this complex project. In the months ahead, we will continue to work on a preferred cleanup approach to be presented in the PP, which will be released for public comment. If you have additional questions regarding the responses in this memorandum or any of the information presented in the boards' package, please contact me or Kristine Koch, Remedial Project Manager, at 206-553-6705.

cc: J. Woolford (OSRTI)
D. Stalcup (OSRTI)
C. Mackey (OSRE)
C. Bertrand (FFRRO)
D. Ammon (OSRTI)
R. Jeng (OSRTI)
NRRB members
CSTAG members