UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

MEMORANDUM

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

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

Stephen J. Ells, Chair
Contaminated Sediments Technical Advisory Group

TO: Richard Albright, Director
Office of Environmental Cleanup
U.S. EPA Region 10

Purpose

The National Remedy Review Board (the Board) and the Contaminated Sediments Technical Advisory Group (CSTAG) have completed their review of the proposed cleanup action for the Portland Harbor Superfund site, in Portland, OR. This memorandum documents the Board's and CSTAG's advisory recommendations.

Context for Board Review

The Administrator established the Board as one of the October 1995 Superfund Administrative Reforms to help control response costs and promote consistent and cost-effective remedy decisions. The Board furthers these goals by providing a cross-regional, management-level, "real time" review of high cost proposed response actions prior to their being issued for public comment. The Board reviews all proposed cleanup actions that exceed its cost-based review criteria.

The Board review is intended to help control remedy costs and to promote both consistent and cost-effective decisions. Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), in addition to being protective, all remedies are to be cost-effective. The Board considers the nature of the site; risks posed by the site; regional, state, tribal and potentially responsible party (PRP) opinions on proposed actions; the quality and reasonableness of the cost estimates; and any other relevant factors or program guidance in making our advisory recommendations. The overall goal of the review is to ensure sound decision making consistent with current law, regulations, and guidance.

Generally, the Board makes the advisory recommendations to the appropriate regional division director. Then, the region will include these recommendations in the administrative record for the site, typically before it issues the proposed cleanup plan for public comment. While the region is expected to give the Board's recommendations substantial weight, other important factors, such as subsequent public comment or technical analyses of response options, may influence the region's final remedy decision. The Board expects the regional division director to respond in writing to its recommendations within a reasonable period of time, noting in particular how the recommendations influenced the proposed cleanup decision, including any effect on the estimated cost of the action. Although the Board's recommendations are to be given substantial weight, the Board does not change the Agency's current delegations or alter the public's role in site decisions.

Office of Solid Waste and Emergency Response (OSWER) Directive 9285.6-08, February 2002, *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*, established the CSTAG as a technical advisory group to "…monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites…." One of CSTAG's main purposes is to guide regional site project managers on how to appropriately manage their sites throughout the cleanup process in accordance with the 11 risk management principles set forth in the OSWER Directive 9285.6-08. EPA decided not to have a separate technical review by the CSTAG per OSWER Directive No. 9285.6-20, September 2009, *Changes to the Roles and Responsibilities of the Contaminated Sediments Technical Advisory Group (CSTAG),* but instead elected to have a combined NRRB/CSTAG meeting for this site. This joint meeting format is the approach EPA plans to take in the future at CSTAG sites.

Overview of the Proposed Action

The Portland Harbor Superfund site, which is approximately 2,190 acres in size, is located in the lower Willamette River's downstream portion (currently river mile [RM] 1.9 to RM 11.8); the portion of the river from Willamette Falls [RM 26.5] to the Columbia River is considered the lower Willamette River). Multnomah Channel is a lower Willamette River distributary channel, which begins at RM 3.1 and flows northwest approximately 21 miles to its confluence with the Columbia River. EPA has designated 13 individual river regions, typically about a mile in length with varying widths, as sediment decision units (SDUs). The SDUs encompassed the Sediment Management Areas (SMAs), which for purposes of this cleanup are the areas where focused contaminants of concern (COC) concentrations were the highest; in these areas, the Region's preferred alternative would include dredging or capping.

Seven alternatives, labeled "A" through "G," were developed in the feasibility study (FS). Alternative A is a "no-action" alternative, and alternatives B through G all use a combination of the following general response actions to varying degrees: institutional controls (ICs), monitored natural recovery (MNR), enhanced natural recovery (ENR), containment, sediment treatment (*in-situ* and *ex-situ*), sediment/soil removal and disposal of dredged sediments.

For this review's purposes, the Region identified Alternative E as the preferred alternative with the following modifications to specific areas of the site:

SDU 5.5E – Alternative F
SDU 6.5E – Alternative B + treatment of principal threat waste (PTW)
SDU 6NAV – Alternative B + treatment of PTW

SDU 6W – Alternative D
SDU 7W – Alternative F
Areas outside SDUs – treatment of PTW only

The Region made these modifications to ensure that risk levels throughout the site will be within the risk range (between 10^{-4} and 10^{-6}) or less than a non-cancer hazard quotient of 10 for individuals COCs for child exposure. In addition, all PTW will still be addressed.

National Remedy Review Board and Contaminated Sediments Technical Advisory Group Advisory Recommendations

The Board and CSTAG (hereafter referred to as "the boards") reviewed the information package describing this proposal and discussed related issues with numerous members of Region 10 management and staff on November 18 and 19, 2015. Oregon Department of Environmental Quality (ODEQ) and the six federally recognized tribes, which are signatories to a memorandum of understanding with EPA and federal natural resource and state agencies regarding the Portland Harbor site, participated on November 18, 2015. Based on this review and discussion, the boards offer the following recommendations:

Institutional Controls

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.

Human Health and Ecological Risk

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).

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.

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.

Principal Threat Waste

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.

Remedial Action Objectives/Preliminary Remediation Goals

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.

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.

Remedy Performance

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.

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.

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.

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.

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.

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.

Cost

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.

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.

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.

Cost Effectiveness

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.

Remedy Effectiveness

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.

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).

Modeling

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.

Grid Resolution: 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.

Bedload Transport: 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.

Monitored Natural Recovery

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.

Stakeholders

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)*.

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.

Policy and Guidance

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).

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.

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.

Conclusion

We commend the Region's collaborative efforts in working with the Board, CSTAG and stakeholder groups at this site. We request that a draft response to these recommendations be included with the draft proposed plan when it is forwarded to the Office of Superfund Remediation and Technology Innovation's Site Assessment and Remedy Decisions (SARD) branch for review. The SARD branch will work with both your staff and the boards to resolve any remaining issues prior to your release of the record of decision. This memo will be posted to the Board's website (http://www.epa.gov/superfund/programs/nrrb) and CSTAG's website http://www.epa.gov/superfund/health/conmedia/sediment/cstag.htm within 30 calendar days of our signatures. Once your response is final and made part of the site's administrative record, your response will also be posted on the boards' website.

Thank you for your support and the support of your managers and staff in preparing for this review. Please call Amy Legare at (703) 347-0124 or Steve Ells at (703) 603-8822 should you have any questions.

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