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OFFICE OF
SOLID WASTE AND
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April 25, 2018

**MEMORANDUM**

**SUBJECT:** CSTAG Recommendations on the Lower Passaic River Study Area, 17 Mile Remedial Investigation/Feasibility Study and Proposed Interim Remedial Action

**FROM:** Karl Gustavson, Chair
Contaminated Sediments Technical Advisory Group (CSTAG)

**TO:** Diane Salkie, Remedial Project Manager
Region 2

## Background

OSWER Directive 9285.6-08, Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (February 12, 2002), established the Contaminated Sediments Technical Advisory Group (CSTAG) to "monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites." One purpose of the CSTAG is to guide site project managers to appropriately manage their sites throughout the Superfund process in accordance with the 11 risk management principles described in the 2002 OSWER Directive, the 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, and the 2017 OLEM Directive on Remediating Contaminated Sediments (OLEM Directive 9200.1-130). CSTAG membership currently consists of nine regional representatives, two from the Office of Research and Development, one from the U.S. Army Corps of Engineers' Engineer Research Development Center, and three from the Office of Superfund Remediation and Technology Innovation. The CSTAG visited the Lower Passaic River Study Area (LPRSA) and met with the EPA project team on February 28 and March 1, 2018. Two stakeholders also made presentations to the CSTAG, including the Community Advisory Group (CAG) and Cooperating Parties Group (CPG). The National Oceanic and Atmospheric Administration and the US Fish and Wildlife Service submitted written comments to the CSTAG and were present for stakeholder presentations. The State of New Jersey Department of Environmental Protection also submitted written comments and participated in the stakeholder presentations via telephone. The CSTAG's review focused on evaluating an interim action proposal for the upper 9 miles.

**Brief Description of the Site**

The 17- mile Lower Passaic River Study Area (LPRSA) is an operable unit of the Diamond Alkali Superfund Site in Newark, New Jersey. The Lower Passaic River (LPR) flows through densely populated and industrialized areas and ultimately into Newark Bay. The Dundee Dam is just above the head of tide at River Mile 17 and presents a hydraulic boundary. The three named tributaries to the LPR include the Saddle River, the Second River, and the Third River. Beginning in the early nineteenth century, the LPR watershed was a major center for industrial operations including cotton mills, manufactured gas plants, paper manufacturing and recycling facilities, and chemical manufacturing facilities. These facilities and adjacent municipalities discharged dioxins, petroleum hydrocarbons, polychlorinated biphenyls, pesticides, and metals to the LPR.

EPA's response at the LPRSA began at a former manufacturing facility located at 80-120 Lister Avenue in Newark, New Jersey, at river mile (RM) 3.4. Manufacturing of DDT and other products began at this facility in the 1940s. In the 1950s and 1960s, the facility was operated by the Diamond Alkali Company (later purchased by and merged into Occidental Chemical Corporation). Between 1951 and 1969, the Diamond Alkali Company manufactured the chemical 2,4,5-trichlorophenol (2,4,5-TCP) and the herbicides 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), ingredients in the defoliant "Agent Orange." A by-product of the manufacturing was 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD), the most toxic form of dioxin. These substances have all been found in lower Passaic River (LPR) sediment and fish/crab tissue.

During the comprehensive investigation of the LPRSA, the sediments of the lower eight miles were found to be a major source of contamination to the approximately 17 miles of the LPR and to Newark Bay. EPA undertook a targeted remedial investigation (RI) and focused feasibility study (FFS) of the lower 8.3 miles. In March 2016, EPA selected a remedy, which includes the construction of an engineered cap over the river bottom of the lower 8.3 miles of the LPRSA, dredging of the river bottom from bank to bank prior to placement of the cap, and implementation of institutional controls designed to protect the engineered cap.

In Summer and Fall 2017, the CPG, who are performing the RI/FS for the LPRSA, asked EPA to consider an interim approach focusing on source control, targeting removal of sediments with higher contaminant concentrations in the upper 9 miles of the LPR. As of February 2018, CPG completed the Baseline Human Health Risk Assessment and in 2017 and 2018 submitted revised drafts of the RI and the Baseline Ecological Risk Assessment.

**Recommendations**

**1. Use of an Interim Action**

**a)** Region 2 presented a proposal to conduct an interim action proposed by the CPG in the upper nine miles of the 17-mile Lower Passaic River Study Area. It is CSTAG's understanding that the interim action is intended to address areas with the greatest contaminant concentrations and exposure potential and will expedite remediation by allowing the upper nine-mile cleanup to be coupled to cleanup in the lower eight miles of the LPRSA. The interim action will employ an adaptive management framework that will assess attainment of risk reduction expectations following the interim action. Monitoring data will be compared to quantitative performance criteria to determine the need for additional remedial action as part of a final remedy for the LPRSA. While some issues were identified with the adaptive

management framework (see Recommendation 6), CSTAG believes the central elements of the interim action proposal are consistent with Principle 5 ("Use an Iterative Risk-Based Framework) and Recommendation 8 of the 2017 OLEM Directive on Remediating Contaminated Sediments (OLEM Directive 9200.1-130), and supports the proposal for an interim remedy in the Upper 9 miles of the Lower Passaic River.

**b)** Based on materials presented to CSTAG, the interim action proposed by the CPG is not intended to meet CERCLA requirements that final remedies protect human health and the environment and attain ARARs. Several stakeholder groups presented concerns about whether an interim ROD would preclude or delay a final, protective action. The NCP (40 CFR 300.430(a)(1)(ii)(B)) states that "Operable units, including interim action operable units, should not be inconsistent with nor preclude implementation of the expected final remedy." CSTAG recommends that Region 2 consider what actions might be needed in the future to attain a protective final remedy, and whether any proposed interim action alternatives might preclude or be inconsistent with those possible future remedial actions. CSTAG further recommends that decision documents clearly communicate that the interim ROD will be followed by a future final ROD that will be protective of human health and the environment and attain ARARs.

**2. Development of Remedial Goals and Remedial Action Levels (RALs)**

**a)** CSTAG supports the use of an exposure reduction criterion (i.e., a percent reduction in the surface-weighted average concentration [SWAC] of 2,3,7,8-TCDD and PCB) as a goal of the interim action. This goal is measurable, directly related to COC risk to receptors, and is reasonably anticipated to be consistent with a final remedy.

**b)** The preliminary RAL estimates are derived using the existing, limited data set. The 300 ppt RAL proposed by the CPG is based on average concentrations of 2,3,7,8-TCDD on depositing solids and water column particulate concentrations. The 2,3,7,8-TCDD concentrations in these media range from 150-680 ppt. The interim action proposal contains a very robust pre-design sampling effort that, if successful, should provide a strong basis for calculating the baseline pre-remedial SWAC. CSTAG recommends that the RAL should be based upon achieving a specific percentage of SWAC reduction in a relevant exposure area (See Recommendation 4) and should be developed by EPA following the pre-design sampling. The decision document should clarify that SWAC and RAL values are preliminary and that a final RAL for the interim action will be recalculated by EPA after pre-design sampling is completed.

**3. Alternative Development**

**a)** The range of alternatives proposed for the interim action FS (no action, targeted capping with dredging to 1.5 feet, targeted capping with dredging to 2.5 feet; all based on achievement of a 300 ppt RAL and a 90 percent reduction in SWAC) appears too narrow. The 2005 "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites" (OSWER Directive 9355.0-85) recommends consideration of a variety of approaches when developing remedial alternatives. A broader range of alternatives should be considered in the FS, including a range of percent SWAC reduction values and associated RALs and a broader range of technology approaches, including an alternative that features dredging to clean sediments where feasible (e.g., areas with relatively shallow depths of contamination).

**b)** During development of the remedial alternatives, the Region should consider hydraulic dredging coupled with transporting dredged sediments via pipeline rather than barges as a possible alternative to

mechanical dredging, as it would reduce barge traffic and reduce the need for multiple daily bridge openings.

**4. Use of SWACs**

**a)** In discussions with the Region and in presented materials, several spatial areas appeared to be considered for the calculation of SWACs. For example, the FS addresses the "upper 9 miles" of the site, but the proposed actions focus on SWAC reduction in RM 8.3 to RM 15. Some calculations included the entire operable unit from RM 0 to RM 17.4. CSTAG understands the need to partition the site into areas or reaches, but recommends that the Region be clear about the areas and underlying objectives associated with each SWAC goal.

**b)** CSTAG also recommends the Region consider application of the SWAC across smaller areas. Appropriate SWAC calculation areas may be based upon human or ecological exposure areas, the home ranges of fish and/or other aquatic species, as well as differences in the river's flow rate, bottom profile or slope, velocity, salinity, or other distinct geomorphic reaches of the river.

**5. Understanding Remedy Performance**

In 2013 and 2014, a removal action was conducted in the River Mile 10.9 area (RM 10.9) to address the risks posed by high concentrations of dioxins, PCBs, and other contaminants found at the surface of an approximately 5.6 acre mudflat. During this action, 2 feet of sediment was dredged and the area was capped with sand, active materials, geotextile, and armoring. CSTAG notes the similarity between this action and the dredge/cap alternatives proposed in the interim action. One objective of the RM 10.9 removal was to "...evaluate the effectiveness of sediment capping methods on reducing bioavailability and migration of COPCs, including caps with carbon amendments in an active layer to mitigate the potential for contaminants to migrate upward through the sand cap..." (2013 River Mile 10.9 Removal Action Final Design Report). CSTAG learned that performance monitoring was conducted at the RM 10.9 site to assess the cap's ability to isolate contaminated sediments, but the information was not provided to CSTAG. Understanding the performance of the RM 10.9 dredge/capping effort will be critical to developing and comparing an appropriate suite of alternatives in either an interim or final action for the site. CSTAG recommends that existing information on performance monitoring at RM 10.9 be compiled and analyzed, and conclusions and lessons learned be developed regarding the monitoring program and performance of the remedy. If information collected to date is not sufficient to evaluate the dredge/cap performance of the RM 10.9 remedy, monitoring data on cap stability and the cap's ability to isolate contaminants and prevent contaminant migration should be collected to assess remedy performance and support the interim and final remedy evaluations.

**6. Adaptive Management Framework and Remedy Effectiveness**

**a)** Following the interim action, an adaptive management process is proposed to evaluate the need for additional remedial actions. CSTAG appreciates that several elements of recommendation 8 of the 2017 Directive on Remediating Contaminated Sediments, "Consider a structured adaptive management approach…", were incorporated to the draft proposal, including establishing objectives, monitoring parameters, triggers, and response actions based on monitoring results. Materials presenting the monitoring endpoints, trigger values, and possible response actions focused on whether measured data were consistent with modeled recovery rates. CSTAG disagrees with the proposed approach of basing evaluations and additional actions on adherence to modeled outcomes ("comparison of performance monitoring data with projected recovery rates"). Instead, the adaptive management process should

compare site-specific post-remediation monitoring data to specific criteria related to the ultimate goal of protection of human health and the environment and attainment of ARARs to determine the need for additional actions.

**b)** Models of the hydrodynamics, contaminant fate and transport, and bioaccumulation of contaminants in the LPRSA could be useful to understand site processes and to evaluate and design the remedy for the LPRSA. Such models could also be used to generally predict when certain remedial goals will be met. CSTAG recommends that the decision documents clearly state that the models are only estimates of future conditions and the accuracy of those predictions is constrained by model uncertainty and the limited available information at the time of the modeling (see Recommendation 7 of the 2017 Directive on Remediating Contaminated Sediments). Remedy effectiveness (*i.e.,* progress toward and/or achievement of metrics, targets, and goals) should be assessed using empirical site-specific data (see Comment 9 of this memo regarding the monitoring plan) relative to risk-based remediation goals and not whether those data comport with model output. CSTAG recognizes, however, that modeling may be used to select a final remedy for the LPRSA.

### 7. Baseline and Long-Term Monitoring

**a)** As noted in Principle 11 of the 2002 Directive, it is essential that adequate baseline data be collected before any remedial activities. Without adequate baseline data, the effectiveness of the Interim Remedy and progress toward remedial goals cannot be tracked. CSTAG recommends that the baseline monitoring include annual sampling of biota and surface water for at least three years prior to beginning the remedial action, and at least one sediment sampling event during that same period. If the biota and surface water sampling occurs over the same period as the sediment sampling for the Predesign Investigation (PDI), the PDI surface sediment data may also be used as baseline sediment data. While CSTAG recognizes that a detailed baseline and long-term monitoring plan may not be developed before the interim ROD is signed, key elements of the baseline and long-term monitoring plans should be described in the interim ROD.

**b)** Key to establishing the effectiveness of the Interim Remedy, as described in Principle 11 of the 2002 Directive, is the collection of adequate environmental data, including concentrations of contaminants in sediment, biota, and water. This data allows the Region to establish the post-remediation concentrations in these media and to establish trends towards achieving RAOs. CSTAG concurs with the proposal to collect biota and surface water on an annual basis for the period over which remedy effectiveness will be evaluated. The 10-year CPG proposed duration of post-construction monitoring to determine if the Interim Remedy will achieve either the RAOs or the Adaptive Management Trigger Criteria should be evaluated in the FS. The species collected should be appropriate surrogates for ecological receptors and those presenting risks to humans. CSTAG also recommends that, in addition to sampling the water column directly, the Region include use of passive sampling for tracking concentrations of contaminants in the water column. Passive samplers provide a time-averaged, freely dissolved measurement that may more confidently detect temporal trends. Sediment sampling over time is critical to understanding exposure conditions and changes in biota and surface water. CSTAG recommends post-remediation sediment sampling at least twice before the first Five Year Review, with a potential for decreased frequency in out years, if warranted.

### 8. Numeric Modeling

The numerical models used to generate future predictions of sediment and fish tissue contaminant concentrations are based on output from the hydrodynamic and sediment transport modeling. The grids

used by these models are relatively coarse compared to the river morphology and processes that impact the sediment transport (*e.g.*, bedload transport). CSTAG recommends that the grid for the hydrodynamic model be refined to more accurately simulate sediment transport in the upper 9 miles. It is important that the grid be fine enough to support forecasts of the time to achieve RAOs and, if necessary, assess alternatives for further action.

**9. Pre-Design Sampling**

**a)** The methodology presented to determine the remediation footprint includes evaluating RAL exceedances up to 18 inches below the sediment surface in areas "...with a demonstrated potential for net erosion...." This delineation step is intended to capture sediments where the sediment surface (0 to 6 inches) may be clean, but buried contamination has a reasonable likelihood of erosion and exposure. Information presented to CSTAG indicates that some areas of the site have erosion potential greater than 18 inches. These sediments would be prone to exposure and transport and, if eroded, could contribute to recontamination and slow the rate of recovery following remediation. In addition, one of the two proposed remedial alternatives dredges 2.5 feet of sediment, followed by a conventional cap. CSTAG recommends that areas with RAL exceedances down to the depth of potential erosion be included in the remedial footprint and that sediments should be sampled to at least the depth of removal in the alternatives to establish whether a cap is needed at all (e.g., capping would not be warranted in areas with less than 2.5 feet of contamination).

**b)** Information presented to CSTAG indicated that 1) there has been a significant period of time since the last bathymetric survey, 2) there can be significant areas of deposition and erosion, and 3) there have been problems in the past obtaining near shore bathymetric data when the depth is shallow. The lack of recent bathymetric data can introduce uncertainty into how older sediment chemistry data describes current contamination depth profiles. CSTAG concurs with the interim action proposal that prioritizes obtaining a bathymetric survey of the study area during the feasibility study. To address issues obtaining data in shallow water, CSTAG suggests evaluating LiDAR (vessel- or land-based) to survey intertidal mudflats at low tide and subsequently combining those data with subtidal bathymetric data.

**10. Expediting Time to Remediation**

CSTAG understands that a major driver for an interim action is implementing an action in the upper part of the LPR at the same time as in the Lower 8 mile area, where remedial design has begun. CSTAG supports a schedule that would allow the two RAs to occur concurrently. This would allow coordination to minimize the possibility of recontamination of either project during the cleanup, speed the cleanup and recovery of the river, reduce the timeframe and degree of impact to the communities, and allow all the parties to benefit from economies of scale. CSTAG recommends that the Region approach the PRPs about beginning the pre-design sampling (e.g., river bed COC concentrations taken at 80 ft centers) in the near term, prior to selecting an interim remedy. Collecting additional data now would expedite the remedial design when and if an interim ROD is issued. This result would be significant time savings, a greater likelihood that lower eight and upper nine actions could coincide, expediting cleanup of the river.