




UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2
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MAY 29 2018

MEMORANDUM

SUBJECT: Contaminated Sediments Technical Advisory Group Recommendations -Lower Passaic River Study Area, OU4 of the Diamond Alkali Site

FROM: Diane Salkie 
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TO: Karl Gustavson, Chair
National Remedy Review Board

This is in response to your memorandum, "CSTAG Recommendations on the Lower Passaic River Study Area, 17 Mile Remedial Investigation/Feasibility Study and Proposed Interim Remedial Action" dated April 25, 2018. The memorandum consists of recommendations from the Contaminated Sediments Technical Advisory Group (CSTAG) concerning their review of the proposed interim remedial action for the sediment source areas in upper 9 miles of the Lower Passaic River Study Area (LPRSA), which is Operable Unit 4 (OU4) of the Diamond Alkali Superfund site.

Let me first express the Region's appreciation to the CSTAG for both their thorough review and thoughtful comments on the proposed interim remedial action for the site which was discussed at the February 28 and March 01, 2018 meetings. Our specific responses to the Boards' advisory recommendations are provided below. The Region is still early in the process of evaluating a potential interim action for the upper 9 miles; therefore, our responses are not very detailed. However, please note that the CSTAG recommendations will be considered throughout the process of remedy selection and implementation. For convenience purposes, each recommendation is presented in the order identified in your memorandum, followed by our response.

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.

Response: Region 2 agrees with the CSTAG's position that an interim action remedy is an appropriate course of action for the upper 9 miles of the 17-mile LPRSA. The Region expects to direct the CPG to proceed with an FS that will support a Proposed Plan for an interim action. During the FS stage, the Region will work with the CPG to develop an adaptive management framework 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). The Region expects to incorporate performance of post interim action monitoring to ensure interim action objectives are met in its decision documents. Using the adaptive management framework that will be developed for the Feasibility study as a basis, a robust adaptive management program would be refined in remedial design and implemented after the interim action to track the recovery of the river in response to the action and gauge the need for additional remedial action work.

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)(I) (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.

Response: As required by CERCLA, the Region will prepare a final ROD for OU4 that includes final remedial goals that are protective of human health and the environment. The interim action and adaptive management program will be constructed to work toward that end. The interim action decision documents will clearly state that a final ROD will ultimately be issued for OU4.

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.

Response: The Region agrees that a targeted percent reduction in SWAC of 2,3,7,8-TCDD and total PCBs is a reasonable and measurable goal to incorporate into the alternatives for a proposed interim action for source control. The Region will develop Remedial Action Objectives (RAOs) for the proposed interim action that memorialize the percent reduction in SWAC that should be achieved as a result of the interim action.

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.

Response: The Region agrees that although an initial RAL will be identified in the FS, the final selection of a RAL needed to achieve a specific percentage reduction in SWAC should be based on the results of the pre-design investigation (PDI) samples. The decision documents for the proposed interim action will clearly state that SWAC and RAL values are preliminary and that a final RAL for the interim action will be recalculated after remedy selection, when 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).

Response: The Region agrees with the recommendation of evaluating a broader range of alternatives than the CPG has proposed. In summary, the CPG's proposal was remediating 300 ppt 2,3,7,8 TCDD and 1 ppm total PCBs and considering two different remediation depths (to accept two cap types). The Region anticipates that a broader list of alternatives will be developed by the CPG that will consider a range of SWAC reductions (and associated RALs), and that broader range of technologies and dredging will be evaluated.

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.

Response: The Region agrees that it would be appropriate to evaluate the use of hydraulic dredging, which is under consideration for use in implementation of the remedial action for OU2, the lower 8.3 miles of the Lower Passaic River. Alternatives will be developed that include hydraulic dredging, either singularly or in conjunction with mechanical dredging.

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.

Response: The Region agrees that the areas and underlying objectives associated with each SWAC goal should be clearly stated in the FS. The Region and the CPG have calculated SWAC reductions for several different reaches (e.g., RM 8.3 – RM 15 and RM 0 – 17.4). While the goal of the interim action proposal is to remove source areas and reduce exposure in the upper 9 miles of the Lower Passaic River, the use of different reaches may be confusing. Therefore, going forward, the Region will use the full reach from RM 8.3 to Dundee Dam, RM 17.4 (i.e., the upper 9 miles) for remedy metrics.

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.

Response: The Region agrees that the FS and decision documents should evaluate whether the remedial alternatives would be more effective if lower SWACs are used in some areas (e.g., fish forage areas to improve tissue concentration reduction) and higher SWACs in areas with greater recovery potential (i.e., depositional areas). The Region agrees that SWAC could be varied in sub-areas within the upper 9-mile reach, but one SWAC criterion would exist in an RAO and it would be for the upper 9-mile reach. Therefore, within the upper 9-mile reach, remedy SWAC goals may be set for sub-areas (e.g., more biologically or physically relevant exposure areas) for the chosen action, but only one SWAC reduction criterion would exist for the entire upper 9-mile reach, from RM 8.3 to Dundee Dam, to consider the effectiveness of the remedial alternatives of this interim action.

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, 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 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.

Response: The Region agrees with the recommendation to consider conclusions and lessons learned regarding the monitoring program and performance of the response action performed at RM 10.9. The Region is currently reviewing the chemical performance monitoring report prepared by the CPG following their initial solid phase microextraction (SPME) porewater sampling efforts of the RM 10.9 sediment cap. The Region will be engaging with the CPG on the interpretation of the sampling results, as this sampling event will provide the baseline data that future RM 10.9 cap chemical monitoring events are compared against. Furthermore, both the Region and the CPG learned multiple, practical lessons concerning SPME deployment during the multiple sampler installation attempts. The Region will be documenting all lessons learned from the RM 10.9 physical and chemical monitoring events, and utilizing these lessons learned where and when appropriate during interim and final remedy designs.

6a. 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.

Response: The Region agrees with this recommendation and expects to require that post-remediation monitoring data be compared to site-specific criteria related to the protection of human health and the environment. However, the Region does see the value in comparing post-remediation monitoring data to model predictions, as a way of accounting for ambient conditions (e.g. river flow and storm surges) during the monitoring period. For instance, biota tissue data collected during a sequence of low-flow years may suggest an optimistic trend over time that should not be extrapolated at the same rate into the future when river flows return to a more typical mix of low, moderate, and high flow years. Notwithstanding the role of data versus model predictions, the ultimate effectiveness of an interim action will need to be clearly demonstrated by comparisons of post-remediation monitoring data to site-specific criteria.

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.

Response: The Region agrees with the importance of clearly communicating the potential roles and limitations of the hydrodynamic, sediment transport, contaminant fate and transport and bioaccumulation models. The Region also agrees with the CPG's expressed intention to use the models in their current state in the FS evaluations, with the understanding that the models would be refined during the design phase of the proposed interim action. The Region recognizes that approximations will be needed in the FS effort to evaluate remediation at finer spatial scales than model grid cells, but expects that the models will be sufficient for the evaluation of alternatives. The Region acknowledges the uncertainty in model forecasts resulting from variability in bed erosion properties and sediment contaminant data that does not span a period of years long enough to rigorously confirm the model's bed parameterization. These limitations, as well as the model grid resolution, are expected to be addressed during the design phase of the proposed interim action. Model forecasts developed during the FS are expected to include more uncertainty than forecasts made with the refined model during the design phase, although the

Region recognizes that the refined model will still include uncertainty, which cannot be completely eliminated from models.

While the refined models will be useful for the design of the proposed interim action (and subsequent actions, if needed), and developing expectations of future trends, it will be comparisons of post-remediation monitoring data to site specific risk-related goals that will be used to assess remedy effectiveness.

7. Baseline and Long-Term Monitoring

a) As noted in Principle 11 of the 2002 11 Principles Memo, 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.

Response: The Region agrees that an adequate baseline data set is required before any interim remedial activities begin, as this information will be used to help determine any short-term impacts, long-term trends, and progress toward remedial goals at the site. The Region intends for this baseline data set to include sediment, surface water, and biota. During the development of the FS, the Region will evaluate the specific sampling matrices (e.g., specific fish species) and the sample spatial and temporal densities needed for a sufficient baselines data set, and the optimal time to develop this baseline data set, e.g., prior to the start of dredging in the lower 8 miles of the Passaic River, as those activities could impact measured chemical concentrations (of particular concern for biota tissue trends) in the upper 9 miles. Key elements of the baseline and long-term monitoring plans will be described in the decision documents for the proposed interim action.

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 and at a frequency of once every five years from that point on.

Response: The Region agrees that the collection of adequate environmental data, including concentrations of contaminants in sediment, biota, and surface water, is key to establishing the effectiveness of the proposed interim action. The temporal density and duration of the post-construction monitoring program, adaptive management triggers, and additional associated actions (if any) will be evaluated during the FS. However, monitoring is currently planned, according to the CPG's proposal, to occur on an annual basis at a minimum. The Region will evaluate the species targeted for monitoring, specific sampling/assessment techniques (e.g., passive samplers for time-averaged water column concentrations), and frequency of monitoring, to ensure these are appropriately identified in the FS and the decision documents for the proposed interim action.

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., bed load 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.

Response: The Region agrees with the recommendation to refine the resolution of the model grid. The CPG has also proposed to refine the grid resolution for the same reason noted in CSTAG's comment, as well as to be able to represent spatial variations in contaminant concentrations that are expected to exist at scales finer than the current model grid.

The current model grid resolution is influenced by the need to perform model forecasts for periods of 30 years following remediation, as part of the evaluation of human health risks. Fortunately, computational speed continues to improve, and significant refinement in grid resolution should be feasible when substantially more-detailed data become available through the PDI sampling. At the present time, refining the model grid resolution would provide an improved spatial resolution of computed bed shear stresses, however, without additional information for sediment composition (i.e. grain size distribution) and the spatial distribution of contaminants, the improved representation of bed shear stresses would represent only one element of the benefit of the recommended model refinement.

The Region expects that the model refinements will be made after remedy selection, incorporating PDI data. The proposed model refinements would include increased model grid resolution, which will allow a more detailed representation of the physical processes, as well as spatial resolution of contaminant concentrations. Model refinements will increase the confidence

in CFT model computations, based on reproducing observations in sediment contaminants from the time of the 2008 Low Resolution Coring (LRC) data collection to the time of the anticipated PDI data collection. The model refinements are expected to improve the accuracy of forecasts of future sediment and tissue contaminant concentrations in response to remediation performed as part of the proposed interim action, or additional actions, if needed. This will provide a more reliable estimate of the time to achieve acceptable risk, and potential benefits of incremental actions (if needed) following interim 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).

Response: The Region agrees with these recommendations, and expects that the FS will consider erosional areas with lower near-surface contaminants and elevated subsurface concentrations, including evaluation of concentration levels down to the depth of potential erosion.

The Region also agrees that PDI for the proposed interim action would need to include sampling to below the depth of sediment removal to support cap design if the removal did not extend to the depth 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.

Response: The Region agrees that conducting an additional bathymetry survey should be prioritized. Multibeam bathymetry surveys were conducted by the CPG in 2007, 2008, 2010, 2011, and 2012, in addition to a single beam bathymetry survey conducted by USACE in 2004. The Region expects that the CPG will undertake additional bathymetry survey work in the near

term. In addition, the remedial design work currently underway for the lower 8.3 miles remedy, which includes LiDAR in near-shore areas exposed during low tide conditions and multibeam and single beam echosounder bathymetry surveys of near-shore areas during high-tide conditions, will provide useful information for additional bathymetry survey work, with respect to the consistency of data in areas covered by both echosounder and LiDAR data, and estimated accuracy of differences in bed elevations calculated in comparisons among future bathymetry surveys.

10. Expediting Time to Remediation

CSTAG understands that a major driver for an interim action is implementing actions at the same time as the lower 8 mile area, where remedial design has begun. CSTAG supports a schedule that would allow the two RAs to start concurrently. This can 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) as soon as possible, prior to issuing an interim ROD. By starting now, the remedial design could begin as soon as the interim ROD is issued. This result would be significant time savings, a greater likelihood that lower eight and upper nine actions could coincide, and expediting cleanup of the river.

Response: The Region agrees that a major benefit of moving forward with an interim action in the upper 9 miles is the ability to coordinate such an action with the lower 8.3 miles remedy implementation. Such coordinated actions would help to lessen the duration of impacts to the Lower Passaic River and surrounding communities and allow the implementing parties to benefit from economies of scale and decreased mobilization/demobilization costs. The Region anticipates that some of the sampling work that the CPG will undertake as part of their current work effort could support an interim action. However, the Region notes that remedial design sampling cannot be conducted prior to EPA's issuance of a ROD selecting the interim action. Therefore, the Region will work with the CPG to determine the types of samples that may be collected in support of the CPG's ongoing modeling efforts, that may also be useful for the design of an interim action, when and if such an action is selected.