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

July 6, 2010

MEMORANDUM

SUBJECT: CSTAG Recommendations on the Berry's Creek Study Area Contaminated Sediment Superfund Site

FROM: Stephen J. Ells, Chair
Contaminated Sediments Technical Advisory Group (CSTAG)

TO: Douglas J. Tomchuk, Remedial Project Manager
Region II

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) 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. The main purpose of the CSTAG is to help Regional site project managers of selected large, complex, or controversial sediment sites appropriately manage their sites throughout the Superfund process in accordance with the 11 risk management principles set forth in the OSWER Directive. CSTAG membership consists of one representative per Region, two from the Office of Research and Development, two from the Army Corps of Engineers Engineer Research and Development Center and two from the Office of Superfund Remediation and Technology Innovation (OSRTI).

Brief Description of the Site

Berry's Creek is an approximately 6.5 mile-long tributary of the Hackensack River. The creek originates in the East and West Riser Ditches near Teterboro Airport, meanders through the New Jersey Meadowlands, and then discharges into the Hackensack River. Portions of the creek are located in the Boroughs of Teterboro, Moonachie, Wood-Ridge, Carlstadt, Rutherford, and East Rutherford. Tidal flow dominates the system, with freshwater flow contributing less than ten percent of the water in the system. The Berry's Creek Study Area (BCSA) study area has approximately 146 acres of tidal waterways and 1060 acres of marshes.

In May 2008, approximately 100 parties entered into a Settlement Agreement with EPA to conduct an RI/FS for the BCSA. The RI/FS is investigating numerous contaminants within the creek from multiple sources. There are three NPL sites within the study area including the Ventron/Velsicol site (the BCSA is tracked as Operable Unit 2 of the Ventron/Velsicol site), the Universal Oil Products site and the Scientific Chemical Processing site. There are also several NJ State listed hazardous waste sites located in the Berry's Creek watershed.

The RI/FS field work for the BCSA is being conducted over a three-year period, with each phase building from previous phases of work. The first phase of was completed in 2009 and the Phase 1 Site Characterization Report and Phase 2 Addendum Work Plan were submitted in February 2010. Some important findings from the Phase 1 Report were that the major contaminants of potential concern (COPC) were mercury and PCBs, with chromium, lead, manganese and zinc considered secondary COPCs. The Hackensack River is considered that major source of sediment to the system. Mummichog, white perch and blue crabs are the predominant aquatic biota in BCSA.

Extensive work is planned for Phase 2 sampling to help clarify the conceptual site model regarding the fate and transport of contaminants in the sediment, and also to determine how the uptake of contaminants into biota is occurring.

The CSTAG visited the site and met with the site team from May 11 to 13, 2010. NOAA and USFWS representatives participated during the site team briefing. Other stakeholders that made presentations to the CSTAG, included the New Jersey Meadowlands Commission, Drs. Judy & Pete Weiss, the Hackensack Riverkeeper, and the BCSA Group (the parties conducting the RI/FS under the Settlement Agreement).

CSTAG Recommendations

Presented below are 14 key recommendations that the CSTAG believes should be addressed by the site team as the RI/FS progresses in order to help ensure consistency with the 11 Risk Management Principles. As the CSTAG monitors the progress at the site, it will continue to evaluate how the 11 principles are being met and how these recommendations are being addressed.

Also presented below are an additional 13 recommendations which the CSTAG believes the site team should consider as the project moves forward. Many of these are related to implementing the 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites and reflect the expertise of the CSTAG members on state-of-the-science practices in characterizing contaminated sediment sites and in evaluating remedial alternatives. The Region does not need to prepare a written response to these secondary recommendations.

1. Control Sources Early.

- Given the numerous and varied sources of contamination to BCSA, the remedial investigation should include a thorough review of existing information on potential sources of contamination and an evaluation of whether current or planned future controls would be sufficient to minimize potential recontamination to the BCSA. This source control evaluation should include relevant information from the RI/FSs or remedial design/remedial action reports for nearby upland sites, as well as information about discharges not associated with Superfund sites. Coordinate with NJDEP and EPA's water programs to help ensure that any on-going releases will be identified and properly controlled in the future.

2. Involve the Community Early and Often.

3. Coordinate with States, Local Governments, Tribes, and Natural Resource Trustees.

- CSTAG recommends that the project team increase its efforts to include states, local governments, and natural resource trustees in planning and discussing future land use and re-use scenarios related to the site. Coordinate with the Corps and trustees and interested parties regarding habitat restoration plans for the meadowlands marshes that are predominantly vegetated with *Phragmites australis* so that those plans can be appropriately considered when developing remedial alternatives.

4. Develop and Refine a Conceptual Site Model that Considers Sediment Stability.

- Although it may exist, the CSTAG has not seen any analysis or data that supports the statement that the primary source of sediment to the BCSA is the Hackensack River. If necessary, additional data should be collected under phase 2 to confirm this finding.

- Legacy contaminants are present at elevated concentrations in surface sediments. The processes and sources maintaining these surface concentrations have not been fully elucidated or described. Preliminary investigations indicating that the study area is depositional with burial of historical contamination from the Hackensack River (implicated as the primary source of sediments) appear to conflict with the existence of ongoing high surface sediment contaminant levels. After collection of the Phase 2 data, refine the Conceptual Site Model (CSM) to clearly identify the dominant processes affecting sediment and contaminant transport and burial and the key exposure pathways presenting unacceptable risks and driving the need for cleanup.

- CSTAG cautions the EPA and BCSA Group site teams regarding their attempt to determine an acceptable relationship between TSS and turbidity because seasonal variability in primary plant production is likely to have a major influence on TSS as well as on the expected nonlinear relationship between turbidity and the temporally varying

percentages of organic matter and inorganic silt/clay size sediment suspended in the water column.

- CSTAG recommends that statements such as "the BCSA is net-depositional and stable in terms of sediment" be rephrased after first defining the terms "net-depositional" and "stable," as these terms can be interpreted differently. Additionally, the deposition rates reported in the phase 1 Site Characterization Report (*i.e.,* 1 to 2 cm/year) should be accompanied by the time period used to calculate these rates. The method used to determine that approximately 91% of the waterways and tributaries area is net-depositional and that the remaining 9% shows "no net change over time" needs to be described in detail. Areas of scour/erosion should be clearly mapped (*e.g.,* pools and bends) and additional evaluations should be conducted to determine sediment erodability and deposition. These could include geomorphologic studies or modeling evaluations, and an evaluation of sediment movement from storm events, bioturbation, propeller wash from recreational vessels, and ice scour.

- CSTAG recommends that the hydrodynamic model developed for the Lower Passaic River-Newark Bay-Hackensack River (LPR-NB-HR) estuarine system be considered for use in the ongoing RI as follows: 1) extract the Hackensack River watershed portion of the model domain from the LPR-NB-HR model, and set the confluence of the Hackensack River and Newark Bay as the downstream boundary; 2) refine the model grid to better represent the geometry and bathymetry of Berry's Creek and the adjacent wetlands; 3) extract tidal boundary conditions for water surface elevation and salinity at the downstream boundary from the LPR-NB-HR model; and 4) use existing and ongoing measurements of tidal currents and water surface elevations to calibrate and validate this model. Based on CSTAG's experience, this effort is not be expected to be a major task, and predictions from the calibrated and validated hydrodynamic model would be a valuable tool in helping to understand the sediment and contaminant transport in the Berry's Creek - Hackensack River estuary.

5. Use an Iterative Approach in a Risk-Based Framework.

- The BCSA Group has proposed an extensive amount of additional work for Phase 2. Although much of it stems from the uncertainties in the CSM, it is unclear how some of the data will be used by the site RPM to assist in decision making for the site. CSTAG is concerned that the study questions developed for the RI/FS appear to have supplanted the EPA Data Quality Objectives (DQO) process (*see* Appendix A of the Phase 2 Addendum Work Plan for RI/FS) for data collection. Neither the study questions nor the DQOs provide a clear indication of whether the proposed studies will provide sufficient information to assess the nature and extent of contamination, assess risks to human health and the environment, and evaluate cleanup alternatives as required under CERCLA and the NCP. The Data Quality Objective discussion needs to more clearly describe how all the Phase 2 data components including hydrodynamics, surface water, sediment, surface water/groundwater interaction, biota and reference sites fit into the overall goals of the

project. CSTAG encourages the site team to develop more detailed DQOs, in order to clarify quantitative measures for phase 2 data collection that will inform moving forward into phase 3, and ultimately, making site decisions.

- Like many sites contaminated with mercury, it is important to collect data that will lead to a better understanding the most important processes driving site-specific methylation rates and predicting the relationships between mercury and methyl mercury concentrations in sediment, water, and fish. Volatilization of mercury also should be further evaluated as part of the HHRA.

- Consider pilot testing of any active remediation approaches being considered for the BCSA. Due to the need for multiple years of data for such an evaluation, it is recommended that such pilots need to be initiated within the timeframe of the RI.

6. Carefully Evaluate the Assumptions and Uncertainties Associated with Site Characterization Data and Site Models

- Clarify what is meant by the term "reference areas". The term "reference site" is typically used in association with toxicity testing, but for this site, data from reference areas appear to be used as background values as defined by CERCLA guidance. At a minimum, areas used to establish background concentrations of contaminants should not be impacted by BCSA contaminants. Other than Saw Mill Creek, reference areas appear to be inappropriate because concentrations exceed screening benchmarks. These sites should be screened for potential upland sources of contamination to determine if these reference sites truly represent regional levels of contamination. If this is meant to be a "background condition" study, then the appropriate DQO discussion needs to reflect the thought process to support such an effort.

- CSTAG questions the rationale for the delineation of the biologically active zone (BAZ) used for the site evaluations given that the SPI images reveal biological activity at depths below the BAZ. CSTAG recommends the development and use of a single BAZ depth for the site; e.g., 10 cm. Problems in interpreting "surface sediment" data taken at different depths would be a greater concern than capturing a small difference in BAZ between Upper Berry's Creek and the rest of the site. Void depth rather than redux potential discontinuity (RPD), should be used to determine the depth of the BAZ.

- If monitored natural recovery (MNR) is likely to be considered as a remedial alternative for this site, a preliminary MNR analysis approach should be developed prior to Phase 2 data collection.

7. Select Site-specific, Project-specific, and Sediment-specific Risk Management Approaches that will Achieve Risk-based Goals.

8. Ensure that Sediment Cleanup Levels are Clearly Tied to Risk Management Goals.

9. Maximize the Effectiveness of Institutional Controls and Recognize their Limitations.

10. Design Remedies to Minimize Short-term Risks while Achieving Long-term Protection.

11. Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness.

- Now is an appropriate time to collect baseline data for later assessing remedy effectiveness. Consider which parameters would be most useful to evaluate remedy effectiveness and establish baseline conditions early. Consider conducting several baseline monitoring events. This would provide a basis of comparison for post-remediation long-term monitoring, establishing current "recovery" trends. A Baseline Monitoring Work Plan should include several key fish and possibly other species (whatever is envisioned for long-term monitoring), as well as "backup" species in case key monitoring species are not present or cannot be captured in future long-term monitoring. The Baseline Monitoring Work Plan should also address fish size range (both "ideal" and "acceptable" minimum number to be collected and analyzed), number of fish, compositing, whether analysis is for whole fish or fillet. The Baseline Monitoring Work Plan should also include any other media or other monitoring that may be part of long-term monitoring (e.g., surface water or sediments)

Additional CSTAG Recommendations and Technical Advice

1 - Consider creative approaches to enhance outreach to the affected community, including making presentations at planned community meetings, staffing information booths at community events, developing newsletters and active mailing lists, and hosting a Berry's Creek research conference. Linking EPA's site website to other community websites may be helpful.

2 - Consider developing and using a sediment transport model to better inform remedy selection, especially if considering an MNR or enhanced MNR alternative.

3 - CSTAG recommends using a suite of appropriate ecological benchmarks *(e.g.,* NJ and Region II screening lists and others as appropriate) to provide a better understanding of uncertainty at the screening-level ERA stage and to better develop COPC lists for water and sediment. Given the concerns about the use of reference sites, reference site data should not be used to refine the COPC list at this time.

4 - For the human health risk assessment, CSTAG recommends use of the regional screening levels to develop COPC list (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm). If there is not a region 2 equivalent for sediments, then site-specific risk benchmarks would be more appropriate.

6 - CSTAG questions the validity of reported statements on the health of biota that are based solely on external observations (*e.g.,* lack of deformities, eroded fins, lesions, and tumors) in the absence of data on effects (*e.g.,* survival, growth, and reproduction). To directly evaluate effects, sediment toxicity testing using *Hyallela azteca* and *Leptocheirus plumulosus* should be considered. Concentration-response relationships could be used to develop protective remedial goals for ecological receptors.

7 - CSTAG recommends analysis of benthic invertebrate tissue and collocated sediments in addition to fish gut content analysis. These data could provide useful inputs to food chain models that are expected to be developed as part of the ERA, and may be useful in characterizing risks to the benthic invertebrates as an assessment endpoint.

8 - Consider increasing efforts to collect higher trophic level species (*i.e.,* larger predatory fish species) to better assess movement of contaminants through the food web, and for the HHRA. Blue crabs have large home and feeding ranges and undertake seasonal and daily migrations of significant distances. As a result, contaminant data from crab tissue is a highly uncertain indicator of site-related contaminants. Since it is believed that crabbing occurs at the site, blue crab data can indicate exposure to humans consuming crabs from the site, but those contaminant data may have little to do with the site contaminant releases.

9 - CSTAG recommends that the RI should consider using additional quantitative chemical and biological evaluations of bioavailability (*e.g.,* passive samplers, desorption studies, tissue concentrations at higher trophic levels). Such information could be used to support statements that infer a mechanistic understanding of factors controlling bioavailability such as: "high organics and AVS/SEM indicates minimal bioavailability of metals and organic COPCs in sediments," and "biouptake low but potentially important for some COPCs…need to understand mechanisms that control biouptake." This information could be used to help explain why existing tissue concentrations for COPCs like PCBs and mercury are lower than predicted based on sediment concentrations.

10 - Clarify what is intended as part of the human use survey and how these data will be used in assessing site risks or remedy selection. Is this a targeted survey or random survey? What is the temporal and spatial coverage of the survey? The proposed human site use studies may be of limited value in evaluating potential future exposures because of the likelihood of avoidance of the site owing to known contamination. Using other information, such as human use of similar uncontaminated sites, may be more useful in developing exposure values for the HHRA.

11 - CSTAG recommends that further evaluation of dioxins/furans in sediments and fish tissue collected in areas with high PCBs be considered in order to confirm the belief that there are no dioxins/furans sources at the site.

12 - Uncertainties regarding PCBs can be reduced in food web models and fate and transport models if analyses are done at the congener level. CSTAG recommends the site team to undertake an appropriate DQO process to determine whether PCB congeners or Aroclor analysis

is needed for Phase 2 efforts. A key consideration factor is primary, secondary and tertiary (if any) data usage (e.g. modeling, risk assessment) and measurement performance criteria (e.g. laboratory analytical reporting limits) required for the decisions need to be made based on the data.

13- The outreach efforts and fishing advisory signs appear inadequate to limit human consumption of contaminated aquatic organisms. Consider working with the NJDPH to increase the outreach efforts and postings.

Regional Response

Please provide a written response to the first set of these recommendations within 60 days. If you have any questions or would like a clarification of any these recommendations, please call Steve Ells at (703) 603-8822.

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