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

Signed May 14, 2004

MEMORANDUM

SUBJECT: CSTAG Recommendations on the Kanawha River, WV Contaminated Sediment Site

FROM: Stephen J. Ells **/s/ Stephen J. Ells**
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Contaminated Sediments Technical Advisory Group (CSTAG)

TO: Dennis Matlock, On-scene Coordinator
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Region 3

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 eleven 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, and two from the Office of Superfund Remediation and Technology Innovation.

Brief Description of the Site

In March 2004, EPA, Monsanto and Pharmacia entered into an Administrative Order on Consent to conduct an Engineering Evaluation/Cost Analysis (EE/CA) to study dioxin-contaminated sediment in the Kanawha River. The EE/CA Order requires Monsanto to characterize the nature and extent of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD, a form of dioxin) contamination in the Kanawha River Site as a result of contaminant releases from the now-defunct Flexsys America L.P. plant in Nitro, West Virginia. The purpose of the EE/CA is to evaluate response alternatives that would protect public health, welfare, and the environment and to provide sufficient information for EPA to determine the necessity, feasibility, and efficacy of particular non-time critical removal actions.

The study area covers approximately 14 miles of the Kanawha River from the confluence of the Coal and Kanawha Rivers to the Winfield lock and dam. Although TCDD contamination extends beyond the Winfield dam, the CSTAG focused its review on the study area as this is also believed to be the area of greatest TCDD contamination in the river. EPA Region 3 believes that the Flexsys plant, which is located in this area, is the predominant source of TCDD to the river. The plant, previously owned by Monsanto, was used to produce the herbicide 2,4,5-trichlorophenoxyacetic acid (2,4,5-T). 2,4,5-T was made from 2,4,5-trichlorophenol (also made by Monsanto). TCDD is formed as a by-product in the production of trichlorophenol and ends up in the 2,4,5-T.

The Kanawha River, the Pocatalico River and Armour Creek (tributaries to the Kanawha River) were placed on the State of West Virginia's 303(d) list of water quality impaired bodies because of TCDD contamination, and a Total Maximum Daily Load (TMDL) was completed in September 2000. The applicable standards included in the TMDL specify that the maximum allowable concentration of TCDD should not exceed 0.014 pg/L in the Kanawha River, and 0.013 pg/L in the Pocatalico River and Armour Creek.

Based on fish tissue samples collected in October 1985, the State of West Virginia issued an advisory not to consume fish collected from the Kanawha River between the Coal and Ohio Rivers. The current advisory extends from the from the I-64 bridge at Dunbar (at or near the downstream end of the former Monsanto plant) to the Ohio River and includes the lower two miles of the Pocatalico River and of the Armour, Heizer and Manilla Creeks. The advisory is a "do not eat" advisory for carp, catfish, suckers, and hybrid striped bass. In addition, there is a one meal/month limit on all other species.

EPA Region 3 believes that the most expedient way to begin addressing the sediment contamination is to conduct a non-time critical removal action. Sampling to date shows areas at and downstream of the former Monsanto plant that have elevated levels of TCDD and areas that appear to be relatively clean. EPA Region 3 believes that by addressing the hotspots, it can significantly reduce the average sediment dioxin concentration and thereby reduce the fish tissue levels of dioxin.

The CSTAG visited the site and met with the site team on April 21 and 22, 2004. The West Virginia Department of Environmental Protection attended much of the meeting. Four of the invited stakeholders made presentations to the CSTAG. The four presenters included the Monsanto Company, the West Virginia Bureau of Public Health (WVBPH), the Heizer/Manilla Watershed Organization, and the West Virginia River Coalition.

CSTAG Recommendations

Based upon the site visit, the review of the site information provided to us, and the presentations made by the stakeholders, the CSTAG offers the following recommendations in order that the OSC can more fully address the 11 principles. The CSTAG expects that the OSC will consider these recommendations as the investigations continue, as the conceptual site model is refined, and as response alternatives are developed and evaluated. The CSTAG recognizes that the project has just begun and appreciates the opportunity to provide recommendations this early in the process.

Principle #1, Control Sources Early

- In order to better understand, track, and communicate about the numerous potential sources of dioxin contamination to the study area, develop a comprehensive map of the potential sources of contamination, including documentation of various historical aliases for each source area.
- Document existing dioxin inputs from surface water and sediment from tributaries (*e.g.*, Pocatalico River, Heizer Creek, and the Manilla Creek).
- Make an additional effort to evaluate, at least qualitatively, the relative contribution of contaminant releases from each major upland/on-shore source to sediment and surface water in the study area. Develop a prioritization scheme in order to identify and classify the largest contaminant contributions and the most significant transport pathways (*e.g.*, groundwater, bank erosion, overland flow, *etc.*). This information could be used to prioritize any upland source studies and control actions and to phase any in-river actions that may be warranted.
- In order to evaluate the extent to which in-place sediment contamination is a "source", design the EE/CA study to be able to determine the relative contributions to the water column and fish contamination from on-going sources compared to in-place sediment. Although the TMDL study concluded that, within the study area, the in-place sediment was not a source of water column contamination because the total suspended solid (TSS) load remained constant, resuspension of sediments can still be occurring.
- Coordinate with the NPDES program to ensure that point sources to the Kanawha River (*e.g.*, Fike pretreatment outfall, Dana/Kincaid outfall, Poca WWTP, stormwater discharges) contain dioxin limits in the NPDES permits where appropriate.
- Coordinate with the RCRA program on the Flexsys cleanup with respect to river inputs. Discuss whether any early actions to address inputs to the river are appropriate (*e.g.*, sheetpiling along the river bank, hydraulic containment of groundwater).

Principle #2, Involve the Community Early and Often

- Develop a comprehensive community involvement program that encompasses all of the on-going EPA investigation and cleanup efforts in the valley. Discuss with the State whether a joint EPA/State community involvement program would be appropriate.
- Work with the community to determine whether there is interest in creating a valley-wide community advisory group.
- Consider using a variety of ways to communicate site information to the public (*e.g.*, local public television station, internet, periodic stakeholder meetings).

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

- Work with ATSDR/WVBPH to clarify their plans for and the objectives of any health consultations for the site.
- Work with the WVBPH to evaluate the most effective placement of fish consumption advisory signs to reach potential fish consumers. Evaluate whether posting additional signs upstream of the study area is warranted, especially at boat ramps where fishers may enter the river and then travel to the area covered by the advisory.
- Discuss with West Virginia's fish consumption advisory committee the consumption rates used to develop the State's fishing advisory. Consider undertaking a creel survey (fish consumption survey) to determine the effectiveness of the fish consumption

advisory and to garner information about consumption rates, species, and cooking preparation methods.

- Coordinate with the agencies that issue dredging permits to ensure that environmental impacts caused by the resuspension of dioxin-contaminated sediments are fully evaluated before any proposed dredging. Request notification from such agencies for any activities proposed within the study area.
- Check with local universities to determine whether additional data exist to refine the conceptual site model (CSM) (*e.g.*, dioxin data in various media, other COCs, documentation of adverse impacts to biota, information on resident species that might be useful for long-term monitoring).
- Coordinate with the Corps of Engineers to discuss whether sediment management activities for the Winfield dam contribute to dioxin transport beyond the study area. If so, discuss potential modifications in order to minimize any transport.

Principle #4, Develop and Refine a Conceptual Site Model that Considers Sediment Stability

- Evaluate the stability of the surficial sediments in the River using, as proposed, the *in situ* inverted flume developed by Ravens and Gschwend (1999). However, since this device only measures the shear stress required to initiate surficial bed sediment movement, this device cannot be used to characterize the erosion potential of sediment (*i.e.*, critical shear stress and resuspension rate) with depth. CSTAG recommends that the USACE's Sedflume be used, in addition to the *in situ* inverted flume, for this purpose.
- Develop a screening level ecological risk assessment in order to evaluate the protectiveness, in regard to ecological receptors, of any potential response action and the associated cleanup goals.
- Evaluate grain size distribution in the surface sediments (*i.e.*, top three inches) within the river to help guide location of the sediment stability studies and chemistry samples.
- Identify the screening criteria used to determine that other human health exposure pathways do not need to be quantified (*e.g.*, dermal contact with surface water).
- Develop a pictorial CSM that shows such things as inputs and exports of dioxin from the study area, fate and transport mechanisms, and exposure pathways. Use this CSM to help refine the goals of this study and to identify data gaps to help guide the data collection activities.
- To predict the lateral variations in flow velocities and the associated bed shear stresses, consider using a two-dimensional, depth-averaged or a three-dimensional (3D) hydrodynamic model rather than the one-dimensional HEC2 model. Even though the Kanawha River is most likely not vertically stratified, a 3D model would be able to simulate the secondary circulation that develops around bends, whereas a 1D or 2D model could not.

Principle #5, Use an Iterative Approach in a Risk-Based Framework

- When developing cleanup alternatives for the study area, evaluate phasing of cleanup actions in order to minimize recontamination of downstream areas.
- Evaluate whether the study area will be recontaminated from source areas upstream of the study area.

Principle #6, Carefully Evaluate the Assumptions and Uncertainties Associated with Site Characterization Data and Site Models

- Adopt a consistent approach in presenting dioxin data (*e.g.*, ppt TCDD, TEQ).
- Consider what approach (*e.g.*, BSAF, mathematical food chain models) will be used to link surface water/sediment chemistry with fish tissue concentrations. Different approaches require different kinds of data which could affect the proposed activities in the work plan.
- In evaluating the water column sample collection activities, consider data needs for both exposure assessment and contaminant transport (*e.g.*, nearshore and cross-sectional).
- Do not assume that dioxin concentrations are low in coarse grained areas. The coal fines in the shipping channel can absorb dioxin, (note that dioxin absorbed to coal may not be bioavailable, but could still contribute to water quality standard exceedances). The work plan should include several samples in channel areas to evaluate this possibility.
- Explain the rationale behind the proposed number of fish and sediment samples to establish baseline conditions or trends. Consider conducting a statistical analysis to determine the appropriate number of samples needed to establish temporal and spatial trends. Consider whether sufficient samples are planned to relate sediment concentrations to fish tissue concentrations for establishing action levels.
- Consider sampling fish species with small home ranges when establishing food chain models or developing BSAFs in order to reduce uncertainty as to the amount of dioxin uptake. Co-located sediment, fish tissue, and surface water quality samples within the estimated home range would also be helpful in establishing a link between sediment and fish tissue dioxin concentrations.
- Ensure that bathymetry and shoreline mapping are based on consistent fixed survey points.
- Since the proposed sampling program calls for widely spaced samples, consider better defining the localized variability in sediment dioxin concentrations by using several high density sampling areas.

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

- Establish a clear, risk-related objective(s) for the response action, *e.g.* to reduce risks from fish consumption in the study area and/or to reduce risks to downstream areas (including the Ohio River) by reducing the TCDD loading to those areas from the study area.

Principle #8, Ensure that Sediment Cleanup Levels are Clearly Tied to Risk Management Goals

- Prior to selecting a response action, clearly understand the relationship between the range of sediment clean-up goals and the human health and/or ecological assessment endpoints that are driving the need for a response. Any decision document (*e.g.*, action memorandum) should clearly explain the relationship between the final sediment cleanup levels and residual contaminant concentrations and the risk-based goals (*e.g.*, reduced fish tissue concentrations).

Principle #9, Maximize the Effectiveness of Institutional Controls and Recognize their Limitations

- Consider working with WVBPH to provide greater public outreach to improve awareness of and compliance with fish consumption advisories (*e.g.*, public education programs, brochures, postings in bait/tackle shops, fishing license proprietors)

Principle #10, Design Remedies to Minimize Short-term Risks while Achieving Long-term Protection The CSTAG will evaluate consistency with this principle later in the process.

Principle #11, Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness The CSTAG will evaluate consistency with this principle later in the process.

Regional Response

Please send us a short written response to these recommendations within 60 days. If you have any questions or would like a clarification to any of these recommendations please call one of us (Steve Ells at 703.603.8822 or John Meyer at 214.665.6742).

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