UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Wheeling Field Office
Wheeling, West Virginia 26003

October 8, 2004

MEMORANDUM

SUBJECT: Region III Response to CSTAG Recommendations on the Kanawha River, WV Contaminated Sediment Site

FROM: Dennis Matlock, On-Scene Coordinator
EPA Region 3

TO: Stephen J. Ells (EPA Headquarters) and John C. Meyer (EPA Region 6)
Co-Chairs, Contaminated Sediments Technical Advisory Group (CSTAG)

Background

We appreciate the opportunity to work with the Contaminated Sediments Technical Advisory Group (CSTAG) on the Kanawha River Site and for the comments and recommendations CSTAG provided to assist the project team in incorporating EPA's eleven management principles for contaminated sediment sites. We look forward to further discussion with the CSTAG as our project progresses. Our responses to CSTAG's recommendations are provided below.

Brief Description of the Site

In March 2004, EPA, Monsanto and Pharmacia entered into an Administrative Order on Consent to conduct an Environmental 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 III believes that the Flexsys/Solutia 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 produced by Monsanto). TCDD is formed as a by-product in the production of trichlorophenol and ends up in the 2,4,5-T.

Response to CSTAG Recommendations

The CSTAG provided the following recommendations to help the OSC more fully address the eleven principles. The recommendations were based upon a site visit, the review of the site information provided to CSTAG by the project team and the presentations made by several stakeholders. Below are the Region's responses to the recommendations. In addition, the OSC will continue to consider, as appropriate, these recommendations as the investigation continues, as the conceptual site model is refined and as response alternatives are developed and evaluated.

Principle #1, Control Sources Early

Recommendation: 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.
Response: We agree that tracking and communication of information related to potential sources between the various State and Federal source control programs will be a key element in the development of an overall cleanup strategy for the Kanawha River. As part of the draft EE/CA work Plan, Monsanto has prepared an initial draft map summarizing potential sources of dioxin contamination within the regional watershed, as identified from prior investigations. This map will continue to be updated as new information is obtained by EPA, the WVDEP and Monsanto, and will be included in the EE/CA Report and included in the GIS-based mapping for the Site.

Recommendation: Document existing dioxin inputs from surface water and sediment from tributaries (*e.g.*, Pocatalico River, Heizer Creek, and the Manilla Creek).
Response: Previous sampling completed by EPA, WVDEP, and the Ohio River Sanitation Commission (ORSANCO), and flow modeling completed by the U.S. Army Corps of Engineers (USACE) partially characterized dioxin inputs from regional tributaries, including the Pocatalico River and Armour Creek. The initial Conceptual Site Model (CSM) developed in the draft EE/CA Work Plan presented a loading analysis updated with recent data, including an analysis of available sediment sampling data. EPA has approved EE/CA surface water sampling activities in the Kanawha River at locations upstream and downstream of the project study area and at two locations within the study area (at the former Monsanto facility and near Guarno Creek which is downstream of Armour and Pocatalico Creek). This information, plus future sediment stability tests and river modeling will help provide an overall mass balance of the dioxin transport in the study area. The need to conduct specific sampling in, for example, the Pocatalico and/or Armour Creek areas will be evaluated in light of the results of the currently approved sampling event.

Recommendation: 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 early actions that may be warranted.
Response: All information that EPA, WVDEP and Monsanto has obtained or will obtain regarding potential sources will be utilized to evaluate dioxin contributions to the river. The CSM will be updated after each major data collection activity to incorporate the new data. At

that time, data from other sources can also be incorporated. As part of each update, the predominate sources of dioxin will be highlighted such that EPA can evaluate opportunities for early source control. The initial CSM developed in the draft EE/CA Work Plan theorized that two greatest sources of dioxin in the water column were ground water discharge from the former Monsanto facility and sediment resuspension due to coal dredging (which has ceased).

Recommendation: 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.
Response: Data from co-located surface water, sediment, and fish tissue data will be used to evaluate the relative contributions to fish contamination. In addition, the EE/CA Work Plan includes plans for a detailed evaluation of potential sediment-related releases of dioxin to the water column, including characterization of resuspension processes using a range of sediment transport analysis methods (e.g., hydrodynamic analysis, sediment stability testing, radioisotope analysis, and sediment trap deployment). This study, plus the rest of the dioxin mass balance evaluation will help EPA determine the surface water loading from on-going sources versus in-place sediment.

Recommendation: 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.
Response: We agree that coordinating with the State and Federal NPDES' programs is important to minimize any on-going dioxin inputs to the river. The project team will contact these programs to discuss such items as dioxin permit limits (if they exist), the necessity of dioxin permit limits, detection of any testing, loading calculations, etc. Any historical data obtained will be used to help refine the CSM.

Recommendation: 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).
Response: The project team has had a number of discussions over the past several years with the RCRA program and agrees that coordination of the EE/CA and any subsequent cleanup activities with the activities at the Flexsys America L.P. site under the RCRA Corrective Action program is important.

<u>Principle #2, Involve the Community Early and Often</u>

Recommendation: 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.
Response: The project team has begun developing a Community Relations Plan for the project. The team will discuss the plan with the State and discuss whether or not a joint program would be appropriate. The team will also discuss with the RCRA program whether or not the communication activities of the EE/CA and the Corrective Action project at the former Monsanto facility should be combined.

Recommendation: Work with the community to determine whether there is interest in creating a valley-wide community advisory group.
Response: The Region will discuss this issue with the community.

Recommendation: Consider using a variety of ways to communicate site information to the public (*e.g.*, local public television station, internet, periodic stakeholder meetings).
Response: The Region is in the process of developing a Community Involvement Program and will consider various methods of communication.

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

Recommendation: Work with ATSDR/WVBPH to clarify their plans for and the objectives of any health consultations for the site.
Response: EPA will continue to work with ATSDR and WV Bureau of Public Health. ATSDR/WVBPH plan to conduct several reviews during 2005. One involves the review of sediment and surface water data (scheduled for late spring/early summer) and the other involves reviewing recreation use of the river (scheduled for middle to late summer).

Recommendation: 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.
Response: The Region has already installed numerous signs along the Kanawha River. EPA will continue to coordinate with WVBPH regarding additional sign placements.

Recommendation: 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.
Response: Since the main goal of the EE/CA is to evaluate cleanup options to reduce fish tissue concentrations, the Region does not believe that a creel study is appropriate at this time. The Region may reconsider this issue if it becomes apparent that such a study would benefit the project.

Recommendation: 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.
Response: We agree that close coordination between the various State and Federal regulatory agencies is needed to ensure that any future dredging projects in the area appropriately minimize environmental impacts of such actions. The project team will begin this coordination by obtaining a point of contact in both the State and the USACE in regard to dredging activities in this area.

Recommendation: 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).
Response: Significant efforts have been made to obtain as much data as possible for the Site. Monsanto will contact local universities, such as the University of Charleston, to determine the status of any historical and/or on-going research or studies.

Recommendation: 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.

Response: In developing the draft EE/CA Work Plan, Monsanto performed an initial review of USACE's past sediment management actions, including localized dredging in the Winfield Dam area. If, as the CSM is further refined, it becomes apparent that changes in the USACE's sediment management strategy would help reduce dioxin transport beyond the Winfield Dam, the project team will discuss appropriate options with the USACE. The need for future modifications to the USACE's sediment management actions should be further assessed as part of the EE/CA.

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

Recommendation: 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.
Response: The Region agrees that the Ravens flume will only measure shear stress required to initiate surficial bed sediment movement. The need for SEDFLUME tests will be evaluated once the Ravens flume data is interpreted in concert with bottom shear stresses computed from modeling efforts (i.e., if the model shows stresses that will initiate surficial bed sediment movement, SEDFLUME testing will be conducted).

Recommendation: 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.
Response: A screening level ecological risk assessment will be conducted using both historical data and data collected as part of the EE/CA.

Recommendation: 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.
Response: The EE/CA Work Plan includes an initial (Phase I) bathymetric and geophysical survey task that will map sediment bed properties, including surface features and general surface grain size distributions. As part of this activity, sediment samples (0-4 inches) will be collected for grain size analysis to support interpretation of the data. This data will allow grain size distributions of surficial sediments to be determined and mapped. The results of this Phase I evaluation will assist in the scope of Phase II sediment stability studies and chemical characterization tasks.

Recommendation: Identify the screening criteria used to determine if other human health exposure pathways need to be quantified (*e.g.*, dermal contact with surface water).
Response: Based on our knowledge of the site and the bioaccumulative characteristics of dioxin, the Region believes that fish consumption is by far the greatest risk driver at this site. As a result, the EE/CA is focused on this pathway. If additional data points to other significant pathways that would not be concurrently addressed along with the fish consumption pathway, the Region will evaluate whether or not changes in the scope of the study at the site are necessary.

Recommendation: 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.

Response: As part of the next revision to the CSM that will incorporate the data collected this fall, a pictorial section will be added to help summarize inputs and outputs of dioxin from the study area, as well as key fate and transport mechanisms and exposure pathways. Inputs will include both point and non-point sources identified during implementation of the study.

Recommendation: 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.
Response: The Region and Monsanto have had several preliminary discussions regarding the type of modeling effort required for the EE/CA. The Region understands that the one-dimensional model likely is not sophisticated enough to answer the questions necessary for the project and will take this into account once the detailed plans for the model are being developed and reviewed.

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

Recommendation: When developing cleanup alternatives for the study area, evaluate phasing of cleanup actions in order to minimize re-contamination of downstream areas.
Response: The Region will evaluate phasing of cleanup actions in order to minimize re-contamination of downstream areas.

Recommendation: Evaluate whether the study area will be re-contaminated from source areas upstream of the study area.
Response: As part the evaluation of cleanup criteria and cleanup options, the potential for re-contamination from sources upstream of the study area will be evaluated.

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

Recommendation: Adopt a consistent approach in presenting dioxin data (*e.g.*, ppt TCDD, TEQ).
Response: Efforts will be made to report dioxin data in consistent units to allow for easier comparison of data. Also, the identity of the data will be clearly presented (e.g., just 2,3,7,8 - tetrachlorodibenzo-p-dioxin [2,3,7,8,-TCDD] or a Toxicity Equivalence [TEQ] value).

Recommendation: 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.
Response: The BSAF approach is being used to link sediment chemistry with fish tissue concentrations.

Recommendation: In evaluating the water column sample collection activities, consider data needs for both exposure assessment and contaminant transport (*e.g.*, near shore and cross-sectional).
Response: Surface water sampling will be completed utilizing a flow weighted compositing approach to provide data at each sample location representative of the water quality throughout the river cross-section. Further interpretation of water column concentrations at specific locations will be evaluated with the aid of modeling tools.

Recommendation: 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.
Response: The Region agrees the that coal fines can absorb dioxin. Several sediment surface samples will be collected in relatively coarse-grained areas that may also have coal fines to further characterize dioxin concentrations in the river.

Recommendation: 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.
Response: The fish sampling program has been substantially revised compared to the first draft of the EE/CA work plan that was discussed with the CSTAG. A statistical approach to determining the number of fish to be collected (both number of composites and the number of fish per composite) has been used. Additionally, the home range of each species has been factored into the placement of the sampling locations. As part of this fall's sampling event, sediment samples are being collected to help evaluate the local variability of the dioxin levels.

Recommendation: 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.
Response: In addition to the collection of catfish and bass, fish with small home ranges (such as juvenile white and redhorse suckers and pumpkinseed) are being collected. In addition to reducing uncertainty, these species will respond faster to changes in levels of dioxin in the sediment and surface water allowing trends to be identified at an earlier date. Co-located sediment, fish tissue, and surface water quality samples are being collected.

Recommendation: Ensure that bathymetry and shoreline mapping are based on consistent fixed survey points.
Response: The Region will ensure that bathymetry and shoreline mapping are based on consistent fixed survey points.

Recommendation: 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.
Response: As part of this fall's sampling event, composite sediment samples are being collected at locations where fish are being collected. The Region is sampling some of the individual sediment samples to help evaluate localized variability in sediment dioxin concentrations.

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

Recommendation: 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.
Response: The main goal of the EE/CA is to evaluate cleanup options that will reduce the fish tissue levels of dioxin, however other goals, such as reducing TCDD loading from the study area to downstream areas of the Kanawha River and the Ohio River may be evaluated as well.

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

Recommendation: 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).
Response: Data collection activities in the EE/CA are being designed to provide understanding of the relationship between sediment and fish tissue dioxin levels. Any decision document will 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

Recommendation: 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)
Response: The Region will work with WVBPH and the WVDEP in determining ways to improve public outreach

Principle #10, Design Remedies to Minimize Short-term Risks while Achieving Long-term Protection

Recommendation: The CSTAG will evaluate consistency with this principle later in the process.
Response: N/A

Principle #11, Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness

Recommendation: The CSTAG will evaluate consistency with this principle later in the process.
Response: N/A

If you have any questions or would like a clarification to any of these recommendations please call one of us (Dennis Matlock at 304.234.0284 or Randy Sturgeon at 215.814.3227).

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