Michigan Department of Environmental Quality Comments to the Contaminated Sediment Technical Advisory Group on the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site April 2002

Introduction

This position paper presents the opinion of the technical staff working on the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site with respect to how the site relates to key principals identified in the February 12, 2002 EPA OSWER Directive 9285.6-08 on the "Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites."

Principal 1 – Control Sources Early

Interim remedial actions were taken at three of the four land-based source area operable units to reduce or eliminate PCB contaminated paper residuals from entering Portage Creek and Kalamazoo River. Early source control (e.g., PCB point source elimination, Bryant Mill Pond Removal Action) may explain some of the observed fish trends, described in subsequent discussions. Secondary sources (e.g., resuspension and bank erosion of the former impoundments) are currently the major contributors of PCB loading to the Kalamazoo River.

An MDEQ analysis by QEA of the PRP fate and transport model concluded that:

- Sediments upstream of bank erosion sources are impacting water and fish PCB concentrations
- Remediating bank erosion sources alone may not significantly accelerate natural recovery throughout the site

Principal 2 - Involve the Community Early and Often

The MDEQ encouraged public comment on the PRP's draft RI/FS for the Kalamazoo River. The comment letters overwhelmingly opposed the PRP preferred remedy (bank stabilization and monitored natural attenuation). The public clearly does not accept the alternative proposed by the PRPs as indicated by:

- 592 letters from concerned citizens
- Letters from 23 community groups (representing opinions of approximately 2,000 local members and 315,000 regional members)
- Letters from 17 local units of government
- Letters from state legislators (representing 193,000 constituents).

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

The Kalamazoo River is a shallow flowing river whose sediments are subject to resuspension and redistribution. Few regions of the Kalamazoo River are quiescent. Sediment stability currently relies on dams that are in such a state of disrepair that they no longer serve their intended use. The sediment stability of the former impounded banks is probably much different than natural bank material and needs to be considered independently of bed stability issues.

There is a lack of agreement among experts on the adequacy of models to predict the effects of extreme events (Sediment Stability Workshop, New Orleans, 2002). River meander, ice scour, transport from groundwater, and other localized events (such as fallen trees creating scour holes, prop wash from recreational craft, fish spawning/movement) are not modeled directly and only accounted for in the global sediment model calibration. MDEQ recommends that

remedial decisions incorporate more conservatism than the model predictions would recommend (e.g., Hudson River and Fox River RODs).

Man-made structures such as dams and bank stabilization cannot be considered as permanent contaminant control components without significant provisions for complete reconstruction and perpetual maintenance. Such engineering controls conflict with the long-term plans of dam owners and of the natural resource trustees. Dam failure is a concern at this site based on recent engineering evaluations.

Finally, the presence of contaminated deposits in floodplains and on islands within braided segments of the river need to be accounted for as long term sources of PCB to the river.

Principal 5 – Use an Iterative Approach in a Risk-Based Framework

EPA, MDEQ, and the PRPs are following an iterative approach in developing a risk-based cleanup plan. RI data was collected by the PRPs. The baseline ecological and human health risk assessments prepared by MDEQ and reviewed by EPA were recently revised to include new data and showed unacceptable risks for aquatic, terrestrial, and human receptors. EPA collected additional RI data in two impoundments to confirm concentration estimates and volume.

MDEQ, EPA, and PRP estimates of PCB-contaminated material volumes, average concentrations, and surface weighted average concentrations are similar.

Estimates of concentration and volume based on EPA's additional sampling were within previously estimated ninety-five percent confidence limits, based on RI data. Existing data are believed to be adequate to support RI/FS decisions provided that more sampling is conducted as part of remedial design after the record of decision. This additional sampling would be used to optimize cleanup strategies at localized scales, insuring that risk based management goals are met with acceptable uncertainty.

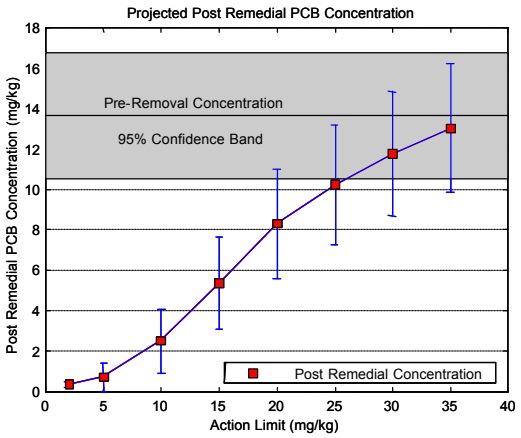
In-stream and exposed sediments pose an unacceptable risk. Decisions can be made on a large scale based on average concentrations, volumes and risks. MDEQ believes large areas (i.e. entire impoundments) should be considered as hot spots in an iterative approach to source control.

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

Characterization of sediment volumes and concentrations without regard to data uncertainty will result in the failure of dredging actions to meet Risk Management Goals.

Hot spot removals that rely solely on interpolations without consideration of uncertainty and river morphology will lead decision makers to select overly optimistic remediation scenarios based on cost effectiveness calculations. Decisions based on interpolated concentration maps (nearest neighbor, inverse distance, kriging) should incorporate uncertainty to determine adequacy of data to support defensible decisions.

The PRPs have assumed that first order decay



models adequately describe observed trends and that those trends will continue into the foreseeable future. This results in unrealistic, optimistic predictions of future PCB concentrations in fish

tissue, sediment, and water. MDEQ is not in agreement with this approach as first order decay models applied by the PRPs:

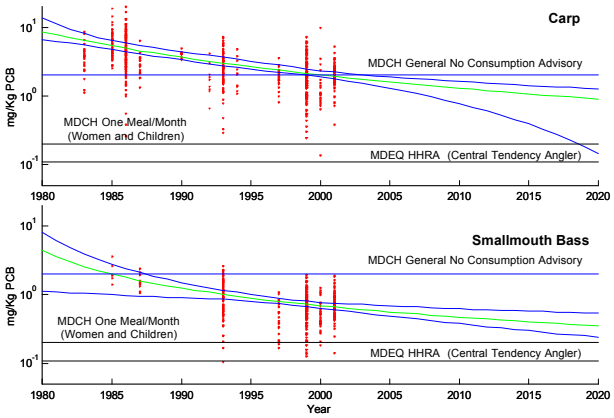
- Have not been justified through a mechanistic approach
- Do not consider that the system is unlikely to achieve a zero concentration (the asymptotes of these model trends are zero).
- Fit curves to early data and do not allow for secondary sources/background to influence trend or asymptote
- Should not be used in a predictive mode, but can be used as a short hand to discuss half-life, based on a given data set, if not extrapolated past the data

Modified mathematical constructs should be used to allow for non-zero asymptotes, temporal changes in PCB concentration decay rates, and estimates of uncertainty.

Fish Trends

The use of simple first order decay models to describe PCB concentrations in fish is not mechanistic. Changes to the system (such as source control or extreme events) invalidate the use of these models for prediction.

In general, fish concentrations today are lower today than they were in 1983. Most of the improvement occurred in the mid 1980's, likely due to regulation of PCB discharges. Since 1990 there are areas of the site that have had little or no improvement in PCB fish concentrations.



Surface Water

Existing surface water data is not adequate for evaluation of trends because temporal effects are confounded with temperature, flow, season and location.

Based on existing data sets, no conclusions can be reliably drawn on water quality trends for much of the site.

Sediment

PRPs have described temporal trends in surficial sediments based on selectively sampled sediment cores. These trends may not be representative of surficial sediments in general. Based on an unbiased sampling design, Stage-1 EPA data indicate that PCB concentration in the surficial sediment in 1994 and 2001 were similar.

Cores need to come from the same geomorphologic structures (edges, depositional areas, mid-channel, non-cohesive sediments and cohesive sediment areas) in the same proportion to make temporal comparisons valid. This is problematic because deposition, scour, and meander are not predictable outside of impounded and channel stabilized areas.

Fate and Transport Models

In order for the PCB fate and transport model to accurately represent natural processes, the sediment model has to accurately describe the transport processes in the system.

The KRSG sediment sub-model was calibrated and presented to MDEQ on two different occasions. The model had substantial revisions to the sediment processes, but still predicted the same trends of PCB concentration reduction. QEA's evaluation of the October 2000 KRSG model indicated that the lack of a mechanistic sediment model invalidates the predictive capability of the model. In addition, fate and transport models can be over-calibrated. This changes an appropriate, mechanism based numerical model into a glorified curve fitting procedure that reduces the ability of a model to forecast long-term trends based on accepted mechanistic principals. The disagreement

in the academic community on the ability of models to deal with extreme events and resultant impacts on natural recovery also needs to be considered when evaluating permanent remedies.

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

MDEQ has prepared baseline ecological and human health risk assessments for the site. Both assessments have been reviewed and approved for use by EPA. The risk assessments conclude the site poses unacceptable risks to human, aquatic, and terrestrial receptors.

Ecological Risk Assessment

Sufficient site-specific data were collected to determine that risks are unacceptable using standard EPA guidance. Additional data collected by the PRPs continue to show that PCBs are pervasive across all species within the study area.

Separate clean-up limits were derived for aquatic and terrestrial receptors for sediment and exposed floodplain soils, respectively. For large portions of exposed sediments that are typically inundated for 2-4 months or more, the MDEQ believes that aquatic criteria should apply. Areas that may be inundated for less than 2-4 months need to be evaluated to determine if significant volumes would not be addressed as part of the sediment remedial alternative. If so, a third semi-aquatic criterion may need to be developed for these areas and wetlands.

MDEQ/CDM conducted a 28-day exposure study at the Trowbridge impoundment to determine the potential uptake of PCBs in biological tissue in inundated floodplains. SPMDs indicate inundated floodplains may contribute to PCB substantially fish body burdens. These seasonally inundated areas represent critical habitat for aquatic and semi-aquatic species and remedial actions should reduce or eliminate these exposure pathways.

Human Health Risk Assessment

The baseline deterministic human health risk assessment shows unacceptable risk to people who eat fish. Sufficient site-specific data were collected to determine that the risks are unacceptable using standard EPA guidance. Fish tissue concentrations exceed the Michigan Department of Community Health fish consumption advisory levels.

The PRPs prepared a probabilistic human health risk assessment (PRA) and assert that the risks at the site are acceptable. The MDEQ has identified the following problems with the PRP-prepared PRA:

- PRPs did not get consensus on a work plan for the PRA as required by draft EPA guidance
- The PRA incorporates uncertainty in toxicological dose response evaluations, counter to EPA policy
- The PRA relies on first order trend forecasts that are not supportable
- MDEQ analysis of ATSDR biological study data used to develop probabilities has documented flaws in its methodology. Authors qualify the report as not representative of the population at large
- Contrary to PRP conclusions of no risk, MDEQ analysis of the ATSDR biological study data shows that even after adjusting for age, fish eaters had higher blood PCB levels than non-fish eaters

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

Sufficient site specific data exist to determine that the sediment cleanup levels provided in the Human Health and Ecological Risk Assessments will reliably:

- Reduce or eliminate fish advisories
- Promote healthy wildlife (e.g., mink) populations
- Be protective of threatened or endangered species (e.g., bald eagle)

The MDEQ recommends the on-going iterative measurement of resident fish, bird serum and eggs, sediment, and surface water PCB concentrations to provide a metric for evaluating the effectiveness of cleanup actions in meeting risk management goals.

Principal 9 – Maximize the Effectiveness of Institutional Controls and Recognize their Limitations

Institutional controls are not likely to achieve substantive risk reduction on a site this size. Recent events limiting the effectiveness of institutional controls on the Kalamazoo River include:

- The MDCH has discontinued publishing its state-wide fish advisory pamphlet
- Recurring vandalism of fish advisory signage
- Advisories and warnings do not reach all populations effectively across socioeconomic demographics.

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

The selected remedy for this site should not restrict long-term goals for the resource. Dams cannot be relied upon as a permanent feature. The partially demolished dams are deteriorating and require complete replacement or removal within the next five to ten years. In the case of the Kalamazoo River, catastrophic/extreme events such as dam failure have foreseeable consequences that should be considered in the decision making process. Removal of certain dams and upstream sediments, such as the Plainwell Dam, is comparable to the costs for replacement and long term care of dam structures. Alternatives that allow dam removal are considered most protective and effective over the long term.

The Kalamazoo River should be allowed to meander within its floodplain. Channel stabilization is against natural resource management goals and adds significant uncertainty and recurring impacts associated with long-term maintenance.

Short-term risks from removal actions such as dredging can be controlled through engineering controls and work methods to the extent that they do not pose long-term threats to human health and the environment. Current estimates of PCB mass loadings to Lake Michigan are 38 to 49 kilograms per year, posing a more significant long-term threat to the environment.

PCB concentrations in sediments at the Bryant Mill Pond were as high as 1000 ppm prior to the EPA time critical removal action. This cleanup resulted in a surface weighted average sediment concentration of less than 1 ppm and a four-fold reduction in PCB fish concentrations. Native vegetation returned within six months. Long-term benefits clearly outweighed short-term risks. This action could be used as a model for future remedial actions.

ADJUSTED PCB CONCENTRATION IN CARP FILLETS AT BRYANT MILL POND
BEFORE AND AFTER NON-TIME CRITICAL REMOVAL ACTION IN 1998