Record of Decision Amendment

Operable Unit 2 (Deposit DD), Operable Unit 3, Operable Unit 4, and Operable Unit 5 (River Mouth)

Lower Fox River and Green Bay Superfund Site

June 2007

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APPENDICES

Abbreviations and acronyms used in this document

agencies	Wisconsin Department of Natural Resources and United States Environmental Protection Agency
Amended Remedy	Remedy selected in Record of Decision Amendment, Lower Fox River and Green Bay Site, Operable Units 2 (deposit DD), 3, 4, and 5, June 2007
ARAR	Applicable or Relevant and Appropriate Requirements
BODR	Basis of Design Report, dated June 16, 2006
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
cy	cubic yards
MNR	Monitored Natural Recovery
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operation and maintenance
OU	Operable Unit
OU 1	Little Lake Butte des Morts reach
OU 2	Appleton to Little Rapids reach
OU 3	Little Rapids to De Pere reach
OU 4	De Pere to Green Bay reach
OU 5	Green Bay
PCB	polychlorinated biphenyl
ppm	parts per million
PRPs	Potentially Responsible Parties under CERCLA
RAL	Remedial Action Level
RAO	Remedial Action Objective
RIFS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RS	Responsiveness Summary
Site	Lower Fox River and Green Bay Site
SMU	Sediment Management Unit
SWAC	Surface Weighted Average Concentration
TSCA	Toxic Substances Control Act
USEPA	United States Environmental Protection Agency
WDNR	Wisconsin Department of Natural Resources
2002 ROD	Record of Decision, Operable Units 1 and 2, Lower Fox River and Green Bay Site, December 2002
2003 ROD	Record of Decision, Operable Units 3, 4, and 5, Lower Fox River and Green Bay Site, June 2003

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Record of Decision Amendment, Operable Unit 2 (Deposit DD), Operable Unit 3, Operable Unit 4, and Operable Unit 5 (River Mouth), Lower Fox River and Green Bay Superfund Site Brown, Door, Marinette, Oconto, Outagamie, Kewaunee, and Winnebago Counties, Wisconsin, and Delta and Menominee Counties, Michigan

I. Introduction

Reasons for a Change in Remedy

This Record of Decision Amendment (ROD Amendment) for the Lower Fox River and Green Bay Site (Site) selects and explains an Amended Remedy that makes changes to parts of the remedy described in the Record of Decision for Operable Units 3, 4, and 5 of the Site, dated June 30, 2003 (2003 ROD). The Amended Remedy changes certain aspects of the 2003 ROD for all or part of the following Operable Units (OUs): OU 2 (Deposit DD), OU 3, OU 4, OU 5 (near the mouth of the River). The ROD Remedy for OU 1, dated December 20, 2002 (2002 ROD), is not affected by this amendment. This ROD Amendment is being issued by the United States Environmental Protection Agency (USEPA) and the Wisconsin Department of Natural Resources (WDNR) under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §§ 9601-9675.

As explained below, the Amended Remedy is being adopted in response to new information that has been collected and analyzed since the 2003 ROD was issued. New information was obtained through experience with full-scale remediation activities in OU 1, and during intensive data collection and evaluation efforts performed as part of the remedial design process for OUs 2-5. For example, a wealth of new sediment data was collected and analyzed during 2004-2005 pre-design sediment collection activities in OU 2-5, including 10,000 sediment samples at more than 1,400 locations.

Much of that new information is compiled and analyzed in a Basis of Design Report (BODR) for OUs 2-5, dated June 16, 2006, that was submitted to USEPA and WDNR and approved on July 11, 2006. The BODR was developed by two Potentially Responsible Parties (PRPs), NCR Corporation and Fort James Operating Company, Inc., as part of the remedial design process for OUs 2-5. That remedial design process, including collection of additional pre-design sediment samples and preparation of design documents such as the BODR, is being funded and implemented under an Administrative Order on Consent that those PRPs signed with USEPA and WDNR. USEPA and WDNR are overseeing all aspects of that remedial design process, and design documents prepared by those PRPs are subject to review and approval by USEPA and WDNR.

The new data and analyses presented in the BODR showed that:

1. Polychlorinated biphenyls (PCBs) are not uniformly spread throughout the Site but tend to be concentrated in smaller, definable areas.

2. A 20-acre area, with PCB concentrations in near-surface sediments as high as 3,000 ppm, the highest known PCB concentrations in the lower Fox River, was found just downstream and west of the De Pere Dam. This area is being addressed in the Phase I remediation project (see Figure 1), with approximately 145,000 cubic yards (cy) of PCB contaminated sediment targeted for removal during 2007. This project includes an estimated 26,000 cy with PCB concentrations equal to or greater than 50 ppm (Toxic Substances Control Act [TSCA] materials), per the Lower Fox Phase 1 Remedial Action, Remedial Action Plan, March 2007. These TSCA sediments are the main focus of this removal.

3. Contaminated sediment as deep as 13 feet below the river bottom was found in the middle channel stretches of OU 4. Relatively less contaminated sediment now covers that deeply-buried sediment contamination. To remove the more highly-contaminated sediment and to maintain a stable river bottom in these areas, a significant volume of relatively uncontaminated sediment would also have to be removed and disposed.

4. Approximately 210 acres out of a total 1,170 acres of the PCB contaminated sediment (roughly 18% by area and 0.5% of the PCB mass) have a relatively thin layer (i.e., less than six inches) of contamination, with relatively low PCB concentrations (between 1.0 and 2.0 ppm).

5. Recent experience with dredging in OU1 and other projects has shown that dredging equipment cannot completely remove contaminated sediment from dredged areas. Thus, residual contaminant concentrations often remain after dredging is completed in an area. For that and related reasons, the dredging remedy selected by the 2003 ROD probably would not achieve the PCB Surface Weighted Average Concentration (SWAC) goals established by the 2003 ROD.

6. Dredging probably cannot be used to remove contaminated sediment in some areas near shoreline facilities and in-water structures because removal of the sediment could undermine and destabilize those facilities and structures.

Based upon this newly–obtained information, particularly the new sediment sampling results, WDNR and USEPA have determined that it is appropriate to modify the 2003 ROD remedy by selecting the Amended Remedy described in this ROD Amendment. WDNR and USEPA are jointly signing this ROD Amendment.

II. Site History

For many years, a large number of paper production facilities have been and continue to be concentrated along the River. Some of the facilities manufactured a particular type of PCB-containing carbonless copy paper. Some of the other facilities reprocessed PCB-containing waste paper and used it as feedstock for the production of other paper products. In both of these processes, PCBs were released from the paper production facilities to the Fox River directly, or after passing through municipal wastewater treatment plants. PCBs were then transported within the river system as PCBs have a tendency to sink and adhere to sediments in the river bottom. Therefore, they have settled to the bottom of the Fox River, and have contaminated areas in the 39 mile length of the Lower Fox River, and Green Bay.

Additional details on Site history appear in the 2003 ROD.

III. Site Location and Description

The Lower Fox River and Green Bay Site ("the Site") includes approximately 39 miles of the Lower Fox River (referred to herein as "the River") as well as the Bay of Green Bay (referred to herein as "the Bay") – see Figure 1 below. The River portion of

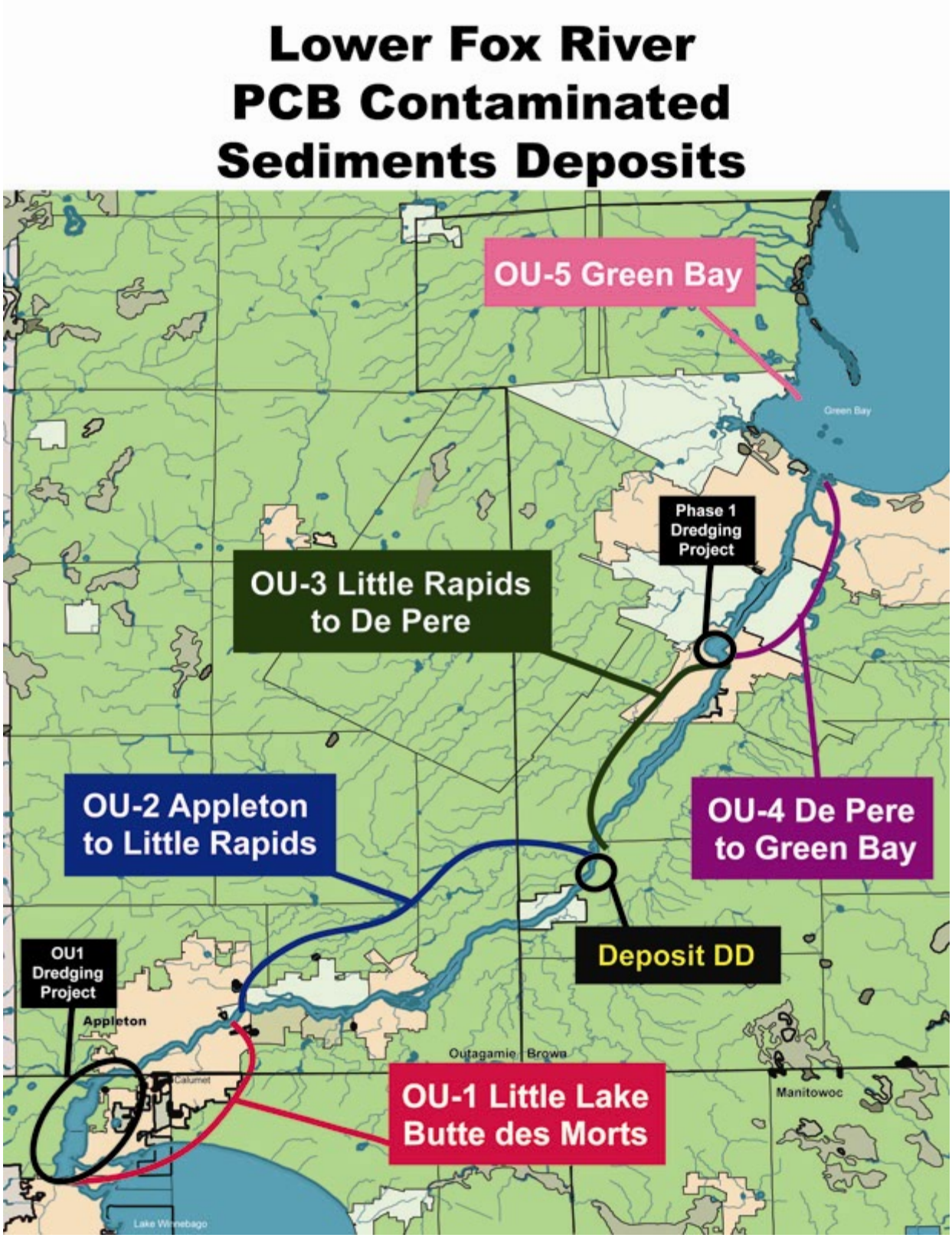

Figure 1. Lower Fox River PCB-contaminated sediment deposits and Operable Units.

the Site extends from the outlet of Lake Winnebago and continues downstream to the mouth of the River at Green Bay, Wisconsin. The Bay portion of the Site includes all of Green Bay, from the City of Green Bay to the point where Green Bay enters Lake Michigan.

USEPA and WDNR have organized the Site into five Operable Units (OUs) and those OUs are addressed by two RODs, briefly discussed above. These OUs, divided on the basis of similar features, characteristics and dam locations, are described in Table 1 below and shown in see Figure 1:

TABLE 1. Operable Units and Remedies

ROD	Operable Unit	Location	Remedy
2002 ROD	1	Little Lake Butte des Morts	Dredging and disposal
	2	Appleton to Little Rapids	Monitored Natural Recovery
2003 ROD	3 (and OU 2 Deposit DD)	Little Rapids to De Pere	Dredging and disposal
	4	De Pere to Green Bay	Dredging and disposal
	5	Green Bay	Monitored Natural Recovery

This ROD Amendment addresses OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (near the River mouth). With the exception of the remedial activities at Deposit DD, the remedy for OU 2 is unchanged, and with the exception of the remedial activities at the River mouth, the OU 5 remedy for Green Bay is unchanged.

IV. Site Characteristics

Section 6 of the 2003 ROD provides a complete description of the characteristics of the Site. Additional post-ROD information regarding Site characteristics is in the BODR, and is summarized in the Introduction above (new information).

V. Site Risks

Section 8 of the 2003 ROD provides a complete description of the risks to human health and the environment posed by the PCB-contaminated sediments at the Site. However,

general conclusions from the Risk Assessments at the site are:

- Human health and ecological receptors are at risk in each Operable Unit.
- Fish consumption is the exposure pathway presenting the greatest risk for human health and ecological receptors.
- The primary contaminant of concern is PCBs.

VI. Agency Evaluations and Decisions

A. Site Evaluations and Original Remedy Selection Decisions

The agencies have conducted extensive evaluations, particularly beginning in 1989 with the Green Bay Mass Balance Study, as well as demonstration projects in two discrete areas of the river (known as Deposit N/O and Sediment Management Unit 56/57) from 1998 – 2000. Details of these projects are discussed in the 2003 ROD.

WDNR released the draft Remedial Investigation/Feasibility Study (RIFS) for public review and comment in February 1999. The early release in the planning process of the draft RIFS for public comment allowed the agencies to better evaluate public acceptance of cleanup alternatives. Comments were received from governmental agencies, the public, environmental groups, and private-sector corporations. These comments were used to revise and refine the scope of work that led to the RIFS and Proposed Plan released for public comment in October 2001. Comments received from the PRPs, the public, and independent peer review committees were incorporated into the final RIFS. In December 2002, USEPA and WDNR signed the ROD for OU 1 and OU 2. That ROD called for active remediation in OU 1 and "Monitored Natural Recovery" (MNR) in most of OU 2. In June 2003, a ROD was signed for OU 3, OU 4 and OU 5. That 2003 ROD called for active remediation in OU 2 (deposit DD), OU 3, OU 4 and MNR for OU 5.

B. Remedial Action Objectives

The 2002 ROD and 2003 ROD adopted the same Site-wide Remedial Action Objectives (RAOs), and those RAOs are unchanged by this ROD Amendment. RAOs address protection of human health and the environment. No numeric cleanup standards have been promulgated by the federal government or the State of Wisconsin for PCB-contaminated sediment. Therefore, site-specific RAOs to protect human health and the environment were developed based on available information and standards, such as "Applicable or Relevant and Appropriate Requirements" (ARARs), guidelines that are referred to as factors "to be considered," and risk-based levels established using the human and ecological risk assessments. As discussed in detail in Section 9 of the 2003 ROD, the following five RAOs have been established for the Lower Fox River and Green Bay Site.

- **RAO 1: Achieve, to the extent practicable, surface water quality criteria throughout the Lower Fox River and Green Bay.** This RAO is intended to reduce PCB concentrations in surface water as quickly as possible. The current water quality criteria for PCBs are 0.003 nanograms per liter (ng/L) for the protection of human health, and 0.012 ng/L for the protection of wild and domestic animals. Water quality criteria incorporate all routes of exposure assuming the maximum amount is ingested daily over a person's (or animals) lifetime.

- **RAO 2: Protect humans who consume fish from exposure to Contaminants of Concern (COCs) that exceed protective levels.** This RAO is intended to protect human health by targeting removal of fish consumption advisories as quickly as possible. The WDNR and USEPA defined the expectation for the protection of human health as recreational and high intake fish consumers being able to safely eat unlimited amounts of fish within 10 years to 30 years, respectively.

- **RAO 3: Protect ecological receptors from exposure to COCs above protective levels.** RAO 3 is intended to protect ecological receptors such as invertebrates, birds, fish, and mammals. WDNR and USEPA defined the ecological expectation of achieving safe ecological thresholds for fish-eating birds and mammals within 30 years following remedy completion. Although the Feasibility Study did not identify a specific time frame for evaluating ecological protection, the 30-year figure was used as a measurement tool.

- **RAO 4: Reduce transport of PCBs from the Lower Fox River into Green Bay and Lake Michigan.** The objective of this RAO is to reduce the transport of PCBs from the River into the Bay and Lake Michigan as quickly as possible. The WDNR and USEPA defined the transport expectation as a reduction in loading to the Bay and Lake Michigan to levels comparable to the loading from other Lake Michigan tributaries. This RAO applies to each OU encompassing part of the River (sometimes referred to as River "reaches").

- **RAO 5: Minimize the downstream movement of PCBs during implementation of the remedy.** This objective would minimize as much as feasible the release of contaminants during remedial activities such as dredging, capping or placing sand covers.

C. New Information Gathered During Pre-Design Sampling, and its Bearing on the 2003 ROD

During pre-design sampling work in 2004-2005, new PCB data from approximately 10,000 sediment samples at 1,400 locations was collected in OUs 2 through 5. The results of that sampling are presented in the BODR, and several significant findings based on that sampling data are summarized above in Section I. Three of those findings are discussed in greater detail below, namely: (1) the discovery of high levels of PCB contamination in a particular area below the De Pere dam; (2) the conclusion

that a much larger volume of sediment would need to dredged under the 2003 ROD remedy; and (3) the projection that the SWAC goals established by the 2003 ROD would not be met even if that larger volume of sediment were dredged.

1. The High-Level Contamination Below the De Pere Dam

The 2004-2005 pre-design sampling identified highly-elevated concentrations of PCBs (with some surface concentrations exceeding 3,000 ppm) in sediment in an area encompassing approximately 20 acres in OU 4, along the west bank of the Lower Fox River, just downstream from the De Pere Dam. USEPA and WDNR determined that the remedial action for OUs 2-5 should be conducted in two phases to expedite the response in that area. Phase 1 of the remedial action will address PCB-contaminated sediments in that area. All remaining elements of the remedial action would be implemented in Phase 2.

Dredging of this newly-identified hotspot will occur during 2007 under a Consent Decree with NCR Corporation and Sonoco-U.S. Mills, Inc. It is estimated that more than 145,000 cubic yards of PCB-contaminated sediment will be dredged from that area in 2007 and disposed of in off-Site landfills. The dredging of this PCB hotspot is consistent with both the 2003 ROD Remedy and the Amended Remedy. However, if that dredging project does not achieve all requirements of the Amended Remedy, the project may only be treated as an interim action and additional response activities may be required in that area during Phase 2 of the remedial action under the Amended Remedy.

2. The Increased Sediment Volume Estimate

The pre-design sampling results also were used to develop a more accurate estimate of the volume of PCB-contaminated sediments above the 1.0 ppm RAL. Additionally, an "overdredge" allowance would be required to remove other uncontaminated sediment to ensure removal of sediments with PCB concentrations greater than 1.0 ppm. This "overdredge" allowance represents an additional volume of 950,000 to 1,000,000 cy of sediment that would need to be dredged to ensure removal of the target material.

Table 2 below summarizes the updated estimate of the volume of sediment (including the overdredge allowance) that would need to be removed or otherwise addressed under the 2003 ROD Remedy.

TABLE 2. Updated Estimate of 2003 ROD Remedial Volume for All Sediment Exceeding the 1.0 ppm PCB RAL

Operable Unit	Volume (cubic yards)	
	Non-TSCA (PCB concentrations <50 ppm)	TSCA (PCB concentrations ≥50 ppm)
OU 2 (deposit DD)	**80,000**	**0**
OU 3	**720,000**	**0**
OU 4	**6,550,000**	**210,000**
OUs 2-5 Total	**7,350,000**	**210,000**

Table Notes:
1) Volume based on dredge prism design from BODR, Table 3-4.
2) OU 4 volumes include approximately 200,000 cubic yards that would be dredged in Green Bay, near the mouth of the River.
3) Volumes are rounded to nearest 10,000 cy.

As shown in Table 2, approximately 7.6 million cy of sediment would need to be removed or otherwise addressed under the 2003 ROD. Of that total amount, approximately 500,000 cy would probably need to be capped in place (rather than being dredged) under the 2003 ROD because dredging that material would threaten the stability of shoreline structures. Thus, the most recent data suggests that approximately 7.1 million cy of sediment would need to be dredged and approximately 500,000 cy of sediment would need to be capped under the 2003 ROD Remedy.

3. The Revised SWAC Projections for the 2003 ROD Remedy

In addition to identifying a larger volume of sediment that would need to be removed under the 2003 ROD, the additional sampling and analyses performed during the remedial design process showed that the 2003 ROD dredging remedy alone probably could not meet the PCB SWAC goals outlined in the 2003 ROD (i.e., 0.26 ppm for OU 3 and 0.25 ppm for OU 4). There are two main reasons why the 2003 ROD remedy would be unlikely to meet those SWAC goals.

- First, even if all sediment exceeding the 1.0 ppm PCB RAL is dredged in an area, the post-dredging surface concentrations may still exceed 1.0 ppm PCBs. That is because experience with dredging projects at this Site and elsewhere has

shown that the dredging process itself commonly re-suspends some contaminated sediment that is then re-deposited in a thin layer on top of the newly-dredged area. That re-deposited contamination is called "generated residuals."[1] The 2003 ROD indicated that generated residuals could be addressed by re-dredging and/or placement of sand covers over dredged areas, but recent experience suggests that generated residuals could still increase the SWAC calculation even if those residuals management approaches were employed.

- Second, contrary to earlier expectations, the recent sampling data shows that large areas of relatively low PCB levels on the surface of undredged areas (i.e., in areas with no sediment exceeding the 1.0 ppm PCB RAL) might prevent the 2003 ROD remedy from reaching the OU-wide SWAC goals.

After considering those two factors, USEPA and WDNR now project that the 2003 ROD remedy would only achieve a 0.31 ppm SWAC in OU 3 and 0.32 ppm SWAC in OU 4, so the SWAC goals specified by the 2003 ROD (i.e., 0.26 ppm in OU 3 and 0.25 ppm in OU 4) probably would not be achieved. If the 2003 ROD remedy did not meet those SWAC goals by the completion of active remediation, then additional time would be required for further reductions in surface concentrations through natural recovery processes before RAOs could be achieved.

4. Summary of the 2003 ROD Remedy and the Relevance of the New Information and Findings

An abbreviated summary of the 2003 ROD remedy follows below, with some discussion of the relevance that the new, more accurate and complete information would have on the 2003 ROD remedy.

- **Sediment removal.** The 2003 ROD called for removal of all sediment with a PCB concentration exceeding the 1.0 ppm RAL. The estimated volume of the sediment that would need to be removed under that remedy has increased. As discussed above in Section I, it is now estimated that approximately 7.1 million cy of sediment would need to be dredged from OUs 2-5 under the remedy selected by the 2003 ROD, in light of new sampling data and overdredge allowance. The 2003 ROD originally estimated approximately 6.5 million cy would be removed (based on older, less complete data and not including overdredge).

- **Sediment dewatering and disposal.** The 2003 ROD envisioned that contaminated sediment would be passively dewatered after it was transported by a temporary pipeline to a dewatering facility. The contaminated sediment

1 In this ROD Amendment, the term "generated residuals" is used to describe contaminated sediment that is re-deposited at the surface of a newly-dredged area (i.e., in the top six inches of the sediment surface). A different term – "undisturbed residuals" – is used to describe contaminated sediment that is more than six inches below the surface of a newly-dredged area.

would then have been disposed of at a facility that would meet all State and federal disposal standards, located adjacent to the dewatering facility. This disposal would have included TSCA sediments. The sediment that is being dredged during Phase 1 of the remedial action is being mechanically dewatered and disposed of in two different off-Site landfills (one that will receive TSCA material and another that will receive only non-TSCA material).

- **Water treatment.** Water generated by dredging and dewatering operations would have been treated prior to discharging it back to the Fox River to meet State and federal water quality standards. This would have required a return pipeline or another method of disposal of treated water.

- **Capping.** A capping contingency plan allowed for the use of an engineered cap in limited areas if that capping was shown to be protective and less costly than dredging. An Explanation of Significant Difference would have been required prior to implementation of capping. The capping portion of the Amended Remedy has evolved from the 2003 ROD capping contingency, but requires a ROD Amendment due to more substantial differences to the original 2003 ROD (i.e., "fundamental" changes).

- **Long-term monitoring.** Long-term monitoring of surface water and biota would continue until PCB concentrations in these media were at acceptable levels.

- **Institutional controls.** Until Remedial Action Objectives (RAOs)[2] were achieved, institutional controls (e.g., fish advisories) would be maintained to minimize human and ecological exposures to contaminants.

- **RAL and SWAC.** Sediments with PCB concentrations greater than the 1.0 ppm RAL were targeted for removal. The 2003 ROD estimated that SWAC levels of approximately 0.25 ppm PCB would be achieved in OU 3 and OU 4 if all sediment above the 1.0 ppm RAL were removed by dredging. If all sediments above the 1.0 ppm RAL were not removed in OU 2 (Deposit DD), OU 3, and OU 4, then the 2003 ROD indicated that a SWAC of approximately 0.25 ppm for OU 2 (Deposit DD), OU 3, and OU 4 would be met by other means, such as by placement of a sand cover on dredged areas. The specific SWAC goals in the 2003 ROD were 0.26 ppm for OU 3 and 0.25 ppm for OU 4. As noted above, the most recent projections indicate that those SWAC goals would not be met by the 2003 ROD remedy.

- **Natural recovery after remediation.** Although the 2003 ROD specified that RAL requirement or SWAC goal would need to be met immediately after the completion of dredging in a particular OU, it also recognized that it would take

2 RAOs are described in Section X, below. RAOs provide a general description of what the cleanup will accomplish (e.g., protection of human health).

additional time for natural recovery before some of the RAOs would be achieved. For example, the 2003 ROD estimated that a SWAC of approximately 0.26 ppm PCBs would be achieved in OU 3 after the completion of active remediation, but the 2003 ROD also estimated that it would take another 9 years before reduced PCB levels in fish tissue would allow unlimited consumption of walleye caught in OU 3. If the 2003 ROD remedy did not achieve the SWAC goals, longer natural recovery periods would be required to meet RAOs.

- **Monitored Natural Recovery for Green Bay.** With the exception of certain remedial actions near the mouth of the River that would address most of the contaminated sediments with PCB concentrations greater than the 1.0 ppm PCB RAL, the 2003 ROD selected monitored natural recovery with institutional controls as the remedy for OU 5.

- **Costs**. Based on new information gathered after issuing the 2003 ROD, the cost of implementing the 2003 ROD remedy in OU2-5 is currently projected at $580 million. The 2003 ROD originally estimated that cost at $325 million. That lower cost estimate in the 2003 ROD was based on older, less complete data and a less detailed engineering analysis.

VII. Procedure for Changing the Remedy

Under CERCLA Section 117(c), 42 U.S.C. § 9617(c), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. § 300.435(c)(2)(ii), if USEPA proposes to fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost, then USEPA is required to publish the proposed amendment, receive comments, and provide an opportunity for comment. In this case, the decision by USEPA and WDNR to modify the remedy for this Site fundamentally alters the basic features of the remedy previously selected, and that action necessitates the issuance of this ROD Amendment.

Accordingly, USEPA and WDNR issued a Proposed Plan on November 13, 2006, and invited public comment on possible changes to the remedy in the 2003 ROD. During the 60 day public comment period, the agencies held a public meeting to discuss the proposed change in the remedy on December 5, 2006 at 7:00 pm at the Brown County Library, in Green Bay, Wisconsin. After reviewing and fully considering the public comments submitted, USEPA and WDNR have decided to modify the selected remedy from predominantly dredging PCB-contaminated sediments to a remedy that employs a combination of:

- Dredging as the primary remedial approach

and the following alternative remedial approaches:

- capping after dredging,
- capping by itself, and
- sand covers for residuals management and as the sole remedial approach in certain areas.

This ROD Amendment is part of an administrative record for the Site, available for public inspection at the following three locations, at the following times: 1) WDNR Northeast Region office, 2984 Shawano Avenue, Green Bay, Wisconsin, 7:45 AM – 4:30 PM, Monday-Friday; 2) WDNR Bureau of Watershed Management, 2nd Floor, 101 South Webster Street, Madison, Wisconsin, 7:45 AM – 4:30 PM, Monday-Friday; and 3) USEPA Records Center, 7th Floor, 77 West Jackson Boulevard, Chicago, Ill, 8 AM – 4 PM, Monday-Friday. This ROD Amendment also will become part of the administrative record for the Site in accordance with Section 300.825(a)(2) of the NCP, 40 C.F.R. § 300.825(a)(2). The most recent update to the administrative record appears in Appendix A to this ROD Amendment. Details of this Amended Remedy is described in Section XI below.

VIII. Community Relations

USEPA and WDNR issued the Proposed Plan for a ROD Amendment to the public on November 13, 2006. This issuance began a 60 day public comment period on proposed changes to the 2003 ROD. USEPA and WDNR held a public meeting to discuss and receive comments on the proposed ROD Amendment at the Brown County Public Library on December 5, 2006. The comment period ended on January 11, 2006. See Section 3 of the 2003 ROD for the community relations history prior up to the June 2003 ROD.

Since the 2003 ROD, the following major public meetings and press conferences have occurred:

- Oct. 2003 -- OU 1 cleanup Consent Decree press conference,
- Aug 2004 -- OU 1 2004 season pre-construction public meeting,
- May 2005 -- OU 3-5 design update public meeting,
- July 2005 -- OU 1 construction update public meeting,
- April 2006 – OU 4 Phase I Consent Decree press conference, and
- June 2006 -- OU 1 construction update meeting.

Additionally, since the issuance of the 2003 ROD, the agencies' staffs have made

presentations at or attended approximately 50 meetings or community events to discuss Site cleanup, restoration or regarding other site-relate issues, as requested by local officials, citizen groups, universities and other schools, unions, etc. The agencies also continue to send the Agency Site newsletter, the Fox River *Current* to 16,000 addresses.

IX. Development of the Remedial Action Alternatives

The ROD Amendment involves evaluation of two remedial action alternatives: (1) the 2003 ROD Remedy; and (2) the Amended Remedy described in Section XI.

The development of the 2003 ROD Remedy alternative was fully described in the 2003 ROD itself.

The Amended Remedy alternative was developed based on new information and new engineering analyses that were assembled in the remedial design process under the 2003 ROD, as summarized in Sections I and VI. The BODR summarized and presented that new information and the new analyses. Section 5 of the BODR also proposed a preliminary remedial design concept that was based largely on the new information and analyses. Details regarding scheduling, monitoring and costs were also evaluated in Sections 6, 7, and 8 the BODR. Unlike the 2003 ROD, the preliminary remedial design concept presented in the BODR included not only dredging, but also alternate remedial approaches that might be suitable for certain areas within OUs 2-5, given the new information and analyses. The ROD Amendment modifies the 2003 ROD to allow alternate remedial approaches under the criteria specified in Section XI (Description of the Amended Remedy).

As discussed in greater detail in Section X, the Amended Remedy was designed to have several advantages over the 2003 ROD remedy, including the following:

- Although the Amended Remedy is primarily a dredging remedy, the Amended Remedy also allows alternate remedial approaches in certain situations (such as sand covering or capping undredged areas). This will result in the Amended Remedy being more likely to produce PCB SWAC levels at or less than 0.25 ppm upon completion of active remediation.

- The Amended Remedy will achieve RAOs years before they would be achieved under the 2003 ROD Remedy. The active remediation work will be done sooner (within 9 years for the Amended Remedy, rather than 15 years under the 2003 ROD Remedy). In addition, less time will be needed for post-remediation natural recovery in order to achieve the RAOs because the Amended Remedy is expected to yield a lower SWAC than the 2003 ROD Remedy.

- The Amended Remedy allows alternate remedial approaches that are much more efficient than dredging for newly-discovered thin layer PCB deposits and

deeply-buried PCB deposits. A significant volume of relatively clean sediment would need to be removed as overdredge allowance during dredging of thin layer deposits and deeply-buried deposits. Once removed, that relatively clean sediment needs to be disposed of in a landfill along with the more contaminated sediment. The Amended Remedy would allow caps or sand covers in some areas with thin layer deposits or deeply-buried deposits, if specified criteria can be met. It is estimated that the Amended Remedy would thereby reduce the overdredge volume by 400,000 cubic yards, as compared to the Amended Remedy.

- The Amended Remedy also allows alternate remedial approaches in certain areas where dredging is not feasible. The 2003 ROD Remedy did not address the potential need for alternate approaches in such areas, including areas where dredging could undermine near shore structures.

X. Evaluation of Alternatives

A. Evaluation Criteria

Remedial alternatives are evaluated based on the nine criteria set forth in the NCP, 40 CFR Part 300. These criteria are described below.

A remedial alternative is first judged in terms of the threshold criteria of protecting human health and the environment and complying with ARARs. If a proposed remedy meets these two threshold criteria, the remedial alternative is then evaluated under the balancing and modifying criteria, to arrive at a final recommended alternative.

Threshold Criteria

1. Overall protection of human health and the environment: Alternatives are assessed to determine whether they adequately protect human health and the environment from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at a site.

2. Compliance with ARARs: Alternatives are assessed to determine whether they attain Applicable or Relevant and Appropriate Requirements under federal environmental laws and state environmental or facility siting laws, or provide grounds for invoking a waiver.

Balancing Criteria

3. Long-term effectiveness and permanence: Alternatives are assessed for their ability to maintain protection of human health and the environment over time, and for the reliability of such protection.

4. Reduction of contaminant toxicity, mobility, or volume through treatment: Alternatives are assessed based upon the degree to which they use treatment to address the principal threats posed by a site.

5. Short-term effectiveness: Alternatives are assessed based on the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. Implementability: Alternatives are assessed based on the technical and administrative feasibility of implementing the alternative, such as the relative availability of goods and services.

7. Cost: The cost of each alternative is assessed, including each alternative's capital cost, annual operation and maintenance (O&M) cost, and net present value of capital and O&M cost. Net present value is the total cost of an alternative over time in terms of today's dollars.

Modifying Criteria

8. State acceptance: The assessment of remedial alternatives includes consideration of any concerns the State has raised with respect to the preferred alternative, other alternatives or with ARARs or ARAR waivers.

9. Community acceptance: The assessment of remedial alternatives also includes consideration of the extent to which interested community members support, have reservations about, or oppose certain components of the alternatives.

B. Application of the Evaluation Criteria to the Amended Remedy and the 2003 ROD Remedy

1. Overall Protection of Human Health and the Environment

Compared to the 2003 ROD Remedy, the Amended Remedy is more protective of human health and the environment in the short term and just as protective as the 2003 ROD Remedy in the long term.

In the short term, the Amended Remedy has the following advantages over the 2003 ROD remedy:

- The Amended Remedy is projected to achieve lower PCB SWACs upon construction completion. The Amended Remedy will leave lower PCB surface concentrations in capped areas, as compared to the higher expected levels that would remain at the surface if the same areas were dredged. The Amended Remedy also provides additional options for meeting the SWAC (such as placement of sand covers over undredged areas). Table 3 presents the current (pre-remediation) SWAC estimates and the estimated SWAC results under the

two remedial alternatives, assuming a post-dredging sand cover for both remedies.

TABLE 3. Estimated Current PCB SWAC and Projected SWAC Results Under 2003 ROD and Amended Remedy

Operable Unit	Current (ppm)	After 2003 ROD Remedy (ppm)	After Amended Remedy (ppm)
3	2.0	0.31	0.28
4	3.2	0.32	0.25

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- The Amended Remedy will also achieve RAOs years before they would be achieved under the 2003 ROD Remedy. The active remediation work will be done sooner (within 9 years under the Amended Remedy, rather than taking 15 years or more under the 2003 ROD Remedy). In addition, less time will be needed for post-remediation natural recovery in order to achieve the RAOs because the Amended Remedy is expected to a yield lower SWAC than the 2003 ROD remedy. For example, it would take less time after remedy completion to reach reduced PCB levels in fish tissue for unlimited consumption of walleye. Under the SWAC levels presented above in Table 3, the Amended Remedy would reach that goal in about 9 years for walleye from OU 3 and in about 20 years for walleye from OU 4. It would take longer for the 2003 ROD Remedy to reach that goal in each OU.

The Amended Remedy and the 2003 ROD Remedy would offer comparable protection over the long term. Both alternatives use the same RAL. Although a lower volume of contaminated sediment would be dredged under the Amended Remedy, all sediment exceeding the 1.0 ppm PCB RAL would still be removed or contained by a cap or sand cover. The engineered caps that are allowed by the Amended Remedy should remain protective over the long term, because the Amended Remedy includes stringent design criteria for caps and ongoing cap monitoring and maintenance requirements. If long term monitoring shows that a cap is deteriorating, the Amended Remedy allows USEPA and WDNR to require that the cap be enhanced or removed (along with removal of the underlying sediment).

2. Compliance with ARARs

Both the 2003 ROD Remedy and the Amended Remedy will meet all ARARs. This is discussed in detail in Section XIV.2.

TSCA requirements are significant ARARs for both dredged sediment and any capped sediment at or above 50 ppm PCBs (TSCA sediment). Under either alternative, TSCA sediment would be dredged from the River and that dredged material would be handled, stored, and disposed of in accordance with TSCA requirements. Under the Amended Remedy, some TSCA sediment might be contained at the Site by engineered caps.

USEPA and WDNR have determined that the Amended Remedy's criteria for such caps effectively meet the substantive requirements of TSCA, including the substantive requirements of a TSCA risk-based disposal approval under 40 C.F.R. § 761.61(c).

3. Long-term Effectiveness and Permanence

Both the 2003 ROD Remedy and the Amended Remedy meet the long-term protectiveness and permanence requirements of the NCP. As discussed above, the Amended Remedy's design criteria for engineered caps require that the caps are designed to be durable and effective over the long term. Those design criteria were developed based on detailed evaluations of the following processes or events that could potentially compromise the integrity and protectiveness of a cap:

- **Scour from hydrodynamic flows (including seiches).** The cap design criteria should ensure that caps are stable under maximum shear stresses for reasonable worst case scenarios (i.e., simultaneous 100-year flows, historical low water levels, and maximum seiche amplitude).

- **Disruption from bioturbation (i.e., biological activity).** The cap design criteria require cap thicknesses that should be more than sufficient to avoid damage to caps or exposure to underlying contamination through bioturbation. Data from other similar Great Lakes sediment sites indicates that the potential bioturbation depth is about 4 inches.

- **Ice scour.** Two experts conducted independent evaluations of potential ice scour using available historic climate data, site visits, and interviews with local individuals who have significant experience on the river. Among other things, the experts evaluated the risk that frazil ice (i.e., ice on the river bottom that occurs in super-cooled areas of the River with turbulent water) could erode caps in certain areas. Both experts identified a particular risk that frazil ice might cause such damage in certain areas immediately downstream from the Little Rapids dam and De Pere dam, so the Amended Remedy precludes use of caps in those areas. Those experts did not identify any other areas where frazil ice or other ice forms (e.g., ice dams) would be likely to cause erosion or damage to caps.

- **Scour from propeller wash.** The cap design criteria include minimum depth requirements and cap design requirements (such as an armor stone layer) to ensure that caps will not be eroded by propeller wash from recreational or commercial vessels. Those requirements were developed based on analyses of existing and possible future vessel types and river uses, including physical tests and modeling. Further refinements to the cap design requirements may be made during the remedial design process, based on rigorous propeller wash analyses.

- **Special capping requirements for the navigation channel.** The Amended

Remedy imposes special cap design requirements for the navigation channel, to ensure that any such caps remain effective over the long term. More specifically, any cap in the navigation channel must be thicker and use larger armor stone, and the top of the cap must be at least two feet below the authorized depth of the navigation channel. Those requirements were developed to ensure cap durability in areas where there will be propeller wash from larger vessels and periodic dredging to maintain the authorized depth of the navigation channel.

- **Other technical considerations**. The cap design requirements will also ensure cap stability, because a cap can only be installed if the underlying sediment has sufficient load bearing capacity and if the capped area will have stable side slopes.

The Amended Remedy also includes long-term monitoring and maintenance requirements for caps as described in detail in Section XI.D.

Finally, the 2003 ROD Remedy and the Amended Remedy both require long-term monitoring of surface water and biota and Institutional Controls (e.g., Fish Consumption Advisories) until remedial objectives are met.

4. Reduction of Toxicity, Mobility or Volume through Treatment

Both the 2003 ROD Remedy and the Amended Remedy reduce contaminant mobility by either containment (under caps or sand covers) or removal and containment (by dredging and off-Site landfill disposal). Contaminated sediment would not be treated under either the 2003 ROD or the Amended Remedy. Dredge water will be recycled, treated to meet State standards to remove PCBs or other contaminants, and discharged back into the River. Contaminated sediments will be removed from the River, and landfilled.

5. Short-Term Effectiveness

As discussed above, in the short term, the Amended Remedy would be more effective than the 2003 ROD Remedy. The Amended Remedy would be done sooner, it would achieve a lower SWAC upon remedy completion, and it would achieve RAOs sooner.

Past experience at this Site has shown that minor amounts of contaminated sediment will be re-suspended and some contaminants can be released during dredging. The 2003 ROD and the ROD Amendment both require measures to minimize those problems (such as use of silt curtains and use of residual management measures). Experience on other projects has shown that there are minimal releases of contaminants during cap placement. Those short-term impacts during remedy implementation would end sooner under the Amended Remedy because that remedy could be completed sooner (9 years versus 15 years for the 2003 ROD Remedy).

6. Implementability

Services, materials and equipment would be locally available for both the 2003 ROD Remedy and the Amended Remedy. For example, materials required for capping (i.e., sand and armor stone) under the Amended Remedy are readily available in the area.

Recent experience and recent technical evaluations indicate that the sediment removal, transportation, dewatering and disposal methods envisioned by the 2003 ROD might have significant implementation problems. Among other things:

- The 2003 ROD prescribed dredging of all sediment exceeding the 1.0 ppm PCB RAL, but dredging may not be feasible in areas where near shore structures could be undermined or in areas near bridge piers or pipelines.

- It may be difficult or impossible to obtain necessary pipeline easements (e.g., at road crossings).

- 2003 ROD Remedy would require a large area for settling basins and a landfill, and this area would have to be located near the pipeline route.

- Experience with sediment dredged from OU 1 indicates that passive dewatering methods may produce “non-workable” material for disposal. “Non-workable” materials are difficult to handle with traditional landfill equipment and the material might need to be placed in specially-constructed disposal cells.

- A landfill near the pipeline route might not have sufficient capacity for disposal of the larger amount of sediment that would need to be removed under the latest volume estimates for the 2003 ROD remedy.

7. Cost

Table 4 below summarizes the most recent cost estimates for the 2003 ROD Remedy and the Amended Remedy, as presented in the BODR. The original cost estimate for the 2003 ROD Remedy was $325 million. The most recent cost estimate for the 2003 ROD Remedy is $579 million. That cost estimate increased for several reasons, but the most significant factor was the increased estimate of the volume that would need to be dredged and disposed of, based on new sampling and recent estimates of overdredge requirements. Pre-design sampling that was done in 2004-2005 identified numerous thin layer PCB deposits and deeply-buried PCB deposits. Under the 2003 ROD Remedy, a significant volume of relatively clean sediment would need to be removed as overdredge allowance during dredging of thin layer deposits and deeply-buried deposits. Once removed, that relatively clean sediment must be disposed of in a landfill along with the more contaminated sediment.

The estimated cost for the Amended Remedy is approximately $390 million. The Amended Remedy allows alternate remedial approaches that are much more efficient than dredging for newly-discovered thin layer PCB deposits and deeply-buried PCB deposits. The Amended Remedy would allow caps or sand covers in some areas with thin layer deposits or deeply-buried deposits, if specified criteria can be met. It is estimated that the Amended Remedy would thereby reduce the overdredge volume by 400,000 cubic yards, as compared to the 2003 ROD Remedy.

The cost estimates for both alternatives include preliminary estimates of operation and maintenance costs, including estimated costs of cap maintenance under the Amended Remedy. Refined estimates of operation and maintenance costs for the Amended Remedy will be developed during the remedial design process. The cost estimates do not include institutional control costs, although those costs are not expected to be significant compared to other cost components.

Because the Amended Remedy would cost an estimated $190 million less than the 2003 ROD Remedy, and the Amended Remedy will achieve better results, it is more cost effective than the 2003 ROD Remedy.

TABLE 4. Estimated Costs of the 2003 ROD Remedy and Amended Remedy

Item	2003 ROD [a]	Amended Remedy [a]
Mobilization/Demobilization - Site Preparation	$ 64,104,000	$ 44,496,000
Debris Removal/Dredging	$ 132,570,000	$ 37,520,000
Dewatering [b]	$ 126,308,000	$ 105,177,000
Disposal [c]	$ 125,657,000	$ 91,355,000
Capping/Sand Cover	$ 4,260,000	$ 32,340,000
Residuals Cover [d]	$ 17,875,000	$ 10,795,000
Beneficial Reuse [e]	$ 25,460,000	$ 6,150,000
Construction Monitoring [f]	$ 50,160,000	$ 37,160,000
Design and Support [g]	$ 24,890,000	$ 19,670,000
Capital Costs h	*$ 571,284,000*	*$ 384,663,000*
Present Worth of Long-Term Monitoring and Maintenance [i]	$ 8,020,000	$ 5,640,000
Total Project Cost [j]	***$ 579,304,000***	***$ 390,303,000***

Notes:

a. All costs in 2005 dollars, except as noted.
b. Includes construction of the NR 213 settling basin under the 2003 ROD. Does not include the cost of amendments that may be needed to achieve physical strength characteristics required for landfill operations.
c. Includes construction of the NR 500 disposal facility under the 2003 ROD.
d. Area requiring residuals cover will be determined based on post-construction sampling, but is estimated here based on areas expected to have post-dredge surface concentrations exceeding 1.0 ppm, assuming a mid-range estimate of 5 percent of the dredged PCB mass retained in the dredge prism area due to generated dredge residuals. Residuals cover is similar to a sand cover over areas where no dredging would be done (i.e., less than 6 inches of contamination and PCB concentrations between 1.0 – 2.0 ppm), but would be done in areas that had been dredged, having residual contamination still remaining.

e. Beneficial reuse would be use of dredged sediments for commercial projects allowing the use of these materials (e.g., road construction)
f. Includes construction monitoring and surveys, and remediation contractor's construction management.
g. Includes engineering and remedial design costs, construction work plan development, and Respondent's construction management and oversight.
h. Includes all costs except long-term operations, monitoring, and maintenance costs.
I Includes long-term monitoring of surface sediment, water quality, and fish tissue. Also includes long-term monitoring and maintenance of caps under the 2003 ROD Remedy (shoreline areas only) and Amended Remedy. Also includes maintenance and monitoring of the NR 500 disposal facility constructed under the 2003 ROD. Long-term monitoring and maintenance costs are based on net present value in accordance with NCP (55 FR 8722).
j. Includes capital costs in 2005 dollars and present worth of long-term monitoring and maintenance costs over 100 years.
k. Average annual long-term monitoring and maintenance cost (in 2005 dollars) over first 10 years following completion of construction, including monitoring of caps, surface sediment, WQ, and fish tissue; cap maintenance; and operation, monitoring, and maintenance of the NR 500 disposal facility (2003 ROD only). Actual costs will vary from year to year based on monitoring schedules, maintenance needs, etc.

8. State Acceptance

WDNR agrees with the Amended Remedy and is co-signing this Record of Decision Amendment.

9. Community Acceptance

Community acceptance considers whether the local community supports or opposes particular alternatives. Comments on the Proposed Plan are an important indicator of community acceptance.

The Responsiveness Summary that is attached as Appendix A to this ROD Amendment summarizes and addresses approximately 600 comments on the Proposed Plan. The vast majority of the public comments supported a remedial action addressing the PCB contamination of the Site. A number of comments expressed support for the Proposed Plan because it would achieve remedial goals sooner, use less landfill capacity for disposal of relatively uncontaminated sediment, and be more cost effective, as compared to the 2003 ROD Remedy. Many comments expressed concerns regarding the permanence of caps (i.e., long-term stability and effectiveness), as well as concerns about long-term maintenance of caps. As noted above, the Amended Remedy includes several features that are designed to address those concerns, including stringent design and criteria for caps and long-term cap monitoring and maintenance requirements. Some commenters expressed concern that capping might substantially reduce the water depth in shallower areas. The Proposed Plan did not address that issue clearly, but Amended Remedy specifies minimum depth requirements for capping, and prohibits capping in shallow areas. None of the comments provided specific technical reasons or justifications for certain assertions that the Amended Remedy would not be effective or protective.

Results of Evaluation Using the Nine Criteria

Both the 2003 ROD Remedy and the Amended Remedy meet the two basic, threshold criteria: they both would provide for protection of human health and the environment; and they would meet state and federal ARARs.

The Amended Remedy has distinct advantages under the balancing criteria. It would be more effective than the 2003 ROD Remedy in achieving risk reduction SWAC goals, and would be more cost effective. Recent analyses also suggest that the 2003 ROD Remedy would be much more difficult to implement.

The two alternatives have also been evaluated under the modifying criteria. WDNR supports adoption of the Amended Remedy and is co-signing this Record of Decision Amendment. In response to community input, certain requirements of the Amended Remedy have been clarified and strengthened.

Applying the nine criteria, USEPA and WDNR have decided to change the remedy for the Site by amending the 2003 ROD, and the agencies are selecting the Amended Remedy described below.

XI. Description of the Amended Remedy

The Amended Remedy addresses all areas of OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (River Mouth) containing sediment with PCB concentrations greater than 1.0 ppm RAL. The Amended Remedy adopts sediment removal dredging as the primary remedial approach for sediment exceeding the 1.0 ppm PCB RAL, but it allows several alternative remedial approaches to be used instead of dredging (such as a combination of dredging and capping, capping alone, and placement of a sand cover) under the eligibility criteria specified below. The short-term and long-term objectives of the Amended Remedy include: removing and containing PCB-contaminated sediment in each OU to meet OU-specific SWAC goals upon construction completion; achieving further reductions in PCB surface concentrations through natural recovery processes; achieving corresponding reductions in PCB levels in the water column and in fish tissue; and ensuring continuation of those benefits to human health and the environment through long-term operation and maintenance and institutional controls.

Deposit DD is the only portion of OU 2 that was targeted for active remediation in the 2003 ROD. Deposit DD is the most downstream deposit in OU 2, immediately upstream from OU 3, and it was included in the 2003 ROD for OU 3 for remediation purposes. Deposit DD will be subject to the same remedial action requirements as OU 3, and it will be included in the SWAC calculation for OU 3. The remedy for the rest of OU 2, described in the 2002 ROD for OU 1 and OU 2, is unchanged.

The area in OU 5 near the mouth of the River in Green Bay will be subject to the same remedial action requirements as OU 4, and it will be included in the SWAC calculation

for OU 4. For all other areas in OU 5, the remedy is unchanged from the 2003 ROD (i.e., Monitored Natural Recovery and institutional controls).

Although the Amended Remedy adopts sediment removal as the primary remedial approach for sediment with PCBs greater than the 1.0 ppm RAL, additional remedial measures will be required in many areas where dredging occurs. As explained above, prior experience with dredging work at this Site and at other locations has shown that, during the dredging process, a small amount of sediment invariably becomes re-suspended and resettles in a thin layer of generated residuals at the surface of the newly-dredged area. The generated residuals may have unacceptably high levels of PCBs, and may continue to pose a risk, unless other steps are taken. The Amended Remedy therefore includes post-removal survey and sampling requirements, and post-removal residuals management requirements, as outlined below.

The Amended Remedy allows alternate remedial approaches such as capping in certain areas at the Site where those alternative approaches can help achieve the overall remedial objectives more quickly, more effectively, more feasibly, and at a lower cost. However, unlike sediment removal, a containment approach such as capping would leave contaminated sediment in place in some areas at the Site, so the Amended Remedy includes two main features that are designed to ensure that capping would be as protective as sediment removal over the long term. First, the cap design and minimum depth requirements specified below should ensure that the caps will be durable over the long term, even with factors such as major flood events, ice scour, and propeller wash. Second, the Amended Remedy includes specific requirements for monitoring and maintaining any caps that are installed, to ensure that the long-term objectives of the Amended Remedy are achieved. Engineered caps are considered to be a method to contain contaminants on a long-term basis. Sand covers are primarily a method to accelerate natural recovery and are not necessarily a permanent fixture.

The ROD Amendment establishes general criteria governing use of the primary remedial approach and the alternative remedial approaches in areas within OU 2 (Deposit DD), OU 3, OU 4, and OU5 (River Mouth), but more specific plans will be developed during the remedial design process. A preliminary design concept – with dredging, dredging and capping, capping, and sand cover areas – is shown in Figures 2 and 3 below, and summarized in Table 5. As discussed in greater detail in the BODR, that preliminary design concept would involve removing an estimated 3.7 million cubic yards of sediment with PCB concentrations greater than 1.0 ppm by dredging, and containing an additional 3.5 million cubic yards by capping or a sand cover. USEPA and WNDR approved that preliminary design concept as part of the BODR, but it will be adjusted and refined as the remedial design process progresses. The final remedial design will be subject to approval by USEPA and WDNR, and the agencies will require the final remedial design to be consistent with all criteria and requirements of the Amended Remedy, as outlined below.

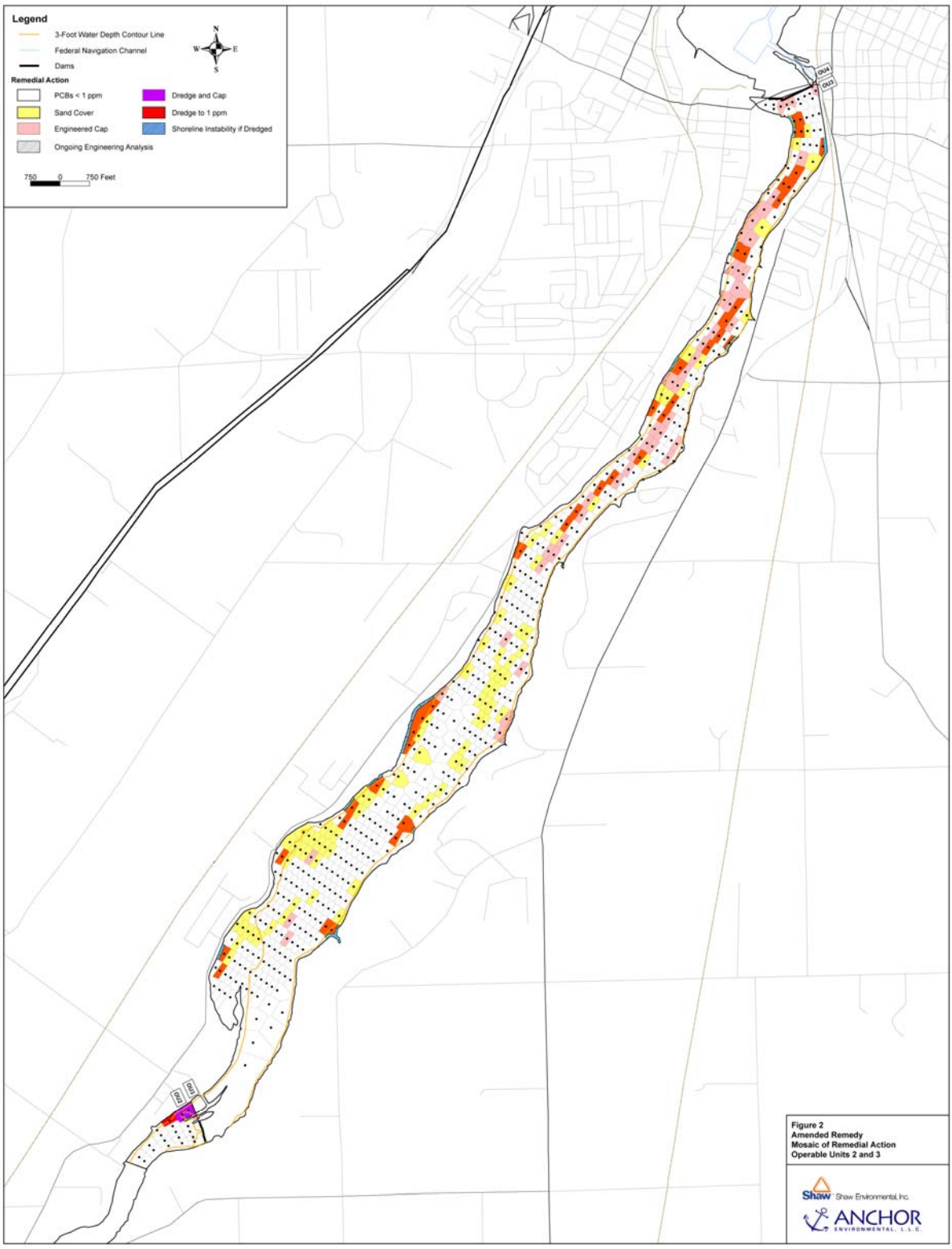


Figure 2. Preliminary design concept for remedial activities in OU 2 and OU 3.

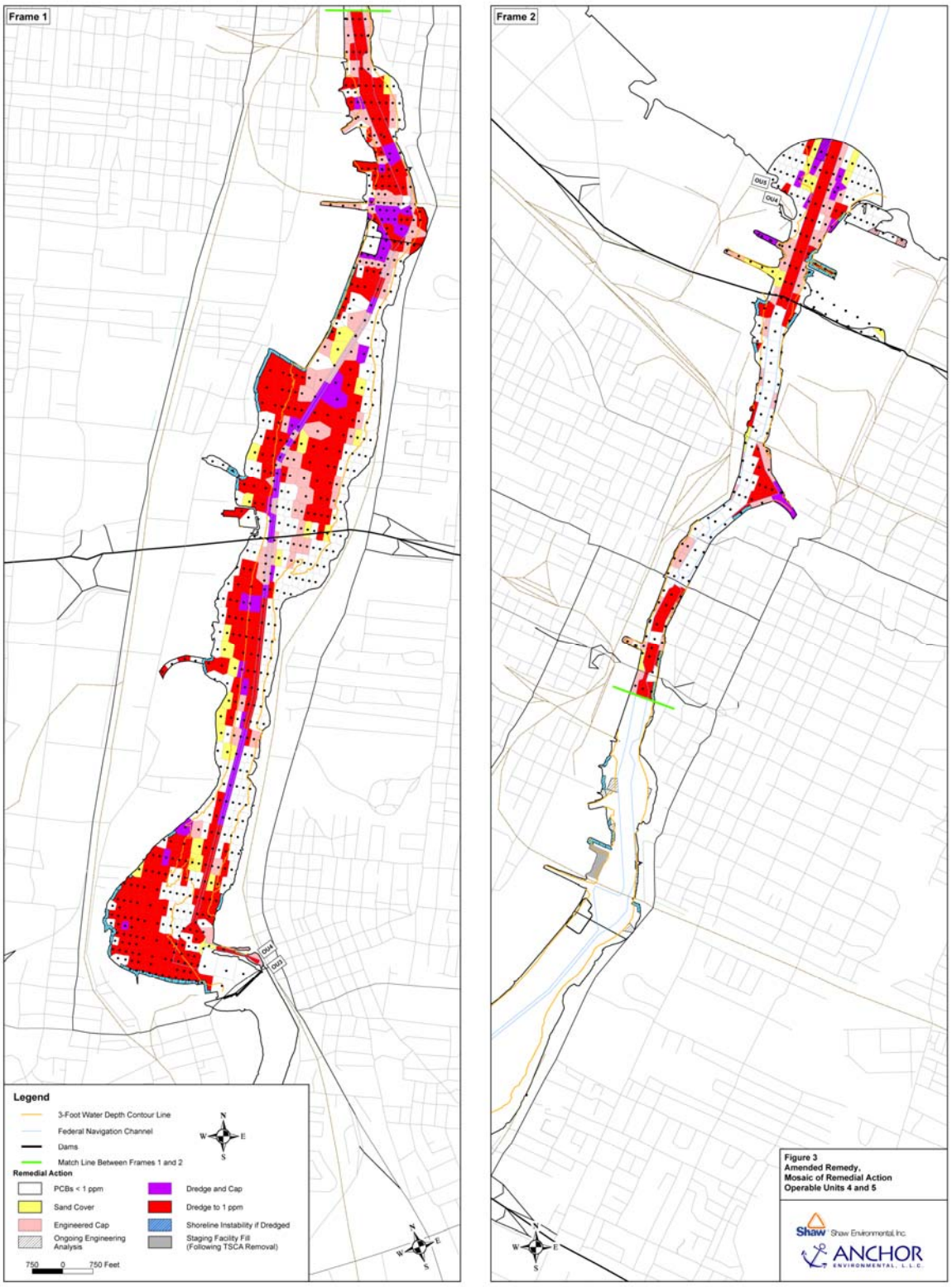


Figure 3. Preliminary design concept for remedial activities in OU 4.

A. The Primary Remedial Approach and the Alternate Remedial Approaches

1. The Primary Remedial Approach

The Amended Remedy adopts sediment removal (discussed below) as the primary remedial approach for sediment exceeding the 1.0 ppm PCB RAL. The primary remedial approach must be used to remediate such sediment unless the eligibility criteria for employing an alternate remedial approach in the specific area can be met and the alternate remedial approach is more feasible and more cost effective in that area.

As noted above, the BODR presented a preliminary remedial design plan that included sediment removal in some areas, but more specific plans for sediment removal at OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (River Mouth) will be developed in the remedial design process. Any final remedial design must incorporate the following minimum standards:

- **Sediment removal requirements.** All sediment with PCB concentrations exceeding the 1.0 ppm RAL will be targeted for removal in all areas within OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (River Mouth) unless use of an alternate remedial approach is approved by the agencies for a particular area under the eligibility criteria listed below in Section XI.A.2. More specifically, in each sediment removal area, sediment shall be removed to a target elevation that: (1) encompasses all contaminated sediment exceeding the 1.0 ppm PCB RAL (as determined from pre-design sampling data and data interpolation), including an overdredge allowance, as appropriate; and (2) removes additional sediment to ensure that side slopes are stable for the remaining sediment.

- **Sediment removal methods and precautions.** Sediment removal will generally be conducted using a hydraulic dredge, although in certain circumstances (such as in areas that cannot be accessed by hydraulic dredging equipment) some sediment may be removed by mechanical dredging or other appropriate sediment removal technologies. For hydraulic dredging, in-water pipelines or other transportation methods will carry the dredged sediment from the dredge to the staging area(s). If necessary, silt curtains will be used around the dredging area to minimize downstream migration of any re-suspended sediment. Buoys and other waterway markers will be installed around the perimeter of the in-water work area.

- **Sediment de-sanding.** In general, PCBs tend to adhere to smaller sediment particles (such as silt or some clays) rather than to larger-sized sediment particles (such as sand and gravel). For that reason, the sand fraction of sediment that is removed from the River may be recovered, washed or otherwise treated, and beneficially reused. Thus, under the Amended Remedy, relatively uncontaminated sand and/or gravel may be recovered from dredged sediments, if USEPA and WDNR have approved specific

beneficial uses of such sand and/or gravel. The PCB concentration of the recovered sand would generally need to be less than 0.25 ppm before it could be beneficially reused, although USEPA and WDNR may approve an alternate concentration threshold for particular uses. Some examples of potential beneficial uses would be use as partial fill for staging areas, road fill, or daily cover for a landfill. It is estimated that approximately 225,000 cubic yards of segregated sand and/or gravel material may be available for potential beneficial reuse under the Amended Remedy.

- **Sediment dewatering and disposal**. Dewatering will be employed at staging facilities for dredged sediment. The dewatering will be accomplished using processes such as plate and frame presses, belt filter presses, or geotextile tubes to remove water from both TSCA and non-TSCA sediment before disposal. Dewatered non-TSCA sediment will be transported by truck, rail, and/or barge to a dedicated engineered landfill or another suitable upland disposal facility, consistent with applicable federal and state requirements. Dewatered sediments subject to TSCA disposal requirements will be transported by truck, rail, and/or barge to a landfill facility appropriately permitted to receive TSCA waste. There currently are no TSCA-permitted landfills in Wisconsin.

- **Water treatment.** Superfund cleanups are required to meet the substantive discharge requirements of the Clean Water Act, but National Pollutant Discharge Elimination System (NPDES) permits are not required for on-site work. Thus, water generated by dredging, de-sanding, and dewatering operations will be treated prior to discharge back to the River and will meet all state and federal water quality standards. This may include (but not be limited to) bag filter and sand filtration and granulated activated carbon (GAC) treatment. Treated water will be sampled and analyzed to verify compliance with the appropriate discharge requirements according to plans that will be developed in the design phase and approved by the agencies.

- **Post-removal confirmatory surveys and sampling.** After removal of sediments from a particular area, a survey and sampling in the area will be done to: (1) determine whether the sediment removal requirements specified above were met; and/or (2) determine whether there is a need for post-removal residuals management measures, as specified below. If the survey and/or sampling shows that the sediment removal requirements were not met in an area, then additional sediment in the area shall be removed until compliance with the sediment removal requirements is achieved. If the survey and/or sampling in a particular area shows post-removal dredge residuals management measures are needed, then those measures shall be implemented. The post-removal surveys and sampling will be done when the initial round of dredging in a particular area is completed.

- **Post-removal residuals management.** As explained above, this ROD

Amendment uses the term “generated residuals” for sediment that is re-suspended and re-deposited on the surface of a newly-dredged area (i.e., within the top six inches of the sediment), and it uses the term “undisturbed residuals” for sediment that is more than six inches from the surface of the sediment. If post-removal confirmatory sampling in a sediment removal area reveals post-removal generated residuals or undisturbed residuals with PCB concentrations exceeding the 1.0 ppm PCB RAL, then following must occur:

- **For management of generated residuals**

  - Generated residuals with a PCB concentration equal to or greater than 10.0 ppm must either be: (1) removed (typically by re-dredging) in accordance with the sediment removal requirements specified above; or (2) capped, if the eligibility criteria for that alternate remedial approach can be met, as specified below.

  - Generated residuals with a PCB concentration between 1.0 ppm and 10.0 ppm must be covered with at least 6 inches of clean sand from an off-Site source (referred to as a “residual sand cover”) if placement of a residual sand cover in the area is necessary to meet the SWAC goal for the OU (i.e., a SWAC of 0.28 ppm PCBs in OU 3 and a SWAC of 0.25 ppm PCBs in OU 4).

- **For management of undisturbed residual**

  - Unless USEPA and WDNR approve use of a different residuals management approach in a particular area within an OU, undisturbed residuals with a PCB concentration exceeding the 1.0 ppm PCB RAL must be removed (typically by re-dredging) in accordance with the sediment removal requirements specified above. USEPA and WDNR may approve use of a different residuals management approach (such as a cap or a sand cover) for undisturbed residuals in limited areas if the PCB levels in the undisturbed residuals are only slightly above the 1.0 ppm PCB RAL.

2. Alternate Remedial Approaches

As noted above, the primary remedial approach shall be used to remediate sediment with a PCB concentration exceeding the 1.0 ppm PCB RAL, unless the eligibility criteria for employing an alternate remedial approach in the specific area can be met and the alternate remedial approach is more feasible and more cost effective in that area. The Agencies have already determined that alternate remedial approaches will be more

feasible and most cost effective than dredging in certain areas identified in the BODR, but the BODR did not make final recommendations for all areas.

Once again, the BODR presented a preliminary remedial design plan that included alternate remedial approaches in some areas, but more specific plans for any alternate remedial approaches in OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (River Mouth) will be developed in the remedial design process. Any final remedial design must incorporate the following minimum standards:

- **Engineered caps.** An engineered cap consisting of a sand layer and an armor stone layer may be installed in an area if the following eligibility criteria are satisfied:

  - **Minimum water depth criteria for capping.**

    - Capping would be allowed in areas within the federally-authorized navigation channel only if the top of the cap is at least 2 feet below the authorized navigation depth.

    - Capping would be allowed in areas outside of the federally authorized navigation channel only if the top of the cap is at least 3 feet below the low water datum as defined in the BODR.

    - USEPA and WDNR may require increased minimum water depths for capping in certain areas within and/or outside the navigation channel based upon location-specific considerations (such as propeller wash impacts, hydrodynamic factors, river uses, and/or cap design).

  - **Ice scour criterion.** Capping will not be allowed within 100-feet of areas that pose a particular risk of cap erosion by ice scour, including in areas immediately downstream from the Little Rapids dam and the De Pere dam.

  - **Engineered caps of at least 33 inches in thickness.** If the criteria specified by this paragraph can be met, an engineered cap of at least 33 inches in thickness may be used to contain contaminated sediments in: (1) areas within the federally authorized navigation channel; (2) areas with deeply-buried sediment having PCB concentrations above 50 ppm; and (3) near shore areas with sediment having PCB concentrations exceeding 50 ppm, if removal of such sediment would impair shoreline stability. A cap in such areas shall meet the minimum water depth criteria for capping, the ice scour criterion, and the following additional criteria:

- The cap shall be constructed of at least 15 inches of clean sand covered by at least 18 inches of relatively large, angular armor stones (such as 4-8 inch quarry spall).

- **Engineered caps of at least 16 inches in thickness.** This type of cap may be used in areas outside of the federally authorized navigational channel if the minimum water depth criteria for capping, the ice scour criterion, and all of the following additional criteria are met:

  - The cap shall be constructed of at least 9 inches of clean sand covered by at least 7 inches of gravel.

  - The sediment beneath the cap shall not exceed 50.0 ppm PCBs at any depth within the sediment profile. Sediment in the specific area may be dredged as necessary to meet this criterion for cap installation.

- **Engineered caps of at least 13 inches in thickness.** This type of cap may be used in areas outside of the federally authorized navigational channel if the minimum water depth criteria for capping, the ice scour criterion, and all of the following additional criteria are met:

  - The cap shall be constructed of at least 6 inches of clean sand covered by at least 7 inches of gravel.

  - The sediment beneath the cap shall not exceed 50.0 ppm PCBs at any depth within the sediment profile. Sediment in the specific area may be dredged as necessary to meet this criterion before the cap is installed.

  - The PCB concentration in the sediment in the six inches immediately beneath the cap shall not exceed 10.0 ppm. Sediment in the specific area may be dredged as necessary to meet this criterion for cap installation.

- **Initial post-construction cap monitoring (for all cap types).** Immediately after completion of capping construction activities, a hydrographic survey shall be performed and cap cores shall be collected. That initial post–construction survey will verify that cap placement specifications and cap construction criteria have been met, including an evaluation of whether the installed cap is sufficient in aerial coverage and thickness, and whether the cap material meets all

applicable physical and chemical design standards. If the initial post-construction cap monitoring in a particular area shows that the cap placement specifications and cap construction criteria have not been met, then the cap in that area shall be augmented or replaced to meet the applicable specifications and criteria.

- **Combination of dredging and capping.** Sediment in a specific area may be dredged as necessary to meet the eligibility criteria for cap installation, including the minimum water depth criteria and/or other criteria for cap installation specified above.

- **Sand cover in undredged areas.** A cover composed of at least 6 inches of uncontaminated sand from an off-Site source can be placed over certain undredged areas that have low PCB concentrations in a relatively thin layer of PCB-contaminated sediment exceeding the 1.0 ppm PCB RAL if both of the following criteria are met:

  - The sediment beneath the sand cover must not exceed 2.0 ppm at any depth within the sediment profile.

  - The sediment profile shall contain only one 6-inch interval with PCB concentrations between 1.0 – 2.0 ppm.

  Immediately after completion of sand cover placement activities, a hydrographic survey shall be performed and sand cover cores shall be collected. That initial post–construction survey will verify that sand cover placement specifications and sand cover construction criteria have been met, including an evaluation of whether the sand cover is sufficient in aerial coverage and thickness, and whether the sand cover material meets all applicable physical and chemical design standards. If the initial post-construction sand cover monitoring in a particular area shows that that the sand cover placement specifications and sand cover construction criteria have not been met, then the sand cover in that area shall be augmented or replaced to meet the applicable specifications and criteria.

- **Exceptional areas.** USEPA and WNDR may approve use of modified remedial approaches or other remedial approaches in exceptional areas at the Site based upon a showing that use of another remedial approach in an exceptional area is sufficiently protective and is more feasible and more cost effective than the primary remedial approach or any of the alternate remedial approaches described above. USEPA and WDNR expect that there will only be a relatively small number of areas at the Site that will need to be treated as exceptional areas, including some shallower near shore areas where extensive dredging could undermine shoreline structures, and some areas over and near infrastructure (such as pipelines, utility easements, and

highway bridge piers). The specific remedial approach for each exceptional area will be subject to review and approval by USEPA and WDNR, and will be included in the final remedial design.

A summary of a preliminary design features for capped areas and sand cover areas is shown in Table 5.

TABLE 5. Summary of Preliminary Design Features for Capping and Sand Covers.

Description		Minimum post-cap/cover water depth	PCB concentration	Area covered by cap or sand cover
Cap	6-inches of sand[1] and 7-inches of gravel	3 feet	<10 ppm[3]	400 acres
	9-inches of sand[1] and 7-inches of gravel	3 feet	10 – 50 ppm	25 acres
	15-inches of sand[1] and 18-inches of quarry spall[2]	3 feet	Varies	25 acres (mainly in navigation channel)
Cover: 6-inches of sand		Varies	1.0 - 2.0 ppm[4]	210 acres
		Varies	Dredge residuals	Dredged areas as necessary to meet cleanup requirements (an estimated 510 acres maximum)

Notes:
Most information taken from BODR, Table 5-5.
[1] Assumes lowest 3-inches would mix with underlying contaminated sediment.
[2] Large angular stone from rock quarries.
[3] PCB concentration in 0 – 0.5 foot depth below mudline.
[4] Maximum PCB concentration in any 6-inch interval. Sand cover is assumed to completely mix with underlying sediment and still achieve the 1.0 ppm RAL.

B. The Relationship Between the Remedial Action Level (RAL) Performance Standard and the Surface-Weighted Average Concentration (SWAC) Goal

This ROD Amendment requires remediation of all contaminated sediment exceeding the 1.0 ppm PCB Remedial Action Level (RAL) in OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (River Mouth) either by the primary remedial approach or by one of the alternate remedial approaches discussed above. The ROD Amendment also establishes two standards that will be used to judge the completion of construction of the Amended Remedy in each OU: a RAL Performance Standard and a SWAC goal. As explained below, construction of the remedy in an OU will be deemed complete if the RAL Performance Standard has been met throughout the OU. If the RAL Performance Standard has not been met after employing the primary remedial approach and/or the alternate remedial approaches throughout the OU, then the remedy will be deemed

complete if the SWAC, as determined by WDNR and USEPA, meets the SWAC goal for the OU. The construction of the remedy will not be deemed complete based on the SWAC goal unless and until all sediment exceeding the RAL has been remediated using the primary remedial approach and/or the alternate remedial approaches.

As discussed in the 2003 ROD, USEPA and WDNR selected the 1.0 ppm PCB RAL because it would achieve cost-effective removal and/or containment of PCBs, substantially reduce migration of PCBs downstream and into Green Bay, and yield a SWAC at or near 0.25 ppm PCBs in OU 3 and OU 4. The Amended Remedy adopts that same RAL, and it incorporates a presumption in favor of remediation by sediment removal, but it also allows remediation of sediment above the RAL by alternate remedial approaches. The mass and volume of contaminated sediment to be removed under the primary remedial approach will depend upon the horizontal footprint and depth of the contamination exceeding the 1.0 ppm PCB RAL. The use of alternate remedial approaches for remediation of sediment exceeding the 1.0 ppm PCB RAL will depend upon the depth and level of contamination of the sediment and location-specific design requirements and eligibility criteria, as detailed above.

If all sediment exceeding the 1.0 ppm PCB RAL within an OU is removed and/or contained using the primary remedial approach and/or the alternate remedial approaches, then construction of the remedy in that OU will be deemed complete based on achievement of the RAL Performance Standard. Achievement of the RAL Performance Standard will be assessed soon after completion of sediment removal, capping, and sand cover placement activities. As discussed below, even if the RAL Performance Standard is not met, construction of the remedy in an OU can still be deemed complete based on the agencies' determination that the SWAC goal has been achieved.

Explanation of Remedial Action Level, and Surface-Weighted Average Concentration,

The term Remedial Action Level (RAL) refers to a PCB concentration in sediment used to define an area or volume of contaminated sediment that is targeted for remediation. In other words, the RAL in this ROD calls for remediation by dredging, capping or a sand cover of all sediment in OU 3 and OU 4 that has a PCB concentration of greater than 1.0 ppm. If all sediment with a concentration greater than the 1.0 ppm RAL is addressed by dredging, capping and sand covers, it is predicted that the residual Surface-Weighted Average Concentration (SWAC) of sediment will be approximately 0.28 ppm in OU 3 and 0.25 ppm in OU 4. The SWAC goals in this instance are less than the RAL performance standard because a SWAC is calculated as an average concentration over the entire Operable Unit, after dredging, capping or a sand cover of sediment for discrete areas that are above the RAL, and includes averaging over areas in which there are surface concentrations less than the RAL. SWAC calculations are discussed in Section 5.2 of the 2002 Feasibility Study.

As explained in the 2003 ROD, a SWAC at or near 0.25 ppm is expected to reduce PCB levels in sport fish to acceptable levels within a reasonable time period after completion of active remediation (e.g., for walleyes, within about 9 years in OU 3 and within about 20 years in OU 4). The Amended Remedy therefore requires achievement of an OU-specific SWAC goal if the RAL Performance Standard has not been met after employing the primary remedial approach and/or the alternate remedial approach throughout the OU

(e.g., if post-removal residuals exceeding the 1.0 ppm PCB RAL remain in an area after it has been dredged to the required target elevation). Under the Amended Remedy, SWAC goals are 0.28 ppm PCBs for OU 3 and 0.25 ppm PCBs for OU 4. Deposit DD in OU 2 will be included in the SWAC calculation for OU 3 and the River mouth area in OU 5 will be included in the SWAC calculation for OU 4. If the SWAC calculation, as determined by the USEPA and WDNR, is met within an OU after all sediment exceeding the 1.0 ppm PCB RAL has been remediated using the primary remedial approach and/or the alternate remedial approaches, then the construction of the remedial action can be deemed complete based on the agencies' determination that the SWAC goal has been achieved.

The Amended Remedy offers a range of options for completing construction of the remedy if all contaminated sediment exceeding the 1.0 ppm PCB RAL has been remediated in an OU using the primary remedial approach and/or the alternate remedial approaches, but it still appears that the RAL Performance Standard or achievement of the SWAC goal will not be met in the OU. Those options are:

1. Performing additional dredging or capping to ensure that all sediments with PCB concentrations greater than the 1.0 ppm PCB RAL are removed and/or contained;

2. Installing additional capping in areas with higher PCB concentrations (provided minimum water depth criteria and other capping criteria and design requirements are met);

3. Placing a residual sand cover over dredged areas; and

4. Placing a sand cover over undredged areas (consistent with the general requirements for sand covers outlined above).

Once the agencies have determined that the RAL Performance Standard or the SWAC goal is achieved in an OU, the construction of the remedy will be deemed complete (although ongoing monitoring and maintenance requirements and contingencies that are part of the Amended Remedy will continue to apply).

C. Other Features of the Amended Remedy

The Amended Remedy includes the following additional elements:

- **Site mobilization and preparation.** Staging area(s) will be required for facilities associated with sediment dewatering, sediment handling, and water treatment. Specific staging areas will be identified during the remedial design process. Site preparation at the staging area(s) will include collecting soil samples, securing the onshore property for equipment staging, and constructing necessary onshore facilities for sediment management and

transportation. Docking facilities for dredging equipment and ancillary equipment may need to be constructed and multiple staging areas may be necessary. Preparation for remedial actions shall also include obtaining needed access agreements and landfill disposal agreements.

- **Demobilization and Site restoration.** Demobilization, Site restoration, and decontamination of all equipment will require removing all equipment from the staging and work areas and restoring the Site to a condition acceptable to the USEPA, WDNR, and the property owner.

- **Natural recovery after remediation.** Although the RAL Performance Standard or the SWAC goal will need to be met before construction of the remedial action can be deemed complete in an OU, it will take additional time for natural recovery before some of the remedial action objectives are achieved. For example, it is estimated that a SWAC of approximately 0.28 ppm PCBs will be achieved in OU 3 after the completion of active remediation, but the sediment quality threshold (SQT) for unlimited walleye consumption is lower than the SWAC (i.e., 0.049 ppm PCBs), and it would take an estimated 9 years to achieve that reduced sediment surface concentration in OU 3. SQTs vary depending on the sensitivity of the particular receptor (such as recreational anglers, high-intake fish consumers walleye, mink, etc.), but post-remediation natural recovery will need to occur before certain SQTs and other remedial action objectives can be achieved. This is unchanged from the 2003 ROD, because the 2003 ROD and the Amended Remedy adopt the same RAL and comparable SWACs.

- **Long-term monitoring, cap maintenance, and institutional controls in OU 3 and OU 4**. These requirements are discussed below in Section XIII.D.

- **Monitored Natural Recovery and Institutional Controls in OU 2 and OU 5.** Deposit DD is the only portion of OU 2 that was targeted for active remediation in the 2003 ROD. Similarly, the area near the River mouth is the only portion of OU 5 that was targeted for active remediation in the original RODs. Under the Amended Remedy, Deposit DD will be subject to the same remedial action requirements as OU 3, and the River mouth area will be subject to the same remedial action requirements as OU 4. This ROD Amendment does not change the original remedy for the remaining portions of OU 2 and OU 5 (i.e., Monitored Natural Recovery and Institutional Controls).

- **Estimated costs.** Costs for the Amended Remedy are estimated to be approximately $390 million and are presented in detail in Table 4 above.

D. Long Term Monitoring, Cap Maintenance, and Institutional Controls

- **Long-term monitoring of surface water and biota.** The Amended Remedy requires long-term monitoring of surface water and biota to assess progress in achieving the remedial objectives. Monitoring will continue until acceptable levels of PCBs are reached in surface water and fish. A detailed Long-Term Monitoring Plan, specifying the types and frequency of monitoring, will be developed during the remedial design process.

- **Long-term cap monitoring.** The Amended Remedy requires long-term monitoring of any caps that are installed at the Site to ensure their long-term integrity and protectiveness. The long-term monitoring will include:

    - **Hydrographic surveys and core sampling.** A hydrographic survey shall be performed and cores of the cap shall be collected, at a minimum, 2 years and 4 years after the initial post-construction survey and every 5 years thereafter. Based on the results observed in that periodic monitoring, USEPA and WDNR may increase or decrease the frequency of periodic monitoring. USEPA and WDNR may require additional cap monitoring (between periodic monitoring events) after particular events that could cause cap damage, such as major storm events, ice scour events, or propeller wash scour events.

        - **Monitoring for physical integrity.** Hydrographic survey results and core samples collected during cap monitoring events will be analyzed to determine cap thickness and integrity and compliance with minimum water depth criteria for capping.

        - **Monitoring for chemical containment.** Core samples collected during cap monitoring events will also be analyzed for PCB contamination within 6 inch intervals (or less) to determine whether contamination is being effectively contained and isolated from biota.

- **Cap enhancement and/or removal in response to cap degradation.** If monitoring or other information indicates that the cap in an area no longer meets its original as-built design criteria and that degradation of the cap in the area may result in an actual or threatened release of PCBs at or from the area, then USEPA and WDNR shall identify additional response activities to be undertaken in the area. If monitoring or other information shows a pattern of cap degradation in multiple areas, then USEPA and WDNR may identify additional response activities to be undertaken in multiple capped areas at the Site (including in areas that have not yet shown any signs of degradation). The additional response activities shall include either:

    - Cap enhancement (e.g., application of a thicker sand layer or stone layer or use of larger armor stone); and/or

- Cap removal and removal of underlying contaminated sediment (consistent with the requirements of the primary remedial approach).

❍ **Cap enhancement and/or removal in response to changed water levels.** USEPA and WDNR may identify additional response activities to be undertaken in a capped area if monitoring or other information indicates that the minimum water depth criteria for capping are no longer being met in the area and that the failure to meet the water depth criteria: (1) may result in an actual or threatened release of PCBs at or from the area (e.g., due to an increased risk of damage caused by propeller wash, ice scour, or other factors); or (2) may have adverse impacts on River uses. The additional response activities may include either:

- Cap enhancement; and/or

- Cap removal and removal of underlying contaminated sediment (consistent with the requirements of the primary remedial approach).

❍ **Institutional controls.** Institutional Controls (ICs) are necessary to prevent interference with the remedy and to reduce exposure of contaminants to human or ecological receptors. ICs are defined as non-engineered instruments, such as administrative and legal controls that help minimize potential for exposure to contamination and protect the integrity of the remedy. ICs are also required to assure long-term protectiveness for those areas that do not allow for unlimited use and unrestricted exposure. ICs are also required to maintain the integrity of the remedy. At this Site, ICs are required to protect the cap (engineered remedy), and reduce potential exposure for all areas where residual contamination will remain. Also, interim ICs may be necessary to prevent exposures to contaminants which may be released during construction such as during dredging, capping and placing of sand covers. Long-term protectiveness requires compliance with effective ICs. Hence, effective ICs must be implemented, monitored and maintained.

Institutional controls will be identified as part of the remedial design process in an Institutional Control Implementation and Assurance Plan (ICIAP) for review and approval by USEPA and WDNR. The required ICs may include property use controls (such as easements and restrictive covenants), governmental controls (including zoning ordinances and local permits), and informational devices (including signage and fish consumption advisories). The ICIAP shall identify parties responsible (i.e., federal, State or local authorities or private entities) for implementation, enforcement, and monitoring and long-term assurance of each institutional control including costs, both short-term and long-term, and methods to fund the costs and responsibilities for each step.

The ICIAP shall include maps, which shall describe coordinates of the restricted areas on paper and provide shape files in an acceptable GIS format (i.e., NAD 83) depicting all areas that do not allow unlimited use/unrestricted exposure and areas where ICs have been implemented along with a schedule for updating them. The maps and information about the ICs shall be made available to the public in at least several ways, such as a website that is easily accessible to the public and posted in the public library. In addition the ICIAP shall identify reporting requirements associated with each institutional control which shall include at a minimum an annual certification regarding the status and effectiveness of the ICs.

Among other things, the ICIAP shall include the following institutional controls for any capped areas:

- By using governmental and/or property use ICs, establishment of a Regulated Navigation Area (designating areas including an appropriate buffer) where use restrictions are required such as water use restrictions (e.g., limitations on anchoring, dredging, spudding, or dragging limitations, conducting salvage operations, establishment of "no wake" areas and other operating restrictions for commercial and non-commercial vessels which could potentially disturb the riverbed or the engineered remedy limitations); construction limitations (e.g., restrictions on utilities such as laying cable or dredging limitations for marina expansion or maintenance); and monitoring and maintenance requirements for all areas including dams.

- Provide additional information to the public to assure protectiveness of the remedy (such as fish consumption advisories.)

The goal should be to create layers of different types of ICs to increase their reliability and protectiveness.

XII. Comparison of the Amended Remedy and the 2003 ROD Remedy

Table 6 summarizes the differences between the 2003 ROD Remedy and the Amended Remedy. Table 7 compares the estimated sediment volumes, contaminant masses, and acreages that would be remediated under the 2003 ROD Remedy and the Amended Remedy.

TABLE 6. Summary of Changes to 2003 ROD

Remedy Element	2003 ROD	Amended Remedy
Remedial Action Level	1.0 ppm PCBs	1.0 ppm PCBs
SWAC Goal for OU 3	0.26 ppm PCBs	0.28 ppm PCBs
SWAC Goal for OU 4	0.25 ppm PCBs	0.25 ppm PCBs
Dredging Volume removed	7.1 million cubic yards	3.5 million cubic yards
PCB Mass removed (kilograms)	18,400	13,700
Engineered Cap	Allowed under contingent remedy	Estimated 450 acres or less
Sand cover over sediments with PCB concentrations 1.0 – 2.0 ppm and 6-inches thickness or less that exceed the 1.0 ppm PCB RAL	None (not allowed)	Estimated 210 acres or less
Post-dredging sand cover in dredged areas if contaminants have PCB concentrations greater than the 1.0 ppm PCB RAL	Required (as necessary to meet the SWAC)	Required (as necessary to meet the SWAC)
Transportation of dredge slurry from dredge to river-side facility	In-water pipeline	In-water pipeline (assuming hydraulic dredging)
Separation of water from sediments	Settling Basins	Mechanical presses or other processes
Transportation of contaminated sediment from a river-side dewatering facility to landfill for final disposal	Overland pipeline	Trucks
Disposal of dredged sediments	Contaminated sediments will go to a landfill that complies with all applicable federal and state laws and regulations	Contaminated sediments will go to a landfill that complies with all applicable federal and state laws and regulations
Institutional Controls until contaminants are at acceptable levels	Required	Required
Long-term monitoring of biota and water until contaminants are at acceptable levels	Required	Required
Dredging in Green Bay near mouth of river	Required	Required
Monitored Natural Recovery until contaminants are at acceptable levels	Required	Required
Long-term monitoring and maintenance of cap	Required for contingent remedy	Required
Time for remediation	15 years	9 years
Cost	$580 million	$390

Fundamental change
Minor change

Table 7. Comparison of Remedy Volumes, Mass Removal, and Remediation Areas

	Sediment Volume Addressed (cubic yards; cy)		Mass Removed (kilograms; kg)		Area Remediated (acres)	
OU 2 to 5 Remedial Action	**2003 ROD**	**Amended Remedy**	**2003 ROD**	**Amended Remedy**	**2003 ROD**	**Amended Remedy**
Dredge/dispose	7,100,000 [1]	3,500,000 [2]	18,400 [3]	10,000 [3]	1,110	510
Engineered cap	500,000 [1]	2,100,000	0	0	67 [4]	335
Engineered cap after dredging	0	1,200,000 [2]	0	3,700 [3]	0	115
Sand cover over PCB concentrations 1.0 - 2.0 ppm	0	400,000	0	0	0	210
Remedial action area total	7,600,000 [5]	7,200,000 [5]	18,400 (86% of 21,400 [6])	13,700 (64% of 21,400 [6])	1,177	1,170

NOTES:

[1] If all sediments greater than 1.0 ppm could be dredged without impacting shoreline stability, the total dredge volume under the 2003 ROD would be approximately 7,600,000 cy. However, because of the thickness of some of the near shore deposits, slope setbacks will likely be necessary to prevent undermining the shoreline, reducing the actual 2003 ROD dredge volume. Assuming a typical dredging offset of 75 feet from the shoreline to address this concern, approximately 500,000 cy of near shore sediment deposits would likely be capped in place. Detailed inventories of shoreline features will be developed as the design progresses, and modifications will be made to the dredge prism to provide slope setbacks as necessary.

[2] The total dredge volume under the Amended Remedy is approximately 3,700,000 cy, including dredge-only and dredge-and-cap actions. Detailed shoreline surveys may result in modifications to slope setbacks and the associated dredge prism.

[3] Incorporates a mid-range estimate of 5 percent of the dredged PCB mass retained in the dredge prism area due to generated dredge residuals.

[4] Assumes 2003 ROD contingency would not be implemented, but engineered capping would be performed in areas where dredging is impracticable (e.g., near shore areas; see footnote #1).

[5] Both the 2003 ROD and Amended Remedy address all sediments containing PCB concentrations above 1.0 ppm. However, the dredge/dispose volume estimates shown here include a significant volume for "over-dredge" sediments containing PCB concentrations less than 1.0 ppm (i.e., an estimated 950,000 to 1,000,000 cy for the 2003 ROD Remedy and 525,000 to 560,000 cy for the Amended Remedy) .

[6] As discussed in the BODR, the total estimated mass of PCBs within the OU 2 to 5 remedial action area (sediments greater than 1.0 ppm) is approximately 21,400 kg, based on analysis on over 10,000 samples collected in 2004/2005. Based on initial evaluations of the 1,300 samples available at the time of the 2003 ROD, the PCB mass within the OU 2 to 5 remedial action area was previously estimated to range from approximately 23,500 to 27,100 kg. The lower dry sediment density observed during the detailed 2004/2005 investigation (0.45 g/cm^3 versus 0.52 g/cm^3 assumed in the 2003 ROD) accounts for much of the apparent "reduction" of estimated PCB mass within the Lower Fox River, as discussed in the BODR. The 2003 ROD estimated a dredge volume of approximately 6.5 million cy, without overdredge allowance; the current 2003 ROD estimate is approximately 7.6 million, with overdredge allowance cy.

XIII. Statutory Findings

Under CERCLA Section 121, 42 U.S.C. § 9621 and the NCP, 40 C.F.R. 300.430, the remedies that are selected for Superfund sites are required to be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatments that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element, and there is a bias against off-site disposal of untreated wastes. The following sections discuss how the Amended Remedy meets these statutory requirements.

This ROD Amendment satisfies these requirements as follows:

1. Protection of Human Health and the Environment

Implementation of the Amended Remedy will adequately protect human health and the environment through the following actions:

- **Dredging and off-site disposal of PCB-contaminated sediment.** Dredging will be focused on sediments with higher PCB concentrations, particularly in areas subject to disruptive forces, having greater potential exposure to biota.

- **In-place containment of PCB contaminated sediments under engineered caps designed to provide long-term stability.** Capping will generally be done where PCB concentrations are generally lower or where PCBs are less subject to erosive forces and/or deeply buried.

- **Enhanced natural recovery by placement of a sand cover.** Natural recovery will be accelerated by where PCB concentrations are only slightly above the 1.0 ppm PCB RAL (i.e., between 1.0 to 2.0 ppm) and would also be limited to areas where the thickness of sediment at those PCB levels is 6-inches or less.

- **Construction monitoring to ensure that there are no significant releases during remedial activities.**

- **Long-term monitoring and maintenance of caps**.

- **Long-term monitoring of surface water and biota.**

- **Institutional Controls.**

The Amended Remedy will address sediment with PCB concentrations exceeding the

1.0 ppm RAL. The estimated PCB SWAC that would be achieved for OUs 3 and 4 is 0.28 ppm and 0.25 ppm, respectively, and those SWAC goals must be met if the RAL is not achieved in all areas within an OU.

Implementation of the Amended Remedy in OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (River Mouth) will result in reductions in fish tissue PCB concentrations to acceptable levels within a reasonable time. The Amended Remedy does not pose unacceptable short-term risk because experience on other projects has shown that environmental dredging and capping does not result in significant contaminant releases during implementation.

2. Attainment of Applicable or Relevant and Appropriate Requirements

ARARs are discussed in detail in the 2003 ROD for the Site, and are summarized in Table 8 below. These ARARs will be met by the Amended Remedy.

TABLE 8. Fox River ARARs

Act/Regulation	Citation
Federal Chemical-Specific ARARs	
TSCA[1]	40 CFR 761.79 and USEPA Disposal Approval 40 CFR 761.75 40 CFR 761.61(c)
Clean Water Act – Federal Water Quality Standards	40 CFR 131 and 33 CFR 323
Federal Action-/Location-Specific ARARs	
Fish and Wildlife Coordination Act	16 USC 661 *et seq.* 33 CFR 320-330 – Rivers and Harbors Act 40 CFR 6.304
Endangered Species Act	16 USC 1531 *et seq.* 50 CFR 200 50 CFR 402
Rivers and Harbors Act	33 USC 403; 33 CFR 322, 323
National Historic Preservation Act	15 USC 470; *et seq.* 36 CFR Part 800
Floodplain and Wetlands Regulations and Executive Orders	40 CFR 264.18(b) and Executive Order 11988
State Chemical-Specific ARARs	
Surface Water Quality Standards	NR 102, 105 (*To Be Considered*), and 207 NR 722.09 1–2
Groundwater Quality Standards	NR 140
Soil Cleanup Standards	NR 720 and 722
Hazardous Waste Statutes and Rules	NR 600–685
State Action-/Location-Specific ARARs	
Management of PCBs and Products Containing PCBs	NR 157
Wisconsin's Floodplain Management Program	NR 116
Solid Waste Management	NR 500–520
Fish and Game	Chapter 29.415 – Wisconsin Statutes

Note 1: TSCA establishes requirements for the handling, storage, and disposal of PCB-containing materials equal to or greater than 50 ppm. TSCA is an ARAR at the Site with respect to any PCB-containing materials with PCB concentrations equal to or greater than 50 ppm that are removed from the Site. This is unchanged from the 2003 ROD and all TSCA requirements for off-site disposal will still be met. However, the Amended Remedy would cap some sediments containing PCBs with concentrations 50 ppm or greater. The caps that would contain PCBs in the River would effectively meet the substantive requirements of TSCA under a risk-based disposal approval (40 C.F.R. § 761.61(c)).

3. Cost Effectiveness

The Amended Remedy will cost approximately $190 million less to implement than the 2003 ROD Remedy and it is cost effective. A significant portion of the cost savings is due to the smaller volume of sediment that will be disposed of at a landfill under the Amended Remedy. Generally, the Amended Remedy will achieve equivalent or better results at lower cost, so it is more cost effective than the 2003 ROD Remedy.

4. Use of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

USEPA and WDNR believe that the Amended Remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner for the Site.

5. Preference for Treatment as a Principal Element of the Remedy

Neither the 2003 ROD Remedy nor the Amended Remedy satisfies the statutory preference for treatment of the hazardous substances present at the Site because treatment was not found to be practical or cost-effective. For example, the most promising treatment technology, vitrification, was fully evaluated, but it was not cost effective and it had implementability issues (e.g., engineering uncertainties because a full-scale sediment vitrification facility had never been designed, permitted, or constructed).

6. Five Year Review Requirements

The NCP, at 40 C.F.R. § 300.430(f)(4)(ii), requires a 5-year review if the remedial action results in hazardous substances, pollutants, or contaminants remaining on Site above levels that allow for unlimited use and unrestricted exposure. Because this remedy will result in hazardous contaminants remaining on Site above levels that allow for unlimited exposure, a statutory review will be conducted within 5 years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

XIV. Public Participation and Documentation of Significant Changes from Proposed Plan

To fulfill the requirements of CERCLA 117(b), 42 U.S.C. §9617(b), and the NCP (40 CFR §§ 300.430(f)(5)(iii)(B) and 300.430(f)(3)(ii)(A)), a ROD Amendment must document and discuss the reasons for any significant changes made to the Proposed Plan. Public participation requirements listed, above as well as those in NCP (40 CFR §§ 300.435(c)(2)(ii) have been met.

The Proposed Plan was released for public comment November 13, 2006. It proposed modifying the 2003 ROD Remedy from an all-dredging remedy with a capping contingency to: 1) dredging, 2) dredging/capping, 3) capping, and 4) sand cover. Compared to the 2003 ROD, the RAL is unchanged and the SWAC goals were not changed materially.

In response to issues raised during the public comment period on the Proposed Plan, USEPA and WDNR reevaluated the proposed modification and made the following major changes, which are reflected in this ROD Amendment:

1) Commenters questioned whether capping would remain effective and appropriate if there were significant declines in water levels in the River and Green Bay. USEPA and WDNR therefore added provisions to the Amended Remedy that may require evaluation and implementation of additional response activities (such as cap enhancement and/or cap removal) in response to changed water levels.

2) Given concerns expressed by commenters about the effectiveness and permanence of caps, the Amended Remedy provides a more specific and detailed description of the cap monitoring and maintenance requirements that are designed to ensure that the protectiveness of the remedy would be maintained.

3) The Amended Remedy provides a more complete explanation of the role that natural recovery will play in helping to achieve the remedial objectives, and clarification of why recovery of the River would not occur immediately after completion of construction activities.

XV. New Information Obtained During the Public Comment Period

While there were many comments on the Proposed Plan that expressed concerns regarding the permanence or effectiveness of capping, no comments had new information or evaluations based on engineering or scientific analyses or data that demonstrated capping or sand covers would not be effective and protective.

In conclusion, there were no fundamental changes to the Proposed Plan due to new information or considerations raised in the public comment periods.

Richard C Karl

Richard C. Karl, Director
Superfund Division
EPA – Region 5

Date 6-26-07

Bruce Baker, Deputy Administrator
Water Division
Wisconsin DNR

Date 6/25/07

Responsiveness Summary

Operable Unit 2 (deposit DD), Operable Unit 3, Operable Unit 4, and Operable Unit 5

Lower Fox River and Green Bay Superfund Site

June 2007

CONTENTS

Abbreviations and acronyms used in this document

Agencies	Wisconsin Department of Natural Resources and United States Environmental Protection Agency
Amended Remedy	Remedy selected in the Record of Decision Amendment, Lower Fox River and Green Bay Site, Operable Units 2 (deposit DD), OU 3, OU 4, and OU 5, May 2007
ARAR	Applicable or Relevant and Appropriate Requirements
BODR	Basis of Design Report, dated June 16, 2006
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
cy	cubic yards
ESC	Environmental Stewardship Council
mg/l	milligrams per liter
MNR	Monitored Natural Recovery
NCP	National Contingency Plan
O&M	operation and maintenance
OU	Operable Unit
OU 1	Little Lake Butte des Morts reach
OU 2	Appleton to Little Rapids reach
OU 3	Little Rapids to De Pere reach
OU 4	De Pere to Green Bay reach
OU 5	Green Bay
PCB	polychlorinated biphenyl
ppm	parts per million
PRPs	Potentially Responsible Parties under CERCLA
RAL	Remedial Action Level
RAO	Remedial Action Objective
RIFS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROD Amendment	The Record of Decision Amendment
RS	Responsiveness Summary
Site	Lower Fox River and Green Bay Site
SMU	Sediment Management Unit
SWAC	Surface Weighted Average Concentration
TSCA	Toxics Substances Control Act
USEPA	United States Environmental Protection Agency
WDNR	Wisconsin Department of Natural Resources
2002 ROD	Record of Decision, Operable Units 1 and 2, Lower Fox River and Green Bay, December 2002
2003 ROD	Record of Decision, Operable Units 3, 4, and 5, Lower Fox River and Green Bay, June 2003

INTRODUCTION

In November 2006, the United States Environmental Protection Agency (USEPA) and the Wisconsin Department of Natural Resources (WDNR) jointly released to the public the Proposed Plan for Portions of Operable Unit 2 and Operable Units 3, 4 and 5 of the Lower Fox River and Green Bay Superfund site. See USEPA "Fact Sheet" entitled "EPA Proposed Changes to Current Cleanup Plan," dated November 13, 2006 and the "Lower Fox River/Green Bay Technical Memorandum, Current Plan and Proposed Plan," dated November 2006 for more details. USEPA invited the public to comment from November 13, 2006, to January 11, 2007. USEPA held a public meeting regarding the Proposed Plan on December 5, 2006, at the Brown County Library in Green Bay, Wisconsin, which was attended by approximately 300 citizens. WDNR also participated in the meeting, assisted in responding to questions, and provided support.

This Responsiveness Summary summarizes the written comments received by USEPA from the community during the public comment period and responds to those comments. This Responsiveness Summary also includes portions of the transcript from the December 5, 2006, public hearing and responses to certain verbal comments.

In total, USEPA received approximately 600 sets of written comments from individuals and groups. About 380 of these written comments opposed the Proposed Plan, whereas about 220 supported it. The Proposed Plan was supported by the Cities of Appleton, Green Bay, De Pere, and Neenah, the Green Bay Metropolitan Sewerage District, and Brown County. A petition submitted by Georgia Pacific also had over 600 signatures supporting the Proposed Plan. USEPA and WDNR carefully considered all comments, both written and oral, received during the public comment period. Comments providing specific and scientific information relevant to the remediation of the Fox River were reviewed in greater detail and given greater consideration than were comments expressing general opinions.

This Responsiveness Summary has three sections: Section 1 summarizes and responds to common concerns expressed by many commenters; Section 2 presents and responds to certain specific and more scientific comments, and Section 3 sets out certain verbal comments made at the public hearing, and provides agency responses.

Acronyms and abbreviations are used throughout the Responsiveness Summary, shown in a Table of Abbreviations and Acronyms, above. All public comments received have been compiled and are included in the Administrative Record.

Section 1. SUMMARY OF SIMILAR COMMENTS RAISED BY MEMBERS OF THE LOCAL COMMUNITY, AND AGENCY RESPONSES

1. Payment for Cleanup

Comment: Concerns were raised that under the Proposed Plan, taxpayers will ultimately have to pay for the cleanup of PCB-contaminated sediments in the Fox River and Green Bay, and that the paper manufacturers responsible for the PCB contamination (i.e. the potentially responsible parties or PRPs) would not be required to pay the full measure of financial support that may be necessary to address the contamination. In particular, concerns were expressed that if the caps placed in the Fox River fail in the future, the PRPs may no longer be liable, or there may be insufficient funding available to repair the caps or to dredge contaminated sediments beneath the failed caps.

Agency Response: Several commenters have expressed concern over how the United States will ensure, on a legal basis, that the PRPs will perform the remedial action in the ROD Amendment and the PRPs will perform additional work, if it is later determined that capping allowed under the ROD is not sufficiently protective of human health and the environment. As an initial matter, these commenters should understand that the ROD Amendment is not the legal document that ensures performance of the work. After USEPA issues the ROD Amendment, the United States will begin the legal process of securing performance of the remedial action. Under CERCLA, the United States has several legal options. First, the United States can enter into a "remedial design/remedial action" (RD/RA) or a "remedial action only" (RA) consent decree with PRPs who are willing to perform the work, which consent decree will be entered as a judgment in federal district court and will become judicially enforceable. Second, if a consent decree cannot be reached in a timely manner, USEPA can issue a "unilateral administrative order" (or UAO) which will order PRPs (without their agreement) to perform all or part of the remedial action. Failure to comply with a UAO can result in significant penalties and/or "treble damages." Third, USEPA can perform the remedial action itself and then the United States can sue PRPs to recover its costs. Finally, the United States can sue PRPs to obtain an injunction against them to perform the remedial action and a judgment to pay past and future costs.

Of the various options available to secure performance of a remedy, entering into a judicial consent decree with PRPs is one of the most common. If the United States does negotiate a consent decree with PRPs to secure performance, CERCLA requires the United States to provide public notice of the consent decree, and an opportunity for the public to comment on the decree, before it is reviewed by the Court. 42 U.S.C. 9622(d)(2). Comments submitted by the public during the public comment period will be addressed by the United States, and the United States reserves the right to modify the decree, or not to support entry, if the public comments suggest that it should not be finalized.

Regardless which option the United States selects to ensure that the remedial action is performed, Section 121(c) of CERCLA requires that if hazardous substances remain on-site, every five years following the initiation of the remedial action, USEPA will perform what is known as a "five-year review" to determine whether human health and the environment are being adequately protected by the remedial action. If during any of the five-year reviews USEPA determines that the remedial action has not proved sufficiently protective, USEPA can order that additional work be performed or can perform the additional work itself. The parties ordered to perform the additional work would depend upon the terms of the Consent Decree and which PRPs sign the decree. The United States can sue any PRP who does not sign the decree ("a non-settler") to obtain an injunction ordering that PRP to perform additional work. Alternatively, USEPA can issue a UAO ordering the non-settling PRP to perform additional work. Under CERCLA, each PRP is "jointly and severally liable" for cleanup costs unless the PRP can meet a heavy burden to show that the harm caused by the pollutants it contributed to the Site is divisible. This "joint and several" liability means that any PRP that cannot establish "divisibility" of harm can be required to pay the entire cost of a remedial action.

2. Permanency of Capping as a Remedy

Comment: Many commenters expressed the view that dredging would be a more "permanent" remedy for PCB contaminated sediments in the Fox River and these commenters expressed concern that natural forces (flooding, ice flows, etc.) and man-made forces (e.g., boat propellers, anchors, etc.) could damage the caps and cause a release of PCB contamination from buried sediments.

Agency Response

In February 2002, USEPA issued a Memorandum entitled "Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites." On page 7 of the Memorandum, USEPA stated that there is no presumptive remedy for any PCB-contaminated sediment site, regardless of the contamination level. Each site is different and each site should be evaluated against the NCP's nine remedy selection criteria. On page 7 of that Memorandum USEPA further stated:

> "At many sites, a combination of options will be the most effective way to manage the risk. For example, at some sites, the most appropriate remedy may be to dredge high concentrations of persistent and bioaccumulative contaminants such as PCBs or DDT, to cap areas where dredging is not practicable or cost-effective, and then to allow natural recovery processes to achieve further recovery in net depositional areas that are less contaminated. "

Consistent with this February 2002 memorandum, the Amended Remedy will use a combination of options to effectively manage the risks posed by PCBs in Fox River sediment. While dredging will be the predominant remedy for sediments with higher PCB concentrations, capping will be employed in other areas where dredging is not practicable or not cost-effective.

There are benefits and limitations to dredging, as there are benefits and limitations to capping. In "Sediment Dredging at Superfund Megasites: Assessing the Effectiveness (prepublication copy)," by the National Research Council of the National Academies, issued June 2007, it was concluded that while dredging can effectively remove contaminants, dredging alone had not been demonstrated to meet desired cleanup levels. One of the limitations of dredging is that contaminants become resuspended in the water column, and redeposit in the sediment following the dredging. It was concluded that this residual contamination was inevitable from dredging, and should be given consideration in evaluating dredging effectiveness. This has been an important part of the agencies analysis, giving consideration to results on Fox River dredging projects. Also, based on experience on other capping projects, less resuspension and redeposition of contaminants occur, and therefore capping can result in a more rapid reduction in PCB concentrations, provided that the cap is properly designed, installed, and maintained.

At the Fox River Site, leading experts in the fields of sediment transport, ice flow and propeller wash have been closely involved in evaluating and providing input into cap design. This will ensure that the caps remain stable in the long term, and effectively contain PCB contamination. The Final Design will have a built-in margin of safety to ensure long-term stability and effectiveness of the caps.

Immediately upon completion of cap construction, a survey will be performed to ensure that the cap is properly placed; thereafter, the physical integrity of the cap will be evaluated, at a minimum, at the 2 and 4 year points, and then every 5 years. Cores will be taken to measure PCB levels in the caps upon initial placement and during long term monitoring. Further, if a large storm event occurs (a 50 year storm or greater) or an event(s) that may impact a cap's integrity, additional cap monitoring may be required. If monitoring shows that caps are not effective in containing PCBs, cap enhancement, repair, or removal (in addition to removal of underlying contaminated sediments) would be performed as needed.

In addition to monitoring the physical integrity of the cap, the surface water and the biota (the fish and biotic life in the river) will be regularly sampled and analyzed for PCB concentrations under the Long-Term Monitoring Plan for the Fox River.

Finally, certain "institutional controls" will be established to reduce the possibility of damage to the cap. These "institutional controls" will include, among other

things, restrictions on anchoring, construction in the river, dredging, and maintenance and monitoring of dams.

3. Shortage of Landfill Space for Dredged Sediment Driving the Change to More Capping and Less Dredging in the Amended ROD

Comment: Some commenters felt that concerns over whether there would be enough landfill capacity to handle all of the dredged sediments from the Fox River were influencing USEPA and WDNR to favor capping over a complete dredging remedy.

Agency Response

USEPA and WNDR are not overly concerned about whether there is available landfill space to handle dredged sediment. The agencies currently believe that there is adequate landfill space available to handle even the larger volumes of sediment that would have resulted under the 2003 ROD. Thus a desire to reduce the volume of dredged material to landfill is not motivating the agencies to amend the ROD to increase capping.

Other important factors considered in issuing this ROD Amendment are short-term effectiveness and long-term effectiveness, cost effectiveness, ARAR compliance, and community and state acceptance.

4. Lower Costs of Capping in Comparison to Higher Costs for Dredging Are Driving the ROD Amendment

Comment: Commenters felt that USEPA and WDNR are allowing cost to be the primary consideration in amending the ROD to include more capping, and less dredging.

Agency Response

Under the National Contingency Plan, 40 C.F.R. Part 300 promulgated under CERCLA, cost is only one of nine criteria that USEPA considers in making remedy decisions. The first two “threshold criteria” under the NCP are ability to protect human health and the environment, and ability to comply with Applicable or Relevant and Appropriate Requirements (ARARs). Both the Amended Remedy and the 2003 ROD remedy met the two threshold criteria equally well, and were then evaluated against the balancing criteria (of which cost is one) and modifying criteria to decide whether to modify the remedy. Three “balancing criteria,” in particular short-term effectiveness, implementability and cost played important roles in the decision to modify the remedy. For these and other balancing criteria, the evaluation showed that the Proposed Plan (and as reflected in this Amended Remedy) is equally or more advantageous than the 2003 Remedy.

5. Potential Inaccuracies of Capping Cost Estimates in the Amended ROD

Comment: Several commenters questioned the accuracy of the cost estimates supplied in the Final Basis of Design Report (BODR) dated June 2006.

Agency Response

The agencies have spent considerable effort in reviewing the cost estimate for both the ROD remedy and the Amended Remedy described in detail in the BODR, and employed an oversight team with expertise in this area. The agencies' review included comparison of likely variations in cost that could occur for both the ROD and Amended Remedy. After careful assessment, the agencies decided that although the costs of the Amended Remedy may be somewhat understated in the BODR, those costs, even when adjusted, would remain significantly lower then the ROD remedy costs. The cost estimates for the ROD Amendment should be more reliable than the cost estimates in the 2003 ROD because new estimates are based on substantially more engineering analysis and a much larger number of sediment samples (i.e., 10,000 sediment samples versus 1,700 sediments samples prior to the 2003 ROD). Table 4 of the ROD Amendment provides details of the cost analysis.

6. Concern that the Agencies Did Not Require the Use of a Sufficiently Large Storm Event in Modeling the River's Hydrodynamics to Determine Whether Capping Would be a Sufficiently Permanent Solution.

Comment: Some commenters thought that the assumptions for a 100-year storm were not sufficiently conservative and the analysis should consider larger events for determining a cap's final design.

Agency Response

Storm events larger than the 100 year storm will be evaluated and considered in the Final Design. However, it should be noted that storms greater than 100 year storms are less relevant than other, more frequent storm events. Once the channel is filled with water, additional water will be traveling over the flood plain and not exerting addition forces on the sediment. In other words there is no increase erosive force due to a larger storm of less frequency.

7. Concern that Sources of PCBs in the Fox River (Other than Paper Companies) Are Not Being Addressed by the Agencies, and Will Hamper the Cleanup.

Comment: Some commenters felt that large potential sources of PCBs remain unaddressed in the Fox River area, and could cause recontamination after cleanup is completed.

Agency Response

The Feasibility Study issued December 2002 considered other sources of PCBs to the Fox River, and found that these other sources were relatively minimal and environmentally insignificant compared to PCB contamination in the river sediment.

Since the December 2002 Feasibility Study, the agencies re-evaluated discharge monitoring data from the direct dischargers alleged to be contributing to the PCB loading in the river, including but not limited to the four municipal treatment plants: Green Bay Metropolitan Sewerage District, De Pere POTW, Appleton POTW, and the Neenah-Menasha Combined POTW. That data revealed that these dischargers have reported no measurable concentrations of PCBs in their effluent to the Fox River since 1999.

The remaining current dischargers to the Fox River are all paper manufacturers or paper processors that discharge only "cooling water" to the river. "Cooling water" is water taken from a river or other water body that is used to cool the temperature of equipment in a manufacturing process without coming into contact with process waste. "Cooling water" should be contrasted to "process water" which is water into which chemicals are added as part of a manufacturing process. Thus, unlike the paper manufacturing processes along the Fox River in the 1960s that resulted in the PCB-contaminated sediments which created a PCB-contaminated process wastewater, the "cooling water" discharges from the current paper manufacturers along the Fox River do not contribute additional PCBs to the river currently. However, since PCBs are present in river water which the paper companies use as their source for cooling water, the cooling water from these paper companies does contain PCBs. No measurable levels of PCBs have been reported by papermills that discharge wastewater to the Lower Fox River since 1999. The ROD Amendment will reduce the concentration of PCBs in the intake water from the river for these paper manufacturers and will therefore reduce the discharge of return flows containing PCBs.

In conclusion, current PCB sources to the Fox River are insignificant; however, the agencies will continue to monitor them on an ongoing basis.

8. Concern that USEPA Has Not Adequately Considered Certain Innovative Treatment Options for PCB-Contaminated Sediments, Such as Vitrification, Sediment Washing, etc.

a. Vitrification

Comment: Some commenters believe that treatment of sediment by vitrification would be a better approach because it would permanently destroy PCBs and would be more cost-effective.

Agency Response

Vitrification of contaminated sediment is heating the material to high temperatures to destroy the PCB molecule. The process would result in the release of chlorine gas which would require capture and treatment as part of an air pollution control permit limitation. The remaining sediment material is transformed into a glass-like material, with any remaining contaminants (e.g., metals) tightly bound in the glass matrix, making the material inert and non-hazardous. The agencies have evaluated vitrification several times over the past few years, and although it appeared promising initially, the agencies have concluded that it would not be cost-effective or implementable on a large scale basis. The capital costs involved in constructing a treatment plant capable of handling the volume of sediment from the Fox River would be extremely high, and the cost of fuel to run such a plant would also be high. Obtaining all environmental permits, including but not limited to air permits necessary to operate such a facility would be a daunting task, particularly given that such a facility would likely be opposed by people who reside or work in the vicinity of any proposed site.

Finally, vitrification is an innovative, but as yet unproven technology. Given the magnitude of the Fox River/Green Bay Site, the agencies believe that proven and demonstrated technologies should be used in a remedial action that addresses contamination at a Superfund site of the magnitude of the Fox River/Green Bay Site.

b. Sediment Washing

Comment: Some commenters believe that rather than dredging and landfilling contaminated sediments, or capping them, sediment washing with a process such as the “Biogenesis Process” should be used to clean the PCB-contaminated sediment in the Fox River, and return it to the river.

Agency Response

USEPA and WDNR are familiar with the BioGenesis sediment washing technology. USEPA Region 2 in New York has been evaluating several treatment technologies, including the BioGenesis soil washing process to address the large volume of contaminated sediment and limited landfill space in the northeast.

The agencies have had discussions with USEPA Region 2 and have reviewed available information regarding the BioGenesis process. USEPA Region 2 performed a demonstration project in May/June 2006 in which 20,000 cubic yards of contaminated sediment from both the Port of New York/ New Jersey and the Passaic River was treated using the BioGenesis process at a rate of 40 cubic yards per hour of dredge material. It is estimated that approximately 250,000

cubic yards of sediment could be treated per year with this process.

The New York/New Jersey harbor sediments generally have PCBs concentrations in the low single digits 1 ppm to 9 ppm), whereas the PCB concentrations in the Fox River sediments are higher, some in excess of the TSCA level of 50 ppm or greater.

Various pilot, bench, and demonstration production-scale testing of the BioGenesis process on contaminated sediments has shown a range of approximately 40% to 90% reduction in PCB concentrations. Based on initial PCB concentrations for Fox River sediments and PCB removal efficiency, the 1.0 ppm PCB remedial action limit (RAL) for cleanup of the Fox River sediments often would not be achieved by the BioGenesis process. Thus, even if the BioGenesis process were used to wash Fox River sediments, a large percentage of the washed sediments would still contain PCBs over the 1.0 ppm level, and hence would need to be landfilled after cleaning.

Given this difference in PCB-levels in the New York/New Jersey sediments situation and the Fox River sediments, and the fact that landfilling would still be required for much of the Fox River sediments, the BioGenesis process is not as attractive an alternative for this Site as it may be for the New York project.

9. Cement Cap Instead of an Armored Cap

Comment: Instead of armored stone, capping with cement would be better as this would be more durable.

Agency Response

An armored cap is where sand is placed over contaminated sediment followed by stone (e.g., gravel) being placed over the sand. The agencies have evaluated a number of remedial techniques and believe that only proven, demonstrated technologies and techniques should be used for this project. The feasibility and reliability of placing cement on the bed of the river has not been demonstrated. A cement cap is a rigid non-flexible cap system that is not self-healing (i.e., if the cap becomes breached the hole may not fill in through natural processes as would happen with an armored sand cap). Engineering difficulties with a cement cap include:

1. Gas generation beneath the cap from the decomposition of organic matter in the capped sediment would damage the cap due to uplift pressures from its migration to the surface.

2. Uneven settlement of the underlying sediment from the compressive load of the cement would cause the cap to crack into smaller pieces as occurs in concrete slabs on grade.

3. The edges of a cement cap would tend to erode and collapse.

4. There could be piping failures around the edge of the cap from ground water trapped under the cap that can only flow out around the edges or through cracks in the cement.

5. A rigid cap system (cement) would not provide the flexibility and permanent durability of a self-healing cap system (gravel and stone armor).

10. No Remedial Action Should Be Performed on the Fox River or Green Bay

Comment: Some commenters felt that it would be better to simply "leave the Fox River alone," as it is cleaning itself up naturally and will recover without any costly or intrusive activities. Also, this would prevent contaminants from being "spread around" during cleanup activities.

Agency Response

These commenters are describing what is referred to in the 2002 ROD and 2003 ROD as the "monitored natural recovery alternative" (MNR). Why MNR alone is not sufficient for the entire Fox River Site is fully explained in Section 11.2.1, pages 75-77 of the 2002 ROD, and Section 11.3.1, pages 115-117 of the 2003 ROD. Consistent with the 2002 ROD and 2003 ROD, areas of OU2 and OU5 that have low levels of PCB contamination will be addressed by MNR.

Simply put, given the desire of the communities in the Fox River and Green Bay area to restore those water bodies to their beneficial uses more quickly, some remediation of the higher level PCB-contaminated sediments is necessary and will be done.

11. Contamination in River from Farm Manure

Comment: Several commenters were concerned that manure going into the Fox River from farms is not considered in the ROD Amendment, and that addressing these sources of manure may be more important than addressing existing chemical contamination to the long-term health of the river.

Agency Response

The agencies agree that controlling manure runoff and sources of nutrients and organic matter is important to improving the water quality of the Lower Fox River and Green Bay. This ROD Amendment, however, is being issued under the authority of CERCLA, and focuses on addressing the risks posed by PCBs to human health and the environment. Runoff from manure is not the focus of this ROD Amendment. Several federal and state regulations and programs address agricultural and urban non-point sources of pollution, including manure runoff. Citizens concerned with these issues should consult the clean water sections of the USEPA and WDNR websites.

12. Concerns that the Process of Revising the 2003 ROD Has Not Been As Open to the Public as Some Members of the Public Would Have Liked

Comment: Some commenters were concerned that the agencies did not provide enough opportunity for meaningful involvement in the development of the Proposal and that documents and information were not provided in a timely way.

Agency Response

Access to technical information about the site throughout the cleanup process has been provided to all interested parties on a regular basis.

Consistent with the National Contingency Plan (NCP), the agencies gave the community advance notice of their issuing the Proposed Plan upon which this Amended Remedy is based. In addition to the announcement of the official start of the comment period, starting November 13, 2006, the "Fox River *Current*" (a newsletter issued jointly by the agencies) provided information on agency plans to issue the Proposed Plan. This newsletter was mailed to 16,000 community members. The agencies consideration of a proposal to modify the 2003 ROD was initially discussed in the Spring 2006 Fox River *Current* newsletter, mailed March 2006. This proposal was discussed in subsequent newsletters (i.e., Summer and Fall 2006). Additionally, the major technical document (the BODR) describing and explaining this proposal in great detail was also made available in September 2006, well in advance of the public comment period. The BODR was made available on USEPA and WDNR websites as well as being placed in the information repositories. This early posting of the BODR and advance notification of the agencies' considerations on this matter exceed the minimum requirements of the NCP.

In addition, to enhance public understanding of the complex technical issues, USEPA issued a "Technical Memorandum" concurrent with the Proposed Plan Fact Sheet (a description of the Proposed Plan intended for the general public). This Technical Memorandum provided additional information and more detailed descriptions of the proposal presented in the Proposed Plan Fact Sheet.

While the agencies have made extensive efforts to keep the communities informed and to involve the public in the process, it should be noted that the NCP does not require every technical meeting among the USEPA , WDNR settling PRPs who are performing a remedial design under an AOC be open to any member of the public who is interested. Public input is allowed at certain stages of the process, but not at every stage of the process, as this would cause significant delays in completing work, if such constant public involvement were required (which it is not, per the NCP).

Thus, in summary, the agencies exceeded the minimum requirements for public involvement set forth in the federal law that governs the Superfund process (i.e. the National Contingency Plan, found at 40 C.F.R. Part 300). Contrary to the assertion of inadequate public participation, the agencies have allowed a significant degree of public participation and have provided extraordinary access to the technical information that is the basis for the Proposed Plan and ROD Amendment.

13. Concerns about Renard Island/Kidney Island PCB Contamination

Comment: Several commenters have observed that there are piles of PCB contaminated sediments on Renard Island/Kidney Island in the Fox River, which need to be better controlled, so that leachate does not enter Green Bay and further contaminate it following clean up efforts. Thus, they felt that Renard Island/Kidney Island should be addressed as part of this cleanup decision.

Agency Response

The lack of inclusion of Renard Island under this Superfund cleanup is unchanged from the 2003 ROD Remedy. The 2003 ROD states: "Final closure of Renard Island in southern Green Bay will be undertaken by the USACE, but is not part of this decision." This issue was addressed in the Responsiveness Summary attached to the 2003 ROD, specifically in agency responses to comments 9.25 and 9.26 on pages 9-1 to 9-2, as follows:

> "Master Comment 9.25
>
> Commenters expressed support for reconstruction of the cap on the Renard Island Confined Disposal Facility (CDF) as part of the remediation of OU 5.
>
> *Response*
>
> The WDNR and USEPA support the appropriate closure of the Renard Island CDF. However, closure of the CDF is the responsibility of the USACE and the local sponsor, Brown County, under the Rivers and Harbor Act and the Water Resources Development Act. The WDNR

recognizes that appropriate closure of the CDF includes ensuring that it is properly capped, monitored, and maintained and that it does not become a source of PCBs back into Green Bay. WDNR Waste Program staff will work with the USACE and Brown County to see that the site is properly closed. Closure of Renard Island is not part of the ROD for OU 5.

Master Comment 9.26

Commenters stated that closure of the Renard Island CDF is not properly included in the Superfund process and cannot be identified as part of a remedy for OU 4 or OU 5. Other commenters suggested that the selected remedy for OU 4 or OU 5 should include the costs of Brown County's financial responsibility for managing Renard Island as well as costs for the Bayport facility operated by the county.

Response

The WDNR and USEPA acknowledge that closure of the CDF [confined disposal facilities] and operation of the Bayport facility are responsibilities of the USACE [United States Army Corps of Engineers] and the local sponsor, Brown County, under the Rivers and Harbor Act and the Water Resources Development Act and, as such, are not included in the ROD. Since neither facility was identified in the BLRA [Baseline Level Risk Assessment] as a specific source of risk and since the facilities are subject to other state and federal jurisdiction, the ROD cannot require any remedial action at these facilities.

Brown County has expressed interest in exploring the appropriate closure and long-term care of Renard Island and Bayport as part of the overall Lower Fox River cleanup. Costs for closure of Bayport and the Renard Island CDF are included in Sections 7.5 and 7.6 of the FS along with the cost of constructing a new CDF. Final closure of Renard Island must be agreed to by the USACE, Brown County, and the WDNR. One element of CDF closure will be ensuring that the CDF is properly capped, monitored, and maintained and that it does not become a source of PCBs back into Green Bay."

Additionally, according to the Renard Island Closure Plan submitted to WDNR on behalf of the Green Bay Port Authority in September 2005 the level of contamination of the sediment within Kidney Island ranges between 0.1 mg/kg and 6.7 mg/kg. These PCB levels mirror the concentration of PCBs found throughout the Bay of Green Bay. Additional data collected between August 2006 and April 2007 as part of the baseline monitoring program required under this remediation effort indicates that there is a significant reduction in water column PCB concentration between Lower Fox River and the southernmost transect of Green Bay. This is an indication that there are no significant sources

of PCBs, including Renard Island, within the Bay of Green Bay. Finally, Brown County as the local sponsor of the navigation dredging that created Kidney Island is developing a final closure plan that will address the release of PCBs from this site, so no additional work is being considered as part of this cleanup action.

14. Concerns that modification of the authorized navigation channel depth to allow capping would permanently restrict commercial shipping.

Comment: If the authorized navigation channel depth were modified to accommodate the Proposed Remedy, commercial shipping would be limited on a permanent basis.

Agency Response

Congress, through the Water Resources Development Act authorizes the navigation channel location and depth. Congress is currently considering re-authorizing the channel at the site to narrow the width of the channel and reduce the authorized depth.

USEPA and WDNR do not determine the authorized depth of the navigation channel and the ROD Amendment is not contingent upon the authorized navigation depth modification (if it is modified). The Remedial Design will consider the appropriate remedy for the navigation channel based upon whatever authorized navigation depth is set by Congress.

By establishing capping as an acceptable alternative remedy in this ROD Amendment and the criteria for its application, the agencies recognize that the exact location of capping is something to be determined in the engineering design process. Proposed capping areas will change as a result of more detailed design work, with current candidate areas (i.e., Figures 2 and 3 of the ROD Amendment) for capping representing the maximum potential capping areas.

Finally, the Wisconsin congressional representation has proposed this re-authorization based on unanimous support by the local units of government and the Port of Green Bay. One consideration of this proposal is the fact that navigation of large vessels is already restricted due to physical limitations created by bridges and locks. While final Congressional action on this has not been completed, if the navigation channels' authorized depth is not modified from DePere to the turning basin, then the navigation channel in that part of the river would not be capped (representing 30 acres out of capping 450 acres under the Proposed Plan).

15. Inability to reliably predict a cap's performance over time due to the long period.

Comment: A cap's performance cannot be reliably predicted due to the long

period of time for which caps would need to be effective, and the uncertainty of predicting sediment transport, deposition, and erosion.

Agency Response

USEPA and WDNR are basing the decision on data currently available, including substantial sampling of river sediments (10,000 samples in the lower 6 river miles). The agencies have consulted with recognized capping experts having substantial expertise in environmental engineering, modeling, and sediment remediation, including those working on the Wisconsin Department of Natural Resources' oversight team. Capping has been used successfully in river systems for years and the advantages are clearly understood. The physical characteristics will be carefully considered when choosing to use capping to assure the long term integrity of the cap. In addition, the cap design will be dictated by the location to provide a secure cap. In many locations where a cap will be employed dredging is not an available or effective option, such as near bridge supports. So the only other option in these locations would be to allow natural recovery which would not provide the aggressive cleanup that is desired in the Fox River.

For decades WDNR has been modeling the Fox River and as a result there is a predictive capability for this river that does not exist for most systems. The modeling has helped understand the dynamics of the river and allows the design to be done with greater certainty.

Attachment 1 provides a summary of thirty four contaminated sediment capping projects in the United States and the world. Experience on these projects has demonstrated the viability and effectiveness of capping as a method to contain contamination and reduce risks to human health and the environment.

Section 2. COMMENTS REPRODUCED VERBATIM AND AGENCY RESPONSES

In this Section USEPA shall reproduce verbatim significant comments that it received from the public concerning the Proposed Remedy, and will respond to those comments. Agency responses to these comments are included as **bold** within the body of the comment under "Agency response."

Comment by Peter L. deFur – prepared for Clean Water Action Council of N.E. Wisconsin, Inc.

Comments On

The Record of Decision
And Basis of Design Report:
Lower Fox River and Green Bay Site

Prepared for
Clean Water Action Council of N.E. Wisconsin Inc.
By
Peter L. deFur
Environmental Stewardship Concepts
January 8, 2007

Issues and Recommendations

- The Optimized Remedy represents a significant step backwards from the original ROD and leaves unacceptable amounts of PCB contaminated sediment (44-48% by volume of sediment) remaining in the Fox River

- Capping is not a viable alternative in the Fox River because environmental factors such as ice and flooding or groundwater seepage could compromise the integrity of any caps

- The management approach taken in the Optimized Remedy is more focused on logistical issues rather than managing and minimizing the risks posed by PCBs in the river

- WDNR needs to develop a source control plan for new and ongoing sources of PCBs into the river

- Investigations outlined in the BODR regarding loadings of PCBs are sparse and inadequate

- WDNR should develop a plan to achieve zero additional PCB discharges into the river

- WDNR should remove as much of the contaminated sediment within the Fox River as physically possible. The most effective method to reduce risks from PCBs in the river is to remove them

- PCB cleanup technologies such as sediment washing exist and should be considered as alternatives to the disposal of contaminated sediments in landfills or CDFs

Agency Response

These points are addressed in detail below. Agency comments are inserted into the body of the text.

Site and Document Summary

Historical discharges into the Fox River have resulted in the accumulation of dangerous levels of polychlorinated biphenyl (PCBs) within the river's sediments. This contamination has cascaded into and through the food chain to a point where fish in the river are no longer safe to eat. In 2003, a Record of Decision (ROD) was established mandating the need to clean PCBs from the sections of the river closest to where the river empties into Green Bay.

In 2004, the Fort James Operating Company and NCR Corporation signed an Administrative Order on Consent (AOC) with the Wisconsin Department of Natural Resources (WDNR) and the Environmental Protection Agency (EPA). The order required the two companies to design a cleanup plan that would meet the standards set forth in the ROD. Through a series of white papers a tentative plan was developed to dredge large portions of the river, and leave other portions of lower contamination sediments in place while monitoring them over time. Investigations characterizing the scope and nature of the contamination in the river have continued to this date.

The Basis of Design Report (hereafter referred to as the BODR) presents the proposed preliminary remediation plans for the Lower Fox River developed by the Fort James Operating Company and NCR Corp. along with the data supporting them. This document forms the basis for the proposed changes to the ROD. While still relying on dredging in some places, the BODR differs significantly from the original ROD, primarily by substantially reducing the quantity of sediment that will be dredged from the river.

The new plan, referred to as the "Optimized Remedy" reduces the volume of dredged material through the use of capping in combination with sand and engineered caps. Some

areas with low contamination will simply be capped, while some particularly deep deposits will be partially dredged before placing an armored cap overtop. Capping will occur over approximately 134 acres of the nearly 32 miles the of river subject to cleanup under the ROD. The BODR claims that this will offer the same level of protection while requiring much less landfill space for the disposal of contaminated sediments and recommends the Optimized Remedy for this reason.

ESC [Environmental Stewardship Concepts] feels that this plan is a significant step backwards from the original ROD. The "Optimized Remedy" proposed in the BODR would remove 26% less sediment than what was originally planned for in the ROD. This change would result in anywhere from 44-48% of the PCB contaminated sediment remaining in the Fox River. Beyond the increased quantities of PCBs to stay in the river, the Optimized Remedy recommends capping in areas that are not suitable for this alternative. Storm events, ice, and groundwater seepage could all compromise the caps and release the PCBs back into the river. The use of alternate treatment technologies such as sediment washing is recommended in place of capping and disposal of contaminated sediments in landfills.

Agency Response

The agencies have thoroughly evaluated the Amended Remedy (a.k.a., the "Optimized Remedy," as referenced in the BODR), and have determined that compared to the original remedy, it is a balanced and protective approach that affords comparable or greater risk reduction, will be effective in the long term, and will achieve risk reduction in a shorter time frame at lesser cost. By utilizing a combination of dredging and capping the Amended Remedy is taking advantage of the strengths of both of these technologies. The limitations by dredging alone have been clearly demonstrated by the previous Fox River pilot studies and the ongoing cleanup in OU 1.

Furthermore, leaving 44 - 46% of PCBs in the river does not necessarily equate to unacceptable risk, given that the remaining PCBs would be effectively and permanently contained. The Amended Remedy would remove approximately 74% of the PCBs as compared to the 2003 ROD Remedy (13,700 kg versus 18,400 kg), with remaining PCBs effectively contained and removed from the food chain.

Comments on the Optimized Remedy

The Optimized Remedy presented in the BODR does not provide the level of long term protection afforded by the original ROD remedy, and therefore cannot be recommended. The BODR frequently claims that "the bulk of PCBs will be removed under this remedy." This is disingenuous, as only 62-66% of the total mass of PCBs will be removed under the plan. A more accurate statement would be "slightly more than half of the PCBs will be removed." The fact that this much contamination will remain in the

river emphasizes that the Optimized Remedy takes the wrong approach to cleaning up the Fox River.

The reliance on capping and monitored natural attenuation to contain PCBs is based on weak assumptions and the basis for the rationale for their use is frequently contradicted by the data. While capping may provide adequate protection at some sites, it is far less suited for others. The key factor in a cap's ability to adequately isolate contamination is the long term stability of the cap. Unfortunately, little to no long term monitoring of caps has been reported in peer reviewed literature.

Agency Response

USEPA has stated in OSWER Directive 9285.6-08, "Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites," February 12, 2002, principle number 7, page 7, as follows:

> **"EPA's policy has been and continues to be that there is no presumptive remedy for any contaminated sediment site, regardless of the contaminant or level of risk. This is consistent with the NRC report's statement (p. 243) that "There is no presumption of a preferred or default risk-management option that is applicable to all PCB-contaminated-sediment sites." At Superfund sites, for example, the most appropriate remedy should be chosen after considering site-specific data and the NCP's nine remedy selection criteria. All remedies that may potentially meet the removal or remedial action objectives (e.g., dredging or excavation, in-situ capping, in-situ treatment, monitored natural recovery) should be evaluated prior to selecting the remedy. This evaluation should be conducted on a comparable basis, considering all components of the remedies, the temporal and spatial aspects of the sites, and the overall risk reduction potentially achieved under each option.**
>
> **At many sites, a combination of options will be the most effective way to manage the risk. For example, at some sites, the most appropriate remedy may be to dredge high concentrations of persistent and bioaccumulative contaminants such as PCBs or DDT, to cap areas where dredging is not practicable or cost-effective, and then to allow natural recovery processes to achieve further recovery in net depositional areas that are less contaminated."**

This Amended Remedy is also consistent with "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites," EPA-540-R-05-012, December 2005, particularly with Section 7, pages 7-1 to 7-17.

Specifically for the Fox River OU 2, OU 3, OU 4 and OU 5, the agencies have considered river conditions, contaminant concentrations, thickness of contaminated sediment deposits, and the effectiveness of dredging (vs. capping) in detail at each of 1400 core locations to determine which cleanup option should be used for each portion of the river. Additionally, ongoing design efforts will study in greater detail the effects of propeller wash on capping activities. Results of this additional study should result in a more conservative and protective design.

In summary, based upon their evaluation of the new sediment sampling data, the agencies do not believe that a "one size fits all" approach should be used for this site. Rather, a more discerning, more targeted approach toward dredging should be used. The agencies agree that capping is appropriate for some areas of the Fox River while other areas are more suitable for dredging.

For this reason, the combination of dredging and capping in certain areas of the Fox River is ill advised. The Optimized Remedy would leave the most contaminated sediments in place, increasing risks to human health and wildlife in the event of a cap failure. A cap cannot be guaranteed to be 100% effective over the long term (100+ years), making the safest solution the dredging of all contaminated sediments.

The reliance on capping is compounded by a reliance on monitored natural attenuation in upper reaches of the river. Natural Attenuation is simply a technical term for "doing nothing" and is unacceptable. PCBs can remain within sediment for up to 100 years or even longer, and no amount of monitoring increases the rate at which they degrade. Significant storm events could disturb otherwise stable sediments, transporting both sediment particles and their associated contamination downstream. Such events would jeopardize remediation efforts downstream, wasting valuable resources while putting both the public and wildlife at even greater risk. The risk is magnified even more when the fact that other contaminants besides PCBs are present in the Fox River. Mercury and dioxins and furans are all present in these sediments and will remain there for years to come.

Agency Response

Possible impacts to caps by natural and man-made events have been identified and will be evaluated further during the final design of the engineered caps to maximize permanence and stability. Because the agencies agree that there is no absolute guarantee that a cap will remain in place under all conditions, the engineering design for these caps is conservative. Due to the conservative design for caps, it is highly unlikely that the caps would be significantly disrupted. Additionally, regular monitoring will inform the agencies if damage occurs, and actions will be taken as necessary to mitigate future exposures. Specifics on these issues are discussed in detail below.

USEPA has compiled and examined the results and design information for 32 sediment capping projects (Attachment 1, page 212). While each of these capping projects has a unique setting, the overall performance assessment for these other projects demonstrates the viability and effectiveness of capping. The Fox River presents its own unique characteristics and challenges, but the cap design in the Amended Remedy considers experiences on these capping projects and customizes the cap design to account for site specific characteristics. Engineering, monitoring and maintenance protocols have been developed by other parties who have successfully used caps to control sediment contamination. These experiences and results have been considered in the capping design in this Amended Remedy.

A rigorous analysis of high flow wind wave, ice scour and potential prop-wash-induced stresses has been done for the Fox River/Green Bay Site to develop a conservative design to ensure long-term cap stability. This design will have further refinements/improvements in the final design to ensure a high degree of conservatism. For example, an armor layer will be placed over all caps regardless of specific conditions. However, cap designs must be distinguished from areas with lower concentrations and thinner zones of contaminated sediment where sand covers will be applied. These sand covers are *not* caps and are not expected to be permanent features. These sand covers rely less on containment and more on mixing and dilution to address PCB contamination.

It should also be noted that there is no guarantee that dredging would be 100% effective. For most dredging projects, a small quantity of contaminants are released (or resuspended) in water, and hence a certain percentage of PCBs will resettle in the dredged area after dredging is completed.

Monitored natural recovery (MNR) is an accepted technique for dealing with low levels of contamination, such as occur in the upper reaches of the river (i.e., OU2). In the 2002 ROD, monitored natural recovery was selected for OU2 for the following reasons:

- **dredging would generally be inefficient due to thin discontinuous deposits of soft sediments,**
- **sediments generally had lower concentrations of PCBs,**
- **access would be difficult due to numerous dams, and**
- **bedrock would likely cause difficult/inefficient dredging and incomplete removal of contaminated sediment.**

However, while most of the upper reaches of OU 2 have MNR as the

selected remedy, the largest PCB deposits (N, O and DD) have already been dredged or will be removed (i.e., dredged), capped, or covered. These three deposits comprise more than half of the PCB mass for OU 2 (based on 2002 RIFS data). In any event, USEPA selected MNR for most of OU 2 and OU 5 in the 2002 ROD and 2003 ROD, and the public comment periods for the 2002 ROD and 2003 ROD expired years ago.

Regarding other contaminants, USEPA considered other possible chemicals of concern in the Fox River and Green Bay in the Risk Assessments in support of the 2002 ROD and 2003 ROD. A Baseline Risk Assessment evaluated over 300 contaminants at the site. From this evaluation, and consistent with USEPA's guidance (USEPA, "Risk Assessment Guidance for Superfund Volume 1," EPA/1-89/002), USEPA focused on the "most significant" chemicals. Based on this analysis, eight chemicals were evaluated in the final stage of the risk assessment process ("Final Baseline Human Health and Ecological Risk Assessment," December 2002, by The Retec Group). It was then determined that PCBs presented by far the greatest risk, with mercury a distant second. In general, these analyses concluded that other chemicals were shown to either not be present or to not have significant risk to human health and the environment

There is no description of the plan for the Monitored Natural Attenuation in the BODR. The optimized Remedy in Section 5.0 should have a description of this part of the plan, but there is no mention of natural attenuation in Section 5.0. The BODR needs to give some justification and evidence that this strategy has any hope of succeeding. The ROD mentions natural attenuation, but gives no data. Attenuation must be some real reduction in the concentration of the contaminant, not just burial or dilution. Attenuation should be the result of physical (sunlight), chemical (oxidation) or biological (bacterial decomposition) processes singly or in combination. Two of the more famous rivers on which no active remedial actions were taken are the James River, VA and the Hudson River, NY where chlordecone (trade name Kepone) and PCB's, respectively, were spilled in the 1970's. In neither case did the contaminants breakdown to the point of not being present in the river sediments after more than 30 years (see *http://www.deq.virginia.gov/fishtissue/xls/2004kepone.xls for Kepone data; see www.EPA.gov/hudson for the Hudson R)*.

Agency Response

The Monitored Natural Recovery portion of the cleanup is unchanged from the 2002 ROD and the 2003 ROD. The remedy description and rationale and reasons for selecting Monitored Natural Recovery for OU 2 and OU 5 are described the 2002 ROD and 2003 ROD for OU 2 and OU 5, respectively. See table below for locations in these documents for descriptions of Monitored Natural Recovery and it's rationale in the 2002 and 2003 RODs.

Decision documents	Monitored Natural Recovery area	Remedy Description		Remedy Rationale	
		Section	Pages	Section	Pages
2002 ROD	OU 2 (except Deposit DD)	13.1	82	13.3.2	88-89
2003 ROD	OU 5 (except near river mouth)	13.1	131-133	13.3.2	140

It should be noted that the Amended Remedy does not allow for MNR in OU 2 Deposit DD, OU 3, OU 4, and river mouth OU 5 sediments that exceed the PCB RAL of 1 ppm (i.e., some remedial action will be performed for all sediments exceeding the RAL).

While the BODR does not detail the spatial extent of contamination from heavy metals such as mercury, it acknowledges their presence. Metals do not degrade, and so natural attenuation is not possible. Decisions regarding the cleanup of individual contaminants in the Fox River should not be made in a vacuum with no consideration for other forms present. The presence of these metals emphasizes the need to dredge all contaminated sediments within the river.

Capping Limitations in the Fox River

Capping is not always an appropriate method to isolate PCB contaminated sediments from the water column. The physical integrity of the cap must be maintained over the life of the capped contaminants and any hazardous breakdown products. In the case of PCBs, this can be well over 100 years (Rice et al. 2003). The areas best suited for capping are those where the bathymetry is as flat as possible and tidal effects are limited (Palermo et al. 1998). The NRC developed guidelines for site conditions that are favorable for the placement of caps (NRC 1997). Palermo et al. evaluated the 9 major capping criteria presented by the NRC in a white paper prepared for the EPA and WDNR (2002). ESC disagrees with two of Palemro's conclusions regarding site conditions in the Fox River.

NRC guidance discourages the placement of caps in areas where there is ongoing contamination to the waterway. Palermo concludes that "external sources of PCB inflow have been controlled" (Palermo et al. 2002). However, the data strongly contradicts this claim. More information regarding this assumption is presented later in this document.

NRC also suggests that capping only be used where "contaminants are of moderate to low toxicity and mobility." At the time when Palermo's white paper was published, the Optimized Remedy had not yet been proposed. Palermo noted that only non-TSCA eligible areas would be considered for capping. Under the Optimized Remedy, sediments overlaying high levels (300+ ppm PCBs) of contamination would be dredged and then a cap placed over the sediments with the highest levels on contamination. PCB concentrations of these levels are extremely hazardous to human health and the environment, making these areas in the Fox River unsuitable for capping according to the NRC guidance.

Agency Response

Regarding the suitability of capping to isolate contaminated sediments from the water column, in the National Research Council (NRC) publication, "Contaminated Sediments in Ports and Waterways," 1997 (referenced in the comment), it is indicated that capping may be suitable when:

1. **sources are controlled,**
2. **natural recovery is slow,**
3. **costs and environmental effectiveness of removal may be high,**
4. **suitable cap material is available,**
5. **hydrologic conditions will not compromise the cap,**
6. **the bed would support a cap, and**
7. **dredging may be difficult or have a low removal efficiency.**

Moreover, more recent NRC publications indicate capping should be considered as a remedial technique to address contaminated sediments, with no presumption for a preferred remedy (such as dredging). In the NRC publication, "A Risk-Management Strategy for PCB-Contaminated Sediments," 2001, it is stated that, "There should be no presumption of a preferred or default risk-management opinion that is applicable to all PCB-contaminated-sediment sites." This publication discusses thin layer capping or enhanced natural attenuation (a.k.a., monitored natural recovery), and thick layer capping and armoring as viable remedial alternatives on pages 209 – 215. The 2001 NRC publication discusses similar capping considerations to those in the 1997 NRC publication, listed above. These factors, outlined in these NRC publications, were considered in development of this ROD Amendment, as well as experience on both capping and dredging projects.

Additionally, in the NRC's recent publication, "Sediment Dredging at Superfund Megasites: Assessing the Effectiveness (prepublication copy)," issued June 2007, it was concluded that while dredging, can effectively remove contaminants, dredging alone had not been demonstrated to meet desired cleanup levels. One of the limitations of dredging is that contaminants become resuspended in the water column, and redeposit over the sediment following the dredging. It was concluded that this residual contamination is inevitable from dredging, and should be given consideration in evaluating dredging effectiveness and applicability. Thus, an important part of the agencies' analysis has been consideration of results on Fox River dredging projects. Based on experience on other capping projects, less resuspension and redeposition of contaminants generally occur, and therefore capping can result in a more rapid reduction in PCB concentrations in an area, provided that the cap is properly designed, installed, and maintained.

Regarding sediments with higher PCB concentrations, under this ROD

Amendment, capping may be done for some sediment areas that have PCB concentrations 50 ppm or greater (i.e., TSCA) under the navigation channel. There would also be limited areas where deep sediments near shorelines would be capped. If these areas were dredged, it would result in a steep river bottom, possibly causing river bank collapse. In these areas caps would have a thicker sand layer, and a larger and thicker armor stone. Also, given that dredging of several feet will occur prior to capping, these areas are unlikely to experience erosion, particularly considering the heavy armor stone placed over the cap sand layer.

Concerns about source control are addressed in more detail below. It should be noted that any remedy, including dredging, capping, or a combination of the two would be equally compromised in the long term if PCB sources in the Fox River and Green Bay are not adequately controlled. However, there are currently no new sources of PCBs and Wisconsin water quality standards would prevent any ongoing sources of new PCBs.

One area of concern that Palermo notes is the NRC's guidance that "hydraulic conditions will not compromise the cap." Along with controlling ongoing sources, this is one of the most important factors to consider when determining if a cap is suitable for a site. Palermo notes that scour from flooding and ice could occur, and recommends armoring the caps and strict restrictions on where caps are placed. However, the data imply that the above suggestions may not be sufficient to insure cap integrity.

Agency Response

There is no data to support the claim that the armoring would be insufficient to ensure cap integrity. Completed evaluations in the BODR, and as well as cap performance for other projects (Attachment 1) demonstrate that the integrity of armored caps would be maintained under adverse conditions (e.g., high-velocity water flow, ice scour occurrences, potential propeller wash, and bioturbation). Additionally, a rigorous long-term monitoring program will evaluate cap stability and effectiveness. If the monitoring program indicates that caps are not effective or protective, additional measures would be required.

One of the most significant hurdles to the use of engineered or sand caps in the Fox River is the interaction between the river and surrounding aquifers. When caps are placed over areas where there is significant flow from aquifers into a river or other body of water where a cap has been placed, the pressure from the upwelling groundwater can place a significant amount of pressure on compressed cap materials, potentially compromising its integrity (Palermo et al 1998, NRC 2001). The BODR notes that such a phenomenon occurs within the Fox River, but fails to evaluate its effects beyond the displacement of porewater. These risks are in addition to other, weather related phenomenon.

Agency Response

This comment suggests that the caps are impermeable (that upwelling would cause a physical disruption of the cap). However, capping layers would be permeable to both water and gas, and would not cause any additional resistance to upwelling. The important issue with upwelling is the impact it may have on the cap design with respect to required isolation thickness. When PCBs are the contaminants of concern, this impact of upwelling is minimal, and has been taken into account in cap design.

One major weather-related threat to sediment caps in the Fox River are the formation of frazil ice and ice jams. The frazil ice occurs most often in turbulent, shallow waters at extreme temperatures (below 0° F) (Daly, 1994). The greatest threat from frazil ice occurs when the ice attaches itself to bottom sediments, after which it is classified as "anchor ice." The formation of anchor ice not only facilitates increased scouring, but also encourages ice jams that have an even greater impact on the riverbed. Page 149 of the BODR notes that "…OU4 might experience scour of up to 3 feet under prevailing hydrodynamic conditions, and that there is a turbulent flow and potential frazil ice formation zone in the center portion of the channel extending immediately downstream of the De Pere Dam in which a greater degree of scour could occur" (Shaw, 2006). The extreme temperatures that cause the formation of frazil ice can occur any time between December and mid-March in Green Bay (NWS). While no water temperature data for the Fox River were available through USGS, data for the Namekagon River in Leonards, WI were available. The sampling station is at approximately the same latitude as the mouth of the Fox River. As shown in Figure 1, water temperatures hover around freezing from December to March. Therefore, it is theoretically possible for frazil ice and ice jams to form for nearly one third of the calendar year. Appendix D, Attachment D of the BODR is an estimation of the effect of such events on bottom sediments and cap integrity.

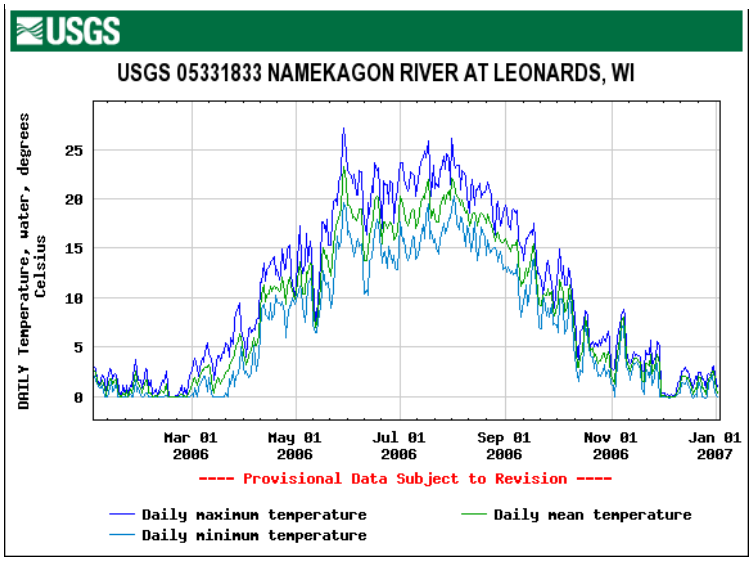
Agency Response

It is agreed that areas with potential for frazil ice formation are not areas conducive to capping. Therefore, areas that have potential for frazil ice formation (e.g., downstream of the De Pere Dam in OU 4) will be dredged instead of capped.

Temperature data is available from the USGS gauge on the Fox River at the oil tank depot in Green Bay http://waterdata.usgs.gov/nwis/uv?site_no=040851385). Although similar in latitude, the Fox River and Namekagon River are different in many respects. For example, the average flow rate of the Fox River is approximately 40 times greater than the Namekagon River, and the Fox River is located in an urban setting with significant point and non-point discharges that can influence water temperature. Temperature is only one of several factors that determine the potential for frazil ice and ice jams. Other factors include flow rate, velocity and turbulence, river geometry, flow restrictions, etc. Experts in the area of ice formation have evaluated

the Fox River and have concluded that the areas likely to have frazil ice are those just below the De Pere Dam (discussed in the paragraph above). Again, these areas will not be capped.

Figure 1: Water Temperatures of the Namekagon River (USGS 2006)



A review of the historical data shows that the analysis performed by Ashton on ice formation (2005) is cursory and incomplete. None of the conclusions are statistically verified, and fail to account for more extreme freezing events. The coldest temperature considered in the analysis is -5° F, while record lows of -20° and below have been recorded a number of times during the winter months. The analysis also does not investigate the effect of ice jams on additional ice formation in the areas behind the dam. It is unclear if such jams could result in ice impacting areas with caps.

The danger of ice scouring or attaching to caps is illustrated clearly in Ashton's white paper by the passage "Occasionally anchor ice has been known to entrain the sediment to which it is attached into the flow when the ice releases from the bottom. The writer has seen small-fist-sized rocks in floating ice covers that undoubtedly were the result of such a process but when seen, these have been widely dispersed and represent only insignificant transport." What Ashton doesn't note is that cap integrity is unrelated to the amount of sediment transported in this fashion. Fist sized holes in caps compromise both their ability to contain sediments and also the ability to resist future scouring events.

Agency Response

The potential for ice scour was evaluated in Attachment D to Appendix D of the BODR in a report entitled, "Effects of Ice on Sediments in Fox River Near Green Bay, Wisconsin," by George D. Ashton, Ph.D., July 10, 2005. Based on historical information from local individuals familiar with the river and climate, as well as observations during a site visit, Dr. Ashton concluded that the potential for ice scour from ice jams or dams on the Fox River was minimal. Observations that supported this conclusion were that there is no visible damage to vegetation or structures along the shore. Interviews with individuals, evaluation of the historical records, climate data, and a review of river characteristics all indicated that the potential for ice scour due to ice jams or water flow related to ice jams is negligible.

However, it should be noted that there is potential for formation of water bottom ice (i.e., frazil ice) in certain areas, which is discussed in the next comment response below.

It should also be noted that if an ice jam or dam occurred, it would likely only disturb a cap in a localized area, and would not compromise the cap's overall effectiveness. Cap effectiveness and associated risk reduction is a function of the area isolated by the cap. Localized disturbance of the cap would reduce its effectiveness in a small area and would likely be filled in from the sand from caps covering adjacent areas. Finally, regular monitoring or event-triggered monitoring would likely detect cap damage. If this occurred, repair, enhancement or removal of the cap and the underlying sediment would be done.

Past experiences with caps have indicated that they are not suitable in rivers that experience even occasional ice jams, and that the ice itself does not always directly cause scouring. In 2001, a pilot study was initiated on the Grasse River to evaluate the use of capping to address PCB contamination in the waterway. After a particularly harsh winter, monitoring of the cap in the spring of 2003 indicated that significant scouring had occurred as a result of an ice jam that had formed over the cap (EPA, 2005). Modeling indicated and underwater videography confirmed that the scour was caused not by direct physical contact of the ice with sediment but from increased water velocity and turbulence just below the toe of the ice jam. The BODR does not appear to plan for such a contingency, further emphasizing that logistical and management related decisions have driven the creation of the Optimized Remedy rather than risk based goals.

Agency Response

The Agency agrees with the technical concerns for the impact of ice jams and/or frazil ice on locations chosen for capping in the Amended Remedy (ice jam potential discussed above). In Attachment D to Appendix D of the BODR in a report entitled, "Effects of Ice on Sediments in Fox River Near Green Bay, Wisconsin," by George D. Ashton, Ph.D., July 10, 2005, it was concluded frazil or anchor ice formation could form in the 1 ½ miles of river in OU3 below the Kaukauna Dam, and the first 1400 feet of river below the De

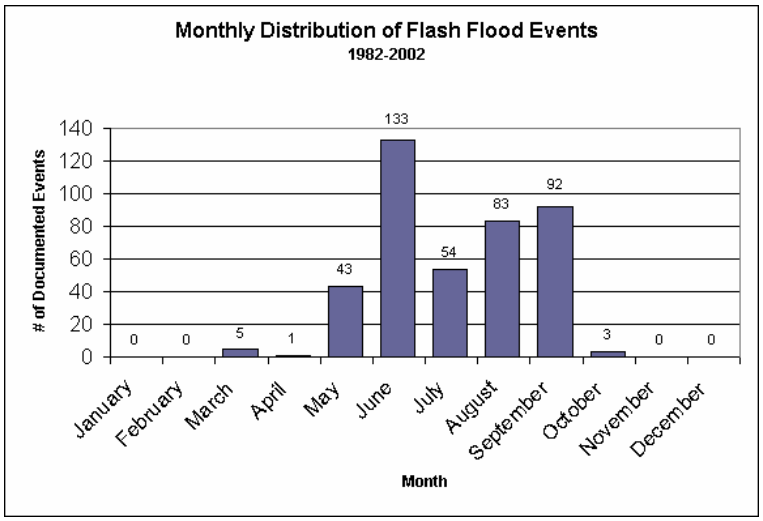


Figure 2: Flash Flood Data for Green Bay, WI (National Weather Service, 2006)

Pere Dam in OU4. Therefore, no capping will be done in those areas. Dr. Ashton concluded that there were no areas in OU3, OU4, or OU5 that are likely to experience ice jams, as discussed in the preceding comment response. Dr. Ashton based his observations both on the United States Army Corps of Engineers database, and local reports.

Flooding is also a significant threat to caps in the Fox River. As shown in Figure 2, significant precipitation events and therefore discharges in the Fox River over the past 20 years occur mainly from May to September, with the greatest number of previous flash flood events recorded in June (NWS). The largest recorded discharge (33,800 cfs) recorded at the mouth of the river also occurred in June over sixteen years ago. Data were obtained from the USGS water database, which is available on the internet at http://waterdata.usgs.gov/nwis/sw. Attempting to determine average discharges at the mouth of the river from USGS data is difficult as the agency appears to only take data from this station sporadically.

Data have been collected more regularly from a station in Wrightstown which has recorded 2 events approaching the 100 year flood estimate of 24,200 cfs used in the BODR (USGS). The station is located at the Rapid Croche Dam, which according to the USGS may influence discharges because of flow restrictions and other dam related activities. However, according to Figure 1-1 of the BODR this location is approximately 22 miles from the mouth of the river (Shaw, 2006). The two events in 1952 and 1960 had discharge rates of 24,000 and 23,600 cfs respectively. Locations downriver have experienced even greater discharges. One instance in 1990 caused a discharge of 33,800 cfs, and the same event caused a flow rate of over 46,000 cfs at the mouth of the East River as it flows into the Fox River (Baumgart, 2007, see attached figure). These high flow rates were caused by a combination of heavy rains and a powerful seiche. A seiche occurs when strong northwesterly winds build up water in the bay, which alters water levels and flow rates. The above data indicate that flood events of the calculated 100 year flood magnitude occur much more frequently than estimated, and wind can play a role in these events.

Agency Response

The 1990 event referenced in the comment was a result of a combination of a moderately high flood flow down the length of the Lower Fox River downstream of Lake Winnebago combined with an extreme localized event around the city of Green Bay which caused flooding in the East River. The East River enters the Fox River 1.3 miles upstream of the mouth. Daily average flows measured at Appleton and Wrightstown peaked at 14,200 cfs and 15,500 cfs respectively. Green Bay experienced 4.9 inches of rain over a 24 hour period and flooding of the East River caused local property damage. The average daily flow at the USGS gage on the Fox River downstream of the East River peaked at 34,000 cfs. The effect of the observed 2.0 to 2.7 ft seiche (caused by changes in water level due to "sloshing" in Green Bay) caused the instantaneous peak velocity at the

USGS gage to reach 47,700 cfs.

Additional computer simulations were run to assess the potential effect of this event on the proposed cap design for the portion of the Fox River downstream of the DePere Dam. The entire 34,000 cfs peak daily flow was input at the dam and a maximum design 4.3 ft seiche was input at the river mouth, greater than the 2.0 to 2.7 ft observed during the 1990 event. A few disconnected proposed capping zones adjacent to the OU 4B navigation channel will require an increase in the stable particle size of up to 2.5 inches.

Remedial design efforts as part of the 30 Percent Design will include further refinement of capping designs. Model results to-date indicate that the proposed cap design in the BODR adequately protects against erosion even under the conservative scenario modeled. Several conservative assumptions using the detailed hydrodynamic model have been utilized for preliminary design evaluations. Specifically, this includes an armor layer with a median (D_{50}) armor stone size of 1.5 inches. Based on existing US Army Corp of Engineers guidance and preliminary engineering calculations performed using the Shields diagram, this stone size will resist a bottom shear stress of approximately 120 dynes/cm^2, which corresponds to an extended (i.e., duration unlimited) flow in the Fox River of roughly 6.2 to 6.5 ft/sec, thereby incorporating a conservative safety factor of two. Under extreme flow conditions in the Lower Fox River (i.e., the highest flow ever recorded in the Fox River – 33,800 cfs, combined with the peak seiche and low water condition), less than 1 percent of the proposed capping area in OUs 2-5 will experience shear stresses greater than the design condition (i.e., greater than 120 dynes/cm2). Additional evaluations will also be performed to ensure the protectiveness of caps near storm water discharge outfalls and tributaries to account for localized flooding. Final design analyses will evaluate whether capping areas in the Lower Fox River may be subject to erosion due to peak shear stresses. These areas, potentially subject to erosion under these conditions, are estimated to be the less than 1 percent of the capping areas, and would likely be enhanced or dredging implemented in the final design.

Other weather related events could have an indirect impact on caps within the Fox River. High wind events on waterways can lead to accidents or unplanned occurrences such as ships breaking their moorings and running aground in shallow areas. Institutional controls are of no use in these situations, so they must be planned for accordingly. Severe weather wind events occur primarily in the summer months, with a similar temporal distribution as flood events (Figure 3). While wind events are unlikely to have the same impact as flooding or ice formation/jams, they should still be considered when evaluating suitability of a site for a cap.

The above data indicate that caps in the Fox River have a high risk of being compromised by scour events 10 months out of the year. The potential for ice related scours is high though the winter months, and through the summer and early fall flood events become a significant concern. Placing a cap in such a high risk area is completely unacceptable.

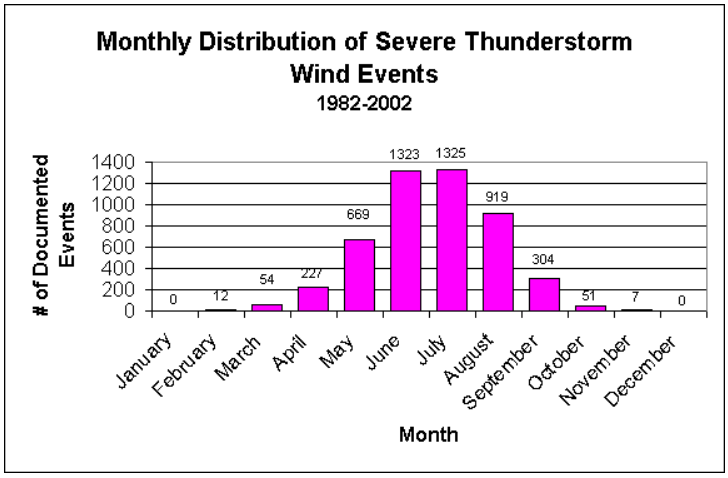


Figure 3: Frequency of Storm Related Wind Events in Green Bay, WI. (National Weather Service, 2006)

Changing conditions in and around the Fox River could also have and adverse effect on caps. Climate change will increase the occurrence of extreme weather events like those described above, but also including particularly low flows which could increase the chances of ice coming into contact with sediment. Population growth also would affect the river and any caps placed within it. The population of Northeast Wisconsin is expected to double in the next 25 years (Baumgart 2007). This would result in increase surface water runoff and higher river flows, along with the potential for higher non-point source PCB loadings. None of these future changes are addressed in the design of the cap presented in the BODR.

Agency Response

Several issues, including those presented in this comment could manifest themselves as increased flow within the Site. The dynamics of flow events was examined in the BODR and the conclusion is that site specific design and implementation will be needed as the remedy is implemented. As stated above, the original evaluation was based on conservative engineering design regarding flow velocities, shear stress, and evaluation of cap designs. The design of the remedy will be based on conservative design principles and the long-term monitoring and maintenance program will assure that the cap integrity is maintained. As part of this conservative design, the agencies recognize certain areas (e.g., where ice scour may be a concern) are not appropriate for capping and therefore will dredge those areas.

Additionally, in recognition of the difficulty of predicting *all* future conditions that could impact site conditions, the Amended Remedy has the following requirements in Section XI.D, pages 42 – 43, to address changed conditions potentially impacting caps protectiveness:

"- Cap enhancement and/or removal in response to cap

degradation.

If monitoring or other information indicates that the cap in an area no longer meets its original as-built design criteria and that degradation of the cap in the area may result in an actual or threatened release of PCBs at or from the area, then USEPA and WDNR shall identify additional response activities to be undertaken in the area. If monitoring or other information shows a pattern of cap degradation in multiple areas, then USEPA and WDNR may identify additional response activities to be undertaken in multiple capped areas at the Site (including in areas that have not yet shown any signs of degradation). The additional response activities shall include either:

- **Cap enhancement (e.g., application of a thicker sand layer or stone layer or use of larger armor stone); and/or**

- **Cap removal and removal of underlying contaminated sediment (consistent with the requirements of the primary remedial approach).**

- Cap enhancement and/or removal in response to changed water levels.

USEPA and WDNR may identify additional response activities to be undertaken in a capped area if monitoring or other information indicates that the minimum water depth criteria for capping are no longer being met in the area and that the failure to meet the water depth criteria: (1) may result in an actual or threatened release of PCBs at or from the area (e.g., due to an increased risk of damage caused by propeller wash, ice scour, or other factors); or (2) may have adverse impacts on River uses. The additional response activities may include either:

- **Cap enhancement; and/or**

- **Cap removal and removal of underlying contaminated sediment (consistent with the requirements of the primary remedial approach).”**

Cap Design

The ability of a cap to withstand impacts or pressure is tested through punch-through analysis. This is tested through theoretical modeling rather than actual field tests. The punch-through analysis for sand caps in the BODR only examines the pressure resulting

from footsteps overtop the cap. This is unacceptable, as it fails to examine the possible effects of impacts from debris such as tree limbs during storm events. These objects would strike the cap with much more force than a human walking over it, and are much more likely sources of damage. If a cap could not withstand the force of a human stepping on it, then it would be completely useless making this a ridiculous point of comparison. A more accurate one would be to model the impact of a large tree during a 100 year flood. The amount of force generated by such an event would be orders of magnitude more powerful that a footstep. It is vital that while evaluating remediation options, documented scenarios should be the benchmark for comparisons.

Agency Response

The Agency agrees that if the caps were proposed for shallow water areas that effects of impact from floating debris (e.g., trees) would be a concern as would be impacts from ice and other floating items. For this reason, the Agency has not approved the use of caps in areas where post-capping water depths would be less than 3 feet. Since floating logs are usually associated with periods of high flow and high water elevation, floating debris would be unlikely to impact the water bottom.

Finally, if monitoring triggered by these events showed the cap was disturbed, repair or removal of the cap and underlying sediments would be conducted as needed. It should also be noted that isolated logs or debris would likely only cause small localized disturbances to a cap, having minimal effect on the overall effectiveness of the cap.

The analysis of stresses resulting from significant flow events does not use the more appropriate and conservative value available. Shaw estimated a 100-year flood event to have a maximum flow of 24,200 cf/s on page 162 of the BODR (Shaw 2006). However, on page 28 Table 2-4 states that the maximum flow recorded at the mouth of the river (where a significant portion of contaminated sediments lie) was 33,800 cf/s. While this value is assumed to come from a more significant event than a 100 year flood, that is no reason to remove it from analysis. The fact that this event has happened in recent history should make it clear that it could potentially happen again, and the remedy should be designed as if it will. It is unacceptable to discount data simply on the belief that it is a result of a rare event- such assumptions often have disastrous consequences.

Agency Response

Please refer to comment response on page 33, above.

One major problem with the Optimized Remedy is the degree to which it relies on spatial analysis to determine where dredging and capping will occur. While such analysis is important and done well in the BODR, it can never be done perfectly. “Hot spots” are an unavoidable reality in these sorts of cleanups and cannot be predicted accurately.

The cleanup process would be better served if WDNR simply dredged all contaminated sediments rather than attempting to guess where the areas of highest concentration are. The inability to accurately predict in all instances where more contaminated sediments lie is another example of the flaws in the dredge and cap approach presented in the optimized remedy.

Agency Response

Given the 10,000 PCB sediment analyses performed as part of the BODR at 1400 locations and the 2590 analyses for PCBs in Fox River sediment that was the basis for the 2003 ROD, the agencies believe that any significant PCB contamination has been identified. Determination of contamination is not a "guess" but a statistical determination based on a large data set which gives the agencies a high degree of confidence that most contamination has been identified. This applies equally to capping or dredging. For this and other projects, the agencies generally take the approach that this method results in the agencies being able to identify a RAL that will address all the areas with significant contamination that pose an unacceptable risk to human health and the environment.

The Agency agrees with ESC (Environmental Stewardship Concepts/Commenter) that removal of the designated contaminated sediment will not necessarily lead to the removal of all PCB-containing sediment in the river, and therefore requires a verification process. The agencies will require post-dredge sampling to determine whether PCB sediment remains in the dredged areas. If PCB sediments remain above the RAL or if the OU does not meet the SWAC goal, further removal and/or capping may be required. In addition to post-remediation monitoring, long-term monitoring of surface water and biota will allow USEPA to assess the long-term environmental effects of the remedy. If monitoring does not indicate improvement, additional evaluations would be done to determine what additional actions would be necessary to adequately protect of human health and the environment.

Alternative Sediment Treatment Technologies

The BODR does not have an adequate evaluation of alternative treatment technologies beyond thermal desorption. WDNR should consider all available treatment technologies, and landfilling or allowing the sediments to remain within the river should only be considered as absolute last resorts. The placement of highly contaminated sediments into landfills does not eliminate PCBs, but only isolates them until a time when the liner of the landfill fails or its contents exposed. The contamination surrounding Kidney Island is an excellent example of the pitfalls involved in contaminated sediment disposal.

Outlined below are discussions of various treatment technologies that have potential viability for this project and should be considered as alternatives to capping contaminated

sediments or placing them in a landfill.

SEDIMENT WASHING

Sediment washing is quickly becoming one of the most viable options for treating contaminated soils and sediments. The process is relatively inexpensive (ranging from $40 to $200 per ton depending on a wide range of parameters), extraordinarily effective, and also produces a viable commercial product in the form of organically rich soil. The process has been proven at several sites, including pilot studies involving the treatment of sediments dredged from the NY/NJ Harbor. The process is relatively simple and produces a relatively minimal amount of harmful byproducts, all of which can be treated at a tertiary level POTW. This may be an issue in the Fox River, as Wisconsin does only requires secondary treatment at its POTWs.

The industry leader in this technology is Biogenesis Enterprises, a subsidiary of Weston Solutions Inc. The process that they have developed does not require a permanent facility and uses a minimal amount of equipment, including but not completely limited to: truck mounted washing unit, sediment processor, sediment washing unit, hydrocyclones, shaker screens, water treatment equipment, tanks, water blasters, compressors, and earth moving equipment.

The process as described by Biogenesis (1999) begins by screening the sediment for large pieces of debris. After the sediment has been screened, it is then treated and mixed with chemicals to aid in the separation of contaminants and soil particles from one another. Soils are then run through a high pressure washer before entering an aeration tank. Foam at the top of the tank is continually skimmed to remove any floatable organics and then placed in a phase separator. Excess water is then pumped back into the process. The bulk of the sediment is then transferred into a high velocity collision chamber. Here the soil is subjected to an ultra-high pressure wash cycle that physically rips contaminants off of soil particles. From the collision chamber sediment is then transferred into a mixing tank where an oxidant (in most cases hydrogen peroxide) is added to wet sediment before being agitated in a cavitation chamber that aids in the breakdown of organics such as PCBs. The sediment is then dewatered and is ready to be sold as organically rich soil. Soils that are still lightly contaminated but that still fall within cleanup standards may be used as backfill material or other non hazardous waste disposal options. Depending on the nature of the soil and cleanup levels required, this process may need to be repeated through one or two more cycles.

The Biogenesis process is geared much more to the treatment of PCBs than other pollutants such as dioxins and heavy metals. Cleanup rates of 99% for PCBs have been achieved in a pilot study examining various cleanup technologies in the NY/NJ Harbor area. Removal rates in the same study for heavy metals averaged around 90% while cleanup rates for dioxins achieved over 95% (Jones, et al, 2001). Other pilot studies have successfully cleaned a variety of contaminants to within cleanup standards (Amiran, 2001; DeDen, 2003). An additional study expected to be released in November conducted in the NY/NJ harbor is anticipated to show similar results, and the technology

recommended to clean sediments in the Passaic River (C. Wilde, personal communication).

Factors influencing the effectiveness (and therefore cost) of sediment washing include sediment particle size, the level of contamination, and the amount of contamination to be removed. Smaller sediments are more difficult to treat because of their higher surface area to volume ratio. As the level of contamination decreases, so too does the effectiveness of the process. Like any sort of washing process, the efficiency of a rinse is inversely proportional to the amount of substance to be cleaned from the sediment. This does not mean that high cleanup standards cannot be easily met, only that higher cleanup levels require more washes and therefore higher costs. Other factors influencing costs are local market for the treated soil (which can be sold to reduce costs) and the amount of sediment to be washed (Biogenesis, 1999). In order to be cost efficient, a minimum of 10,000 cubic yards of sediment is required for treatment. Smaller volumes would not justify the costs of transporting and setting up the required equipment for the treatment (Wilde, 2004).

Agency Response

USEPA and WDNR are familiar with the BioGenesis sediment washing technology. In fact, USEPA Region 2 in New York has been evaluating several treatment technologies, including the BioGenesis soil washing process for years, to address the large volume of contaminated sediment and limited landfill space in the northeast.

The agencies have discussed this technology with USEPA Region 2, and have reviewed available information regarding the BioGenesis process. A demonstration project by USEPA Region 2 was performed in May/June 2006 in which 20,000 cubic yards of contaminated sediment from both the Port of New York/ New Jersey and the Passaic River were treated using the BioGenesis process at a rate of 40 cubic yards per hour of dredge material. Although a report for this demonstration project has not yet been issued, an estimated 250,000 cubic yards per year could be treated, based on previous production rates.

The New York/ New Jersey harbor sediments have been characterized to generally have in the low single digits for PCB contamination (ppm), whereas Fox River sediments are higher, some in excess of the TSCA level of 50 ppm or greater.

Various pilot, bench, and demonstration production-scale testing of the BioGenesis process on contaminated sediments has shown a range of approximately 40% to 90% reduction in PCB concentrations. Based on initial PCB concentrations for Fox River sediments and PCB removal efficiency, the 1.0 ppm PCB remedial action limit (RAL) for cleanup of the Fox River sediments would often not be achieved by the BioGenesis

process. Thus, even if contaminated sediments from the Fox River were biowashed after being dredged, much of the washed sediments would still need to be landfilled, because they would be above the RAL. It is questionable whether any market would exist for washed sediments from the Fox River, given the levels of PCB that would exist in such sediments.

BIOREMEDIATION

Bioremediation can be defined as using naturally occurring processes to breakdown or otherwise detoxify contaminants. Most often this occurs in the presence of various species of bacteria, but other organisms such as higher plants can also be utilized. These processes all occur naturally over time, but the most efficient bioremediation projects in terms of both cost and level of cleanup optimize growth conditions (pH, temperature, etc) for the target organisms.

In addition to the optimization of growth conditions, primers or catalysts can also be used with effectiveness. Primers usually take the form of a compound easily broken down by the target organism which usually initiates dechlorination or other remedial reactions (Bedard, 1997). Catalysts such as certain species of iron or iron sulfide can also help initiate reactions (Zweirnick, 1998). These primers and catalysts are specific to the target organisms and the compounds that they are to detoxify.

Bioremediation has been successful in the treatment of a wide variety of chemicals ranging from PAHs to heavy metals. Considerable success has been noted in the dechlorination of contaminants such as PCBs and dioxins. Using bacteria such as *Dehalococcoides ethenogenes* that utilize chlorine for energy, high rates of dechlorination have been observed (Fennel, 2004). Rates increase substantially when a primer or catalyst is used. Zweirnick (1998) observed dechlorination rates of PCBs of 90%. The dechlorination of more complex compounds such as PCBs and dioxins generally is not complete (Zweirnick 1998, Fennel 2004, Bedard 1997). Usually the compounds are broken down into less toxic congeners such as ortho substituted PCBs (Zweirnick, 1998). While this reduction is still useful, persistent compounds with adverse health effects still remain after treatment. Some success in the complete breakdown of less complex compounds has been noted. *Pseudomonas stutzer*i KC (strain KC) has been found to be highly successful in the dechlorination of carbon tetrachloride without the production of chloroform, the most common product of carbon tetrachloride degradation (Dybas, 2002). Heavy metals have also been successfully treated, but treatment is also dependant on specific contaminants. A study conducted by Seidel (2004) reduced levels of Zn, Cd, Mn, Co, and Ni by significant amounts, but the treatment had little or no effect on lead or chromium.

A significant obstacle to bioremediation beyond the compound specific nature treatments is the length of time that many treatments require. Less complex compounds such as vinyl chloride can be treated over the course of days (Bradley, 1996). However more complex compounds such as PCBs or dioxins have taken upwards of three years, and at a minimum of several months for most treatments (Gosh, 2000).

Bioremediation could be difficult to implement within the Fox River, particularly given the massive scale on which it would have to be used. Potentially, bioremediation could be used in isolated areas of low contamination, but overall cannot be considered to be a viable treatment option on a broader scale.

Agency Response

The agencies agree bioremediation is not a viable option.

THERMAL TECHNOLOGIES

There are several technologies that use high temperatures to break down or otherwise destroy harmful contaminants. The main differences between the methods are the conditions that sediments are exposed to during the time that they are superheated. These differences affect the types of emissions and the efficiency of the processes.

All thermal processes except for vitrification have similar limitations. Most thermal processes can only treat organic compounds and mercury because of these compounds' sensitivity to high temperatures. Other heavy metals are generally not removed from sediments, requiring further treatment. Fine grain sediments are also difficult to treat. The finer grains trap gasses between the soil particles, making the thermal processes less efficient. Thermal processes also require thorough pretreatment in the form of dewatering.

Incineration is the most common type of thermal treatment and is used for a wide variety of wastes ranging from medical supplies to sediments (Eche, 2001). Incineration is also the most basic type of thermal treatment, where sediments are exposed to temperatures in excess of 700º C, breaking down most organic compounds and volatilizing mercury. Facilities are permanent and can occupy one to two acres of land. The process is not effective for PCBs due to the reaction forming dioxins that those compounds undergo when burned (Jones, 2001). Dioxins are one of the most dangerous classes of compounds because they share the persistent nature of PCBs and are more toxic. Scrubbers are used to reduce harmful emissions but are not effective enough to remove all emissions and in fact most incinerators do not meet air emission standards. Costs are typically high, ranging from $500 to $1350 (Sierra Club, 2001) per cubic yard because of the high energy costs.

Thermal desorption is similar to incineration but uses an additional scrubbing system to treat gas emissions. In addition, the heating process is performed in the absence of any oxygen and thereby removing the possibility of any dioxins or furans from being produced. Gas emissions are trapped and condensed with water, creating a contaminated but more easily treated waste stream. Facilities are designed to be portable but still may take 2-4 months to set up depending on the size of the project (Chemical Waste Management, 1993). Thermal desorption has been successfully demonstrated in pilot studies at a PCB contaminated Superfund site in New York (Jones, 2001). Costs are

much lower than other thermal technologies, ranging from $55 to $150 per cubic yard (Sierra Club, 2001). However, true treatment costs will be higher than this because of the need to treat the contaminated waste stream created by the process.

Thermal reduction systems use the same processes of thermal desorption but treat the gasses differently. Instead of simply condensing the contaminants with water for later treatment, thermal reduction injects hydrogen into the process and chemically reduces organic compounds into less toxic forms. Air emissions are recycled back into the process to increase the efficiency of contaminant reduction. Overall efficiency is dependant on the initial thermal desorption phase because this is where contaminants are physically released from the sediments (Smith, 2001). The technology is considered transportable but not necessarily portable, meaning that set up times are generally quite long (6-12 months) and difficult to set up. Costs are much higher than thermal desorption, ranging from $225 to $525 per cubic yard (Sierra Club, 2001).

Vitrification is the only thermal treatment that can treat metals other than mercury and also does not have the same problems with fine grain sediments as other thermal treatments. The process is similar to incineration, using even higher temperatures (> 900º C) temperatures to volatilize mercury and destroy organic compounds (Tzeng, 2000). The higher temperatures melt the sediments and remaining metals into a slag which is later hardened, effectively binding the metals and stabilizing them in a compound that can be resold as bricks, gravel, or other construction supplies. Air emissions are scrubbed in similar fashion to incineration, and because of the similarities between the processes the same potential exists for the creation of dioxins and furans. Facilities are difficult to set up and can take 6-12 months for site approval, depending on the size of the project. Costs are greatly reduced by the creation of an end product that can be easily sold. As a result costs are significantly lower than incineration, only running $60-90 per cubic yard (Sierra Club, 2001).

Thermal technologies are effective at eliminating contaminants such as PCBs from river sediments. However, the primary drawback of these technologies (the creation and release of dioxins and dioxin-like compounds) counters the overall benefits from their use. Creating one toxin to eliminate another is not acceptable, particularly given the particularly toxic effects of dioxins even at low concentrations. For this reason thermal technologies are not recommended to remediate contaminated sediments from the Fox River.

Agency Response

The agencies have continued to evaluate the viability of vitrification as an alternative to disposing PCB-contaminated Fox River sediments in landfills. Compared to landfilling of dredged sediments, this treatment technology is not cost-effective. Additionally, while the demonstration project for the Minergy process indicated that PCBs could be successfully destroyed, the agencies are concerned that vitrification would not be implementable on a full scale basis at the Fox River/Green Bay Site, given

the huge volume of sediment that needs to be addressed.

IN-SITU CAPPING TREATMENTS: ACTIVATED CARBON STABILIZATION

Another more recent method to remediate sediments that are contaminated with organic compounds such as PCB's uses materials that bind or react with the chemical or the sediment particles. Several research papers examine the effectiveness of activated carbon in immobilizing PCB's in sediments (Ghosh et al., 2000; Zimmerman et al., 2004). The basic concept is to bind the contaminants to the activated carbon and thereby reduce the ability or propensity for the contaminants to move from particles to either water or tissues of infaunal animals.

The work of Gosh et al (2000) and Zimmerman et al (2004) indicate a reduction of up to 99.5% in the water concentrations of PCB's following treatment with activated carbon. The method involved mixing the contaminated sediments with activated carbon at a concentration of 2.5 % activated carbon. This method was used in both lab and field trials. The results were consistent in showing reductions.

Follow-up research showed that activated carbon also reduced uptake of PCB's from contaminated sediments by clams and micro-crustaceans (McLeod et al., 2004; Millward et al., 2005). The >90% reductions in uptake could be from direct sediment uptake or pore-water uptake.

This method has some promise but has not been tried and used in long term field conditions. Even if lab or field trials of days to months duration are effective, the long term effectiveness remains unknown. Several factors must be evaluated in assessing this method, such as the stability of the contaminant-carbon association, integrity of the carbon over long periods, and the resistance to biological activity (microbial, macroinvertebrates, etc.) over decadal periods.

Treatment Recommendations:

Because of its effectiveness in eliminating contamination and the ability to reuse soil after treatment, the Biogenesis sediment washing process is recommended as a means to reduce the volume of contaminated sediment designated for landfilling. Treating contaminated sediments is far preferable to capping or landfill disposal as it actually eliminates PCBs instead of risking future exposures either through seepage from landfills or the failure of a cap. Bioremediation has yet to be proven cost effective and thermal technologies such as vitrification create harmful byproducts such as dioxins and distribute them over wide areas through air emissions. Currently, sediment washing appears to be the most cost effective and safest treatment option for contaminated sediments. It has a proven track record in treating the contaminants of the Fox River and satisfied the EPA's recommendations for the beneficial use of treated sediment.

Control of Ongoing PCB Sources

The Fox River receives effluent discharges from a number of industrial and municipal facilities for some distance. According to EPA (EPA 1998), at least 14 major dischargers have been identified as sources of PCBs and list PCBs in the facility effluents. These dischargers are listed below. The Wisconsin Department of Natural Resources (WDNR 1999) has identified thirty-three dischargers, including those listed by the EPA, as facilities which have included PCBs as being discharged between 1973 and 1997. These dischargers are listed below. Further information on these sites can be found in Appendix A.

Major discharge sources of PCBs into the Fox River (US EPA 1998):

- Kimberly Clark-Badger Globe Combined Treatment
- P. H. Glatfelter-Bergstrom Division
- Neenah Menasha Combined
- Wisconsin Tissue Mills
- Riverside-Kerwin Division
- Consolidated Papers-Appleton
- Appleton POTW
- Thilmany
- DePere POTW
- Fort Howard
- James River/American Can
- Green Bay Packing
- Green Bay POTW

These reports from 1998 and 1999 were the most recent sources of PCB discharge data available from the Wisconsin DNR. Additional input of PCB's can be expected from upriver sources discharging into the river, upriver sediments mobilized and transported downriver, and from atmospheric deposition that washes into the river as non-point source pollution (other than in stormwater collected by such systems).The BODR and original ROD documents do not account for any of these sources, with the single exception of a partial consideration of some stormwater input (in Section 2.5.3.5).

The river is a major sink for PCB's from historical discharges and from both current ongoing discharges. The goal of the cleanup effort is to improve the quality of the river environment for the protection of human and ecological health, and without strict control of PCB sources water quality improvements will be minimal regardless of the success of any dredging or capping program. WDNR identified 33 separate facilities discharging into the Fox River, 9 of which are paper mill facilities that have been identified as the most significant sources of PCBs into the river. (WDNR 1999, Shaw 2006).

The BODR considers these sources to be insignificant; however such assumptions cannot be made without adequate evidence. Stormwater data is the only evidence cited in defense of this assertion within the BODR, and it is significantly flawed. Stormwater was only tested during significant rain events, which are likely to dilute concentrations from those sources to non-detectable levels. Under normal conditions with small scale periodic

rains these could in fact be a significant source. The BODR estimates that point sources could account for as much as 23.5 kg/yr. This value is only insignificant in comparison to the massive loadings released from sediments. The goals set in the ROD cannot be met with continuing point source discharges of this magnitude. In order to meet these goals, WDNR needs to act decisively to control these sources.

As soon as possible, WDNR should develop a plan to achieve zero PCB discharges into the Fox River. Such an action is likely to encounter stiff resistance from dischargers, but this is no excuse to not meet the obligations established in the ROD. Only once these sources are controlled can long term remediation of the Fox River be successful.

Agency Response

The concept of developing a plan to achieve zero PCB discharges into the Fox River is impracticable because it is based on the faulty assumption that PCBs are no longer present in the environment. Contributions of PCBs are present in the atmosphere worldwide, and precipitation alone contributes enough PCBs in some locations to trigger elevated fish tissue concentrations that may cause fish consumption advisories. There are no new sources of PCBs from the Fox River discharges so it is already zero in terms of new sources. WDNR has a PCB standard developed by USEPA and the other Great Lakes states for the protection of the Great Lakes. Any discharger would have to maintain no detection of PCBs to comply with Wisconsin law.

Regarding contaminant non-point sources of PCBs into the Fox River, these sources are presently being addressed by WDNR's permitting and water quality division in various ways, including but not limited to Chapter NR216 of the Wisconsin Administrative Code, which requires industrial sources of storm water runoff to develop "stormwater pollution prevention plans."

Previous work documented in the Feasibility Study issued December 2002 provides the basis for the remedial action based on the nine criteria in CERCLA guidance for selection of the remedy. That work considers the relative contributions of various inputs of PCBs into the system, and determines that the sediment of the river was by far the largest source of PCBs presenting an unacceptable level of risk to human health and the environment. While other sources were assessed and acknowledged to exist, these other sources of PCBs are much smaller, and not environmentally significant.

Based on this comment, the agencies have re-evaluated the list of direct dischargers alleged to be contributing to the PCB loading in the river. A new review of the discharge monitoring reports from possible point sources of PCBs results in the same conclusion that they are insignificant

sources of PCBs to the Fox River. For the four municipal facilities: Green Bay Metropolitan Sewerage District, De Pere POTW, Appleton POTW and the Neenah-Menasha Combined POTW, no measurable concentrations of PCBs have been reported since 1999.

For the remaining current point source dischargers (all paper manufacturers or processors) the reported discharges are related to cooling water. The source of the cooling water is the Fox River itself. There have been no documented discharges of measurable quantities of PCBs from any paper making facility discharging process wastewater to the Lower Fox River since 1999. The discharge is therefore due to the presence of PCBs in the river before use by the paper manufacturers, with no addition of PCBs from industrial processes. The remediation planned in the original remedy, as well as the proposed modified remedy will reduce the concentration of PCBs in the intake water from the river for these processes, and will therefore reduce the discharge of return flows containing PCBs. In addition, three of the paper mills that are identified in the comment as ongoing sources of PCBs are no longer in operation and obviously all discharges have ceased for those operations.

In conclusion, current PCB sources to the Fox River (both point sources and non-point sources) are not considered to be significant, although they merit ongoing monitoring to assure that no new sources of PCB are introduced into the Fox River. Non-point sources are being addressed as part of the storm water management program, and other State programs.

Specific Comments on the BODR

Section 1

This section is primarily background information on the Fox River, and as such we have no comments on this portion of the BODR.

Section 2

Section 2 outlines the basic characteristics, both physical and chemical, of the Lower Fox River and the sampling programs performed to generate the data.

Section 2.2

Section 2.2 describes the physical characteristics of the Fox River. It should include a discussion of the organic content within the sediment as this has direct implications for the remediation of PCBs because of the affinity these compounds have for sediments with high organic content.

Agency Response

The sediment in the Fox River contains a substantial percentage of organic material as shown by the low specific gravity of 2.4 measured for the sediment (Table 2-10 in the BODR). A specific gravity of 2.4 indicates organic content of 10-20% by weight (ASTM Special Publication 820 on Peat Soils). Since the organics actively adsorb/absorb PCBs, it is not possible to wash PCBs from the organic component and soil washing will at best remove the sand fraction from the sediment.

Section 2.2.2.4

This section details the infrastructure, utilities, and obstructions in the waterway which may influence the cleanup. On page 24, the fifth bullet for OU4 notes that archeological sites are present. What is the nature of these sites? This needs to be expanded on.

Agency Response

Evaluations for potential cultural resources indicate that resources may be present, although none known of great significance are known. Determinations for the OU 1 Remediation, project in Winnebago County, Wisconsin, are:

- **two previously unrecorded prehistoric sites,**
- **one area was flagged to ensure that the ground would not be disturbed, allowing possible future investigations,**
- **a possible 19th century Euro-American farmstead at the OU 1 remediation site, and**
- **possible historical objects on the river bottom needing further evaluation for a final determination.**

Determinations for the Phase 1 project in Brown County, Wisconsin, are:

- **Two archeological sites in disturbed context, and**
- **One shipwreck within half a mile of the project area, which the project would not disturb.**

Further details are provided in the reports listed below.

These reports were completed, in part, due to requirements by the National Historic Preservation Act to evaluate the potential impact to cultural resources for projects that may affect cultural resources. These sites are either areas where land-based activities relating to dredging have occurred, or areas in the river where dredging was or will be done. Cultural resources reports that have been completed for Fox River projects include the following:

- **Stage 1A Cultural Resources Survey of the Fox River National (sic) Resources Damage Assessment, PCB Releases Site, Wisconsin, by Great Lakes Archeological Research Center, April 2004.**
- **Phase I Archeological Investigation of the Lower Fox River/Green Bay Operable Unit 1 Remediation Site Along the West Shore of Little Lake Butte des Morts, by Foth & Van Dyke, May 2004.**
- **Phase I Archeological Investigation of the Lower Fox River/Green Bay Operable Unit 1 Remediation Site and an Archeological Review of Side Scan Sonar Data from Little Lake Butte des Morts, Winnebago County, Wisconsin, by Foth & Van Dyke, August 2004.**
- **An Archeological Review of Sidescan Sonar Data from Little Lake Butte des Morts, Winnebago and Outagamie Counties, Wisconsin, by Stratamorph Geoexploration, Inc., September 2004.**
- **An Archeological Review of Side-Scan Sonar Data from the Lower Fox River, City of De Pere, Brown County, Wisconsin, by Strata Morph Geoexploration, Inc., November 2006.**
- **Phase I Archeological Investigation of the Lower Fox River Phase I Remediation Site along the West Bank of the Fox River, Brown County, Wisconsin, by Foth, January 2007.**

Section 2.2.4

Here hydraulic characteristics such as groundwater and discharge rates for the Fox River are discussed. In addition to the table on page 27, there should be a figure included in the document to display the historical flow data for OU2 from 1917-present.

Agency Response

Revisions to the BODR will not occur, as the document is considered final. However, the agencies may make modifications to later design documents. This applies to other comments recommending modification to the BODR.

This section of the BODR appropriately discusses challenges associated with various disposal options, including beneficial re-use as a net benefit to the project and the environment.

Each section of the BODR represents a component of the plan designed to meet the goals for water quality and reducing risk factors identified by the ROD.

Section 2.4

This section emphasizes the overall management position that disposal options and costs will drive the cleanup process. The emphasis should instead be on meeting water quality

goals in terms of fishable and swimmable waters.

Agency Response

In the agencies consideration for remedy selection, overall protectiveness is given first consideration. The 1.0 ppm PCB RAL established in the 2002 ROD and the 2003 ROD is based on risk, namely the bioaccumulation of PCBs in the food chain, with a goal of removing the fish eating advisories in a reasonable time frame, thus resulting in fishable and swimmable waters. In the BODR, Section 2.4 describes the framework for managing the disposal of sediments with PCB concentrations above the RAL, as well as for the potential beneficial re-use of sediments with PCB concentrations below the RAL that are separated during processing to reduce the volume requiring landfill disposal.

Section 2.4.2

This section outlines the methodology by which sediments are identified for disposal in a TSCA landfill. Why is OU4 the only area considered in this section? Other areas throughout the river have been recorded at or near these levels. This has serious implications for the disposal of contaminated sediments.

Agency Response

All cores in OU2-5 were considered in the analyses of TSCA sediment for disposal purposes, not just OU4. However, the analytical results of the sediment samples indicate that TSCA-levels of PCBs in sediment are only present in OU 4.

Section 2.5.2, Best Management Practices, pages 50-51

Best management practices (BMPs) should include the use of silt curtains, specific "no-dredge" weather and river conditions, the use of environmental buckets for the highest concentrations of PCBs, and other operational controls.

Agency Response

While the agencies experience on dredging projects on the Lower Fox River indicates that silt curtains may not be necessary, specifics on this and other matters will be developed in the Final Design (and possibly in later work plans). For purposes of this decision, these detailed considerations do not require final resolution.

Section 2.5.3.2

The methods used to estimate PCB loadings from tributaries and urban runoff in this

section are very crude and likely underestimate the amount of PCBs entering the river from these sources. Even with these flaws, these estimates indicate that stormwater sources contribute a significant amount of PCBs to the river and need to be controlled if water quality goals are to be met.

Agency Response

Stormwater is not a significant source of PCBs based upon years of monitoring including the intensive research done by WDNR and USEPA when a comprehensive PCB mass balance was developed for Green Bay and the Fox River. See Green Bay Mass Balance Report completed in 1993. In the Fox River, the contribution of PCBs from stormwater is the same percentage contribution as if found across the United States in all stormwater, as a result of atmospheric deposition of PCBs. There are no continuing or new sources of PCBs that are being conveyed by stormwater to the Fox River. These quantities are so small that they are not a factor in the development of the remedy.

Section 2.5.3.3

The last line of this section discussing atmospheric loads should be changed to indicate that atmospheric loads are only negligible when volatilization is factored into the mass balance.

Agency Response

So noted herein.

Section 2.5.3.4

On what basis is the assumption made that there are no loadings from surface water runoff at the Arrowhead Park Landfill? Without data, this assumption should not be made, particularly given the fact that the landfill is a documented source of PCBs into the groundwater.

Agency Response

Section 2.5.3.4, page 52 of the BODR states the following:

> **Steuer et al. (1995) estimated the groundwater PCB load for the Arrowhead Park landfill at 0.013 kg/yr (0.035 g/day). This estimate was based on dissolved PCB concentrations in groundwater samples from monitoring wells in the landfill (ranging from non-detect to 1.98 ng/L), and the estimated rate of groundwater flow through the containment dike of the landfill. The estimated load**

contributed by particulate runoff from the landfill was assumed to be zero.

Thus, loadings from Arrowhead Park have been determined to be insignificant.

Section 3

This section discusses the original remedy selected in the ROD, and outlines site considerations, dredging volumes, and the disposal of dredged sediment.

Section 3.1.1

When determining considerations for the transport of dredged materials, the document again is proposing management decisions that are based on logistical issues rather than cleanup goals. This approach is backwards. Cleanup decisions should be made based on the stated water quality goals, and logistical issues should be approached with achieving them.

Agency Response

Cleanup decisions have been made based on the nine criteria established in the NCP (including protection of human health and the environment). Remedial Action Objectives for the site were established in the 2003 ROD and are unchanged in the Amended Remedy. Section 3.1.1 of the BODR simply discusses the details of how the standards and goals in the ROD will be met in an efficient manner.

Section 3.2.1

This section noting the equipment selection process should make the environmental bucket dredge the default equipment for mechanical dredging.

Agency Response

An environmental dredge will be used for all dredging. The election of a specific dredge will be based upon site-specific conditions, engineering analysis, and a balancing of objectives of minimizing resuspension and residual contaminated sediments that remain after dredging, as well as efficient operations, and production. An environmental bucket will certainly be considered if mechanical dredging is used for a portion of the project.

Section 3.3.2.2, page 71, second full paragraph

This section notes that one section where PCB concentrations run between 70-80 ppm

that cannot be dredged. Sediments with this level of contamination should be removed, even if engineering controls are needed. If these areas cannot be cleaned up, signs and other institutional controls should be required.

This paragraph also notes that "sediment caps constructed in this side slope area will be designed to ensure permanent protection." If caps are used, then all should be designed as such.

Agency Response

For the particular area of the river referenced in the comment and referred to in the BODR Section 3.3.2.2, dredging would result in the removal of a large volume of relatively uncontaminated material and necessary land disposal of that large volume or would create an unstable shoreline.

The agencies agree that institutional controls will be necessary and a plan for their development and implementation is required in the Amended Remedy (Section XI.D, page 43- 44).

Section 3.3.4

When designing the dredge prism or the three dimensional volume of sediment to be dredged, efforts should be made to insure that the result is as protective to human health as possible. To be conservative and protect these resources, Type II (identifying contamination in places where it doesn't exist) errors should be preferred to Type I errors (determining that no contamination is present when it actually is) that to overcome uncertainties associated with dredging, the opposite of which is proposed in the BODR.

Agency Response

The agencies agree that it is better to overestimate contaminated material than underestimate. However, in addition to a robust pre-design sampling program, a post-remediation evaluation will further ensure that all contamination of the PCB RAL of 1 ppm is addressed. Furthermore, the Amended Remedy includes provisions for additional steps to be taken, if the 1 ppm cleanup level is not achieved. When setting the model to determine the 1 ppm PCB depth, Type 1 and Type II errors were balanced. Further overdredging will be required to meet target dredge elevations; statistical analysis considering this overdredge material increases the Type II error and decreases the Type I error.

Section 3.6.3.5, page 89, Metals

This paragraph is a gross misrepresentation of the metal concentrations shown in Table 3-9. While dissolved concentrations of metals did not exceed standards, total concentrations of mercury were well above standards. This paragraph should be amended.

Agency Response

Table 3-9 does not have metal concentrations. Output from the DRET model indicates that results were below State acute and chronic water quality criteria.

Section 4

This section is a continuation of the issues outlined in Section 3. Section 4 focuses specifically on sediment transport and disposal.

Section 4.1.1, page 111, first full paragraph

This paragraph notes that amendments to the percent solids in landfilled sediments may be required to reduce costs. What are the costs of the amendments not included? The inclusion of even rough estimates would be helpful.

Agency Response

The current cost estimate for the 2003 ROD may be low as amendments that may be necessary for disposal could add from approximately $100 million to $200 million. However, if amendment costs increased the 2003 ROD Remedy cost estimate, it would make the 2003 ROD Remedy even *less* cost effective than the cost estimates for the Amended Remedy. This reinforces the conclusion that the Amended Remedy is more cost-effective than the 2003 ROD Remedy.

Section 4.1.2.4

This section notes that treated decant water will be discharged directly into the Fox River. This water should be tested before it is allowed back into the river to insure that it is not damaging to water quality.

Agencies Response

The agencies agree. The water would be tested prior to discharge under any remedial action to ensure all State standards were met.

Section 4.1.2.5

Tested leachate from the Fox River contained significant concentrations of lead, arsenic, and PCBs. These compounds should not be allowed to enter groundwater. There should be no such discharges without treating the water first.

Agencies Response

The agencies agree. The water will be treated prior to discharge as needed to meet state discharge standards.

Section 4.3.7, page 132, first paragraph

Sand from the Fox River should not be used in conjunction with WWTP biosolids and sold as topsoil. These biosolids often have significant levels of PCBs, dioxin, and heavy metals. Combining them with even lightly contaminated sediments from the Fox River could create a significant health threat.

Agencies Response

The disposal of any dredged material must comply with all State standards and protectiveness criteria. The use of dredged material alone or in combination with bio-solids would have to be analyzed and evaluated to assure that the use does not pose a risk to human health and the environment. If the sediment is combined with biosolids or any other material, the combined concentration of chemical compounds or heavy metals would be fully considered before such a decision would be made. The resulting "product" would have to meet all State and Federal laws.

Section 4.3.8

The BODR proposes that dredged sediments from the Fox River be placed in the Renard Island CDF. However, it is clear that the island is already a hazard and not constructed adequately to contain contaminants. Additional contaminated sediments would only add insult to injury, and increase future costs of remediation at Renard Isle. No additional sediments should be placed at this facility.

Agencies Response

No contaminated sediments dredged as part of the Amended Remedy will be placed in Renard Island.

Section 4.3.12

The BODR proposes that lightly contaminated dredge material be used to cap more contaminated sediments in other areas of the river. This potential use of dredged sediments is completely unacceptable. Taking even marginally contaminated sand and using it as a cap over other contaminated sediments defeats the purpose of a cap. These sediments should be disposed of or treated as contaminated.

Agency Response

The agencies agree with the comment that sand separated from the dredge

slurry should not be reused in construction of the lower layer of engineered caps, unless the separated sand was tested and found to be non-detect for PCBs (using low level PCB analyses). This is the same requirement for an upland sand source to construct caps and covers. Only sand not containing PCBs or other contaminants will be used for the caps.

Section 5 Optimized Remedy

The introduction to this section outlining the Optimized Remedy states that substantial new information has been obtained and that much of the PCB contamination will still be removed. This section also claims that the capping will achieve the same level of protection as the ROD. The problem here is that the text does not explain the amount of PCB's that will be left in the river, the general uncertainty of how the caps will function, the overall comment that substantial Institutional Controls will be required essentially forever on this section of the river or that the primary purpose of the change from the ROD is to save money for the responsible parties.

Agency Response

The BODR Section 5.9.2 addresses the estimated percentage of PCBs removed under the ROD Remedy versus the Optimized Remedy. Cap design and considerations are described in Section 5.3 of the BODR. BODR Section 5.7 addresses cap monitoring, maintenance, and institutional controls. Cost is not the primary consideration for modifying this remedy, but is just one of seven "balancing criteria." As per the NCP, the "threshold criteria" of protection of human health and the environment and meeting ARARs have been critical in the decision to amend the 2003 ROD remedy.

This introductory section needs to be clear about the unknowns and gaps in this cleanup plan. The introduction should give a general statement regarding levels of uncertainty, the weather conditions in the river that raise problems for capping, the residual risks that can be expected and other uncertainties and unknowns. This section should also state that the ROD and BODR only have limited information on ongoing sources and the estimate from WDNR is that the current discharges will continue adding PCB's to the Lower Fox River for many decades.

Agency Response

Given the large amount of new design data now available (10,000 sediment samples from 1400 locations), there are significantly fewer "unknowns and gaps in the cleanup plan" than at the time of the 2003 ROD Remedy. A more detailed engineering analysis was performed in the BODR, providing the basis for the selection of the Amended Remedy. Also, USEPA's experience on other capping projects (See Attachment 1), extensive additional analysis, and conservative design all suggest that uncertainties

for caps are acceptable. Additionally, any remaining concerns regarding the remedy's protectiveness and effectiveness would be addressed by long-term monitoring and maintenance. This monitoring pertains to cap integrity and performance, as well as monitoring of surface water and biota. Post-construction monitoring should ensure that the Amended Remedy provides sufficient protection of human health and the environment. If monitoring were to indicate that the remedy is not achieving the Remedial Action Goals, then USEPA would consider requiring additional measures.

The BODR states in numerous places that the 6 inch layer of sediment is too thin to effectively dredge with a hydraulic dredge without capturing clean sediments that underlie the contaminated sediments. The problem here is that the BODR presents no data which supports this claim regarding the inability of dredge equipment. If this statement is to be believed, then the BODR must provide documentation that some project attempted dredging 6 inches and failed or letters from dredging operators and contractors, or any other hard data on which to base such an important decision.

Agency Response

Based on experience for numerous dredging projects (e.g., at the Fox River, Deposit N, SMU 56/57 and OU 1 dredging), USEPA believes that it is reasonable to assume that 6 inches of "over-dredging" would occur.

Specifically, the following information from recent dredging activities at OU1 at the Fox River/Green Bay Site supports this assertion:

1) **"Final Report, Lower Fox River Operable Unit 1, Remedial Summary Action – 2004 Remedial Summary Report," March 2006 in Section 3.4, page 15: "The average depth of cut of the sediment to 1.0 ppm PCB in OU1 is 1.0 feet. Thus, a typical 6-inch overcut would increase the actual volume dredged by 50% over the targeted sediment volume."**

2) **"Draft Report, Lower Fox River Operable Unit 1 Remedial Action – 2005 Remedial Summary Report," March 2006, Section 3.2.2, page 16: "The average overcut in Sub-area A was 3.5 inches and, in C/D2S, it was 2.7 inches."**

3) **"Lower Fox River Operable Unit 1 Remedial Action 2006 Summary Report," March 2007, Section 4.1, page 4-7: "GW Partners selected a 4-inch overcut allowance for 2006 based on experience from the 2005 RA dredging and feedback from J.F. Brennan."**

Thus, the assumption that an extra 6 inches of sediment would likely be

removed during a dredging project is a reasonably conservative assumption, based on experience at Fox River and other projects.

The situation is in fact worse because of the other assumptions regarding a thin, 6 inch sand cap on 210 acres of the river where sediment PCB is 1-2 ppm. The BODR assumes that the surface sediment mixes with the lowest layers of the sand cap, essentially causing the two layers to form a boundary layer of sorts. The BODR assumes this mixed layer is 3 inches. The top 3 inches is then the thickness of the clean sand that forms the cap to separate the contamination from the river water and anything else. The punch through analysis is based on 6 inches, not 3. The result would then be that a person walking on the sand (the punch through scenario) would or could penetrate the sand cap to a depth greater than 3 inches, and reach the "mixed" layer where the contamination is assumed to begin.

Agency Response

The six-inch sand "covers" are not being proposed as engineered "caps." The sand covers are expected to mix with the underlying contaminated sediment. Specifically, the Amended Remedy includes placing a 6-inch sand cover over sediments with PCB concentrations between 1.0 and 2.0. The sand cover option is not intended to permanently isolate PCBs, but is necessary to provide an enhanced natural recovery by mixing to reduce the concentration of PCBs in the surficial sediments to below the RAL.

As described in the BODR, sand cover would be placed in two 3-inch lifts, with the bottom lift mixing with, and stabilizing the underlying soft sediment, and the top lift not mixing with the first lift. However, the agencies have adopted a more conservative approach by assuming that the 6-inch cover would completely mix with the underlying sediment over time. With a limitation of one 6-inch interval of sediment up to 2 ppm PCBs, a completely mixed layer of sediment and sand cover will be less than the 1.0 ppm RAL. Further, in a majority of the areas it is expected that the mixing layer will actually be less than 3-inches.

With respect to engineered caps, design of the lower isolation layer includes an analysis of sand mixing with the underlying sediment, as well as other construction/ placement considerations, such as an over-placement allowance.

Finally, as stated on page 143 of the BODR, "While such low-risk areas collectively represent only about 0.5% of the total PCB mass in OUs 2 to 5, such areas represent nearly 18 percent of the remedial action area and about 5% of the volume of sediments that would be dredged under the ROD."

The punch through analysis does not account for objects falling into the river and being

driven into the sand cap with any force. The punch through analysis needs to account for tree limbs, objects falling from ships, docks and shoreline, and other situations in which projectile penetration is evaluated. The BODR authors surely recognize that large objects fall into the water and can penetrate into the sediment or be driven into the sediment by the force of floodwaters or river ice.

Agency Response

Small disturbances to a cap would not compromise the overall efficiency of the cap, regardless of the process. Any localized disturbance of the cap would potentially reduce its efficiency only for the area disturbed.

Engineered caps will include an armor layer over the sand layer. The specifics of the armor stone, including its thickness, will be refined in the Final Design. Prior to completion of the Final Design, further consideration will be given to the potential for cap disruption by ice scour, high water flows, propeller wash, bioturbation, or other disturbances by natural or man-induced activities.

The BODR does not mention and therefore must discount recreational boat use of the river. Boaters anchor and anchors can and do penetrate more than just an inch or two into the sediment. Anchoring will certainly increase physical disturbance of the sand caps.

Agency Response

Some anchoring impacts to the cap are expected. However, these would be localized, and would not compromise the overall effectiveness of the cap. In areas with expected high density of recreational craft use, dredging rather than capping will occur.

Institutional controls may also be used in certain areas to minimize anchor drag or punch through over caps.

The effects of propeller (and jet) wash on engineered caps from commercial and recreational boats will be further addressed in the final design and accounted for in the final cap construction plans.

The BODR does not present a failure analysis or accident analysis for the extensive capping of high and low level contaminated sediments in the river. The BODR should, at a minimum, conduct such analyses based on US Coast Guard records, shipping company records, etc. Risk analysis of shipping is not a new field and needs to be applied to this plan for the lower Fox River.

Agency Response

As part of ongoing design efforts relating to the BODR, a survey of

commercial and recreational vessels currently using the river will be completed. Vessels likely to use the river in the future will also be considered. An analysis of current and future navigational uses will be incorporated into the Final Design. If the analysis suggests that future water bottom disruptions are likely, then a more robust armor layer or dredging will be required along with reporting or monitoring system and/or instititutional controls may be required.

Throughout Section 5 and the entire BODR, the report states that large areas are covered with a "thin layer" of sediment with PCB concentrations of 1-2 ppm, far lower than the rest of the contaminated areas. The action level is 1 ppm, so the BODR states that about 210 acres are marginally contaminated. The BODR fails to state that pretty much the entire lower Fox River is contaminated with PCB's from the paper mill effluents and other releases. As a result, fish and other aquatic animals will encounter PCB's in the entire habitat during all life stages. Admittedly, the 1-2 ppm is substantially lower than the highest concentrations that contaminate the river sediments. On the other hand, the BODR presents no data to indicate that 1-2 ppm are safe levels, or levels that do not result in significant harm to the aquatic system and people. Indeed, the ROD is based on a cleanup standard of 1 ppm PCB's in sediment because higher levels do not provide protection of human health and the environment. The lower levels of contamination are coupled with extensive areas that will not be treated at all and the continuing discharge of PCB contaminated effluent from paper mills and POTW's on the Fox River, and possibly other sources of PCB's (i.e., leaking contaminated sites).

Agency Response

The Amended Remedy does not change the RAL performance standard or the SWAC goal. A sand cover will be place in areas where sediments contain PCB concentrations between 1.0 ppm and 2.0 ppm. The sand cover should provide a final PCB concentration in these areas of less than 1.0 ppm.

Possible ongoing sources of PCBs have been evaluated in the BODR, and will be given further consideration during design. In Section 2.5.3.6, page 53, the BODR states:

> **"Given the magnitude and uncertainty associated with PCB loads from Lake Winnebago, tributaries, urban stormwater runoff, and point sources, these sources may deserve further consideration in assessing their impact on the long-term effectiveness of sediment remediation in meeting RAOs. While the resuspension and dissolution of PCBs from in-place sediments in the Lower Fox River likely represents the largest load source to the river system under present-day conditions, when this source is controlled as a result of the sediment remedial action, the significance of remaining point and non-**

point sources may become more evident. The significance of these other potential sources may only become known in the context of future, long-term, post-construction monitoring of water and fish tissue concentrations."

The BODR fails to accept the fact that PCB's are sufficiently toxic that 1-2 ppm in sediments will certainly result in accumulation into the aquatic food web. PCB's can increase in concentration by several hundred over the level in sediments or water (Rice et al., 2003). Tissue levels of a few ppb or lower can have serious reproductive and developmental effects on fish, birds and terrestrial mammals (e.g., mink). Mink suffered reproductive problems when fed a fish diet that contained 0.25 ppm PCB's (see Rice et al., 2003). The Wisconsin water quality criterion of 0.003 parts per trillion is set so low because of the accumulative potential and enduring effects of these toxic compounds on humans and wildlife (see Rice et al., 2003 and references contained therein).

Agency Response

The agencies agree. Therefore a PCB RAL of 1.0 ppm, and a PCB SWAC of 0.25 ppm have been established for the Fox River/Green Bay Site and are only slightly modified in this ROD Amendment, with PCB SWAC goals established for OU 3 at 0.28 ppm, and for OU 4 at 0.25 ppm.

Monitored Natural Attenuation is not described and not even mentioned in this section that is supposed to give the details of the plan. This omission is a major flaw in the report. The BODR needs to spell it out describe the areas where natural attenuation will be used and what evidence exists to believe that PCB's will naturally breakdown in these sediments. Rice et al. (2003) describe some of the information on degradation and breakdown of PCB's in the environment, noting that in the absence of sunlight and oxygen, such breakdown is a slow process. Given the fact that PCB's discharged over many decades still remain buried in the Fox River, there is no reason to now believe that other PCB's will not remain in the sediments in other parts of the river.

Agency Response

Monitored Natural Recovery (a.k.a., Monitored Natural Attenuation) for most of OU 2 and OU 5 is unchanged from the 2002 and 2003 RODs. The 2002 and 2003 RODs further explain Monitored Natural Recovery (MNR) and its basis. The Agencies have not accepted MNR for any areas exceeding the 1 ppm PCB RAL in OUs 3 and 4.

Section 5.1 Design Goals

The third bullet states that the sediment removal will remove high level PCB contaminated sediments without disturbing sediments with lower level contamination or where there are logistical difficulties. The text here fails to note that "near 1 ppm" also means sediments that exceed 1 ppm PCB's, despite the 1ppm action level for this site.

The statement is also vague with regard to the criteria for what sediments are too difficult to remove or whether some are just more expensive than others to remove, and therefore the responsible parties want a less expensive method.

Agency Response

As stated above, the Amended Remedy will address all known areas with PCB concentrations above the 1.0 ppm RAL. The only areas that will not be addressed are areas where it is impracticable to implement a remedial action. Even if there are a few small areas above the 1.0 ppm RAL performance standard left unremediated, the PCB SWAC goals of 0.25 ppm for OU 4, and 0.28 ppm for OU 3 will be met.

The fourth bullet makes all the assumptions about capping and fails to include the limitations. The statement also implies that all the caps will be armored, when such is not the case. Many caps, especially in shallow areas will not be armored and will only be sand caps that have no armor. The casual comment about institutional controls fails to convey the full sense and meaning of this control measure. The bullet needs to include the fact that parts of the river will have legal limits on commercial and recreational activities forever.

Agency Response

All engineered caps will be armored, as "caps" in the context of the Proposed Plan and ROD Amendment refer to areas where 6 - 15 inches of sand plus 7 - 18 inches of armor stone will be placed. "Sand covers" with 6-inches of sand will also be used but are not considered permanent "caps" and will only be placed over sediments with PCB concentrations less than 2 ppm (only slightly above the RAL of 1 ppm), and over relatively thin (i.e., 6-inches) zones. Sand covers will accelerate natural recovery, but are not necessarily permanent features. Engineered caps on the other hand are designed to be stable over the long-term and will be monitored and maintained as required. Sand covers are expected to mix with underlying sediment, will provide a protective result, producing PCB concentrations in covered sediments of less than 1 ppm. Table 5 in the ROD Amendment, reproduced below, describes the different caps and sand covers.

Summary of Preliminary Design Features for Capping and Sand Covers.

Description		Minimum post-cap/cover water depth	PCB concentration	Area covered by cap or sand cover
Cap	6-inches of sand[1] and 7-inches of gravel	3 feet	<10 ppm[3]	400 acres
	9-inches of sand[1] and 7-inches of gravel	3 feet	10 – 50 ppm	25 acres
	15-inches of sand[1] and 18-inches of quarry spall[2]	3 feet	Varies	25 acres (mainly in navigation channel)
Cover: 6-inches of sand		Varies	1.0 - 2.0 ppm[4]	210 acres
		Varies	Dredge residuals	Dredged areas as necessary to meet cleanup requirements (an estimated 510 acres maximum)

Notes:
Most information taken from BODR, Table 5-5.
[1] Assumes lowest 3-inches would mix with underlying contaminated sediment.
[2] Large angular stone from rock quarries.
[3] PCB concentration in 0 – 0.5 foot depth below mudline.
[4] Maximum PCB concentration in any 6-inch interval. Sand cover is assumed to completely mix with underlying sediment and still achieve the 1.0 ppm RAL.

The last bullet on page 141 states that sediment removal will be done in a manner equivalent to the dredging described in the ROD, but this statement is so vague as to be disingenuous. This statement is misleading. This bullet needs to specifically state what method is equivalent to the one(s) in the ROD.

The second bullet on page 142 of this section claims that the original ROD cannot dewater the sediments on site because of the larger volume. This point is simply a thin excuse for weakening the cleanup. The problem with this statement is that the solution is being driven by what the responsible parties want to do, rather than what needs to be done to clean the river. If a larger volume or more space or additional equipment is needed, then financial resources need to be provided by the responsible parties to accomplish the cleanup properly, including obtaining the needed space. The first statement of the bullet needs to be removed.

Agency Response

This bullet does not intend to state that mechanical dewatering would not be feasible under the 2003 ROD. Rather, it states that the lower dredge volumes under the Amended Remedy make it more feasible than for larger volumes dredged under the 2003 ROD Remedy.

The last bullet on page 142 of section 5.1 gives a cursory statement about monitoring, natural recovery and institutional controls. None of these points adequately explains the full magnitude and significance of the three activities. Monitoring should be used to enforce, institute cleanup or determine effectiveness and will continue for decades. Natural recovery is a fancy way of saying that the responsible parties will do nothing. Institutional controls limit the use and access to the river and will last forever, the time that PCB's will remain in the sediments of the lower Fox River.

Agencies Response

The last bullet on page 142 of Section 5.1 of the BODR recognizes that as a practical matter capping and dredging cannot immediately eliminate all risks of PCB in sediment, surface water and fish. Even if the PCB RAL and SWAC goals are met, it will take additional time for PCB concentrations in fish to be reduced to acceptable levels.

Somewhere else the BODR needs to provide a complete and well documented analysis of capping effectiveness. If capping technology is considered to be so effective as to use it throughout the river to hold in sediments in surface layers, at depth and in low and high flow areas, then there must be some data on which to base this conclusion. The WDNR, EPA and responsible parties need to provide a technical analysis of caps that includes peer-reviewed literature, technical government reports, industry documents regarding the use of caps in rivers. This report needs to show the use of caps, the duration, contaminants capped, types of sediments, waterbody, and other information. This technical view needs to provide the results of monitoring efforts and documentation that the data are acceptable from a quality assurance quality control perspective.

Agencies Response

A table in Attachment 1, page 212, summarizes the design, operation and monitoring results for 32 capping projects that were constructed between 1978 and 2001. A similar table was included in the Responsiveness Summary to the 2002 ROD (Responsiveness Summary, White Paper 6B, Attachment 1). Attachment 1 to this document includes a summary of the following information for these projects: Chemicals of Concern, Site Conditions, Design Thickness, Cap Material, Year Constructed (1978 to 2001), Performance Results, and other pertinent information. Information on these projects indicates that to-date, these caps have been effective in providing contaminant containment for a considerable range of conditions world-wide.

Page 142 bottom- The bullet needs to state clearly that monitoring will be conducted for the foreseeable future so long as PCB's remain in the river sediments. The text of this bullet also needs to state clearly that institutional controls are not the preferred approach and will place permanent restrictions on property use and use of the river. Finally, the bullet needs to indicate what information will trigger additional actions or work on this

site.

Agency Response

The agencies agree. These concepts are incorporated in the Amended Remedy.

Section 5.1.1

This section of the BODR summarizes the "new information" from the Remedial Design (RD) (sediment core data) used to justify leaving up to 40 % of the total PCB load in the river. On page 143, the first bullet refers to figures 2-21 and 2-22 for support of the statement that deeper sediments are more contaminated in parts of the river, and overlying, less contaminated sediments would have to be disturbed to get at the deeper sediments. The figures also indicate that sediment PCB levels at the surface or in shallow sediments exceed the 1 ppm action level and should be removed anyway. These figures support the conclusion that the sediment is contaminated with toxic levels (determined in the ROD that set the 1 ppm level) of PCB's and needs to be removed at depths as great as 10 feet (see Figure 2-23). This bullet text seems to attempt to justify leaving highly contaminated sediments (perhaps as high as 100 ppm) in place because they are deep, in the navigational channel and dredging these sediments will cost more money. None of these justifications is satisfactory in violating the terms of the ROD.

Agency Response

The term "new information" as used here, refers, in part to greater core density and better core recovery than previous Fox River sampling, particularly for deeper sediments (i.e., greater than 10 feet below the mud/water line). The agencies previously thought that sediments were more homogeneous than this more detailed sampling revealed. Additionally, more recent engineering evaluations have confirmed that caps are protective.

Contrary to what the commenter has stated this proposal does not "violate the terms of the ROD." Under the NCP, RODs can be modified, provided that the procedure as described therein is followed. USEPA has carefully followed that procedure for the Fox River Site. Further, cost is only one of nine criteria that the NCP requires USEPA to consider in selecting or modifying a remedy for Superfund Sites. At this site, USEPA compared the Amended Remedy against the 2003 ROD Remedy under each of the nine NCP criteria. The first two threshold criteria are: 1) whether the proposed remedy is protective of human health and the environment, and 2) whether all Applicable or Relevant and Appropriate Requirements (ARARs) can be met by the Amended Remedy. In USEPA's judgment, both the 2003 ROD Remedy and the Amended Remedy meet the first two threshold criteria. Given that, USEPA next considered the "balancing criteria" under the NCP.

The Amended Remedy and the 2003 ROD Remedy were considered to both be implementable and provide long-term and short-term effectiveness. Both remedies reduce the mobility of contaminants but do not treat sediments, although dredge water is treated prior to discharge back to the Fox River. The Amended Remedy was found to be more cost effective ($390 million versus $580 million). Both remedies are acceptable to the State Agency (i.e., WDNR), as witnessed by WDNR's cosigning this Amended Remedy. Regarding community acceptance, while a majority of the public comments generally opposed the Proposed Plan, the comments did not cause the agencies to change their view that amending the ROD is appropriate.

The second bullet on page 143 suggests that lower level contaminated sediments in shallow areas can be covered with 0.5 ft of sand as a remedy as effective as removing the contamination. First, this plan to place 0.5 ft of sand over large area of flats contradicts other statements that all caps will be armored. Placing 0.5 ft of sand is not an armor. Nor will there be any way to enforce institutional controls on this broad area cap of the river flats. Nor is there any evidence presented of the effectiveness of such a shallow cap of sand on top of a layer of more organic and lighter depositional contaminated material. The problem that may well occur is that the PCB contaminated material may not simply bury, but may end up in the surface sediments as a result of physical-chemical processes or biological activity in the clean sand. The text needs to state the uncertainty of this method and admit that these will be unarmored caps requiring institutional controls over vast areas of the river.

Agency Response

As stated above, engineered caps will be armored; sand covers will not be armored. Engineered caps are designed to be stable and will be subject to monitoring and maintenance into perpetuity. Sand covers are assumed to mix with the underlying sediment, and thus their use is restricted to certain conditions, described above.

Bullet 3 on page 143 essentially concludes that it is too difficult to dredge the surface contaminated sediments that are near the RAL of 1 ppm. The BODR needs to make a substantive case for violating the conditions of the ROD other than it is a difficult task to comply with the ROD corrective action measures to protect health and the environment. The BODR does not seem to have any documentation that sediment layers of 0.5 ft cannot be removed without taking vast quantities of uncontaminated sediments as well.

Agency Response

As discussed above, limitation of dredging technology would require the removal of six inches of sediment, in addition to removing the sediments that actually contain PCBs.

The fourth bullet on page 143 in Section 5.1.1 anticipates Early Actions to remove some of the contaminated sediments with the highest PCB levels (3,000 ppm). This plan is wise and should be taken up without delay. In implementing these early actions, the borders/ footprints and boundaries of the contaminated hot spots have to be carefully evaluated.

Agencies Response

The agencies agree. The agencies have entered into a Consent Decree with NCR Corporation and Sonoco-U.S. Mills Inc. to clean up the referenced hotspot area below the De Pere dam. Planning and design efforts for this work, known as Phase 1, are ongoing with dredging starting on May 1, 2007, and should be completed by the end of the 2007 construction season.

Page 144, top bullet – the point that Congressional Reauthorization of the navigational depth must also note that this change has to be permanent and part of the Institutional Controls that prevent disturbance of these areas.

Agency Response

If Congress changes the depth of the navigational channel in the Fox River, as described in the BODR, capping in the navigation channel could be implemented. If Congress does not change the depth by authorizing a shallower channel, then capping in the channel would likely not occur. The Amended Remedy allows for either possibility, as the Amended Remedy simply states that any cap that is placed under the navigation channel must be 2' in elevation below the authorized navigation depth, whether it is the current depth of 18 feet, or a modified one presently proposed for 6 feet. If the navigation channel depth is not modified from the current authorized depth of 18-feet, Amended Remedy costs would be higher as approximately 30 acres in the navigation channel (out of a total 450 acres planned for capping) would be dredged instead of capped. However, added costs due to additional dredging in lieu of capping would not be sufficient to change the conclusion that the Amended Remedy is more cost effective than the 2003 ROD Remedy. Ensuring that the top of the cap is 2 feet below the authorized depth of the navigation channel would not be an Institutional Control requiring ongoing enforcement.

Page 144, third bullet- The text here points out that some of the deep contaminated sediments are located in areas that make dredging difficult or dangerous to the point of causing structural damage. Such areas have to be carefully examined and EPA consider all treatment options. In places where highly contaminated sediments cannot be completely removed, other measures must be taken, including using reactive caps to enhance PCB breakdown, bind the PCB's and reduce or eliminate the uptake of PCB's into the aquatic food web.

Agency Response

Areas that are difficult to dredge will be comprehensively evaluated, considering limitations related to local conditions. Reactive caps are an emerging and promising technology, and may be used if site-specific conditions indicate they are necessary.

Page 144, last bullet of Section 5.1.1- This bullet argues that there is nothing to do with the dredged contaminated material except put it in a landfill and that not enough landfill space is available for this project. The BODR fails to mention any of the newer treatment technologies that are available, including sediment washing that would then provide an end-product that does not require treatment such as hazardous waste landfilling and may even allow reuse as a clean material. These comments include materials on alternative treatment technologies for contaminated sediments.

Agency Response

In earlier responses USEPA has discussed possible treatment technologies such as the BioGenesis soil washing process. Additionally, it should be noted that even if the sediments were treated, the vast majority of treated material would be unsuitable for most beneficial uses, and most sediments likely would still require proper disposal (probably in a landfill).

Section 5.2.1 page 151, second bullet. The example of a sand and gravel cap of 1.1 feet, about 13 inches, demonstrates the inadequacy of the cap remedy. Notwithstanding the modeling exercise on cap design, the 1.1 foot cap is hardly enough to physically protect and shield the water column from the contaminants.

Agency Response

Based on extensive technical evaluations and experience, the agencies disagree with this conclusion. Preliminary cap design for the Amended Remedy follows USEPA guidance in calculating the necessary thickness of the sand and armor layers, with an extra safety margin. These evaluations include consideration of experience on other capping projects, potential bioturbation impacts, and detailed calculations of potential migration of contaminants through the cap. The armored layer provides additional protection from possible erosive forces, based on modeling and water flow data from the Lower Fox River.

The last bullet indicates that the dredging estimates conducted for the BODR are not capable of dredging only 6 inches of sediment, for reasons that are not explained and with no documentation. The BODR challenges credibility by suggesting that the dredge contractors and operators do not know how or are not able to dredge only 6 inches of sediment.

Agency Response

As previously discussed in response to earlier comments, even when precision dredging techniques are used, it is normal for "overdredging" of approximately six inches to occur. Simply put, there are limitations to the accuracy of dredging techniques, even when contractors experienced in dredging are used. To remove six inches of targeted sediment, it is expected that approximately twelve inches will need to be removed, to ensure removal of the desired six inches. This "overdredging" has been experienced at numerous projects, including the Fox River OU1 dredging project, discussed above.

Section 5.3.1 Cap design criteria, Page 162. The design used a seiche amplitude of 4.3 feet over an 11 hr period. Will this account for the seiche that was documented by Dr. Paul Baumgart and is included in these comments as an appendix? In the seiche noted in 1990, flow increase from 12,000 cfs to about 48,000 cfs in a matter of about 6 hrs, and the seiche continued for more than 2 days. These measured results indicate that the modeled seiche is not sufficient to account for the observed sieches.

Agency Response

The seiche that occurred between June 22 and 24, 1990 consisted of a series of upswings in water level measuring approximately 2 to 2.7 feet peak to trough. The highest peak was measured at 13:00 on June 22, and the heights of the peaks gradually declined over the two-day period. This relatively large seiche, however, is 40% smaller than the seiche used in the hydrodynamic modeling. Furthermore, hydrodynamic modeling conducted as a supplement to the BODR conservatively simulated the June 22-24, 1990 flow, including the effects of the 2-2.7 ft seiche, and applied the maximum 4.3 seiche as an additional component. This supplemental modeling effectively accounted for compounding seiches is considered very conservative.

Pages 163, last paragraph. This section gives the clearance between the top of the cap and the bottom of river ice that might threaten the cap below. The clearance given is only 7.2 inches in OU3 and only 1.2.inches in OU4. Neither of these clearances is sufficient to provide a margin of safety that can be expected to protect the integrity of the cap. A bit of debris or abnormal ice could protrude beyond the modeled depth of ice. In addition, more extreme weather conditions from global climate change can be expected to make weather conditions more severe than in the past.

Agency Response

The "worst-case" conditions represent the combined effect of an extreme (100-year) ice thickness and an extreme (lower 1% of all winter measurements since 1953) low water. Even under these combined extreme

conditions, there would be a small buffer between the bottom of the ice and the maximum top of caps. Furthermore, only approximately 10 percent of the capping areas in OU 4 will have a final surface elevation within six inches of extreme worst-case bottom of ice elevation under extreme low water conditions. Therefore, nearly 90 percent of the areas to be capped will have at least a six inch buffer between the top of the cap and the bottom of ice under these extreme conditions.

Although the Amended Remedy is designed to avoid interaction between ice and caps under reasonable worst-case conditions, it is important to consider the potential impacts of such interaction. Since capping has not been proposed within the portions of the river subject to potential frazil ice formation, the potential for cap materials to adhere to the bottom of an ice sheet is minimal (especially considering the gravel-sized likely to be used for armored caps).

Based on the above discussion, the cap design presented in the Amended Remedy should be successful in avoiding impacts associated with ice formation. Furthermore, the Amended Remedy requires a monitoring and maintenance program that would identify and remedy potential impacts to the caps.

Page 163 The BODR here states that "All cap designs presented in this BODR include gravel or larger armor materials." And goes on to describe 210 acres that will only have a layer of sand placed on top. The subtle distinction between an armor cap and a sand cap is not lost on this review, but the public is certainly to be confused or deceived by the distinction. All caps are NOT armored- only the ones in deeper water in the navigational channel and nearby. The caps in shallow areas will just be a layer of sand. The BODR is deceptive in not clearly stating this fact clearly.

Agencies Response

As noted previously, engineered caps are armored; sand covers are not armored. As discussed previously, sand covers would only be applied to areas with PCB concentrations less than 2 ppm, which is only slightly above the PCB RAL of 1 ppm. The total PCBs in these areas only cumulatively comprise 0.5 % of the PCBs in the Fox River.

Where are the data from other projects showing that this plan has any chance of success? The BODR relies on modeling to conclude that the deeper highly contaminated sediments will remain entombed forever and that the shallow sediments will gradually get better, go away or remain undisturbed (the BODR is vague on the fate of the PCB's in shallow water sediments). There is no documentation of other sites or specific data on the success of this approach. The BODR should give specifics in river systems that are comparable in depth, flow, latitude, etc so that the public has some evidence that the plan for the lower Fox River is more than an inventive experiment with no factual basis for support.

Agency Response

Attachment 1, page 212, summarizes experience on 32 capping projects. While none of these projects are exactly comparable to the Fox River, they are subject to the same forces (e.g., high water flows, ice, bioturbation, etc.) that are potentially disruptive to a cap. Additionally, caps in the Amended Remedy are based on generally accepted engineering design principles and USEPA Guidance.

Section 5.4.4, Page 172 .The BODR presents some results of hydrodynamic modeling on water levels and flow. What will be the effects of hydrodynamic modifications on flooding and ice scouring? These points need to be addressed in this report.

Agency Response

When fully implemented, the Amended Remedy for the Fox River will result in a net deepening of the river because there will be more sediment dredged and removed from the river than material placed on the riverbed as cap. As a result of this net deepening, the river will have greater capacity to carry water to Green Bay and Lake Michigan when the remedy is completed than it had before.

Having said that, the design and implementation of the remedy must take into consideration site-specific conditions within the river channel that will impact the flow velocities and ice-scour potential. These include existing structures as well as the river channel characteristics that will result from the dredging and capping. The BODR provides sufficient analysis of the range of potential conditions to give the agencies confidence that the design considerations can be dealt with as the remedy is implemented.

Section 5.7 Monitoring, maintenance and IC for Capping.
Page 177. The BODR needs to explain how no anchor institutional controls will work in recreational boating areas that are extensive in the Fox River.

Agencies Response

The agencies agree. This will be addressed in the Final Design.

Page 178, top. This section has no information that usefully gives a vague idea of what type of monitoring is contemplated. The section needs to elaborate on the general goals and parameters of monitoring, especially monitoring of caps that must last forever and protect highly toxic PCB's.

Agencies Response

The agencies agree. The Final Design will provide more detail.

Section 5.9 Comparative Evaluation
Page 186. The BODR should include an option of using more equipment to conduct the operations, if shortening the duration of the project is needed.

Agency Response

The agencies agree.

Section 6

This section details the sequence and schedule of construction and dredging operations for the cleanup. No comments at this time.

Section 7

Any capping in the Fox River would require long term monitoring and maintenance. The scheduling of these measures is outlined in this section. ESC agrees with the Science and Technical Advisory Committee (STAC) that the monitoring plan as presented is insufficient (Kennedy 2007). If a cap is placed in a high risk area such as the Fox River, monitoring should be done annually and in extreme detail. The entire cap should be checked after every winter using sonar imaging, chemical and biological monitoring. Noticeably missing from this section is a discussion of how long such monitoring should continue. Because field data on the long-term (> 75 years) persistence of PCBs is unavailable, monitoring should continue indefinitely.

Regardless of whether or not a cap is placed in the Fox River, a sufficient monitoring plan needs to be developed that would include congener specific analysis, biological tissue monitoring, as well as a phase analysis to determine if any detected PCBs are in particulate or dissolved forms. This would help evaluate the source of detected PCBs. This monitoring needs to extend into Green Bay as well. A remediation plan cannot be considered successful if the means to evaluate its progress are insufficient.

Agency Response

The agencies agree. The ROD Amendment outlines the basic elements of the monitored program. The Final Design will include more detailed plans on how and when monitoring will occur. Monitoring will continue at the Lower Fox River Green Bay Superfund Site as long as concentrations above the PCB RAL of 1.0 ppm or the PCB SWAC goal exceeds 0.25 ppm in OU 4, or 0.28 ppm in OU 3.

Section 8

This section compiles cost estimates for the various alternatives proposed for the

remediation of the Fox River. No comments at this time.

Section 9

This section outlines the actions that WDNR and the EPA will take during the cleanup process to reach out to the various stakeholders involved in the cleanup, particularly during the selection process for the staging, dewatering, and disposal of contaminated sediments from the river. The plans presented here are sparse, as exact locations for many of these facilities have not been finalized. However, stakeholder outreach activities should include regular and direct contact with grassroots organizations such as the Clean Water Action Council. These groups represent the interests of local interests, and their opinions and concerns should be considered at the same level or higher than those held by the Fort James Operating Company and NCR Corp. A plan to involve these groups regularly beyond public meetings and comment periods should be presented.

Agency Response

The agencies will provide the public regular updates as the design continues in the agencies "Fox River Current" newsletter issued and mailed quarterly to over 16,000 individuals and organizations who have notified USEPA of their interest in keeping informed on the Fox River clean up, and in regularly updated webpages, maintained on the USEPA and WDNR websites. See: http://www.EPA.gov/region5/sites/foxriver/index.html and http://www.dnr.state.wi.us/org/water/wm/foxriver/index.html. Further, if any citizen requests, USEPA will add his/her name to the mailing list for the periodic "Fox River Current" newsletter (presently, by emailing or calling Susan Pastor at pastor.susan@usepa.gov, 312 353-1325).

Additionally, USEPA and/or WDNR will provide the community updates at public meetings and other events when remedial action milestones are met. Agency staff and management are also available to attend meetings or events sponsored by local groups to give updates or answer questions about the Fox River projects or plans. Since the issuance of the 2003 ROD, agency staff and management have made presentations or attended approximately 50 meetings or community events to discuss site cleanup, restoration or other site-related issues as requested by local officials, citizen groups, universities and other schools, unions, etc.

Section 10

This section lists the references used in the BODR. No Comments at this time.

CONCLUSIONS

While the above are significant flaws, the fundamental problem with the "Optimized

Remedy" is that it is only optimal in terms of lower costs and effort. Nearly half of the total PCB mass contained within the sediments of the Fox River will remain in place under the proposed plan. This is completely unacceptable, particularly given the uncertainties discussed above regarding the stability of the cap and toxicity of PCBs to humans and wildlife. Combine this with the use of monitored natural attenuation in higher reaches of the stream and the long term persistence of PCBs within sediment, the only sure way to insure the protection of water quality in the future is to remove all contaminated sediment. Alternative treatment options exist if landfilling is impractical.

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APPENDIX A: FOX RIVER PCB SOURCES

Table 1 of "Technical Memorandum 2d: Compilation and Estimation of Historical Discharges of Total Suspended Solids and PCB from Lower Fox River Point Sources" WDNR, 1999.

Number	Discharger Description
1	Kimberly Clark Corporation-Neenah and Badger Globe --- Formerly Neenah Paper (1956), Neenah Dam and Kimberly Clark-Badger Globe. Located side by side above Neenah Dam. Split discharge to river and POTW before combined effluent into one secondary treatment system about 1976. Produced paper and tissue from virgin pulp and purchased small amount of deinked pulp.
2	P.H. Glatfelter Company --- Formerly Bergstrom Paper Company. Located just downstream of Neenah Dam. Primary treatment 1951 and secondary 1978. Produced paper from deinked fiber and purchased virgin pulp.
3	P.H. Glatfelter-Arrowhead Landfill: disposal site for P.H. Glatfelter Company solid waste from 1951 to 1975. Waste placed in landfill was subject to wave action and runoff until the confining berm was sealed when the landfill was closed in 1975. Runoff to Little Lake Butte des Morts observable in aerial photos.
4	American Tissue Mills --- Formerly Kimberly Clark-Lakeview. Southern end of Little Lake Butte des Morts, west side. Primary treatment in 1967. Produced paper and tissue from virgin pulp and small amount of purchased deinked pulp.
5	Mead Corporation, Gilbert Paper Division. Rag pulp mill made premium and security paper. Sent effluent to NM POTW about 1975. Produced legal paper and currency from high quality virgin pulp and rags.
6	U.S. Paper Mills Corporation, Menasha Division --- Formerly Menasha Company, John Strange Paper Corporation. Sent all effluent to NM POTW about 1975. Located on Menasha Channel. Paperboard and core mill using secondary fiber.
7	American Can Canal Plant, Menasha --- Formerly Marathon Corp. On Menasha Channel. Eleven (11) tons per day, fiber recovery and water reuse. 1957: savealls to Menasha Channel
8	George Whiting Paper Corporation. Book mill. Sent effluent to NM POTW about 1975.

Number	Discharger Description
9	Neenah-Menasha POTW. Serves Neenah and Menasha. Replaces Menasha East POTW about 1983. Mills sending partial waste stream in 1957 include KC Neenah/Badger Globe, Mead, U.S. Paper-Menasha, Wisconsin Tissue and George Whiting. Discharges at the end of Menasha Channel entry into Little Lake Butte des Morts. Likely significant PCB load from Wisconsin Tissue with minor load from some others. Bypassing important.
10	Wisconsin Tissue Mills. Deinking/recycle mill located in Menasha. Discharges through NM POTW from 1936 until 1975, however, cooperative mill surveys presents data on discharge through 1960. Substantial quantity was likely bypassed directly to the river in collection system or at NM plant. Pretreatment of primary and secondary. Direct discharge to river in 1976. Produced tissue products from deinked fiber and purchased virgin pulp.
11	Menasha East POTW. Phased into NM POTW about 1983.
12	Menasha West POTW. Located on west side of Little Lake Butte des Morts. Aroclor 1254 detected in effluent. Closed in 1983 when Grand Chute/Menasha West came on line.
13	Grand Chute/Menasha West POTW. Located on west side of Little Lake Butte des Morts and discharges near north end lake.
14	Riverside Paper Corporation, Kerwin Paper Division --- Formerly Amricon Corporation-Kerwin Paper, formerly Riverside Paper Corporation. Located on islands between upper and middle Appleton Dam. Split discharge between river and Appleton POTW to meet permit limits. Fiber recovery is only treatment. Produced bond paper from purchased virgin pulp and secondary fiber deinking after 1967.
15	Consolidated Paper, Appleton --- Formerly Consolidated Water, Power and Paper Corporation. Located just down from lower Appleton dam on east bank. Closed in 1983, dismantled in 1987. One detect of 1254. Produced virgin sulfite pulp.
16	Appleton POTW. One mile north of College Avenue bridge. Frequent bypassing during 1950s, 1960s and 1970s prior to major expansion. Bypassed before primaries all flow above 19 mgd before major expansion. Primary plant in 1957 and secondary in 1964 with major upgrade in 1979. Between 1964 and early 1979, diverted effluent to river after primary treatment (and chlorination) when applied BOD_5 load to secondary system exceeded organics loading capacity. Received waste from Riverside, NCR Appleton Papers, Appleton Coated Papers, Fox River Paper, KC Atlas and others. Significant load likely from Appleton Coated and smaller load from Riverside.
17	Fox River Paper Company --- Formerly Fox Valley Corporation. NI fine and post-consumer recycled paper. Discharges to Appleton POTW. No information on flow, TSS or production 1954-1997. No estimate can be made unless some of this data is available. Potential to contribute PCB to Appleton POTW.
18	Consolidated Paper, InterLake Paper Inc. --- Formerly Repap, Wisconsin Inc., formerly Midtec Paper Company, formerly Kimberly Clark, Kimberly Mill. Located right on the Kimberly Dam. Was a sulfite pulp mill, now ground wood and NI fine coated paper manufacture. Prior to piping sewers in 1973, discharged below the dam. Secondary treatment system and discharge pipe now located upstream of mill. No PCB detects in effluent data. May have used secondary fiber sources.
19	Appleton Papers, Incorporated, Coating Mill --- Formerly NCR Appleton Papers, formerly Appleton Coated Papers Company. Discharge went to Appleton POTW sewer with bypass potential at Green Bay Road crossing and at the POTW. Primary coating operation that manufactured NCR Paper.
20	Appleton Papers, Incorporated, Locks Mill --- Formerly NCR Appleton Papers, formerly Appleton Papers, Locks Mill, formerly Combined Locks Paper Corporation. Located below Little Chute Dam on east side of river. Primary in 1972 and secondary in 1975. Deinking and book mill, now groundwood chemi-mech pulp and NI fine and carbonless paper. Used PCB containing emulsion to produce NCR Paper: July (December?) 1969 through April 1971.

Number	Discharger Description
21	Kimberly, Little Chute, and Kaukauna POTWs. Small POTWs serving respective communities using trickling filters or activated sludge. Kimberly activated sludge in 1957. Little Chute primary in 1957. Kaukauna primary in 1957 and receives some paper mill waste in 1950s. All were phased out and combined into Heart of the Valley POTW in the late 1970s. Some low-level detects of Aroclor 1254.
22	Heart of the Valley POTW. Put on line in late 1970s to replace POTWs listed above. Discharges below lower Kaukauna dam just below Lock Number 5.
23	International Paper Corporation, Thilmany Division --- Formerly Hammermill, Thilmany Division, formerly Thilmany Pulp and Paper Corporation. Located just down from lower Kaukauna dam on west side. Kraft pulp and NI fine and NI lightweight paper mill. Uses lagoons and aerated lagoons and UNOX treatment.
24	Wrightstown POTW. Very small POTW discharges above Rapide Croche Dam. Aroclor 1254 detected once.
25	Charmin, Little Rapids Mill. Small groundwood mill located at Little Rapids Dam. Closed mid-1960s.
26	International Paper Corporation, Nicolet Paper Division --- Formerly Hammermill, Nicolet Division, formerly Philip Morris, Nicolet Division, formerly Millprint, Incorporated. Built over the river and DePere Dam on the west side. Glassine mill and specialty paper.
27	U.S. Paper Mills Corporation, DePere Division --- Formerly U.S. Paper Mill corporation. Primary treatment discharges to river below DePere Dam on west side. Discharges to DePere POTW 1973 on. Paperboard, core stock and cores using secondary fiber from OCC, DLK and boxboard.
28	DePere POTW. Located about 1/2 mile below DePere Dam at most narrow point. Frequent collection system overflows in 1960s and early 1970s before major upgrade in mid-1970s. Primary in 1957 with frequent overflows due to combined sewers. Treated U.S. Paper, DePere waste stream from 1973 to the present. Several detects of Aroclor 1254.
29	Fort James Corporation, Green Bay West Mill --- Formerly Fort Howard Corporation, formerly Fort Howard Paper Company. Located 3.5 miles upstream of river mouth on west side. Began treating with lagoons in early 1950s. Improved treatment lagoons and added secondary in early 1970s. Deinking/recycle tissue mill.
30	Procter & Gamble Paper Products Company --- Formerly Charmin Paper, formerly Hoberg Paper Mills 1948. Located between East River and Fox River mouth on east side. Pulp waste sent to GBMSD in mid-1970s. Tissue produced from virgin sulfite and groundwood pulp and more recently purchased virgin pulp with small amounts of secondary fiber.
31	Green Bay Packaging Incorporated --- Formerly Green Bay Paper and Pulp Corporation located about 1.5 miles from the river mouth on the east side. Used reverse osmosis to treat waste in mid-1970s, now advanced tertiary. Corrigated products using semi chemical pulp and secondary fiber including OCC, DLK, old newspapers and other secondary fiber sources.
32	Fort James Corporation, Green Bay East Mill --- Formerly James River Corporation, formerly American Can Corporation, formerly Marathon Corporation, formerly Northern Paper Mills. Paper waste treated in a lagoon and discharged to first slough on east side of river above mouth. Pulp waste to GBMSD till purchased pulp. Sulfite pulp and coated paper, later tissue (and deinking?), now NI tissue.
33	Green Bay Metro Sewerage District. Located 1 mile upstream before major upgrade moved plant directly to river mouth in 1977. Primary in 1957 with combined sewers and frequent bypassing. Treated pulp waste for Procter & Gamble and James River in late 1970s and early 1980s.

TECHNOLOGY NEWS AND TRENDS

A newsletter about soil, sediment, and ground-water characterization and remediation technologies

Issue 18

May 2005

This issue of Technology News and Trends *highlights innovative approaches for addressing issues arising at sites with contaminated sediment. An estimated 12-25% of all National Priorities List sites contain contaminated sediment due to inadequate treatment and inappropriate discharge of industrial and municipal wastewaters in the past. Particular problems are posed by heavy metals and hydrophobic organic chemicals that have settled in bottom sediment.*

Changes in River Sediment Conditions Attributed to Ice Jam-Related Scouring

Alcoa, Inc. began a pilot study in 2001 to evaluate subaqueous capping as a potential remedial alternative for addressing polychlorinated biphenyls (PCBs) in sediment and biota of the lower seven miles of the Grasse River near Massena, NY. The pilot study examined various cap materials and application techniques in a 7-acre study area. [For more information, see the September 2002 issue of *Technology News and Trends*.] Data collected over the following year demonstrated that the cap had remained intact and relatively unchanged and was functioning as designed.

Spring 2003 monitoring results, however, indicated a loss of cap material and underlying sediment in the study area. Investigations found that these changes were caused by a severe ice jam that formed directly over the cap. The occurence of ice jams severe enough to scour sediment was not known prior to this. As a result, the cap was not designed to withstand forces associated with ice jam-related scour.

A review of recent climatic events revealed that severe winter conditions in 2002-2003 had created a thick ice cover over much of the river. Warmer temperatures the following spring created heavy runoff and higher flows that coupled with a weakening ice cover in the Upper Grasse River to transport a large volume of floating ice pieces downstream. Floating ice encountering the (still intact) ice cover proximate to the study area caused accumulation of a thick ice jam extending approximately four feet above the water surface and through most of the water column.

Modeling indicated that scour of the cap material, underlying sediment, and sediment outside the study area was caused by the turbulence and high velocity of water flow below the ice. The turbulence and high water velocity resulted from an increase in water stage upstream of the ice jam, a reduced cross section below the jam, and the roughness of the ice jam. Sonar imagery and underwater videography supported the finding that scour resulted from hydraulic forces below the toe of the ice jam rather than physical contact between the ice and sediment.

The extent and magnitude of sediment disturbance caused by the ice sour event was characterized by examining changes in sediment elevation and type relative to pre-ice jam conditions (Figure 1). Comparisons indicated that scour ranged in depth from 0.4 to 5.0 feet and occurred in about 15% of the river bottom in the uppermost 1.8 miles of the Lower Grasse River. The greatest scour depth was observed in "pilot cell #4" of the study area, which contained a 24-inch

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Contents

SedWeb Resources

The Hazardous Substance Research Centers/South & Southwest (HSRC/S&SW) sponsor SedWeb℠ (http://www.sediments.org), an online forum for exchanging new information and ideas on contaminated sediments management and research. SedWeb participants are invited to contribute articles to an online library, post items on a bulletin board, subscribe to monthly news advisories, or use more than 150 links to additional online resources.

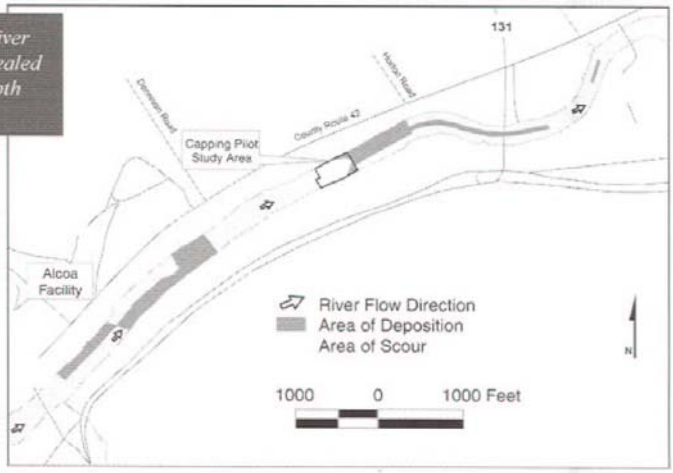

Figure 1. *Analysis of the Grasse River system following ice jam scour revealed high correlation between scour depth and material deposition.*

[continued from page 1]

thick sand/topsoil cap covering approximately 1.2 acres.

The greatest accumulation of material deposition also occurred in pilot cell #4, where a 4.6-foot increase in sediment elevation was noted. Bathymetric comparisons showed an overall net increase of sediment deposits (in addition to sediments scoured from upstream areas), which indicated that more solids are entering the river system from upstream sources and depositing into the Lower Grasse River than previously believed.

Redistribution of sediments and PCBs during the 2003 ice jam and scour did not significantly affect average PCB concentrations in sediment, water, and fish, suggesting that potential PCB exposure in the river did not change significantly. Surface sediment PCB concentrations in the scour area, however, were higher and more variable than before capping, averaging 13 ppm instead of 8 ppm. This increase is attributed to exposure of deeper sediments typically containing higher PCB concentrations. Surface sediment PCB concentrations decreased in areas subject to deposition, as evidenced by a three-fold reduction immediately downstream of the study area.

Routine monitoring indicated that the scour event did not have an adverse impact on PCB concentrations in the water column or on PCB mass flux. Additionally, system-wide effects from the scour event were not observed during analysis of native fish tissue (with the exception of brown bullhead in one of the monitoring areas). Expanded testing indicated that PCB mobilization to the river banks did not represent an exposure pathway of concern.

A review of historic records and physical evidence such as tree scarring indicated that possibly six ice jam events have occurred in the Lower Grasse River over the past 40 years. Analysis of high-resolution and stratigraphic cores suggested that ice jam-related scouring occurred in the Lower Grasse River four times over the same period or about once each decade. Results of this and other investigative work to date indicate that ice jams, and resulting scour associated with severe ice jams, are limited to the upper 1.8 miles of the Lower Grasse River.

A follow-on study on the Grasse River will be conducted in 2005-2006 to evaluate a range of technical issues, including options for reducing potential risks associated with future ice jam-related scour events. Options include the installation of an ice control structure to control formation and breakup of jams, and the placement of an armored cap (containing large-grade material) to protect against erosive forces associated with severe jams.

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International Networking

The North Atlantic Treaty Organization (NATO) is sponsoring a workshop on sediment assessment and remediation this month in the Slovak Republic to exchange information between North American and European experts. To view the agenda now, or presentations with audio clips later this summer, visit the HSRC/S&SW at http://www.hsrc.org.

New Tools Improve Assessment of Contaminated Ground Water and Surface Water Interaction

The Space and Naval Warfare Systems Command (SPAWAR) and Naval Facilities Engineering Service Center (NFESC) are working with Cornell University to develop techniques for assessing contaminated ground-water discharge into coastal environments. Two of these tools – the Trident® probe and the UltraSeep® meter – help to identify potential areas of ground-water impingement into surface water and to quantify flow rates and contaminant levels. Recent field trials of these tools show they provide rapid assessment of coastal contamination migration and can lead to selection of more effective and less costly remedial alternatives than those selected through conventional characterization techniques.

The Trident probe is a flexible, multi-sensor sampling device consisting of a simple direct-push system equipped with temperature, conductivity, and pore-water sampling probes (Figure 2). Contrasts in temperature and conductivity between surface water and ground water are used to determine likely areas of ground-water impingement. The device's water sampler allows extraction of interstitial water from sediment at depths reaching 90 centimeters below the sediment/water interface.

The UltraSeep meter is a modular seepage meter featuring an ultrasonic flow meter that provides continuous and direct measurement of ground water (Figure 3). The device's water sampler collects up to 10 samples of discharge water, which are collected in proportion to the measured discharge rate using a low-flow peristaltic pump equipped with a sample selector valve and bag array. Temperature and conductivity measurements collected by onboard sensors are stored in an onboard computer that also controls sampling events. The flow meter detects a specific discharge or recharge in the range of approximately 1-1000 cm/day.

The two tools typically are applied as an integrated system, with Trident sensors used first to identify potential contaminant discharge zones. Its water sampler then operates to determine spatial distribution and concentrations of contaminants in the identified discharge zones. Deployment of UltraSeep follows in key areas to quantify the discharge rate and concentrations.

One of the first coastal sites where the integrated system was deployed on a full-scale basis is Naval Air Station (NAS) North Island Site 9, CA. Bordering San Diego Bay, the site was a marshland that was filled during the 1930s with dredge material and subsequently served as a chemical waste disposal site. Shoreline monitoring wells and ground-water modeling suggested that a trichloroethene (TCE) plume was migrating toward but not discharging into the Bay.

The Trident probe was deployed at 20 stations located across an approximate 100- by 200-meter area to a depth of approximately 60 cm, collecting both sensor readings and pore-water samples at each station. Though sampling was restricted to 4-hour, low-water time windows, the survey was completed in two days. A localized discharge area of approximately 50 by 100 meters was identified based on a temperature contrast of 1-2 °C that corresponded with elevated concentrations of volatile organic compounds (VOCs) in pore water. UltraSeep deployment then provided direct quantification of the ground-water discharge rates (up to approximately 30 cm/day) and the VOC concentrations. These results were incorporated into a refined conceptual model and resulting remedial strategy for the site that reflects a more isolated zone of discharge into San Diego Bay.

More recently, a full-scale demonstration of the integrated system was completed at NAS Panama City, FL, which lies on St. Andrew Bay along the Florida panhandle. From the mid 1950s to the late 1970s, an area now designated "Area of Concern 1" (AOC 1) was used for firefighter training that generated waste oils, fuels, paint/thinners, and bilge water. The source area was remediated but concern remained for surface water discharge of a residual dichloroethene (DCE) plume that extended to the bay shore.

Use of Trident and UltraSeep technologies demonstrated that DCE concentrations in the discharge zones offshore from AOC 1 were below detection. This finding facilitated a determination that monitored natural attenuation is a feasible remedy for AOC 1, thereby providing a potential cost savings of $1,250,000.

Full-scale deployment of these integrated tools was conducted at several other contaminated sediment sites including the Anacostia River in Washington, DC, and the Naval Construction Battalion Center Davisville Site 7, in Rhode Island.

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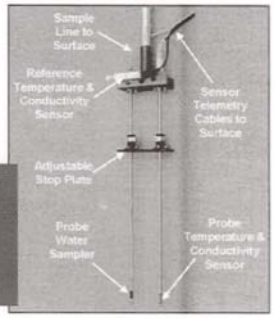

Figure 2. *Its relatively compact size (24-inch length), stainless steel construction, and adjustable air hammer allow the Trident probe to be used easily in a variety of sediment scenarios.*

[continued from page 3]

SPAWAR and the NFESC anticipate additional deployments in Naval Station San Diego and NAS Orlando this summer.

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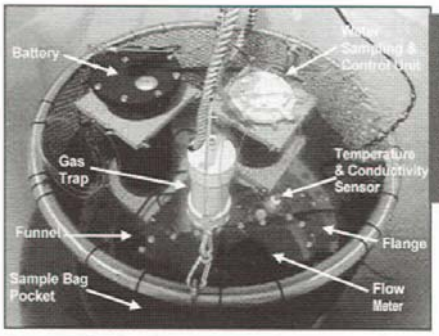

Figure 3. *State-of-the-art technology enables the UltraSeep unit to serve as a turn-key tool for quantifying water flow and quality in complex sediment.*

Capping Techniques Affect Contaminant Resuspension

Recognizing that little information has existed on the potential release of in-situ contaminated sediments during and after capping operations, the U.S. EPA's National Risk Management Research Laboratory (NRMRL) led an interagency investigation of the issue at two contaminated sediment sites over the past two years. Contaminant releases were measured during cap placement at two confined aquatic disposal (CAD) cells in Boston Harbor, MA, and on creosote-contaminated sediments resulting from past wood-treating opperations at the Wyckoff/Eagle Harbor Superfund site on Bainbridge Island, WA. The study found consistent evidence of contaminant resuspension during capping and identified potential field methods for minimizing resuspension.

The Boston Harbor investigations focused on CAD cells containing 118,500 m^3 and 136,850 m^3 of dredge material placed in the Mystic River during late 1999. The material is characterized as silty, fine-grained sediment containing total petroleum hydrocarbons (TPH), PCBs, and polycyclic aromatic hydrocarbons (PAHs) averaging 1,520 mg/kg, 220 µg/kg, and 64,500 µg/kg, respectively, in concentration.

Nine months after filling the cells, at which point consolidation was considered complete, sand dredged from Cape Cod Canal was placed over the cells to form caps. A tugboat was used to maneuver a partially opened hopper dredge that distributed sand over each cell to achieve a cap thickness of 0.67-1.22 meters. This capping method was expected to minimize disturbance of silt material within the cells.

During cap installation, an aqueous monitoring tool (AMT) was towed behind a boat to collect and integrate in-situ measurements with continuous water collection at the rate of 12 L/min. The AMT sensor package included components for measuring conductivity, temperature and depth; two turbidity sensors; and a Teflon™/ titanium pumping system for water sample collection. The AMT was suspended 1-2 meters above the sediment surface while the research boat maneuvered around the capping vessel. Ten separate sampling events were conducted over a 22-day period. All water samples were analyzed for PCBs, PAHs, TPH, total suspended solids (TSS), and eight RCRA-regulated metals.

Turbidity mapping of the water column revealed that the highest turbidity and TSS concentrations occurred during the first capping run, followed by progressively decreasing turbidity and TSS as capping continued. This suggested that a substantial portion of the sediment suspension measured during the initial runs was due to bed sediment resuspension, and that the amount of bed sediment resuspension decreased with each run.

A similar trend was noted in contaminant concentrations, whereby concentrations of contaminants of concern increased significantly during the first capping run but generally decreased throughout the remainder of capping activities. For example, analytical results indicated that concentrations of total PAHs reached a maximum average of 1,370 ng/L during the first capping run but approached pre-capping concentrations and averaged 55 ng/L after cap installation. Similarly, PCB concentrations were below detection prior to capping but reached 84 ng/L during the initial run. By the end of the monitoring study, PCB concentrations returned to a non-detectable level.

Similar results were obtained in Eagle Harbor, which is a shallow marine embayment west of Seattle, WA, containing sediment with TPH and PAH concentrations reaching 3,060 mg/kg and 2,120 mg/kg, respectively. The U.S. Army Corps of Engineers (ACE) initiated partial capping in 1993 to begin controlling migration of contaminants from the sediment into the water column and surrounding sediment. The final phase

[continued on page 5]

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began in 2001, when the ACE capped the area containing the highest contaminant concentrations as part of an enhanced source control effort. Capping was performed by transporting sand to the site in a flat-top barge maneuvered by a tugboat and washing sand overboard with a high-pressure hose. Approximately 91,700 m^3 of clean sand was distributed to form a cap covering 5.27 hectares.

Contaminant resuspension was studied in a 150- by 275-meter portion of the cap located 76-381 meters from the primary contaminant source. During capping, the AMT was pulled at a depth of one meter above the sediment and immediately behind a barge depositing the cap material on the sediment surface. Three monitoring runs were conducted over three consecutive days of cap installation to obtain a total of 90 water samples.

Elevated turbidity levels were observed at varying distances and directions from the capping barge, and TSS levels were observed 200 meters from the capping area within three hours of capping commencement. Unlike the results at Boston Harbor, turbidity and TSS levels remained high during the following three capping runs, likely due to higher rates of TSS from the cap material itself rather than bed sediment. Turbidity levels were found to decrease to pre-run capping, however, within 1-2 hours.

Consistent with the Boston Harbor results, total PAH concentrations in water were elevated during initial capping operations but progressively decreased and dissipated after capping was complete (Figure 4). Rapid dissipation of contaminant plumes likely resulted from the combined effects of sedimentation and off-site plume migration.

These results suggest that alternative techniques for cap installation may considerably reduce negative impacts on water quality. Resuspension may be minimized by placing cap material in several lifts, whereby the first lift uses minimal disturbance techniques to provide a uniform layer of clean material and subsequent lifts are placed more aggressively. While some low-energy techniques may reduce the degree to which native sediments are disturbed, they may slow the cap placement process and prolong the duration of exposures due to resuspension.

This study was conducted in cooperation with the U.S. Army Engineer Research and Development Center, ACE, Batelle Memorial Institute, and EPA Regions 1 and 10. Copies of the complete report will be available from NRMRL later this year at http://www.epa.gov/ORD/NRMRL.

Contributed by Terry Lyons, EPA Office of Research and Development/NRMRL (513-569-7589 or lyons.terry@epa.gov)

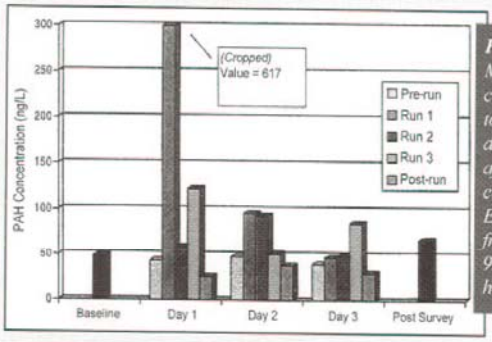

Figure 4. *Maximum average concentrations of total PAH decreased quickly after the first capping run at Eagle Harbor, from 617 ng/L to 95 ng/L within 24 hours.*

Increased Federal Funding Expedites Great Lakes Sediment Cleanup

EPA's Great Lakes National Program Office (GLNPO) reports that contaminated sediment is the largest major source of contaminants in Great Lakes rivers and harbors entering the food chain. Although the discharge of toxic and persistent chemicals to the Great Lakes has decreased significantly over the past 20 years, continued high concentrations of contaminants in bottom sediment raises concern about potential risks to aquatic organisms, wildlife, and humans.

To address the problem, the Great Lakes Legacy Act of 2002 (GLLA) authorizes

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$270 million during fiscal years 2004-2008 for remediation of contaminated sediment in 31 areas of concern (AOCs) of the Great Lakes region. Each year, $50 million is targeted for projects that monitor or evaluate contaminated sediment, implement a plan to remediate contaminated sediment, or prevent further or renewed sediment contamination at the AOCs. Priority also is given to projects employing an innovative approach that provides greater environmental benefits than conventional methods or equivalent environmental benefits at a reduced cost.

The Black Lagoon on the Detroit River in Trenton, MI, will be the first contaminated sediment site to be cleaned up under the GLLA. Environmental dredging, which began in October 2004, is in use to remove approximately 90,000 yd^3 of sediment contaminated with PCBs, oil and grease, mercury, and other heavy metals from the bottom of the lagoon.

Over 3.3 million yd^3 of contaminated sediments were remediated in the U.S. Great Lakes basin between 1997 and 2003 (Figure 5). The GLNPO anticipates that the rate of sediment remediation activities will continue to accelerate with the availability of GLLA funding opportunities. More information on GLNPO's Contaminated Sediments Program, current projects, and links to related resources is available at http://www.epa.gov/glla.

Contributed by Marc Tuchman, GLNPO (312-353-1369 or tuchman.marc@epa.gov)

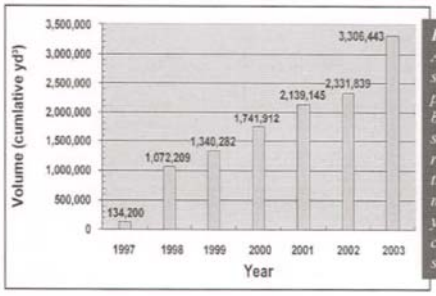


Figure 5. *Although significant progress is being made in sediment remediation in the Great Lakes, millions of cubic yards of contaminated sediment remain.*

Flow at Oil Depot (cfs in thousands)
50
45
40
35
30
25
20
15
10
5
0
-5
Time (June 22, 23, 24; 1990)
15
215
415
615
815
1015
1215
1415
1615
1815
2015
2215
15
215
415
615
815
1015
1215
1415
1615
1815
2016
2215
15
215
415
615
815
1015
1215
1415
1615
1815
2015
2215

Comment by Rebecca Katers, Executive Director - Clean Water Action Council (Rebecca Katers first comment)

The Clean Water Action Council is submitting this second letter as an addendum to the comments sent by mail in regard to the proposed amendment to the Record of Decision (ROD) for the Lower Fox River and Green Bay PCB clean-up.

We support and agree with the technical comments submitted by Dr. Peter deFur on our behalf, and won't repeat those arguments here.

This letter is primarily a comment on the appalling process used to arrive at the Basis of Design Report (BODR) and the proposed amendment to the ROD. Our concerns are as follows:

Manipulation of the Decision-making Process and Public

1. More than 3.5 years of Secret Meetings

> The corporations have had exclusive access to secret closed-door technical meetings held with EPA and DNR staff for all of the 3.5 years since the 2003 ROD was finalized, resulting in a grossly imbalanced scientific investigation of remedial options. The public and news media were excluded from all technical debates during this time. All compromises and tradeoffs with corporate lobbyists have been made secretly.

Agency Response

Members of the public have been provided extensive opportunities to access major Site documents and information, and have been encouraged by USEPA and WDNR to review the documents *prior to* and during the comment period. Citizens and members of the media called and emailed USEPA and WDNR staff regularly to ask questions and give input. Since the issuance of the 2003 ROD, agency staff and management have made presentations or attended approximately 50 meetings or community events to discuss Site cleanup, restoration or regarding other site-relate issues, as requested by local officials, citizen groups, universities and other school, unions, etc.

In addition, to enhance public understanding of the complex technical issues, USEPA issued a "Technical Memorandum" concurrent with the Proposed Plan Fact Sheet (a description of the Proposed Plan intended for the general public). This Technical Memorandum provided additional information and more detailed descriptions of the Proposed Plan. Thus, in summary, the agencies exceeded the minimum requirements for public involvement set forth in the federal law that governs the Superfund process (i.e., the National Contingency Plan, found at 40 C.F.R. Part 300). Contrary

to the commenter's suggestion, the agencies have allowed a significant degree of public participation and extraordinary access to the technical information that has formed the basis for the Proposed Plan

Regarding the technical meetings, the National Contingency Plan does not require USEPA to make technical meetings open to the public. The process for arriving at decisions regarding the Fox River has already taken many years; to open technical meetings to the public would have resulted in further delays.

2. TAG expert excluded-

   Several times, Clean Water Action Council requested that it be allowed to send its technical advisor to at least some of the EPA and DNR technical meetings, during the investigation of remedial options. CWAC received an EPA Technical Assistance Grant for the purpose of hiring this technical advisor and wanted the advisor to act as a citizen representative at the meetings. The EPA and DNR absolutely refused, and argued that it would only "slow down" the process. More likely, their corporate partners didn't want the public to know what compromises were being made or by whom. And if our advisor did provide input which slowed down the process, this could have been beneficial, by correcting serious mistakes or gaps in the planning. Now, the one-sided plan has major fatal flaws because no one was there to question the corporate lobbyists.

Agency Response

Since it is Agency policy to permit only members of the Superfund design team to attend technical meetings, the CWAC and other organizations were not permitted to attend these discussions. However, the USEPA project manager offered to meet in person with the TAG group to discuss technical issues regarding the Proposed Remedy, but the TAG group did not take advantage of this opportunity. The USEPA project manager was also available at any time for consultation by phone, but the TAG group did not contact the project manager to initiate such a discussion.

3. Most analyses conducted by corporate consultants/lobbyists under corporate control

   Because this is a "voluntary" cleanup, the corporations have been given enormous control over the choice of consultants and contractors to use for the cleanup. Boldt Construction was assigned by the state as project oversight managers, despite the obvious direct financial connections between this firm and the paper industry in the Fox River Valley. The agencies may have ultimate oversight, but they are weakened by the fact that they rely heavily on a biased corporate contractors' expertise rather than keeping independent expertise on staff at the DNR and EPA.

Agency Response

The Superfund program through numerous projects has found that requiring PRPs to do the design work for a remedial project is the best approach because it is more expeditious, and results in a more successful cleanup. The approach being used for the Fox River is typical for the Superfund program. The agencies monitor the design and remedial work, both through their own oversight, and through the use of an "oversight contractor."

The Boldt Company was selected as "oversight contractor" for the Fox River Site through a state procurement process. The Boldt Company is one of the largest construction companies in the State of Wisconsin and has over 100 years of major construction experience, including several large projects for the State and local governments. Contrary to the commenter's suggestion, Boldt is not simply a contractor to paper companies. It has an excellent reputation in the construction industry, and is one of the few companies in Wisconsin with adequate expertise and capacity to handle a project on the scale of the Fox River cleanup. The Agencies have found Boldt's experience extremely helpful in addressing the complex technical challenges associated with the Fox River cleanup, which is the largest PCB sediment cleanup ever undertaken, worldwide. Boldt has employed a team of independent experts, including those from outside their company to assist WNDR and USEPA with technical questions.

In short, USEPA and WDNR believe that the large and experienced oversight team for the Fox River clean up bring objectivity to the process of reviewing the PRPs' design and remedial work. The PRPs' work is not simply "rubberstamped."

Finally, please note responses in Section 2, pages 23 – 24, and 28 - 29, describing the agencies reliance on 2005 USEPA guidance, and the most recent evaluations and conclusions by the National Research Council in USEPA's and WDNR's final determination for the best cleanup plan in this Amended Remedy for the Fox River.

4. Capping proposals made AFTER public hearings and comment period ended in 2003.

The agencies argue that capping is not a new proposal because the 2003 version of the ROD included capping as a "contingent remedy," but this was NOT in the draft 2002 ROD that was offered for public hearing and comment. This "contingent remedy" was inserted into the 2003 ROD only AFTER the public comment period ended, when the paper companies launched an intense lobbying and public relations campaign to make capping the preferred solution. Prior to

that point, we had been told by agency staff that capping was unacceptable. The public was not given an opportunity to comment on capping as a serious proposal.

Agency Response

Capping was one of the alternatives presented as part of the 2001 Proposed Plan. Specifically, capping was Alternative F for OUs 1, 3 and 4, and it was found to be a viable alternative. The community, including the companies, were free to comment on this and other alternatives considered as well as the selected remedy. In the Remedial Investigation/Feasibility Study [RIFS] evaluation supporting the 2002 and 2003 RODs, capping was determined to be a viable alternative because it was considered adequately protective of human health and the environment. The protectiveness of capping is discussed in Section 11.1.1, pages 84 – 87, and Section 11.2.1, pages 100 – 103 of the 2003 ROD. One of the reasons that capping was not selected in the 2002 ROD and the 2003 ROD was because it was not considered, at that time, to be cost-effective. USEPA added capping as a contingency to the final decision in response to comments suggesting that USEPA should be more flexible by maintaining capping as alternative in the event that capping would be shown in the future to be cost-effective and protective.

5. Industry hired university professors as lobbyists - undercutting the STAC

   In 2003, the corporations hired 5 professors from the University of Wisconsin to "review" the results of an "expert panel" proposal to cap pollutants in the river. As a result, these paid-off professors behaved like lobbyists for the industry proposal, even though many of them were speaking outside their own area of expertise. This manipulated public opinion by giving the appearance of University and scientific endorsement for capping. It also damaged the effectiveness and credibility of the DNR's "Science and Technical Advisory Committee" for the Fox River Remedial Action Plan a local committee which has monitored and commented on the Fox River cleanup for 20 years), because two previously independent key members of the STAC (Bud and Vicki Harris) were now tied to industry and supporting capping.

6. Industry Gave Large Grants for University Projects - Silenced University Inputs

   The corporations reinforced their claim on the University by giving large grants to support projects of other University professors. This effectively silenced most University staff comments on capping and eliminated University staff support for local citizens fighting against capping or on other issues.

7. Corporate NRD funds bought goodwill from local officials

The agencies allowed Georgia-Pacific to dictate how their NRD restoration settlement dollars would be used. As a result, G-P distributed the funds carefully to pay for several pet recreation projects favored by local officials in several Brown County municipalities. The officials are naturally grateful.

8. Hostile, Rude DNR Staff ---

For more than 15 years, DNR staff have been irritable and rude towards any citizen who dares question their decisions on the Fox River clean-up. They are chummy with all the corporate representatives and treat local citizens as the enemy. The favoritism is blatant. While we can understand staff frustrations with being overworked, understaffed and underfunded, that is not an excuse for poor treatment of citizens and excessive friendliness towards corporate representatives.

9. STAC excluded ---

For many years, even members of the local Science and Technical Advisory Committee have been excluded from any meaningful input in the remedial design (except for those members hired by industry). The Chair of the STAC recently complained that Greg Hill, the DNR's Fox River Project Manager, has refused to respond to his phone calls or e-mails for more than 1.5 years. Such snubbing is outrageous.

Agency Response to comments 5-9 above

Whether WDNR employees respond to phone calls or emails should be taken up with WDNR officials. USEPA believes that both agencies, on the whole, have made extensive efforts to provide information to the public, including meetings and presentations to many community groups. These activities have been discussed in the Agency Fox River *Current*, a newsletter issued quarterly to approximately 16,000 households.

10. DNR Website Hopelessly Out of Date and Documents Inaccessible ---

In the fall of 2006, when the ROD amendment was being finalized and the BODR was supposedly out for public review, the DNR website for the Fox River Clean-up was hopelessly messed up and the EPA website made no attempt to compensate. DNR contact names and phone numbers were more than 2 years out of date, with no forwarding number. Numerous people were complaining that the BODR report and attachments couldn't be opened online. We called DNR to get these problems fixed and the DNR acknowledged the problems had already persisted for months and they weren't sure how to fix it. They hoped it would be fixed soon. A month later, the documents were still inaccessible online. The EPA never posted copies. Some citizens had copies of the documents on disks provided by the agencies, but the general public was left in the dark. Public

involvement was clearly not a priority.

When the public hearing was scheduled, the DNR website continued to say that there was nothing on the calendar. Just a day before the hearing it still said this. Only by carefully searching through several Fox River pages did I finally find a little box in the upper right hand corner on one page which briefly stated that a public hearing would be held. Truly pathetic.

11. Unreasonable Restrictions on Hardcopies

The EPA and DNR required the corporations to print only 7 hardcopies of the BODR for the public, for placement at 7 public libraries. Very few other copies were printed. When asked why, the EPA said "nobody really wants to read all that detail," despite our repeated requests for copies and the acknowledged frustrations of everyone having trouble opening the documents online. Clearly, all those citizens would have been grateful to receive a printed copy. It appears the EPA staff have a low opinion of citizens who are attempting to provide input, if the EPA believes those citizens aren't willing to read the full technical report.

The EPA also claimed they printed 2 hardcopies for Clean Water Action Council, one for our Green Bay Office and one for the Technical Advisor in Virginia, who was hired with the EPA Technical Assistance Grant. But they claimed that FedEx "lost" the copy that was mailed to Virginia and refused to replace it. We had to send our only copy to Virginia, so now we have none. Valuable study and research time of the Technical Advisor was wasted as we wrangled with EPA staff, trying to get another copy. On one hand, the EPA argued that we could print it off the disk ourselves, or have it printed by a printing business, but then they acknowledged this could cost us up to $1,000 because of all the colored charts that accompany the BODR. They didn't seem to care that this would be cost-prohibitive to us or most other citizens. We asked them why they didn't file a claim with FedEx for the "lost" package, so they could recover the value and use the money to pay for a replacement, but EPA said that would require too much time and red tape. They're either too lazy or public involvement is not a priority to them.

The bottom line is that the agencies are deliberately running interference for the corporations. They're saving the corporations printing money and making the one brief opportunity for public review of the technical documents as difficult and unlikely as possible.

12. Disk-based Documents Discourage Public Input

In recent years, the agencies have provided disks instead of hardcopies for many technical reports related to the Fox River. These disks are very difficult to study for highly technical issues, because the text often refers to charts, graphs and diagrams on other pages or in the appendices. The BODR is no exception,

because the printed version is several inches thick. Normally, with a paper copy, a reader flips back and forth among pages, but that's impossible with a PDF document on a computer screen. Readers also like to add tabs to key pages, underline or circle certain passages, use highlighters, or scribble notes in the margins as they read. That's impossible with a PDF document on a computer screen. Eye strain is also a serious problem when spending hours studying such large documents on a computer screen.

If the EPA truly believes that "nobody really wants to read all that detail," why would CD printing be an improvement over hardcopies, unless your real goals are to discourage public input and save money for the corporations?

Agency Response to comments 10-12 above

USEPA provided the TAG recipient (the Clean Water Action Council or CWAC) with a hard copy and a CD copy of the Final Basis of Design Report (BODR) approximately two months before the 60 day public comment period began to run (on November 13, 2007). If CWAC desired additional hard copies of the BODR to distribute to its members, CWAC could have used TAG money to make and mail these additional copies, because such expenditures would have been within the scope of the TAG mission. In addition to providing CWAC with a CD of the BODR, USEPA and WDNR made the BODR available generally to the public on the USEPA and WDNR websites in September 2006. Any CWAC member could have accessed the BODR online. This comment, in essence, is a disagreement over who should have borne the cost of making and mailing hard copies of the BODR to the CWAC's members: the CWAC (through use of the grant monies that USEPA provided to it), or USEPA itself.

Many of the criticisms made by the CWAC above apply generally to any situation where electronic availability of documents is replacing hard copy availability of documents. Overall, there are obvious advantages to making documents available to the public electronically on government websites (wider and faster availability to anyone with access to a computer, avoiding the necessity to call a government agency to request a document, savings in paper and mailing costs), and this trend will continue. Contrary to the commenter's suggestion, the move toward making documents available on the computer and on disks results in making information more readily accessible to the public, not less. The agencies have made extraordinary efforts to provide the public access to information concerning the Fox River cleanup, as detailed above in earlier responses that discussed the wide distribution of the "Fox Current Newletters," the 50+ meetings/presentations that USEPA and WDNR staff have lead, participated in, or attended, etc.

13. Last Minute Notice of Announcements ---

EPA and DNR public involvement staff keep saying they're doing their best to involve the public, but virtually every Fox River public announcement or news conference over the past 5 years has involved total secrecy and obviously sneaky efforts to hide from ANY public attendance at the news conferences. Clean Water Action Council is supposed to be the designated Technical Assistance Grant coordinator for the Fox River cleanup and we have a duty to gather and share updated information with the public, but the agencies have done their utmost to shut us out and keep us completely in the dark until they have informed the news media.

Every time this happens, we get a flurry of phone calls from the news media, with on-the-spot newspaper, radio and TV interviews asking us to comment on the new EPA and DNR announcements. But the agencies have nearly always failed to send us the news releases and we have never gotten the detailed documents in time for careful study before the media contact us. This forces us to comment with only sketchy background, after the reporters tell us the basics of the announcements. Not a good situation.

This hostile treatment by DNR and EPA staff is further proof of a serious pro-corporate bias in this process. The corporations are always well-informed, prepared and fully briefed before major announcements. In fact, the corporations are full partners in the development of all the documents leading to the announcements. Only the public is excluded and kept deliberately ignorant, to allow smooth sailing for the corporate propaganda.

In many cases, the detailed documents have been sent to us only weeks, or in one case many months, after the announcements have been made.

14. Political Grandstanding

Most Fox River announcements have become political events where the politicians jump on board and pile praise on the agencies. They don't want feedback from the public, they want an exclusive conduit to the media with undiluted positive sound bites about their leadership and work. It's extremely dishonest and manipulative, and has nothing to do with protecting public health and wildlife, or cleaning up the river.

15. Governor Upstages Our Only Public Hearing

Most recently, Governor Doyle just happened to schedule one of his rare "Town Hall Meetings" only 2 hours before the beginning of our only public hearing opportunity on the proposed amendment to the ROD. This appeared to be a deliberate effort to upstage news of our hearing and citizen protest rally against

capping, and if not deliberate, it showed an appalling disinterest in the Fox River issue. If the Governer had been truly serious about coming to Green Bay that night to hear local citizen concerns, he should have come to the Fox River hearing where 300 people had gathered for comments. As it was, the Governor predictably drew all the news media to his non-event where he said nothing new, taking up precious space in that night's brief TV news segments and drawing media attention away from our critically important public hearing. It appears to be just another small favor the Governor has granted to the paper industry.

16. Public Hearing and Comments During Busiest Season

Once again, the agencies deliberately chose the very busiest time of the year (the Christmas season and the end of the school semester during final exams) to hold the public hearing and comment period. If the agencies truly cared about maximizing public involvement, they would choose early fall or early spring for these events. We've complained about this repeatedly, but the agencies never listen.

It wasn't as if the planners had to coordinate a lot of staff to attend. There were only 3 people up front listening to citizen testimony, plus a court reporter.

Agency Response to comments 13- 16 above

Complaints regarding the Governor's priorities should be raised with the Governor's office. The agencies scheduled the public meeting many weeks in advance, and prior to the time the Governor's meeting was made public. Advanced scheduling is needed to reserve a large room for the event and place a newspaper ad, post to the web, and mail the Proposed Plan Fact Sheets. Such advance planning is done to ensure that the public is informed about the time and place for the meeting. Regardless of scheduling conflicts, this meeting had the largest attendance approximately 300 people) for any Fox River meeting to date. Additionally, in response to the commenter's request, the TAG group was notified more than three weeks in advance of the meeting to ensure the widest possible attendance. Also, USEPA's Proposed Plan Fact Sheet was posted on its website and mailed in hard copy form the week prior to the start of the comment period.

Regarding news releases, USEPA has been sending them to the commenter via fax at the same time the media receives them. The USEPA press team added the CWAC to the media fax list following a request at a TAG workshop in 2003. If the commenter is not receiving USEPA releases, that can be rectified. Another option is to subscribe to USEPA's news release listserve. While the listserve is geared towards the media, anyone may sign up. However, all Wisconsin news releases are sent out – not just those pertaining to the Fox River. To subscribe, go to

www.epa.gov/region5/news/index.htm and click on "sign up to receive News Releases by mail." WDNR has already included the commenter in its listserve distribution. The commenter receives all WDNR news releases this way.

17. Citizen Oral Comments Limited to 3 Minutes, Unevenly Applied

While the corporate polluters have had 3.5 years of unlimited personal access to all the involved agency staff, citizens were limited to just 3 minute comments to one DNR and one EPA staff person, at one public hearing. The EPA hearing coordinator seemed to think the hearing process was a joke and citizen comments needed to be rushed as much a possible. She did not restrict timing of comments evenly, often letting industry supporters take much longer than capping opponents. Early in the hearing, she even allowed one of the Fox River cleanup contractors to displace a citizen commenter, and allowed him to taken up citizens' precious time with embarrassing praise for his own efforts. It was not appropriate. It was not fair. That man has constant access to the agencies.

Agency Response

Time for verbal comments was limited because there were many people who wanted to speak, and a limited amount of time to conduct the meeting. Those who spoke were treated fairly by giving each speaker an allotted amount of time. In the instance referred to in which "contractors" allegedly "displaced" a "citizen commenter," the "contractor" in fact had obtained a numbered card given out at the start of the meeting, assigning him a slot to speak. The "citizen commenter" in question had not obtained a numbered card for a speaking slot, but was nevertheless granted an opportunity to speak.

The Agency staff handling the meeting was professional, courteous and respectful. The meeting moderator did not know the majority of the people in attendance, so preferential treatment was not granted to anyone. Many attending the meeting later complimented the Agencies on how they handled such a large crowd of sometimes angry commenters. Commenters were consistently treated in an evenhanded and fair manner. An impartial and careful review of the transcript from the meeting (completed and certified by Nancy M. Baux, Certified Professional Reporter as "a true and correct transcript") should supports these points.

18. Industry Stacks Meeting with Coached Employees

Georgia-Pacific obviously induced many of its employees to attend the public hearing as a cheering squad in the back of the room, making a mockery of the process. During testimony, one by one, G-P employees got up and made the same

speech: "My name is _____. I've lived in Green Bay all my life and I have a family. I love to fish and boat and swim in the river and bay. I also value my job at G-P and think we need to find balance on this Fox River cleanup. I think this capping plan is great and I support it." The testimony of these employees should NOT be given equal weight when compared to other independent citizen testimony. Their employer Georgia-Pacific essentially WROTE this plan and has had constant access to agency staff for the past 3.5 years. Their views have been represented all along, while the rest of us have been excluded.

Agency Response

Community members' comments cannot be controlled at public meetings, and individuals are allowed to express their views in such an open forum. All individuals are welcome to express their view, provided that they adhere to the timeframe allowed.

19. Agency Staff Misled Public at Hearing

At the public hearing, agency staff gave SEVERAL dishonest answers to direct questions from the public. Jim Hahnenburg made a particular effort in his introduction and answers to discount all the concerns Clean Water Action Council had raised in its handout that night. For example:

1. He said groundwater upwelling had been addressed and wasn't a problem. Our technical advisor says that is absolutely not true.

2. He said ice formation had been addressed and wasn't a problem. Our technical advisor says that is absolutely not true.

3. He said they used other successful comparable caps in other parts of the country to help them design these caps. But there ARE no comparable caps in a flowing river of this size at our latitude.

4. He said PCBs stick to particles and will not move once capped. But lower-chlorinated PCBs ARE soluble and WILL move with water and air. And as the PCBs gradually break down they will turn into lower-chlorinated PCBs, so ultimately all the PCBs will become mobile. Lower-chlorinated PCBs are still seriously toxic.

5. He said the limited 40 year monitoring time was not a problem because EPA would continue to do monitoring forever afterwards into the future. But will EPA exist? Who will pay for it? Why are the corporations paying for only 40 years? Don't these questions pose problems for the future?

6. He said the caps would be as secure as landfills, a claim he can't back

with any evidence, and is certainly NOT true for the sand blankets which are not barrier caps at all. The sand is only a dilution layer that will gradually (or quickly) erode downstream --- an upland landfill equivalent would never be tolerated.

7. He assured the public that the corporations would always be liable if problems develop with the cap, which he knows to be untrue given the likelihood that the corporations will demand a cash-out of their liability once the plan is done. He also knows that a hundred years from now our political situation could be vastly different, the laws may change, and the corporations may not exist.

8. He said this new plan would speed-up the cleanup, because it would be completed in only 10 years whereas the old plan would take 17 years. That's a dishonest industry argument. The old dredging ROD called for the same stretch of river to be completed in 10 years, not 17, and this would definitely be possible if the EPA and DNR had the backbone to require multiple crews and adequate equipment right away. Besides, the speed of the cleanup is far less important than doing it right the first time.

9. He said it was important to use a mix of technologies to address the Fox River problem. Why? Why abandon a proven technology (dredging and landfilling) in favor of a purely experimental and risky technology (capping in a large northern river) that has NOT yet demonstrated one success?

8. Etc. etc. etc.

Agency Response

Before the public meeting, USEPA and WDNR staff had heard technical concerns similar to those raised by CWAC from other members of the community. In preparing opening remarks for the public meeting, it was not the agencies' intention to discount CWAC's concerns, but rather to address many of the concerns commonly held by members of the public, including CWAC members.

Technical points made by agency staff were correct. The specifics of the discussion referenced above are included in the meeting transcript. Additional information addressing these issues is presented in greater detail elsewhere in this summary. These include a response to the Clean Water Action Council comment by Peter L. deFur, the Science and Technical Advisory Committee and others, immediately preceding this comment.

I made a long list that night of untrue statements made by agency staff. It was a shameful performance designed to deliberately mislead, confuse and neutralize legitimate public input.

20. Corporations and Agency Staff Lobby the Media and Elected Officials Together

It was extremely disturbing to hear that agency and corporate staff were working together as teams of lobbyists to manipulate media coverage of this issue. These teams visited all the possible media outlets in person, in some cases several times, to sell the ROD amendment and badger the media. It was pure propaganda and blatantly pro-corporate, repeating many of the lies and half-truths listed in #16 above. When did our public agencies become such blatant employees of the corporations? Who is providing their salaries?

Agency Response

Communication on the status of the project and project details are an important part of public participation for the project. WDNR staff often meet, as requested, with news media representatives to respond to comments they have received from interested groups. Since the remedial design for the Fox River project is being done in a collaborative fashion, it is only reasonable to have representatives from the agencies and the paper companies that are performing the engineering evaluations meet together to ensure that all of the questions can be answered accurately. WDNR has routinely met with the media throughout the project and with a few exceptions, those meetings only involved WDNR and/or USEPA staff.

21. Secret Dismantling of the Town of Holland Landfill Option

The agencies held secret, closed door meetings with local Brown County officials regarding the use of the Town of Holland Landfill for the bulk of the Fox River cleanup project. This particular landfill was the keystone underlying the 2003 ROD, but there was absolutely no public input process allowed as a few County officials debated this option secretly. Now the EPA and DNR say that they MUST amend the ROD and allow capping because they lack adequate landfill space. The most critical decision was already made before the public comment period opened, making this so-called "public involvement process" a fraud.

Agency Response

The town of Holland landfill appeared to be a viable option for disposal at one time. However, that landfill was never built because Brown County opted not to build it, which is the county's prerogative. Informal discussions between Agency staff and various local officials have occurred regarding disposal options, and various

other cleanup-related topics. The limitation of landfill space was one among many considerations used in selecting the Amended Remedy. The full range of considerations were (and are) the "nine criteria," as set forth in the NCP, 40 C.F.R. Part 300, which criteria are discussed at length in the ROD Amendment.

Conclusion

We've always had concerns about excessive corporate influence over DNR and EPA decisions on the Fox River, but this latest process has been blatantly corrupt and indefensible. The corporations are clearly in control and getting what they want, despite high risks for public health and taxpayers in the future.

The result is an absolute disaster of a plan. Completely unacceptable.

Sincerely,

Rebecca Katers, Executive Director

Clean Water Action Council

Comment by Rebecca Katers, Executive Director - Clean Water Action Council (Rebecca Katers second comment)

Susan Pastor, Community Involvement Coordinator U.S. EPA, P-19J 77 W. Jackson Blvd.
Chicago, IL 60604

January 11, 2007

Dear Ms. Pastor

The Clean Water Action Council is submitting this letter and attached CD disk and ring binder as evidence that Renard Isle remediation should become part of the amended Record of Decision (ROD) for the Lower Fox River and Green Bay. In summary, we believe Renard Isle should be added for these 5 basic reasons:

1. Renard Isle is a PCB contamination site clearly linked to Fox River PCB discharges

2. It warrants serious PCB cleanup attention in its own right, even without the river contamination.

3. Funds are desperately needed to protect public health and wildlife from risks at Renard Isle.

4. Success of the Fox River and Bay PCB clean-up could hinge on whether Renard Isle's properly addressed. Continued island leakage or a storm breach at Renard Isle could counteract any improvements in the Bay produced by the ROD.

5. The Fox River paper industries must be held accountable and cover a large share of the costs of Renard Isle remediation, repair and long term maintenance. This toxic dump was created because the paper industry polluted the Fox River and Bay sediments. It exists only because of the contamination. If the sediments were clean, no disposal site would have been necessary and these sediments could have been used as fill material or for landspreading on farmland over the years.

Background

Renard Isle is a 55 acre artificial island constructed off shore from Bay Beach Amusement Park as a Confined Disposal Facility (CDF) in 1978. It sits at the extreme southern end of the Bay, just to the east of the mouth of the Fox River. It was filled from 1979 to 1996 with contaminated dredged sediments from the Brown County shipping channel (Port of Green Bay).

The island contains sediments dredged during some of the most intense historical PCB discharge periods and from the most heavily contaminated areas in the last 5 miles of the Fox River, including a final loading from the notorious Fort Howard Turning Basin near site 56/57. According to rough estimates made by the Wisconsin Dept. of Natural Resources in the 1980s, the island contains about 30.000 pounds of PCBs, and high

concentrations of mercury, arsenic, lead and a host of other toxic contaminants.

When compared to the 60,000-70,000 pounds of PCBs in the river, Renard Isle is an enormous unaddressed toxic PCB hotspot.

Major Concerns

1. Large Continuing PCB Source Unaddressed --- The BODR claims that new inputs of PCBs to the Fox River and Green Bay are minimal, but the BODR never addresses the long-term PCB leakage from Renard Isle, which could easily be significant. Similarly, the island has caused a large accumulation of many acres of

contaminated sediments between the island and shore, which have also been ignored and unstudied. This is a maior blind spot in the amended ROD. The liability assignment issues are a side issue at this stage; the most important need is to apply Superfund and state standards to investigate and remediate this site for the sake of public health and wildlife.

2. Lack of Studies --- Detailed, systematic core sampling has never been done on the island to determine the true distribution and extent of toxic contaminants. Only a handful of cores have been sampled over the years, enough to show a wide range of contaminant concentrations, some near TOSCA levels. Only 5 sampling wells were used by the County recently to make broad claims regarding all 55 acres of the island. In addition, during the 5 well sampling, the wells were sheathed and filtered, because (as the samplers Foth & Van Dyke said) the "mud would flow into the sampling wells." By filtering out a large percentage of the particulates and solids, and analyzing only the pore water, the PCB and other toxic samples were badly skewed to hide the true nature of the toxic flows from the island. (Many contaminants stick to particulates.) The DNR has required that 5 new wells be placed and sampled this year, but this still is not the comprehensive site characterization that is needed.
The sediment was laid over many years, from many different areas of the river, with uneven placement on different segments of the island. At least 110 cores are needed, or 2 cores per acre.

3. Uncapped and Exposed --- Since the last sediment additions in 1996, the island has remained uncapped and exposed to the elements, resulting in run-off, volatilization and blowing dust. Large populations of woodchucks, ground squirrels, rabbits, fox, raccoons, waterfowl, terrestrial birds and even deer have been noted on the island, often burrowing through the contaminated sediments, causing further toxic uptake or distribution.
Cottonwoods and willows are growing in large numbers on the island, and their falling leaves undoubtedly carry more contaminants offsite. The site needs a properly sloped, thick impervious clay and barrier cap, with thick vegetated topsoil, just as required at any upland PCB sediment landfill. (The Corps and County are . pressuring the DNR to give them permission to simply cap the island with sand dredged from the no[them end of the shipping channel. This would be grossly inadequate.)

4. Leaking Dike --- The perimeter dike is not sealed and has little ability to filter contaminants from water flowing in and out of the island on a daily basis. The dike wall consists of only one layer of interlocked sheet metal held in place by large rocks. There is no sand, clay or fabric filter core in the walls. In fact, the Corps once told us verbally that they built the walls with gaps at the bottom to facilitate dewatering of the sediments.
The perimeter is over a mile long, creating a large leakage area from highly contaminated sediments within, like a huge toxic tea bag soaking in the Bay. Army Corps' dye-tracer studies at other similar, but less contaminated, disposal islands in Wisconsin showed over 90% of the water flow was directly through the walls to the outside, not through designated filters. The Corps has repeatedly refused to conduct a dye-tracer study at Renard Isle.
The County and Corps have provided no relevant data to support their claims that the leakage effects are minimal. The island nee.d-.SJo-bej;ealed to prevent further escape of toxins. Capping alone is not enough.

5. Dysfunctional Filters --- The island was built with two weir structures at one end which were supposed to serve as sand-filtered outfall cells for the island (on the assumption that the walls would "seal themselves.") The County and Foth & Van Dyke have acknowledged that the weirs are non-functional and NOT filtering wastewater leaving the island. In fact, DNR documents from 1987 state that the sand weirs were already completely plugged and in dire need of maintenance. That was 20 years ago.

6. High Vulnerability to Storms --- The dikes were built to withstand only weak storms with an intensity expected statistically every 20 years, but a 50, 100, or 300 year storm could hit any day, breaching the dikes and spilling contaminated sediments into the bay. The walls must be reinforced to withstand maior storms.

7. Short Lifespan --- The Corps built the island with only a 50 year design life which will end soon. In roughly 20 years, the sheet metal walls will need replacement, which will be extremely expensive and logistically difficult to do without serious leakage of toxic contaminants. Planning must begin now to properly design new walls and identify the source of funding. Perhaps the plan should be to excavate and remove the island materials to a safer upland site.

8. Lack of Planning --- Currently, we have only a vague promise that the Corps will repair the island in the event of storm damage, and the County has set aside roughly $250,000 for the task, but one storm at the similar Saginaw Bay CDF in Michigan caused a serious breach and cost more than $1 million to repair. We are very worried that any response in Green Bay will be slow and inadequate. A detailed contingency plan must be prepared that identifies the specific personnel and chain of command needed for rapid remedial actions starting immediately after island storm damage. The plan should also secure guaranteed ready equipment, and ensure adequate and immediate sources of repair materials. All necessary funding sources should also be identified and secured in advance, so repairs will be uninterrupted by funding shortfalls.

9. Lack of Law Enforcement --- For more than 2 decades, the state has refused to enforce the terms of wastewater discharge permits or apply water quality criteria to discharges from the island, despite several documented permit violations and a DNR staff recommendation in 1987 that an enforcement action was warranted.

The ring binder attachments with this letter provide documentation for the claims made above. A PowerPoint presentation is also included as visual evidence and background, though it was originally prepared for the Wisconsin Dept. of Natural Resources.

Sincerely,

Rebecca Katers Executive Director Clean Water Action Council ofN.E. Wisconsin

Agency Response

To repeat USEPA comment response Number 13 in Section 1, page 16-18, above:

The lack of inclusion of Renard Island under this Superfund cleanup is unchanged from the 2003 ROD Remedy. The 2003 ROD states: "Final closure of Renard Island in southern Green Bay will be undertaken by the USACE, but is not part of this decision." This issue was addressed in the Responsiveness Summary attached to the 2003 ROD, specifically in agency responses to comments 9.25 and 9.26, on pages 9-1 to 9-2, as follows:

> **"Master Comment 9.25**
>
> **Commenters expressed support for reconstruction of the cap on the Renard Island Confined Disposal Facility (CDF) as part of the remediation of OU 5.**
>
> ***Response***
>
> **The WDNR and USEPA support the appropriate closure of the Renard Island CDF. However, closure of the CDF is the responsibility of the USACE and the local sponsor, Brown County, under the Rivers and Harbor Act and the Water Resources Development Act. The WDNR recognizes that appropriate closure of the CDF includes ensuring that it is properly capped, monitored, and maintained and that it does not become a source of PCBs back into Green Bay. WDNR Waste Program staff will work with the USACE and Brown County to see that the site is properly closed. Closure of Renard Island is not part of the ROD for OU 5.**
>
> **Master Comment 9.26**

Commenters stated that closure of the Renard Island CDF is not properly included in the Superfund process and cannot be identified as part of a remedy for OU 4 or OU 5. Other commenters suggested that the selected remedy for OU 4 or OU 5 should include the costs of Brown County's financial responsibility for managing Renard Island as well as costs for the Bayport facility operated by the county.

Response

The WDNR and USEPA acknowledge that closure of the CDF [confined disposal facilities] and operation of the Bayport facility are responsibilities of the USACE [United States Army Corps of Engineers] and the local sponsor, Brown County, under the Rivers and Harbor Act and the Water Resources Development Act and, as such, are not included in the ROD. Since neither facility was identified in the BLRA [Baseline Level Risk Assessment] as a specific source of risk and since the facilities are subject to other state and federal jurisdiction, the ROD cannot require any remedial action at these facilities.

Brown County has expressed interest in exploring the appropriate closure and long-term care of Renard Island and Bayport as part of the overall Lower Fox River cleanup. Costs for closure of Bayport and the Renard Island CDF are included in Sections 7.5 and 7.6 of the FS along with the cost of constructing a new CDF. Final closure of Renard Island must be agreed to by the USACE, Brown County, and the WDNR. One element of CDF closure will be ensuring that the CDF is properly capped, monitored, and maintained and that it does not become a source of PCBs back into Green Bay."

<u>Additionally</u>, according to the Renard Island Closure Plan submitted to the Department on behalf of the Green Bay Port Authority in September 2005 the level of contamination of the sediment within Kidney Island ranges between 0.1 mg/kg and 6.7 mg/kg. These PCB levels mirror the concentration of PCBs found throughout the Bay of Green Bay. Additional data collected between August 2006 and April 2007 as part of the baseline monitoring program required under this remediation effort indicates that there is a significant reduction in water column PCB concentration between Lower Fox River and the southernmost transect of Green Bay. This is an indication that there are no significant sources of PCBs, including Renard Island, within the Bay of Green Bay. Finally, Brown County as the local sponsor of the navigation dredging that created Kidney Island is developing a final closure plan that will address the release of PCBs from this site, so no additional work is being considered as part of this cleanup action.

Science & Technical Advisory Committee

The Science & Technical Advisory Committee (STAC) of the Lower Fox River and Green Bay Remedial Action Plan (RAP) has reviewed the EPA and WDNR (the "Agencies") proposed changes to the remedy described in the Record of Decision (ROD). We have also reviewed the Basis of Design Report (BODR) which provides the supporting detail. However, the BODR represents a very complex body of work, and we have not had the resources to evaluate the report to the extent that we would like. Therefore, our comments submitted in this document will address primarily the proposed changes to the original ROD plan as described in the Technical Memorandum which the agencies released in November of 2006.

The Lower Fox River and Green Bay Remedial Action Plan process has been heavily involved in the Fox River contaminated sediments issue for two decades. From the very beginning of this effort, the goal of the STAC has been to identify, evaluate and incorporate the best science and policy into the remediation process as is possible. The Wisconsin Department of Natural Resources (WDNR) no longer supports structured RAP committees. However, our group has worked together since 1986, and will continue to provide comments and input to all parties working towards environmental improvements for the Fox River and Green Bay ecosystems.

Any written comments provided by our committee normally represent a consensus opinion. In this case our comments are being submitted specifically on the merit of the plan developed by the EPA and WDNR, referred to as the Optimized Remedy. It should be noted that the views expressed by the STAC do not reflect the official position of the parent organizations of its members and that our WDNR and U.S. Fish & Wildlife members have chosen not to contribute directly to the statements presented below.

The STAC submitted formal comments to the Proposed Remedial Action Plan (PRAP) in January of 2002. The following comments will build on our 2002 comments and will specifically address the agencies proposed changes to the original PRAP cleanup plan.

Comments Regarding the Philosophical Shift to Increased Capping and Less Dredging

The Optimized Remedy would result in substantially less dredging as compared to the current plan; i.e. 3.6 million cubic yards as compared to 7.6 million cubic yards. In order

to maintain a similar level of remediation, the proposal calls for a significant increase in capping. The primary benefits of the proposed changes have been reported as: less time to complete; quicker positive response by the fish community (i.e. reductions in PCB body burdens); and lower cost.

However, we continue to be concerned about the tradeoffs which will accompany these benefits. The capping issue was prominent in our 2002 PRAP comments. In that document, we stated:

> *The process for selecting a final alternative must weigh: capping - the benefits of short term risk reduction coupled with long term risks due to possible cap failure against; dredging - the benefits of long term risk reduction associated with mass removal coupled with the short term risk of PCB release from resuspended sediments during dredging and some amount of risk posed by residual PCBs which remain in the sediment.*
>
> *The STAC has previously recommended permanent removal of PCBs from the lower Fox River and Green Bay wherever technologically and economically feasible. The intent of the overall cleanup strategy should be to minimize the potential for both short-term and long-term risks, to humans and wildlife populations.*

But we also noted that that the concept of mixing dredging and capping was sound, and should be explored during detailed design. Essentially, our opinion in this regard has not changed.

The agencies have highlighted new information that has come to light since the PRAP was published. We wish to comment on four areas included under the heading of "new information" as contained in the EPA document titled, "EPA Proposes Changes to Current Cleanup Plan", dated November 2006.

First, it appears that a main element of this new information reflects the observation that the concentrations and locations of PCBs in the river are somewhat different than earlier believed. However, we are not at all surprised at this finding. Sediment surveys conducted over the past 20 years have verified that the PCBs are not static, but rather are regularly redistributed by effects of current and other physical disturbance. Concentrations have been shown to be highly variable, and will no doubt continue to show even more variability as more sampling is performed, given the nature of sedimentation characteristics and PCB chemistry. Even when the PRAP was released, it was expected that the estimates of total volumes of sediment to be remediated would be revised as more detailed sediment coring was performed. So, we fail to see how the new analytical data in any way supports the need for a dramatic shift to more capping.

Agency Response

Since the 2003 ROD was issued, new, comprehensive sediment sampling

of the Fox River has been conducted, and this new sampling data now provides the agencies with a much better basis for deciding which areas of the river should be dredged and what areas should be capped. The agencies now have a much better understanding of how and where PCB sediments are distributed in the river and in what concentrations.

For example, the agencies now have a better appreciation of how deeply buried some of the PCB sediments are in certain areas of the river. Many of these areas of deeply buried PCB sediments are covered by several feet of relatively clean sediment. Given this situation, the agencies now understand that the projected unit cost for dredging PCB sediments that appeared in the 2003 ROD was too low, and that the current cost of removing such deeply buried PCB sediment would be substantially higher. The costs would be substantially higher because in order to maintain a low-angle slope for river bottom stability, large volumes of relatively clean upper layer sediments (sometimes as much as 15 feet) would need to be removed and landfilled, in order to reach the more deeply buried, higher-concentration sediments. The landfilling of the clean upper layer sediments would use up limited landfill space.

A second example of how newly available information has required the agencies to re-evaluate the original remedy is near-shore areas with PCB-contaminated sediments. At the time of the 2003 ROD, not much was known about how dredging would impact the stability of banks near the shores of the Fox River. As part of the remedial process, an additional shoreline survey was performed to assess shore stability and to collect more refined data on PCBs in near-shore sediments. The survey revealed that there are many near-shore areas where dredging would cause the river bank slopes to be too steep and unstable, and would risk collapse. The results of this survey will be used in developing the final design.

A final example of how new information has required a re-examination of the remedy is sediments with PCB contamination between 2.0 ppm and 1.0 ppm PCBs. Recent engineering evaluations suggest that dredging sediments that contain between 2.0 ppm and 1.0 ppm PCBs would result in the removal of significant volumes of "clean" sediment (due to the limitations of dredging operations), while removing a relatively small amount of PCBs. These relatively clean sediments would also have to be landfilled, resulting in limited environmental benefits, but imposing a significant burden on limited local landfill space.

To a degree, the previous ROD anticipated that projected costs might increase, and that is one reason the Contingent Remedy was provided in the 2003 ROD. For these areas with deeply buried, higher contamination sediments, as well as other difficult or dangerous places to dredge, the criteria originally included in the Contingent Remedy are similar in the

Amended Remedy.

Second, there is discussion in the proposed plan that there are a number of limitations to dredging in several areas of the river, such as along some riverbanks and near structures. Again, this was noted in the original PRAP as a "fine tuning" need to be elucidated during final design. However, we note that the discussion suggests that considerable portions of nearshore areas may not be conducive to dredging. This will no doubt be true in some cases, but as long as the shoreline is stable, there should be no reason to preclude dredging in most nearshore areas, particularly in OU 4.

Agency Response

As long as the shoreline is stable, and dredging is more effective and less costly than capping, we agree that dredging should be performed on near shore areas. However, if the shoreline is not stable, and/or if capping would be equally effective but less costly than dredging in reducing risks, the agencies believe that capping can be performed. The "contingent remedy" in the original ROD explained these considerations. Nearshore areas that have been preliminarily identified as appropriate for capping are shown in Figures 2 and 3 of the Amended Remedy identified as "Shoreline Instability If Dredged."

The third element listed under the "new information" heading relates to limited landfill space. This topic surely represents a critical component to any remediation plan, and has been the subject of considerable discussion ever since the RAP work began. As we review the proposed changes, we have concerns that this element, in fact, may be the primary driver behind the philosophical shift towards capping. Though landfill space has always been a key issue, until now the agencies have not indicated that this element would be a limiting factor in the ultimate remediation strategy. We now have concerns that this may no longer be the case. We have seen serious difficulties with landfill issues every step of the way; first with the Deposits N and 56/57 Demonstrations Projects, then the Little Lake Butte des Mortes project, and most recently with Georgia Pacific's proposal to accept TSCA sediments at their Green Bay landfill. It should be no surprise to the agencies that securing landfill space was paramount to the successful implementation of any remediation scenario. Our PRAP comments included a recommendation which stated:

> *Off-site landfilling has been selected as the long-term disposal alternative for all dredged sediments. We have gone on record that landfilling provides the only reasonable and certain means at hand to secure contaminated sediments in a safe and cost effective way, and prevent further contamination of Green Bay. However, the most cost effective means for landfilling dredged sediments may involve the siting and construction of a new landfill. Many institutional and regulatory hurdles would have to be addressed for this option to be viable. We are concerned that this key issue could significantly delay the remediation plan. Therefore, we recommend that the Department present specific details of this*

issue as soon as possible

However, we can only assume at this point that the agencies have been unsuccessful in this effort. We say "assume" because the agencies have been especially quiet on this aspect since the PRAP was issued. For example, the WDNR reported that it had met with Brown County on several occasions to discuss possible options for utilization of a proposed landfill site near Wrightstown. However, no final decision on the use of that site was ever publicized.

Agency Response

The 2003 ROD identified landfilling of the dewatered contaminated sediment at a local landfill as a critical component of the remedy selected. The selection of the dredging remedy in the 2003 ROD was based, in part, on local governments' expressions of willingness to help find a site for the disposal of the dredged sediment. However, as the commenter has suggested, since the issuance of the 2003 ROD, public opposition has arisen to the landfilling of Fox River sediment. For example, state legislators have repeatedly attempted to introduce legislation to prohibit the disposal of PCB-contaminated sediment in any landfill in the state. Additionally, the Town of Vinland threatened a lawsuit over the permitting of a landfill owned by one of the responsible parties, Winnebago and Outagamie Counties passed resolutions opposing the landfilling of Fox River sediment in any landfill in their counties, and several municipalities and numerous individuals have expressed opposition to the permitting of a sediment cell within the footprint of an existing landfill in Brown County. While the STAC may be in support of the dredging, dewatering, and landfilling of all of the contaminated sediment in the Fox River, their support has not influenced the overall public opposition to the landfilling of PCB-contaminated sediments.

Responsibility to design and implement the remedial action rests with the responsible parties who are obligated to do the site cleanup. This STAC support may prove useful as the responsible parties seek to find landfill capacity as they move forward with the remedial design and remedial action required at this Site.

In summary, we feel that the Optimized Remedy represents a significant shift of opinion of the agencies towards a significantly greater proportion of capping versus dredging. Based on our review of the issues, such a shift offers the following advantages and disadvantages.

Advantages – quicker establishment of desired sediment surface concentrations (leading to lower fish body burdens); less use of scarce landfill space; reduced cost.

Disadvantages – significant increase in monitoring costs related to cap integrity; risk of

failure to meet fish consumption advisory goals if cap integrity is compromised at any time in the future; risk of liability for ultimate responsibility for cap integrity falling back to the citizens of Wisconsin; potential increased costs related to future in-river construction by area communities.

Agency response

Under the 2003 ROD, the agencies in fact did allow capping as a contingency, potentially addressing a significant amount of PCB contaminated sediment. The following portion of Table 11-9, excerpted from the June 2003 ROD, indicates that capping met all the requirements of the NCP and the nine criteria (with criteria 8 and 9 being State and community acceptance), and was a viable alternative comparable to the selected alternative (i.e., dredging). A major reason Alternative F (capping) was not selected in the 2003 ROD was because it was not believed to be cost effective. However, more recent evaluations and new information indicate that capping is cost-effective relative to dredging.

Yes = Fully meets criterion Partial = Partially meets criterion No = Does not meet criterion	**Alternative F *In-Situ* Capping**
1. Overall Protection of Human Health and the Environment	Yes
2. Compliance with Applicable or Relevant and Appropriate Requirements	Yes
3. Long-Term Effectiveness and Permanence	Yes
4. Reduction of Toxicity, Mobility, or Volume Through Treatment	Yes
5. Short-Term Effectiveness	Yes
6. Implementability	Yes
7. Cost (millions of $)	$352.9

While the Amended Remedy is a fundamental change to the 2003 ROD, this remedy has many similarities to the 2003 ROD in that it still has a significant amount of dredging and includes capping that is largely consistent with the contingent remedy (i.e., capping) included in the 2003 ROD.

One final point here concerns ultimate liability for monitoring and care of any caps. There has been much said that the Responsible Parties will carry the ultimate responsibility for long term monitoring, maintenance and repair of any caps, essentially forever. However, our review of the actual language contained in the documents leaves

us less certain on this issue. Therefore, we strongly recommend that the final Record of Decision should outline, in detail, the exact liability determination. The final decision to allow caps should not be made without such documentation.

Agency Response

As previously stated in Section 1, Comment 1, pages 6-7 of this Responsiveness Summary, the ROD Amendment is not the legal document that will obligate the PRPs to perform the remedial action. See this prior response for an explanation of the legal options that the United States has for securing work at the site.

Comments Addressing Specific Technical Components of the Optimized Remedy

Again, the Basis of Design Report represents a significant body of work, and our committee did not have the resources to pursue a full scientific evaluation. However, we do wish to make a limited number of comments on specific elements of the plan which stand out even at a cursory level of review.

Final Estimates of "Dredged" versus "Dredged and Capped" versus "Capped" Sediments

Regarding the indicated volume of sediments proposed to be capped or dredged and capped, it clearly seems that these numbers will not be known with any degree of accuracy until the final engineering design phase. At our most recent committee meeting on December 12, 2006, Greg Hill of the WDNR provided us with a very useful presentation of the Optimized Remedy. One of our questions concerned the designated areas of possible capping, as indicated in Figure 5 – 6 in the BODR report. If taken literally, the mosaic image would suggest that numerous "plateaus" of undredged, capped sediment would remain, surrounded by large tracts of dredged river bottom. Logistically this would seem terribly inefficient. Greg's responded that the figure represents areas that meet the capping criteria, but that actual designations would not be done until final engineering design. His response made good sense, but it alludes to a future stage of the project where the final delineations of dredge versus dredge-and-cap versus cap will need to be completed. These delineations must be made based on good engineering as well as ecological considerations, without any previously determined maximum landfill space consideration.

Agency response

We agree that the final design must be based on sound engineering principles and judgments to be protective of human health and the environment. Available landfill space is a consideration, but it does not dictate the remedy. The details of the cleanup and detailed delineation of areas subject to capping, dredging, and sand covers will be finalized in the Final Design. An element of the design will be to make sure that different remedies blend well together, particularly in adjacent areas. The final

design will probably not have small isolated areas for the various remedies (i.e., dredging, capping or sand covers), due to the need for a practical construction plan. Final determinations for remedies for specific areas will be based on characteristics such as habitat, sediment type, water depth, potential river use, accessability of equipment, water flow, potential for scour related to ice formation or propwash, and contaminant type and concentration.

Leaving Highly Contaminated Sediments In Place

One important feature of the 2002 PRAP, and of the ROD itself, specified that PCB concentrations of over 50 parts per million (referred to as TSCA sediments) would all be dredged. The Optimized Remedy indicates that this will no longer be the case, and that some of the TSCA sediments, if deep enough in the sediment column, could be capped.

We strongly recommend against this change. The increased risk of leaving "hot spots" in the river, in our opinion, far outweighs the marginal cost savings. Throughout the earlier planning efforts, it was acknowledged that riverine sediments with higher PCB concentrations posed the greatest risk to long term contamination of the Bay. At the same time, it was shown that dredging high concentration areas provided a cost effective means of removing PCB mass from the ecosystem. Therefore, we see no reason to modify the original ROD guidance on this issue.

Agency Response

The only locations where PCBs above 50 ppm would be capped are areas in the navigation channel where contaminants are deeply buried and in near-shore areas where shoreline stability would be in question. In these locations there would be some dredging and then capping with thicker sand, and larger armor stone (preliminary designs call for 15-inches of sand and 18-inches of large stone). Thus, the cap over these deeply buried, higher level PCB sediments would be especially stable and robust. It is highly unlikely that these deeply buried sediments would be subject to erosion or re-exposure, particularly because these areas would have a thicker cap with larger armor stone. In areas where the PCBs are nearer the surface, with higher PCB concentrations, or in areas more subject to erosion or disruption, dredging would be done.

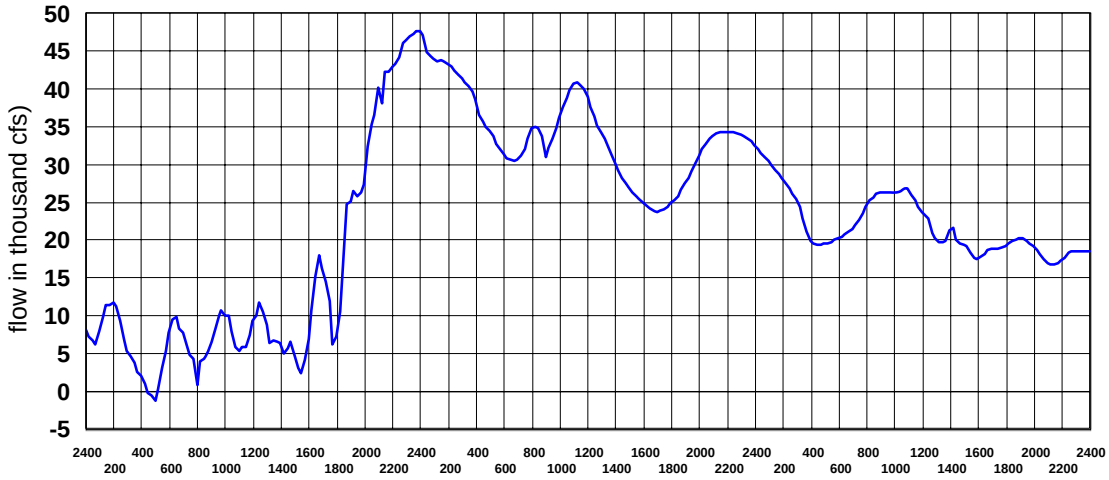
Cap Design Criteria

The design flow of 24,200 cfs that was utilized in the BODR for determining the design and applicability of capping is inappropriately low, particularly for the portion of the Fox River below the DePere dam. We recommend a daily design flow in the range of 40,000 to 50,000 cfs, and if needed, an even higher 1 hour design flow, based on the following information:

1) The impact of stream contributions from the East River, Dutchman Creek, Ashwaubenon Creek and other tributaries or urban outfalls below the DePere dam were not adequately considered in the BODR hydrodynamic study. River flow between the dam and the outlet to Green Bay is unregulated. Therefore, discharge records at upstream locations should not be strictly utilized to determine design flows below the DePere dam. It appears that the revised hydrodynamic model discussed in Appendix D of the BODR accounts for contributions from the East River by adding 10% to the discharge at the DePere dam. However, a linear relationship between flow at the DePere dam and the Fox River mouth cannot be assumed for all conditions.

This concern can be demonstrated by reviewing the highest known recorded daily average flow below the DePee dam of 33,800 cfs**,** which occurred on June 23, 1990 at the USGS Oil Tank Depot station near the Fox River mouth (Station # 040851385). But the highest daily flow at DePere during this same storm event was only 14,500 cfs. The BODR report states that, "Reversing currents associated with seiche effects have resulted in instantaneous peak discharges at the river mouth as high as 957 m^3/sec (33,800 cfs)." In fact, the peak one hour mean flow during this event was 47,400 cfs at the Oil Tank Depot station (see Figure below). While the seiche may have had some effect on discharge, the hydrological response at the Fox River outlet is consistent with heavy rainfall occurring over the entire Lower Fox River sub-basin, which has a significant amount of impervious surface with quick drainage to the Fox. A total of 4.9" of rain was recorded by the Green Bay National Weather Service on June 22, 1990. Similar

Figure 1. Flow at USGS/GBMSD Oil Tank Depot Station (15 minute data)



amounts fell over the entire Lower Fox River sub-basin (4.2" at Appleton; 5.0" at Seymour and 4.78" at Brillion, which are just outside of the sub-basin).

2) The importance of localized precipitation events on Fox River flow at the mouth, such as the June 22, 1990 rain event, will no doubt become greater in the future as the area continues to urbanize. Flow contributions to the Fox River below Lake Winnebago are

increasingly influenced by urban areas with relatively high proportions of impervious surfaces and associated flashy flows. Urban areas within the Lower Fox River sub-basin increased steadily at a 2.6% annual rate between 1954 and 2000 (Baumgart, 2005). There is little reason to expect that this trend will not continue, so urban areas could occupy over 50% of the entire sub-basin land area by 2025, and nearly 100% by 2050 if current urbanization rates are maintained. Obviously, this level of increased urbanization would serve to increase the Fox River flows even beyond events such as was experienced in June of 1990. In addition, some climate change models predict an increase in the frequency and/or magnitude of intense precipitation events in the future due to the effect of increased greenhouse gas levels. The BODR indicates that elements of cap design are based on conservative climatic conditions. Based on the discussion presented above, we cannot agree with that assertion.

Agency response

Hourly flows in the range of 40,000 cfs are a condition that will be considered in the Final Design.

Baseline Water Elevation as it affects shear stress and capping

We recommend that the final design of any remediation efforts, particularly capping, account for the potential effects of climate change on Lake Michigan and Green Bay water levels. Lofgren et al. (2000) reported the results of 12 climate models on the effects on Great Lake water levels. They found 10 of the 12 models showed a decrease in Lake Michigan-Huron water levels ranging from 1.3' to a maximum of 8.13'. The remaining two models predicted a slight increase of 0.16' over varying time frames, a result of their predictions of precipitation increases of 7 to 20%.

We do not see that the Optimized Remedy considers any change in long-term lake levels related to climate change. Based on the assessment by Lofgren et al. (2000), it would not be unreasonable to expect lake level reductions of two to four feet to occur well within the duration of the predicted cap life. Such a decrease would clearly have serious adverse effects on the capping alternative as presented. Shear stresses as estimated by the hydrodynamic model would significantly increase, shipping channel depths would no longer be adequate in areas of the channel that were capped, and overlying water depths for much of the proposed capped areas would no longer meet the existing cap criteria. Even if lake levels stay relatively constant, observed shear stresses could still increase because of increased frequency or intensity of large storms in conjunction with increased level of urbanization.

Agency response

The agencies agree that this is a concern and it is addressed in the Amended Remedy as a modification to the Proposed Plan. The June 2003 ROD discussed this matter as follows:

"Recent climate models indicate that Lake Michigan water levels could decrease by 3 feet by 2050 and 4.5 feet by 2090, below historical low-water levels. Therefore, decisions concerning capping should consider potential future declines in Lake Michigan water levels which would in turn affect levels within the Lower Fox River and Green Bay. Monitoring and maintenance would be required in perpetuity to ensure the integrity of the cap and the permanent isolation of the contaminants."

Therefore, in response to this comment and due to similar agency concerns, if water levels were to decrease from 2003 levels by 3' or more as determined annually, then an evaluation of the impacts to capping effectiveness would be required. This evaluation would also determine what would need to be done (if anything) to maintain the containment effectiveness of the cap. Additionally, impacts to river usage would be considered and recommendations to address this matter would also be made. Possible mitigation measures could be cap enhancement, increased monitoring, or cap removal and dredging. This is further described in Section XIII the Amended Remedy, and is a modification to the Proposed Plan.

Alternative Technologies

The 2002 PRAP indicated that alternative technologies could be considered as additional information became available. Comments provided to the agencies at many of the previously held public informational meetings and public hearings have urged that technologies that offer complete disposal, rather than landfilling, be considered. Yet, the current plan has completely dismissed the option of vitrification, even though an extensive amount of information about this technology has been included in the review process. The final assessment by the agencies states that the technology does not offer any significant benefit, primarily due to cost.

However, we recommend that the agencies reconsider this (and any other appropriate) technology in the planning process. The remediation of the Lower Fox River will be an unprecedented event, both in scope, time and cost. It would seem to us a missed opportunity not to consider evaluation of alternative technologies, even if at a pilot scale, within the overall work plan for this project.

Agency Response

Treatment technologies were evaluated in the Feasibility Study and were found to be too difficult to implement, of questionable effectiveness, and likely too costly. Vitrification was re-evaluated during development of the BODR and as the STAC correctly states, was again found to be too uncertain as to effectiveness, implementability and cost.

As described elsewhere in these responses to comments above, the agencies also evaluated the BioGenesis soil washing technology, and reached similar conclusions. For the various treatment technologies available for contaminated sediments, there are few case histories, other than pilot scale or demonstration scale projects, which are not particularly useful in predicting costs for larger projects. Predictions of unit costs for treatment technologies are consistently considerably higher than landfill disposal, and dredging/disposal is more expensive than capping. This is confirmed at recent professional conferences (e.g. the 4th International Conference of Remediation of Contaminated Sediments, Savannah, Georgia, January 22-25, 2007). This conference was attended by many experts in sediment remediation who presented information on the latest remediation techniques and developing technologies. While many in-situ and ex-situ treatment technologies are under development, none have been shown to yet be viable or cost-effective at full scale, particularly for conditions such as exist in the Fox River.

However, the remedy does allow possible soil washing through the use of hydrocyclones and attrition scrubbing to reduce the volume of sediment that may need to be disposed in a landfill.

Cost Issues

Reduced cost has been highlighted as a significant benefit of the Optimized Remedy. Table 5 in the Technical Memorandum includes a comparison of the summary costs for the Current Plan versus the Optimized Remedy. Though the cost savings as listed are indeed significant, we are not confident that these savings may ultimately be realized. We understand that a great deal of detailed cost estimates went into the summaries, but from our review of Table 5 we have two concerns. First, the summary indicates a 72% reduction in costs related to dredging ($37,530,000 versus $132,570,000), yet the volume of sediment to be dredged only reduces by 54% (3.5 million yards compared to 7.6 million yards). This estimate of cost savings, then, would appear to be somewhat optimistic.

Second, the average O & M costs for the Optimized Remedy option, again based on the summary data presented in Table 5, would appear to be understated. Our comments in the Monitoring Plan section below will address this issue further.

Agency Response

The dredging cost in the estimate for the ROD remedy is based on 7.6 million cubic yards at a dredge operating efficiency of 50% with two dredges running (equivalent of one dredge running 24 hours per day). The Optimized Remedy is based on 3.7 million cubic yards at a dredge operating efficiency of 67% with a single dredge running. The dredges are each capable of moving approximately 200 cubic yards per hour. The

difference in dredging cost is therefore not linear with the change in volume. The reason for the relatively low estimate of operating efficiency for the 2003 ROD Remedy is because of the very long pumping distance (approximately 20 miles of pipeline from the river to the proposed disposal location in Holland, WI). The higher efficiency for the Amended Remedy is because the longest pipeline would be 4 miles with discharge into a sediment washing/sediment dewatering facility with two separate process lines for sediment washing/dewatering operations (one could keep up with the dredge).

Assuming the referenced "Table 5" is the cost table in the "Lower Fox River/Green Bay Site, Technical Memorandum, Current Plan and Proposed Plan," dated November 2006, the O & M costs are based on a simple percentage calculation from the overall estimated costs. This is a preliminary estimate and will be refined in the Final Design. These adjustments are a relatively minor part of the overall costs and would not affect the overall comparison of the remedies or the final determination of the best cleanup plan described in the Amended Remedy.

Monitoring Plans

The topic of long term monitoring was not addressed to any extent in the agencies Technical Memorandum which compared the Current Plan to the Optimized Remedy. The STAC has previously communicated its strong support for comprehensive, long term monitoring for the Lower Fox River and Green Bay, regardless of the final remediation plan that is developed. We have therefore reviewed Section 7 of the BODR and offer the following comments.

The BODR section on monitoring includes two separate programs for long term monitoring – Cap Performance Monitoring and Maintenance (Section 7.5.2) and long term ambient monitoring (Section 7.6). The monitoring plan scope for assessment of cap integrity, for the most part, appears adequate. However, the long period between surveys (5 years) is unacceptable. We would strongly recommend that some kind of short term, less intensive monitoring, such as an acoustic survey, be conducted every spring. Should a significant portion of any area of cap be damaged, the release of PCB mass could drastically affect the long term reduction of PCB body burdens in fish. Also, we recommend that a full monitoring effort be conducted whenever the Fox River flow rate exceeds the design criteria.

Agency response

For the first 5 years after capping, there would be 3 monitoring events – at year 0 (construction confirmation), year 1, and year 4. This information would be summarized and evaluated in the first 5-year review. Based on results from other capping projects, this frequency of monitoring should be sufficiently protective. If initial monitoring indicates that more frequent

monitoring (e.g., annually) is necessary, then monitoring would be conducted more frequently. Additionally, if a trigger event (e.g., 100-year storm, ice scour, scour from vessels or other man-induced occurrences) occurred that could potentially impact a cap, then additional monitoring would be conducted. If the cap performs as predicted, monitoring would thereafter be conducted every 5 years (e.g., the next monitoring event would be during year 9 for a 5-year review completed in year 10), precluding event trigger occurrences. If review of monitoring results indicates that it is appropriate, monitoring frequency and methods may be either increased or decreased.

Complementing the cap monitoring

Regarding the long term ecological monitoring plan for Green Bay, our initial response is that it would not be adequate to assess the impacts of the Fox River sediment remediation, whether the Current Plan or the Optimized Remedy is chosen. In our view, it is of the utmost importance that a comprehensive monitoring plan be developed for this project that can provide answers to the wide variety of questions that will surely be asked during and after the implementation phase. Remediation of the Lower Fox River will require significant expenditures, regardless of which option is chosen. It will only be through review and interpretation of detailed monitoring data that our successors will be able to judge the ultimate success or failure of the project.

Section 7.6.1.2 of the BODR report states that one of the main goals of the monitoring plan should be:

> *Verify that sediment remedial actions in the Lower Fox River result in substantive reductions of PCB loadings to Green Bay. Decreased loadings from the Lower Fox River will help facilitate natural recovery processes in Green Bay.*

Our review of the monitoring plan, as described in Section 7.6 of the BODR report, will not generate sufficient information to assess compliance with this goal. The plan emphasizes monitoring only of water and fish. But considering the limited number of sites and sampling events, this effort is not likely to provide sufficient data. Water concentrations, especially in the Bay, will show short term, relatively dramatic changes in PCB concentrations, but are not likely to be useful for identification of longer term, subtle variations. Fish concentrations can be used to judge whether the ultimate goal of elimination of fish consumption advisories is achieved, but may not be helpful in analyzing slow or otherwise unexpected responses along the way.

Agency Response

The long-term monitoring plan will comprehensively sample fish and surface water and in the view of the agencies, will allow them to determine whether Remedial Action Objectives (Section X of the Amended Remedy) are met. Surface water will be sampled from transects at one to three

stations for each operable unit. A number of fish species will be sampled to assess potential risk to humans and ecological receptors, as well as an "early indicator" species. The details of this plan will be described in the Final Design, currently under development.

At a minimum, therefore, we recommend that the monitoring plan include a component designed to assess short to medium term changes in PCB concentrations, such as sediment traps or tissue analysis from young of the year fish.

Agency Response

The monitoring plan will include monitoring of fish that are bottom feeders. Data from these fish should yield information on short term changes.

Overall, we find that the long term monitoring plan, as contained in Section 7.6 of the BODR, is unacceptable and should be revisited. Our committee is ready and able to assist the agencies in this endeavor.

Agency Response

A comprehensive long-term monitoring plan will be completed in the Final Design. An interagency team with expertise in these matters has been formed and will review the final design. We will consider comments submitted by your committee and other commenters in evaluating the Final Design.

Summary and Future Concerns

The critical issue with the Optimized Remedy involves a balance of risk – the possibility of a quicker, cheaper remedy against the possibility of buried PCB mass eventually being released into Green Bay. (The following data is contained in Table ES-1 in the BODR.) The Current Plan would leave 11 - 17% of the estimated total mass of PCBs in the Fox River. Even with this significant amount of PCB removal, modeling estimates for removal of walleye fish consumption advisories suggest several decades. Under the Optimized Remedy, 34 – 38% of the estimated total mass of PCBs will remain in the river, more than twice as much as compared to the Current Plan. The computer models which simulate the response of fish tissue PCB levels to reduction in delivery to Green Bay are driven by surface sediment concentrations. Thus, the Optimized Remedy results in faster reduction of fish tissue PCB level, due to the faster time frame. But what happens if all of the optimistic assumptions about cap integrity fail to occur, and portions of the remaining mass of PCBs are ultimately released to the Bay? There are an unlimited number of possibilities associated with this scenario; none of them good. The big question to be answered is; is the long term risk of leaving these additional PCBs in the river worth the short term cost savings?

Our 2002 PRAP comments concluded with two points: first, that we should move

forward with expediency toward cleanup. Second, that as we move ahead we should incorporate the principles of adaptive management to the entire process. We find that these issues are equally pertinent today.

In summary, we are grateful for the extensive work that the agencies have conducted since release of the 2002 PRAP. The proposed changes (summarily identified as a significant shift to much less dredging and much more capping) are not without merit. However, we have serious misgivings about the details of the plan as presented thus far. We would, however, be supportive of the proposal if it can be demonstrated that the agencies will address the following issues:

- The final engineering design should identify areas to be dredged based on the use of best science and engineering practices, and should not be influenced by a predetermined maximum available volume of landfill space.

Agency Response

The final engineering design is not being predetermined by any figure on maximum available landfill space. All nine NCP criteria have been considered in this decision to Amend the ROD.

- The final Record of Decision must include specific language regarding the permanent liability to the Responsible Parties for monitoring, maintenance and repair of any caps.

Agency Response

This ROD describes the technical basis for the decision and the decision itself, including the possible requirements for long-term monitoring and maintenance. Legal documents describe PRP liabilities and responsibilities.

- All TSCA (>50 ppm) sediments must be dredged.

Agency Response

Most TSCA sediments will be dredged. Exceptions to the general rule to dredging TSCA sediments are when sediments are deeply buried (sometimes 10 feet or more). In these areas, there would be dredging as deeply as practical after which capping would be done. This cap would have thicker sand and larger armor stone to provide greater assurance of stability and resistance to possible navigation dredging or propeller wash.

- Cap design criteria should increase the maximum expected river flow to account for contributions downstream of the DePere dam, and they should include the potential for long term water level fluctuations due to global warming.

Agency Response

A modification to the Proposed Plan includes a re-evaluation of capping protectiveness and stability under lower water conditions that may occur in the Great Lakes in the future due to global warming. Based on this re-evaluation, if it was determined that caps would not be stable or protective, then caps would have to be improved or removed.

- Alternative technologies, particularly vitrification, should continue to be evaluated. Such technologies should be considered for possible utilization for pilot scale research as part of the main remediation project.

Agency Response

Vitrfication will still be considered. If it is determined that vitrification would be cost-effective, it would be reconsidered for treatment of dredged sediments.

- Expand the Cap Performance Monitoring Plan to include limited annual assessments.

Agency Response

Based on experience from other capping projects (Attachment 1), the planned frequency of monitoring (several times in the first 5 years after capping and once every five years thereafter) should be sufficiently protective. If initial monitoring indicates that more frequent monitoring (e.g., annually) is necessary, then monitoring would be conducted more frequently. Additionally, if a trigger event occurred (e.g., 100-year storm, ice scour, or scour from vessels) that could potentially impact a cap, then additional monitoring would be conducted. If the cap performs as predicted, monitoring would thereafter be conducted every 5 years (e.g., the next monitoring event would be during year 9 for a 5-year review completed in year 10), precluding event trigger occurrences. If review of monitoring results so warrants, monitoring frequency and methods may be increased or decreased.

- Revisit the long term monitoring plan for Green Bay, preferably with input from area scientists familiar with the ecosystem.

Agency Response

The original decision for Green Bay is unchanged. There is no new information that would cause the agencies to re-evaluate the original decision.

We appreciate the opportunity to comment on the agencies proposed changes to the Fox River Remediation Plan. A primary goal of the STAC has been to work towards effective, scientifically based remediation of the Fox River. We are hopeful that we may continue to work as a partner with the agencies and other participating entities on this important issue.
Sincerely,

John Kennedy, Chair
Science & Technical Advisory Committee
Lower Green Bay and Fox River RAP

References

Baumgart, P. 2005. *Source Allocation of Suspended Sediment and Phosphorus Loads to Green Bay from the Lower Fox River Sub-basin Using the Soil and Water Assessment Tool (SWAT) - Lower Green Bay and Lower Fox Tributary Modeling Report.* Prepared for the Oneida Tribe of Indians of Wisconsin and the Science and Technical Advisory Committee of the Green Bay Remedial Action Plan. (full report: www.uwgb.edu/watershed/REPORTS/Related_reports/Load-Allocation/LowerFox_TSS-P_Load-Allocation.pdf)

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Late comment accepted from Congressman Kagen (including attachment from Dr. Roger Kuhns).

STEVE KAGEN, M.D.
WISCONSIN
8TH DISTRICT

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April 19, 2007

RECEIVED
APR 24 2007
Superfund Division

Richard Karl
Director, Superfund Division
EPA Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

Dear Mr. Karl,

I am writing to you in reference to the Final Basis of Design Report (BODR) you are now considering for the cleanup of contaminated sediment in the lower Fox River. It is my understanding that you will be making this decision in May. As you do so, I strongly urge you to reconsider the original Record of Decision (ROD) plan that was created by the Environmental Protection Agency (EPA) in 2003 and not simply approve the modified proposal for the Final BODR.

I am deeply concerned about the extensive changes that have been made in the proposed Final BODR since deliberations on this project began. Consultation with scientists, business owners, families, and others with an interest in the Fox River's health and potential reflect widespread concern that these changes will keep a significant amount of contaminated sediment in the river and will jeopardize the long-term economic viability of the navigation channel.

While I am aware of the design challenges posed by efforts to clean up the Fox River, namely the wide and uneven distribution of PCBs and the structural characteristics of the river, I believe that the proposed Final BODR does not provide the best solution for the lower Fox River and takes shortcuts, rather than dealing comprehensively with these challenges.

The best solution to the PCB problem plaguing our river is to remove as much of the contaminated sediment as possible, to dispose of it permanently, and to restrict the use of so-called capping to an absolute minimum. The proposed changes would remove only 3.6 million cubic yards of contaminated sediment, compared to the 7.6 million cubic yards suggested in the original ROD. With the extensive use of capping recommended in the Final BODR, and by removing fewer PCBs, we are leaving behind a danger to human health. Capping, or covering

up, PCBs is not a permanent solution[1], and future generations will inherit this problem. Is the long-term cost of monitoring and maintaining the caps, ensuring their success, fixing their potential failures, and endangering the health of our great-grandchildren worth such small savings today[2]? Over the long run, this proposed modified plan will cost Wisconsin families a great deal more.

My other concern is the impact the proposed Final BODR will have on the navigational channel in Operable Unit (OU) 4. The change in depth in the navigation channel suggested in the Final BODR will essentially prevent any future barge or large cargo ship traffic through the Fox River. The long-term viability of the Fox River for future commercial traffic is critical to economic prosperity for our communities and surrounding businesses. I believe that serious consideration to reassess the depth of the channel of OU 4 must be taken. It is essential that any plan to clean up the Fox River not jeopardize the navigability of our waterway. The Fox River Navigational System Authority has also expressed serious concerns over the potential loss of the navigation channel.

Lastly, I am concerned that vitrification of PCB wastes is once again being excluded in the Final BODR. It has been demonstrated that vitrification offers a permanent, efficient, and cost-effective solution for remediation. It is my hope that you will reconsider including this successful technology as part of your final decision.

I was very pleased about the recent decision of the Wisconsin Department of Natural Resources (DNR) and the EPA for an expedited cleanup of the DePere Dam area. It is my hope that the EPA and the DNR will give weight to the positive results from this cleanup, as well as a favorable reaction from the community regarding this decision, while considering the Final BODR for the lower Fox River.

I ask that you give strong consideration to the concerns I have raised. If you have any questions, please feel free to contact me at any time. I look forward to working with you to achieve long term health and economic prosperity for the Fox River.

Sincerely,

Steve Kagen

Steve Kagen, M.D.
Member of Congress

cc:
Mary A. Gade, Regional Administrator, EPA Region 5
Steve Johnson, Administrator, U.S. EPA

[1] A January 26, 2004 report by the EPA concluded that capping was not a long-term solution for PCB pollution problem.
[2] The 1-10 Year average annual operation and maintenance (O&M) costs of the Current Plan vs. the Proposed Plan would be $467, 819 vs. $602, 007 respectively. *"Lower Fox River/Green Bay Site, Technical Memorandum, Current Plan Proposed Plan."* Environmental Protection Agency, November 2006.

STEVE KAGEN, M.D.
WISCONSIN
8TH DISTRICT

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April 16, 2007

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Dear Mr. Hahnenberg, Schmitt, Murawski, Hoffman, and Epstein,

Thank you all very much for participating in this morning's telephone discussion regarding the removal of the PCB contaminated sediments from the Fox River. I very much appreciate all of you taking time out of your busy schedules to review the project with me as you prepare to write the Final Basis of Design Report (BODR).

As we are all aware, there are several issues that make this project unique. First, the size of the clean up - this is the largest removal of PCB contaminated sediment in the nation. Second, there is no reliable long-term data available to review regarding the "capping" process within a navigable river. The capping approach, or covering up, is brand new in a navigable river and has not been attempted anywhere else in America. Thus, the precedent set by the EPA during this project will be far reaching.

These facts make it critically important to do it right the first time. All of us must work together to set a new, higher standard for the nation on how best to reduce, and/or eliminate, the risks posed by PCB exposures, because everyone knows, the safest level of human exposure to PCBs is zero.

I was pleased to hear that we have the same goals. First, to simultaneously protect both human health and our environment, and econd, to continue to be the very best stewards possible for our natural resources - while at the same time allowing our Wisconsin industries to prosper.

Everyone I have been listening to about the Fox River clean up during the past several decades – as a physician, as a medical scientist, and a more recently as a Congressman – is saying the same thing: we would like all of the toxic PCB carcinogens removed. Unfortunately, there is no easy way to do it.

There is still much skepticism in the community, and across the nation, regarding the safety and long-term viability of "caps" – especially within a navigable river. We must build the highest degree of confidence into this decision and we certainly have time to accomplish our mutually stated goals the right way. After all, it is never too late to do it right, especially when many experts believe that the word "permanent" does not apply to capping measures.

Based on our conversations, it is my understanding the EPA is planning to release a Final BODR in May 2007. As we discussed, the legislative provision required to change the depth of the navigational channel, which only affects a small portion of the Final BODR, is in the Senate version of the Water Resources and Development Act. This bill is not likely to pass the House and the Senate in its final version earlier than June of this year, which means there is still time to evaluate alternative options and further involve and inform the community. Eliminating a portion of our navigation channel for all time is unwise, even if it is only for a short distance. No one can anticipate future economic demands for this channel and creating a solution that guarantees the channel depth and human safety can be achieved.

I believe there is a better way of doing things. By working together, we will find it.

Also during our conversation, which was very informative, you mentioned that a pilot vitrification project was successful in destroying PCB contaminated sediments. Many people were, therefore, surprised that further consideration of this methodology has not been more aggressively pursued, especially when far more PCB contamination was discovered, as related in the Shaw report.

As you know, vitrification offers the only real solution to permanently eliminate all risks to human health posed by PCBs. It also offers a solution for space issues within landfills, as mentioned during the pre-design research. Indeed, information available suggests that vitrification can be more cost-effective in the long run and will simultaneously provide a permanent solution by destroying the PCB's. If the PCBs are destroyed, then we do not need to worry if they will escape a landfill.

Plainly stated, vitrification appears to be the only permanent fix available. Moving PCBs from a riverbed to a landfill does not offer greater advantages than destroying them altogether.

Finally, I have attached a summary analysis of the Fox River pollution problem from Dr. Roger Kuhns, a recognized expert in hydrology and environmental remediation which will assist you in your deliberations.

Thank you again for your significant efforts to establish a new, higher standard in America for the removal of PCB contaminated riverbed sediments. I look forward to working with you, along with local officials, the Wisconsin DNR and others on this critically important project.

Sincerely yours,

Steve Kagen

Steve Kagen, M.D.
Member of Congress

MEMORANDUM

TO: Steve Kagen, M.D.
Member of Congress

FROM: Dr. Roger Kuhns

DATE: 12 April, 2007

SUBJECT: PCB Remediation on the Fox River

DISCUSSION:

The assessment of Fox River sediment types and transport, river levels, flow rates, flooding, anthropogenic impacts, and impacts from seiche events in Green Bay illustrate that under known conditions based on 5 years up to 100 years of records, the dynamics of the river is somewhat quantifiable. However, somewhat quantifiable is not, in my opinion, a strong enough argument to cap rather than remove PCB contaminated sediment.

The following observations are made after examining the document: "EPA Proposes Changes to Current Cleanup Plan (EPA, Nov. 2006 newsletter); and Shaw Environmental, LLC, 2006, Final Basis of Design Report (BODR); Brown, Outagamie, and Winnebago Counties, Wisconsin, Volume I (June 16, 2006): Submitted to WDNR and USEPA."

1. The sediment and river analyses are good science, but do not (to my satisfaction) demonstrate the BODR's confidence levels of non-erodable capping material. The reason for this is base on two poorly constrained variables in the BODR's analysis:
    a. Time, and
    b. Changes in sediment transport patterns and erosion.

The first variable, *time*, is a daunting problem for any modeling of a geologic process, such as sedimentation over a long period of time in a river system. The data just does not exist to adequately predict what will happen to the channel and bed of the Fox River over the lifetime of PCB contaminants. Further more, models become increasingly less accurate with longer time frames (as in weather prediction, sediment transport, and other natural system models).

The second variable, the variability of *sediment transport, deposition and erosion*, is extremely difficult to predict over the long-term. The current depositional site of PCB contaminated sediments means that sedimentation, transport, and shifting of certain aspects of the Fox River channel have allowed PCB-containing sediment migration, deposition, erosion and re-deposition over a period of 30 or more years (since PCB deposition). The contaminated sediment is residing in

areas formerly occupied by non-contaminated sediment at some time in the past (that is an unknown quantity, and not addressed in the BODR analysis). Sediment scour, transport, deposition, erosion and continued transport are on-going fundamental characteristics of river dynamics. **The fundamentals of these parameters are examined in the report, but do not adequately model or predict long-term sedimentation trends. The certainty is just not there.**

2. Two references of concern lend uncertainty to the suggested "permanence" of a capping sediment within the BODR's analysis, and include:

a. In the cap design model "no net sedimentation was assumed on the surface of the cap, even though net sedimentation rates ranging from 1 to 2 cm/yr are typical of the prospective capping areas." (p. 185). **This statement is in conflict with the sense of permanence predicted in the BODR.**

b. Sediment stability models and understanding are based on very short time frames (p.216 and Section 5.1.4 looked at scouring of the river bed between 1995 and 2000; also see p. 173). It was recognized that "discrete areas of OU4 might experience scour of up to 3 feet under prevailing hydrodynamic conditions..." (p. 174). This data is combined with other information and modeling, **but in reality does not represent a long enough time line to truly characterize the river.**

3. The capping of PCB contaminated sediment will keep the PCBs in the Fox River environment. The ROD Remedy dredge plan removes approximately 92% of the near-surface mass within the remedial action area, and 83% to 89% of the total mass of PCBs in the area of the 7.6 million cubic yards. The Optimized Remedy removes 62% to 66% of the total mass of PCBs (or 74% of the ROD Remedy). **Because of these statistical differences, and the longevity of PCBs in the natural environment, removal is supported as the only safe and long-lasting option.**

4. The BODR proposes the use of a 13-inch sand/gravel cap for areas of <10 ppm PCBs, 16-inch cap for area 10-50 ppm PCBs, and 33-inch cap for areas 10 - 100ppm PCBs. The suggested longevity of a sand/rock cap and the BODR's implied high degree of confidence that the cap will survive as a "permanent" feature in the river. **This premise is not demonstrated to my satisfaction, based on the above comments.**

5. The BODR does anticipate cap maintenance and monitoring programs that would have to be an on-going (indefinite) activity (as described on p. 216; p. 245, etc.). **Such a program will ultimately be time consuming and costly, and is not adequately weighed against the full cost of sediment removal remediation.**

CONCLUSION:

It is appreciated that the dredging methodology has some limitations at this time. It is also appreciated that the dredge prism defined by the study is 7.6 million cubic yards, and is 1 million cubic yards greater than the ROD contemplated volume.

It is also recognized that BODR claim that the engineered caps "provide protective and reliable chemical isolation that prevents erosion of the underlying sediment even in the face of major erosion events (e.g. floods, propeller wash, ice scour, and wind-waves)...", is probably true in select instances. It is also appreciated that the ROD Remedy requires 15+ years (cost: $580 million), the Optimized Remedy requires 9 years (cost: $390 million).

But the veracity of PCBs in the environment and their long-term threat to human health and the natural environment identifies these contaminants as requiring extraordinary efforts to remediate.

Therefore, I can only support removal of the PCB-contaminated sediments from the Fox River system as the only sure methodology of protecting peoples health and the environment.

ABOUT THE AUTHOR:
Dr. Roger Kuhns is a geologist with over 27 years experience in geology, ecology, natural resources, hydrology, sediment analysis and river systems, mining, dredging, and tailings capping. He works for Applied Ecological Services, Inc.

Agency Response

The use of capping to remediate contaminated sediments has been an evolving issue, with recent evaluations and experience by responsible parties, WDNR and USEPA continuing to inform the agencies on this matter. While there are advantages to dredging contaminated sediment, current USEPA guidance (e.g., "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites," December 2005) recognizes capping as a viable cleanup alternative. Of course each project must be evaluated on site specific characteristics, as has been done at the Lower Fox River and Green Bay Superfund Site. USEPA's evaluation is based on risk reduction and the nine criteria described in the Superfund's National Contingency Plan. After caps are in place, long-term monitoring would continue to assess the protectiveness of the caps. If monitoring indicated capping was not protective of human health and the environment, cap repair or removal could occur. In addition, any capped areas would be maintained to ensure that the cap remains effective.

Regarding possible capping in the navigation channel: this is a relatively minor component of the overall remedy, and USEPA's final decision is not contingent upon the authorized navigation depth being modified. Please note that USEPA does not determine the authorized depth of the navigation channel. If the navigation channel's authorized depth is not modified from DePere to the turning basin, then the navigation channel in that part of the river would not be capped (representing approximately 30 acres out of approximately 450 acres under the Proposed Plan and this ROD Amendment).

While the demonstration project for vitrification indicated that PCBs could be successfully destroyed, there are still significant concerns regarding whether the process would be as successful when taken to full-scale. The fact is that vitrification has never been performed on a full-scale basis for a large PCB sediment clean up. Given that the Fox River clean up is the largest PCB clean up to be performed not only in the United States, but in the world, the agencies have been appropriately cautious about embracing such an unproven technology.

However, should new information become available regarding the merits of vitrification as a treatment technology for PCB-contaminated sediments prior to the "Final Design," the agencies would be willing to consider it.

In contrast to vitrification which has only been successfully performed on a small-scale, demonstration basis, capping has been successfully performed in a variety of freshwater and marine environments in the United States and around the world. Attachment 1 provides a listing of capping projects that have been implemented. Attachment 1, compiled by WDNR

and USEPA, indicates caps have been successfully constructed and are effectively containing contamination in sediments in a variety of water bodies.

Regarding the permanence of caps, some who commented on USEPA's Proposed Plan during the Superfund comment period also voiced concerns about long-term stability of the caps. In response, the agencies have conducted extensive evaluations of natural forces that could cause damage to the caps and the potential release of contamination, such as flooding and ice-flows, and man-made forces (e.g., boat propellers, anchors, etc.). Evaluations by experts in the fields of sediment transport, ice flows and propeller wash have provided input into the design of the caps to ensure that caps would maintain long term stability and would effectively contain PCB contamination. An additional safety margin will also be added in the cap design, creating additional assurance that caps would be stable and effective over the long-term. Finally, in-stream monitoring would continue to evaluate whether capping continued to provide effective containment of the PCBs. If monitoring showed that caps are not effective in containing PCBs, then maintenance would be performed or the caps and/or contaminated sediment would be removed.

In response to comments by Dr. Roger Kuhns:

1. **USEPA is basing its decision on the data currently available, including substantial sampling of river sediments (10,000 samples in the lower 6 river miles). Also, the agencies have consulted with recognized capping experts having substantial expertise in environmental engineering, modeling, and sediment remediation, including those working on the Wisconsin Department of Natural Resources' oversight team.**

2. **The agencies have weighed both advantages and disadvantages of dredging versus capping. Information on dredging and capping projects indicates that contamination cannot be completely captured by dredging efforts, with "residual" contamination expected to remain after dredging and that capping has demonstrated effectiveness for contaminant containment (Attachment 1, page 212).**

3. **There will be institutional controls, monitoring and maintenance of the caps, as well as environmental monitoring of surface water and biota. This will not only ensure that the caps are maintained as necessary, but will also inform the agencies regarding their effectiveness. In addition to ongoing monitoring, there will be a comprehensive site review every 5 years.**

4. **Finally, if at some future time the agencies determine the remedy is not protective or effective the agencies can amend the ROD again and require further actions as needed.**

In summary, the agencies believe that this ROD Amendment will provide a remedy protective of human health and the environment, and will be completed sooner that the remedy contained in the 2003 ROD.

Comments by SNP

January 10, 2007

Greetings:

I am writing to make you aware of my establishing: "Solutions - Not - Pollutions" (SNP, LLC) A Montana Corporation.

With interest; I have been following the EPA water, air and soil pollution projects of the Great Lakes. In particular, such problems associated to the Lower Fox River of Wisconsin. As a former resident of Green Bay (and having a college degree in Biology);
the pollution project / problem intrigues me. I believe that I will (in 2007) be able to offer to you (and, to your Department) new insights and solutions to such projects of environmental concern. I base this statement on the newest of technologies that I am presently working on. And, will jointly introduce into the United States.

The technology SNP, LLC wishes to introduce to you will offer to all; the ability to remove environmental contaminants - rather than to simply move them! Our joint venture technology is environmentally friendly. And, once fully explained and shown by demonstration will revolutionize the way that pollution problems, wastes and contaminants will be viewed in the future. Our technology is slowly being introduced into this hemisphere with full disclosure and actions coming very soon.

In my briefness of explanation to-date; I can tell you that the process will involve a catalytic pressure-less depolymerization (oiling) technology. By our chemical process (closed system) most hydrocarbon materials are chemically reduced and converted to high quality inexpensive bio-synthetic diesel fuels. This chemical process is of fact; but, unknown to most people.

Several Federal entities are now looking into this technology with demonstrations now being planned by use of a "portable unit". To my awareness; the EPA has not been directly approached for such a demonstration in the near future. But, will be: as a "special interest. marketing direction for SNP, LLC". Our efforts of due diligence are now being taken very seriously as a mix of confusion and possible misrepresentations will need filtering. SNP, LLC has contacts with all parties of patent and marketing interests and we are currently working to "clear the pollutions of these waters, so to speak". Our intent is to keep you abreast of our workings and developments in this first quarter of the New Year.

I anxiously await the proper timing to sit down and merge this technology with the environmental concerns being addressed by the EP A. A bit of patience on your part will be appreciated; as SNP, LLC works to make the introduction of this technology into the United States a success and not a delayed legal wreck.

My contact information is guardedly being exposed to you now at this deadline time for your Public Comment period concerning: the Lower Fox River - Green Bay Site.

"Solutions - Not - Pollution" (SNP, LLC) Irving L. Johnson - CEO and Strategic Marketing Planner

Agency Response

The design basis for the Fox River remediation project, with work beginning this year, must be based on established, proven technologies. At the same time, the agencies are interested in new information that might demonstrate that new technologies may be viable.

Comments by the Green Bay Yachting Club

Green Bay Yachting Club

P.O. BOX 485 GREEN BAY, WISCONSIN 54305
TELEPHONE 920-432-0168

January 9, 2007

Ms. Susan Pastor
Community Involvement Coordinator Office of Public Affairs (P-19J)
US EP A Region 5
77 West Jackson Blvd.
Chicago,IL 60604-3590

Re: Proposed Changes to Fox River Remediation Plan

Dear Ms. Pastor:
The Green Bay Yachting Club (GBYC) has been in existence for over a century. We have occupied our current location at the mouth of the Fox River since the early 1930's. We lease the property from the Green Bay Metropolitan Sewerage District.

We have been financially and operationally affected by contaminated sediments in the Fox River, as have all users of this outstanding natural resource. However, our experience is likely more pronounced than most.

In early 2000, the extremely low water levels of the Lake Michigan system required us to initiate dredging plans for our harbor. We applied for permits and sampled the harbor sediments according to the direction we received from Mike Hanaway from our local DNR office. Sample results indicated that we had a substantial level of PCB contamination in our harbor. Total PCB concentrations ranged from "non detectable" to almost 22 ppm.

This led to a more limited but expensive dredging project, which we were able to complete in spring of 2000. Due to the level of PCB contamination, the DNR would only allow us to dredge a portion of our slip; only where the concentration of PCBs was less than 5 ppm. This also resulted in a much higher cost for disposal of the sediments.

Over the next two years, we corresponded several times with the Department and the Trustees associated with the Natural Damages Resource Assessment (NRDA) process. Our contention was that we had been negatively impacted by the PCB contamination issue, through no fault of our own, and expected that we would receive assistance from some phase of the Fox River Remediation Project effort, through whatever means appropriate.

I have attached the chronology of correspondence for your review. However, a quick

summary of events is as follows:

March 17,2000 - GBYC sends letter to Secretary George Meyer, alerting him to the situation and asking for any assistance that might be available. Includes our first formal request that our harbor be included in any future full-scale remediation projects for the Fox River.

April 12, 2000 - Response from Secretary Meyer, encouraging us to stay involved in the process but giving us no clear answer to our dilemma.

May 8, 2000 - GBYC sends letter to Dean Haen (Brown County Port and Solid Waste Department) with final analytical data ftom core samples form our harbor and description of areas where edging would be allowed (i.e. less than 5 ppm).

March 26, 2002 - GBYC sends letter to NRDA Trustees, highlighting the effects of PCB contamination on our dredging project (about half of the harbor could not be dredged due to the high concentrations; sediment disposal costs were approximately $60,000 higher than if PCBs had not been present). We asked to pursue both an NRD A claim (if appropriate) and a request to be included in any full-scale remediation of the lower Fox River.

April 23, 2002 - Response from George Boronow (Green Bay area DNR), which indicated that we probably did not qualify for reimbursement under the NRDA process, but that it was possible that the proposed Fox River Remedial Action Plan "may effect" our contaminated sediments.

April 29, 2002 - Response from Thomas Nelson (Oneida Tribe), which followed the response from Mr. Boronow.

So, the last official word we received was that it was unlikely that we qualified for relief for past expenses under the NRDA guidelines, but that it was likely that our harbor would be included in any large scale cleanup effort of the lower Fox River.

The purpose of our comments here, therefore, is twofold. First, we wish to once again go on record with a request that our harbor be included in any remediation project that may be ultimately conducted on the lower Fox River. We have documented evidence of the PCB contamination, which most assuredly came from the same source as the rest of the PCBs in the Fox River.

The second part of our comment involves the proposed changes to the original cleanup plan. As we understand the scope of the proposed changes, less dredging of contaminated sediments would be done, and more areas of capping would be approved. As far as the open areas of the river are concerned, we would only comment to the extent that we encourage your design engineers to take all pertinent factors into account: how well the caps will last in a dynamic river system; ensuring that the Responsible Parties will commit to evaluating the caps and making any necessary repairs as long as they exist; and, that your comparison process adequately assesses the benefits of the initial cost savings against the long term potential cost expenditures.

However, we also wish to comment specifically on one aspect of the proposal. We understand that the proposal does not yet represent the final engineering design. But the proposal does indicate that many near shore areas will be capped instead of dredged due to physical considerations, such as accessibility issues or problems related to undercutting stream banks. Though this may indeed be the case in some areas, it would certainly not be an issue in any existing harbor. Our harbor was engineered with maintenance dredging in mind. The banks are sloped appropriately and armored with stone. The intent was that dredging could occur whenever necessary, without any risk of disrupting the bank or other structures. Also, capping (as described in the proposal) within our harbor would essentially end its use as a harbor. Most of the area, at today's water level, exhibits depths of three feet or less. Adding any kind of cap on top of that would essentially turn it into a parking lot. Therefore, we are asking that you include our harbor within the dredging portion of your overall plan for cleanup of the lower Fox River.

We should add that we are a "working man's" club. We stand ready to assist in the dredging effort by any means appropriate. Our marina utilizes floating docks, which we can move at any time in order *to* facilitate the dredging process. Also, in our March 26, 2002 letter to the Trustees, we noted that the configuration of our harbor would lend itself to a dry excavation project, which might be more cost effective than conventional dredging. Again, if this option were chosen we would plan to move the docks completely out of the harbor for the duration of the project.

In summary, the Green Bay Yachting Club has clearly been damaged due to the effects of contaminated sediments from the Fox River which have settled in our harbor. We are requesting that the US EPA and the WDNR include our harbor in any remediation conducted in the lower Fox. We further state our concern that capping within our harbor would not be a viable option, due to the shallow depth. We have waited patiently since 2000 for actions to take place. We are anxious to resolve this problem, as the recent lake levels have exacerbated the situation. We welcome your response, and offer any assistance that we can.

Thank you for your efforts towards Gleaning up what will once again be a truly valuable natural resource.

Sincerely,

Dan Laubenstein
Commodore

Agency Response

As the design progresses, if additional sampling data is available from the commenter or others that indicates there are additional areas that exceed the PCB RAL of 1 ppm, then those areas would be addressed in remedial activities.

Comments by Thomas Erdman (email)

FOX RIVER CAPPING

I strongly oppose using this method. History tells us a major rainfall event or spring melt will scour out these areas. This exact situation was well documented in Lower Michigan when 6 feet of sediment was scoured out before it could be removed or capped.

The models used for Fox River flow are not adequate. I've seen 6 inch rainfalls in one afternoon here at Green Bay. The conversion and separation of sewage lines and drainage lines at many cities along the river puts in much more water than historically. The great increase in blacktop and concrete areas in developments has increased waterflows. Modeling should be done for at least a ten inch rainfall. I would note such rainfalls have occured in NE. Wisconsin in the 1800's.

I suggest that you continue with dredging and safe storage.

Thomas Erdman

Agency Response

What scouring event in "Lower Michigan" the commenter is referring to is unclear as no dates or waterbodies are identified. Whether such an event would be relevant for purposes of the Fox River would depend upon factors such as stream characteristics, flow velocities during storms, etc. Large rain events (e.g., 6-inch rainfalls) have been considered in the water flow history and frequency of high-flow events in the river, and have therefore been considered in the evaluations in the BODR.

Form Letters and Post Cards Follow

232 of the following post cards were submitted by commenters.

Comment

Pollution in the Fox River threatens the health of the people and the environment in the Fox Valley, Green Bay, and Lake Michigan. We must uphold the cleanup agreement and remove the PCBs from the river.

Years of study indicate that the only way to adequately protect public health and the environment is to dredge the PCBs. There is no excuse for backing down from the original, well-researched cleanup plan.

- Uphold the original ROD!
- Clean up; don't cover up the PCBs in the Fox River. We need a permanent solution, so that our children will not have to deal with this polluted mess.
- Make sure the liable polluters take full responsibility and pay for the cleanup!

Thank you for your help in protecting the people, wildlife, waters, and unique character of Wisconsin.

Agency Response

These comments are addressed in Section 1, responses number 1 (pages 6 - 7), and number 2 (pages 7 - 8), above.

88 of the following letters were submitted by commenters.

Form letter comment

I'm writing to oppose the amendments to the Record of Decision for the Lower Fox River PCB cleanup. In particular, I oppose any reduction in the quantity of sediments and PCBs to be. removed from the river and bay, and I oppose any use of caps as a replacement for sediment removal. *Key concerns about the proposed plan:*

1. Caps are Experimental Caps have never been proven to last in any large flowing river. Caps were placed recently in a few rivers, but those caps have yet to survive the test of time or a multitude of severe floods. As Carl Sagan said, "Extraordinary claims require extraordinary evidence." Common sense and centuries of experience with river erosion tell us caps will not last. Plan promoters have NOT provided evidence to the contrary. Their claims are based on flawed mathematical predictions, not actual caps.

Agency Response

The Agency has complied the results and design information for 32

capping projects (See Attachment 1, page 212). While each of these capping projects has a unique setting, overall performance assessments for these other projects demonstrate the viability and effectiveness of capping. The Fox River presents its own unique characteristics and challenges, but the cap design in the Amended Remedy considers experiences on these capping projects and customizes the cap design to account for site specific characteristics.

2. Weak Caps The plan calls for only sand layers over many partially dredged areas. Any child who has built sand castles knows sand is washed away easily. In other areas, thicker caps are planned, but this is still a bandaid given the force of longterm erosion.

Agency Response

The sand covers are expected to mix with the underlying contaminated sediment. Specifically, the Amended Remedy includes a 6-inch sand cover over sediments with PCB concentrations between 1.0 and 2.0 ppm, and less than 6-inches thick. The sand cover option is not intended to permanently isolate PCBs, but provide an enhanced natural recovery with long-term mixing as a means to reduce the concentration of PCBs in the surficial sediments to be below the RAL.

3. Not Built for Worst Case Scenario According to this plan, caps would be built to withstand only a 100 year flood, which would be irresponsible and disastrous for future generations. When a so-called 200 or 500 year storm hits, which could occur year, the caps could be washed away entirely, exposing and recirculating dangerous levels of PCBs, mercury and other toxic chemicals.

Agency Response

The design for caps considered modeling for high water flow events. While a 200-year or 500-year event was not considered due to uncertainty of defining these events, the cap design does have a built-in margin of safety which would provide additional resistance to less frequent large water flow events. Additionally, if such a large event occurred, monitoring would be triggered and post-event cap conditions would be determined. If caps were found to be compromised, then appropriate maintenance would be done (e.g., cap repair).

4. 100 Year Flood Improperly Calculated The plan used a maximum river flow of 24,200 cfs as the basis for a 100 year flood, but studies have recorded a recent flow of 33,800 cfs on the Fox River. Again, it is irresponsible to deliberately ignore known intense storms, especially when climate change could drastically alter rainfall, storms and river flows, making any predictions highly suspect. Some climate change models show our region getting more water and more storms than in the past.

Agency Response

The 33,800 cfs flow that occurred in June 1990 has been simulated along with several conservative assumptions using the detailed hydrodynamic

model developed for the site. Even under the 33,800 cfs flow, model results indicate that the proposed cap design in the BODR adequately protects against erosion even under the conservative scenario modeled.

See also page 33-34 above for a more detailed response to a similar comment.

5. Punch-through Strength Inadequate The plan only examined the pressure resulting from human footsteps overtop the caps and ignored the obvious potential for huge wayward ships to puncture caps. Or human mistakes involving heavy construction near, through or on the caps 100-200 years from now. Or large tree limbs, boulders or other heavy objects rammed repeatedly into the caps during extreme flooding. Or floods in the spring during ice break-up causing powerful ice shoves across the caps. The planners also ignored erosion from "fractile ice" particles. Again, the caps are not being designed responsibly to incorporate known threats.

Agency Response

Small disturbances to a cap would not compromise the overall efficiency of the cap, regardless of the process. Any localized disturbance of the cap would potentially reduce its efficiency only for the area disturbed.

Engineered caps will include an armor layer over the underlying sand, and the armor layer will be appropriately designed during later stages of this project to account for potential for cap disruption by ice scour, high water flows, propellor wash, bioturbation, and punch through, or other disturbances by natural or man-induced activities.

It is agreed that areas that have potential for frazil ice formation are not areas conducive to capping. Therefore, areas that have potential for frazil ice formation (e.g., downstream of the De Pere Dam in OU 4) are areas that will be dredged instead of capped.

6. Groundwater Upwelling Ignored When caps are placed over areas with significant flow from aquifers into a river, as there is in the Fox River, the pressure from upwelling groundwater can put pressure on compressed cap materials, compromising the caps' integrity over time and forcing PCB leakage upwards into the river. The plan should have addressed this concern, but didn't.

Agency Response

Potential for ground water effects are addressed in detail in Appendix D of the BODR in Section D.2.1., pages 17 - 18, including the following statement:

> **"Regional groundwater modeling conducted by the USGS (1997) suggests that advective flow into the Lower Fox River from the relatively shallow groundwater system is likely, particularly at shallow water depths along the shoreline. However, largely due to the presence of a low permeability (approximately 10^{-6} to 10^{-7} cm/s) contiguous clay aquitard layer**

present beneath the river bed, relatively low groundwater seepage velocities have been calculated for the river channel."

7. Scattered Sites Pose Problems The proposed cleanup maps show a multitude of areas considered suitable for caps:- The result is a hodgepodge of dredged, capped or unaltered sites. Will "islands" of capped sites stick up from surrounding sediments, making them more vulnerable to erosion? How will future people remember the locations of all these sites 200 years from now? Will our descendents be willing or able to maintain and repair the caps? Where will they get the money, fuel and materials?

8. Monitoring is Too Brief Only 40 years of cap monitoring is planned, but caps need to last more than 200 years. They'll only get weaker with time, and PCBs may migrate through the cap slowly. If monitoring isn't maintained, won't people forget the caps?

Agency Response to comments 7 – 8 above.

Through the legal processes available to it, USEPA will endeavor to obtain legal judgments or commitments from the PRPs to perform the remedy and the monitoring and maintenance necessary to keep the remedy effective. Additionally, as previously explained on page 113, as part of the "five-year review process" mandated by Section 121(c) of CERCLA, USEPA will re-examine the effectiveness of the remedy every five years and will take or require to be taken additional actions, if necessary, to protect human health and the environment.

9. Corporations Released from Liability, but Taxpayers Hooked If this plan is accepted, the governments will sign a corporate release from liability when the short-term work is complete. This means public taxpayers will be stuck with hundreds of millions of dollars in remediation costs when the caps fail. And the bulky cap materials will make remediation much more difficult and expensive. It would be far better to get the PCBs out of the river now, treat the sediments, and be done with the whole issue permanently.

Agency Response

See Section 1, response number 1 (pages 6-7).

10. New Sources Neglected The plan doesn't do enough to stop significant new river inputs of PCBs from urban storm water runoff, leaking shoreline landfills like Arrowhead Park (a toxic PCB papermill sludge dump in Neenah on the shore of Little Lake Butte des Morts), widespread sludge landspreading from contaminated wastewater and sewage treatment plants, and other continuing PCB sources. Until those sources are shut off, the new contaminants will just recontaminate our "clean" river.

Agency Response

Previous work documented in the Feasibility Study issued December 2002 provides the basis for the remedial action based on the nine criteria in CERCLA guidance for selection of the remedy. That work considers the relative contributions of various inputs of PCBs into the system and determines that the sediment of the river was by far the largest source of PCBs presenting an unacceptable level of risk to human health and the

environment. Other sources were assessed and acknowledged, although relatively much smaller and not environmentally significant.

However, the agencies re-evaluated the list of dischargers alleged to be contributing to the PCB loading in the river. A new review of the discharge monitoring reports from the facilities listed results in the same conclusion that they are insignificant sources of PCBs to the Fox River. For the four municipal facilities: Green Bay Metropolitan Sewerage District, De Pere POTW, Appleton POTW and the Neenah-Menasha Combined POTW, no measurable concentrations of PCBs have been reported since 1999.

For the remaining current dischargers, all paper manufacturers or processors, the reported discharges are related to cooling water. The source of the cooling water is the Fox River itself. The discharge is therefore due to the presence of PCBs in the river before use by the paper manufacturers, with no addition of PCBs from industrial processes. The remediation planned in the original remedy, as well as the proposed modified remedy, will reduce the concentration of PCBs in the intake water from the river for these processes and will therefore reduce the discharge of return flows containing PCBs. In addition, three of the paper mills that are identified in the comment as ongoing sources of PCBs are no longer in operation and obviously all discharges have ceased for those operations.

In conclusion, current PCB sources to the Fox River after remediation are not considered to be significant, although they merit ongoing consideration.

11. Renard Isle Ignored A large mass of PCBs is contained in Renard Isle, offshore from Bay Beach Amusement Park. This old sediment disposal island leaks like a sieve, is uncapped, and will take millions of dollars to remediate. Brown County taxpayers should not get stuck with this remediation work. It's clearly the polluters' responsibility, as part of this PCB cleanup plan.

Agency Response

Please refer to USEPA's comment response in Section 1, response number 15 (pages 16-18), and repeated in Section 2, pages 104 - 105, above.

12. Bay Sediments Ignored While the agencies have taken 10,000 sediment samples at more than 1,300 locations in the river, very few samples have been taken in the first 7 miles of the lower Bay, just beyond the river's mouth. This is a MAJOR gap in the plan that must be corrected. At the least, a full sampling effort, comparable to that on the river, must be conducted to determine the mass of PCBs still remaining in the lower Bay, particularly in deeper areas and around Renard Isle.

Agency Response

Remediation of Green Bay is addressed in the 2003 ROD and attached Responsiveness Summary, specifically in White Papers 18, 19, 20 and 21 (in addition to the ROD and Comments responses).

13. Lack of ANY Detoxification Treatment I strongly support the use of new, proven, non-burning treatment technologies, such as soil washing by the company called Biogenesis, to detoxify contaminated sediments, rather than trucking them to distant landfills.

Agency Response

USEPA and WDNR are familiar with the BioGenesis sediment washing technology. In fact, USEPA Region 2 in New York has been evaluating several treatment technologies, including the BioGenesis soil washing process for years to address the large volume of contaminated sediment and limited landfill space in the northeast.

The agencies have had discussions with USEPA Region 2, and reviewed available information regarding the BioGenesis process. A demonstration project by USEPA Region 2 was performed in May/June 2006 in which 20,000 cubic yards of contaminated sediment from both the Port of New York/ New Jersey and the Passaic River was treated using the BioGenesis process at a rate of 40 cubic yards per hour of dredge material. Although a report for this demonstration project has not yet been issued, an estimated 250,000 cubic yards per year could be treated, based on previous production rates.

The New York/ New Jersey harbor sediments have been generally characterized to have in the low single digits for PCB contamination (ppm), whereas Fox River sediments are higher, some in excess of the TSCA level of 50 ppm or greater.

Various pilot, bench, and demonstration production-scale testing of the BioGenesis process on contaminated sediments has shown a range of approximately 40% to 90% reduction in PCB concentrations. Based on initial PCB concentrations for Fox River sediments and PCB removal efficiency, the 1.0 ppm PCB remedial action limit (RAL) for cleanup of the Fox River sediments would often not be achieved by the BioGenesis process. Thus, the final disposition of most dredged sediments would still have to be disposed in a landfill and would not result in a significant volume of materials that could be disposed in a different manner (e.g., for beneficial reuse).

A goal for New York and New Jersey Harbor sediments is to achieve PCB levels for treated sediment below state residential soil cleanup standards, which in New Jersey is 0.49 ppm, so the treated material can be beneficially reused without restriction. Achieving this standard is easier when the untreated sediment concentrations are low to begin with. Wisconsin does not have a published soil residual contaminant level for direct contact to PCBs, but a value can be determined based on appropriate risk analyses. It is safe to conclude that even if some Fox River sediments were treated to

PCBs <1ppm, the treated sediment would still have restrictions on its use due to requirements by the State of Wisconsin, and likely even if treated to the New Jersey standard of <0.49 ppm. It is unknown whether a market would exist for treated sediments <1.0 ppm PCBs, especially at the relatively large volume anticipated to be dredged from the Fox River and considering costs to transport the material to its destination, or whether the materials would still require landfill disposal.

Given these considerations, disposal of dredged Fox River sediments in a secure landfill is still considered the best solution based on consideration of all nine of the CERCLA criteria for selecting a remedial alternative.

The agencies are proposing a major step backwards from the proposal made just 3 years ago. The governments seem too concerned with saving the Corporations money, and not concerned about protecting longterm public health, wildlife or taxpayer interests.

Agency Response

Again, under the National Contingency Plan (NCP), 40 C.F.R. Part 300, USEPA considers nine criteria set forth in the NCP in selecting a remedial action. USEPA 's evaluation of the Amended Remedy and the 2003 ROD Remedy is based on all of the NCP's nine criteria, not just the cost criteria. The Amended Remedy and the 2003 ROD Remedy were first judged in terms of their ability to meet the threshold criteria of protecting human health and the environment, and complying with Applicable or Relevant and Appropriate Requirements (ARARs). Both remedies met the two "threshold criteria," and were then evaluated against the "balancing criteria" (of which cost is one), and the "modifying criteria" to arrive at a remedy selection in the Amended Remedy.

Comments by George Howlett

Addendum to Statement: Proposed Revision; Fox River Clean-up Plan

I, George Howlett, Jr., a Certified Ecologist, previously submitted a written statement to Susan Pastor (USEP A) and to Greg Hill (WDNR) at the recent hearing in Green Bay on the proposed revision to the Fox River Clean-up Plan. This addendum adds information from the scientific literature and from my own research in limnology and algology on the Menominee Reservation which answers the key question about how algae are vectors carrying PCBs in the water column and eventually to Green Bay. The original written statement begins this discussion and should be referenced to my statements in this addendum.

Very Sincerely Yours,

Certified Ecologist; Environmental Scientist

December 14, 2006 ADDENDUM TO STATEMENT OF DECEMBER 4, 2006.
RE; Role of cyanobacteria algae populations in moving PCBs from sediments into Fox River currents.

The discussion with Steve Westembroek of USGS in Madison as mentioned in the PCB statement prompted me to explore further the role of algae as vectors of PCBs as suggested by the USGS paper of his predecessor, Jeffrey Steuer, (Fitzgerald and Steuer, 1996). I also briefly discussed this issue with Clay Patmont of Anchor Environmental at the Hearing. He states that he has a background in algology.

I cite Imboden and Schwarzenbach (1985) to indicate that planktonic algae have been known since at least 1982 to be vectors of hydrophobic chlorinated hydrocarbons in open lakes. They cite a study done on Lake Zurich (Muller, 1982) showing that spring algal blooms are one of 4 factors removing hexachlorobenzene (HCB) from the lake. The source to the lake is by "surface contamination." Removal is by: l.flushing at a surface outlet, 2. reentry back to the air, 3. photolysis, and 4. particulate settling to the sediments. Particulates are termed POCs, (particulate Organic Carbons). In early spring in-water POC concentration is low, but a spring algal bloom develops as diatoms and cool water algae using nutrients released from the bottom by the spring turnover form a spring maximum population.

This is followed by a clear water phase as nutrients are used and as zooplanktons have grazed on the phytoplankton population (see Wetzel, 2001; Ruttner, 1963; and other limnology texts). There is also a settling to the bottom of bloom elements. HCBs are carried to the lake sediments on POCs as the bloom fades and a plankton rain develops. Note that "most diatoms accumulate a significant portion of their reserves as lipids" (Stoermer and Julius, 2003), which, as previously explained, (Howlett, statement on plan) is a location in algae for attachment and biomagnification for chlorinated hydrocarbons. Stoermer and Julis say that the tendency to accumulate lipids as food reserve "is particularly strong in taxa that am survive prolonged sediments entrainment and burial, the ability to survive periodic return to sediment surfaces seems to be one of the major evolutionary adaptations of freshwater planktonic diatoms."

Muller indicates (as cited) that a substantial fraction of summer measured HCB is transported to

lake sediments where 80% undergoes degradation in the sediment mixed layer and 20% is buried into deeper sediment, and thus are permanently removed from the aquatic phase. The log K_{ow} of HCB is approximately 5.5 which is in the lower range of hydrophobicity of the PCBs as determined from figure 7.3 in Schwarzenbach et al. (1993). This indicates that HCB is sufficiently non-polar for van der Waals forces to unite HCB to the surfaces of algaL .' particulates in the L. Zurich plankton. I suggest that the mechanism for HBC attachment to spring bloom diatoms such as *Tabellaria* and other colonial diatom groups is at mucilage pads used to.attach individual frustules to each other and to other carbohydrate substances that extrude from the frustule pores (see structural descriptions of various species in Round et a1, 1990).

The algal population in Lake Zurich is not described by Muller, but the population peaks in spring after turnover, indicating that it is not a cyanophyte type summer bloom, and that Lake Zurich (Zurichsee) was not highly eutrophic. It is a deep lake that can be well stratified in summer. Ruttner (1963) discusses *Tabellaria* as a diatom in the first b1oom at Zurichsee which had a winter bloom of *Planktothrix rubescens* forming as an organic winter sediment layer. Ruttner cites an author who could demonstrate the viability of quiescent forms of diatoms in sediment layer to 12 years old.

As the USGS studies on PCBs does not describe the species population in Fox River reservoirs, I must turn to generic sources to consider that the summer bloom conditions are cyanobacteria dominated. I have never collected Fox River waters for species analysis, but have collected water samples for nutrient analysis for Sager and Wiersma. I know that the Fox commonly carries high amounts ofPO4 derived mainly from non-point sources. Citing Lillie et al. (1993), "Blue-green algae are the single most important and dominant taxonomic group of algae in most Wisconsin lakes during summer months regardless of trophic state" "Blooms are more common in large shallow reservoirs or drainage lakes"... "The greater internal recycling of nutrients, availability of sunlight, and thermal homogeneity of these systems provide a more optimum growth medium for blue-greens than that offered by deeper, thermally stratified lakes."

Physical features of bloom forming cyanobacteria that serve as vectors of PCBs.

Cyanobacteria are Gram-negative bacteria that differ from other Gram-negative bacteria in the fact that they carry on photosynthesis by photosystem II (oxygenic photosynthesis) (Prescott et aI., 1993). The cell wall of Gram-negative bacteria including cyanobacteri suggests a structural feature which can most easily be a point of attachment of hydrophobic pollutants to bacterial cells. The Gram-negative bacterial wall is covered by an exterior membrane, the outer membrane. This membrane is built up primarily of lipopolysaccharides (LPSs) made of 3 molecular fragments; Lipid a core polysaccharide, and an O side chain. The Lipid A fragment has fatty acid chains of plant type fat joined by glucose-amine sugars with phosphate attachments. This fat arrangement is similar to triglycerides which are so easily bound to PCBs in human and animal fat. PCB molecules may not be able to more deeply penetrate into bacterial cell interiors since the cell wail and external membrane are barriers to entry of larger molecules.

The O side chain creates a negative charge on the exterior of the Gram-negative cell which has other functions in antibody-antigen reactions of infectious bacteria. Because this negative charge could interfere with non-polar attachments, I note that almost all bacteri including cyanobacteri have a gelatinous outer substance named the glycocalyx or external polymeric substance (EPS) (Tortora et al., 1986). The EPS is variable is different taxa, being a gelatinous polymer of polysaccharides, polypeptides or both. It may be firm as a capsule or unorganized as a slime layer. What is important is that the polymeric nature of the EPS serves as a site for sorption of

hydrophobic pollutants such as PCBs. I noted in the main statement that bacteria involved with decomposition of decaying algal masses in the colloidal mix at the top of the sediment also may be carriers (vectors) of the PCBs along with the live cell masses of colonial cyanobacteria.

Cyanobacteria metabolism and movement in the water column by aerotopes or gas vacuoles**.**

The gas vacuolate forms of cyanobacteria are planktonic bacteria which move vertically in the water column for 3 reasons

1. To escape UV radiation when near the surface.

I studied *Planktothrix rubescens* in Founder Lake on the Menominee Reservation, a cyanobacteria which dominates cold, highly colored lakes and with a population peak below the Secchi disk reading level. The population peak was determined to be at 3 meters. High organic color kept the Secchi disk reading at a lesser depth (Howlett, 2001) *P. rubescens* may suffer photo inhibition at higher light levels due to damage by blue and UV light I cited Castenholz and Garcia-Pichel (2000) who suggested that some gas vacuolate cyanobacteria may position themselves as a negative response to UV wavelengths penetrating the upper part of the water column. (see Howlett, 2001). Algae in dense near-surface blooms such as in eutrophic reservoirs may be damaged by UV light if unable to descend to a safer depth. Gas vacuoles permit a physiological response preventing UV damage to the cells of the trichome (or thallus for *Microcystis)* by releasing buoyancy gas.

2. To move to nutrient rich areas of the water column to enrich the trichome with nutrient luxury uptake (especially phosphate) when the surface waters are nutrient deficient and the cells have used available in-cell nutrient stores.

Citing my Founder Lake report

"Planktothrix rubescens trichome become dense with disaccharide or cyanophycean starch, fall into the anoxic hypolimnion zone where they are able to take on dissolved nutrients, deplete the sugars of photosynthesis by respiration, and rise again to the photic zone" (after Paerl, 1988; Oliver and Ganf, 2000).

Live *Planktothrix rubescens* will be present from the near surface but out of the damaging light of UV penetration and all the way to the benthic zone as individual trichome respond to nutrient depletion and then to sugar/starch depletion and luxury uptake of phosphate taken from the free phosphate in the an.oxic zone including that available in the sediment mixed layer. *Microcystis, Aphanizomenon, Anabaena* and other warm water bloom cyanophytes shade out *Planktothrix* when waters are warm because they harvest light in the mixed epilimnion while *Planktothrix rubescens* thrives best below the Secchi disk level of the normal metalimnion at colder temperatures. The vertical movement occurs only in the cyanophytes that have gas vacuoles, gas vesicles or aerotopes which serve as regulators of ballast in the water column. Non-cyanophyte and non aerotope cyanophyte algae have problems in maintaining buoyancy which is discussed in limnology texts such as Wetzel.

3. Gas vacuolate cyanobacteria sink into the sediment mixed laver when water temperatures fall below physiologically active levels. They rise enriched in nutrients and also as vector of hydrophobic pollutant compounds as growth conditions resume following winter dormancy.

One bloom species that I observed a number of times in Southeast Bass L. on the Reservation, *Gloeotrichia echinulata,* had periods of very intense blooms that developed very rapidly in periods of very warm and sunny conditions, especially in-calm weather. I was called to this lake several times by lakeside residents who had complaints that there must be some kind of pollution because the blooms developed so suddenly. Oliver and Ganf (2000) state that G. *echinulata* tolerates low light conditions in the bottom of shallow lakes (in the mixed sediment zone) as spherical benthic colonies or as akinetes (a resting stage resistant to low temperatures) in the phosphate rich sediment. *Gloeotrichia* is highly efficient at luxury uptake of phosphate as a reserve in the form of polyphosphate granules (Prescott et al., 1993, diagrams the cyanobacteria cell showing the polyphosphate granule).

Pettersson et al. (1993) discuss the phosphorus storage strategy *of* nitrogen fixing cyanobacteria which obtain phosphorus reserves from the sediments so as to sustain pelagic growth and thus avoid competition for phosphorus and nitrogen. Konopka (1989) states that addition of phosphate increases the buoyancy recovery of *Aphanizomenon flos aquae* which lost buoyancy when exposed at the surface to extreme irradiance in a lab test. The concept that dormant cyanobacteria can rise again in the warm season when "their "tanks are filled" with phosphate leading to the gas vesicle tanks or aerotopes also filling up is supported by experimental evidence. Nitrogen fixing bloom species such as *Gloeotrichia* and *Aphanizomenon* get nitrogen in nitrogen deficient waters using heterocysts. Non-nitrogen fixers obtain nitrogen ttom ammonia in the bottom waters. When ammonia is deficient, then the nitrogen fixers tend to dominate the blooms.

Gloeotrichia forms a rapid bloom under favorable environmental conditions not by rapid reproduction, but by having a resident dormant population in the sediment top able to rise as the aerotopes fill with gas and able to out-compete the *Microocystis* population when nitrogen is limited. Wetzel (2001) notes that the bloom cyanophyte species are slower growing (and reproducing) than the eucaryote algae. Survival as live colonies living off the lipid rich reserve in bottom sediments over cool and winter conditions allows blooms to form rapidly as warm water summer conditions develop especially in reservoirs which mix water to contact warm air, and not be dependent on wave mixing to move summer heat deeper into lakes that establish a cold hypolimnion. .

This discussion of cyanobacteria dormancy in the sediments explains the finding of Fitzgerald and Steuers (1996) that measured summer transport of PCBs was 10 times more than winter transport, even when winter current discharge (Q) was above summer Q. Algae laying dormant in the mixed sediment layer were able to mix in the colloidal mass of the mixed layer, contact PCBs in sediments, and take on a load *of* PCBS by transfer from one hydrophobic substance (sediment) to the hydrophobic outer surfaces of the dormant algae, keeping to the physical laws labeled van der Waals forces. Following the findings discussed above and supported by the cited authors and others not cited here, the gas vacuolate cyanobacteria rose into the current to form blooms in warm periods. The slower the water because of reduced Q, the greater the PCB load in-water as particulate organic carbon (POC). In Zurichsee the hydrophobic pollutant was removed ttom the water column for deposit in the sediment. Because the biodegradation rate was high, resuspended algae did not bring it back into suspension in the water column. The reverse is the condition in the Fox River. PCB are resuspended into the water column by cyanobacteria algae cycling it up ttom the bottom in early summer and again by cycling up and down the water column as nutrient needs dictate the aerotope response as described above. Additional discussion on cyanobacteria buoyancy, blooms and nutritional status is found in Klemer (1991).

Use of barrier system stops transfer of PCBs to POCs

As stated in the statement of Dec. 4, placing an organic free sand barrier over the PCB laden sediments interferes with the algal population and the associated decomposer bacteria of the planktonic rain, plus organic mass of the decaying rain from making contact with the contaminated sediments. Adding armoring.stone insures that the barrier will remain in place. Had this been done 10 years ago, the movement of most of the PCBs would have been stopped. This is not a matter of doing things on the cheap. It is a matter of bringing down the level of contamination to a very minimal level of contamination in transit and thus protecting the biotic resource. Lower this level of new PCB to the Bay and even to L. Michigan to a minimum level, and the biomagnification up the food chain is lowered to .the point where bird and ftsh are safe. Humans consuming the fish are safe. Waiting until we destroy every last PCB at high expense does not make environmental sense.

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Agency Response

The comment is noted and the agencies appreciate the documentation of the processes which result in the transfer of the PCBs from the sediment into the water column and foodchain within the Lower Fox River and Green Bay ecosystem. We agree that the physical and chemical barrier provided by the cap and armoring alternative can be as effective in cutting off the pathway as dredging the PCB-contaminated sediments from the river.

Comment by Chester A. McDonald, McDonald Lumber Company, Inc.

MCDONALD LUMBER COMPANY, INC.
2020 Angie Avenue
Green Bay, Wisconsin 54302
(920) 465-3230

The McDonald Lumber Company operates a marina at the mouth of the Fox River in Green Bay, Wisconsin. We obtained all required permits to dredge out our new marina. Our project has been staged, adding a limited number of boat slips each year as resources allow.

We received approval from the Wisconsin Department of Natural Resources (DNR) to dredge our marina and dispose of the sediments on our site, in an excavation which we dug specifically for this project. A significant portion of our marina is still not in service, and will need to be dredged before that can occur. Unfortunately, our permit for the disposal of the sediments on site has expired, and we are uncertain if there is any chance for receiving a new one.

In any event, we are concerned that sediments within our marina may be contaminated with the same PCBs that are found throughout much of the lower Fox River. If so, it would seem only fair and logical that our marina be included in the full scale project planned for the whole river. In fact, our marina was not even constructed until after the period of PCB deposition, according to DNR historical documents.

We have experienced low water levels of Lake Michigan and Green Bay for quite some time, with predictions of even lower level to come (based on Army Corps of Engineers projections). This will require maintenance dredging within our harbor, even in areas which we dredged just within the past five years.

Therefore, we are requesting that our marina be included in any future cleanup projects which may be conducted on the Fox River. We would expect that evaluation of the PCB level within our marina be included as part of this process, as has been for the rest of the river itself. Any PCBs found in the sediments inside our marina most certainly originated from the same source as the rest of the PCBs in the Fox River.

We understand that the most recent proposal for cleanup recommends much more capping of contaminated sediments instead of dredging than the original plan. This may be appropriate in some areas of the river, but we don't see how it can work in a marina. Water depths are far too shallow to allow for capping and still maintain adequate depth for boat dockage. As far as problems with bank erosion, our experience with dredging is that this has not been a problem thus far, and we would not expect any problems in the future. The bank system we have installed is essentially engineered to allow for maintenance dredging without causing such problems.

In summary, the McDonald Marina should be included in any remediation conducted in the lower Fox, We also feel that dredging within properly constructed boat marinas, not capping, should be used due to the shallow depths.

Thank you for allowing us to comment on your planning efforts for remediation of the Fox River. We hope to contribute to this effort by providing quality facilities which can be used by the citizens of northeast Wisconsin to enjoy the river and bay.

Sincerely,

, Chester A. McDonald

Agency Response

As the design progresses, discussions with shoreline property owners and other interested parties (e.g., marinas) will be ongoing. If additional sampling data is available that indicates there are additional areas exhibiting contamination that were previously not included in the remediation footprint, and shows contaminated areas that exceed the RAL that have not been included in the remediation footprint, then these areas will be added to the cleanup plan.

Comment by Brenda Smith

I would like to submit the following documentation for review in the Fox River NRDA/PCB Superfund site. I discussed this issue with you and several others at the EPA and the Wisconsin DNR. 1 was assured that the EPA and the DNR wished to be advised and made aware of additional chemicals that should be addressed in the current review. By providing such information, this could lead to a much extended investigation and larger fines and penalties to the parties that may be responsible for the additional damage and contamination and additional chemicals.

To that purpose, I would like to present a listing of just a small number of additional chemicals that have been used in the manufacture of carbonless copy paper, ccp, by Appleton Papers Inc. in Appleton Wisconsin. The other parties subject to penalties such as Glatfelter et a1 have also contributed to the additional contamination and damage by the same method as the PCB contamination and damage. I believe it is very important that all the current and former residents on the entire area in this superfund site be made aware of this information via such avenues as public mailings, various forms of media attention, and other public awareness programs. It is believed that the human damage may be far greater than the damage to the environment.

As examples of this concern is the damages that have been suffered by employees and consumers of products from Appleton Papers Inc. (Appleton) I use Appleton as an example. The same sort of data may be available for the other parties being held responsible for the environmental damage in the Fox River area. For decades, Appleton has secreted their knowledge of the potential for severe injuries to employees, citizens and consumers of their products claiming such information to be either a Trade Secret" (TS) and/or" Confidential Business Information" (CBI). While some of the claims being made using these terms may be true and protect claimed valuable formulations, chemical compounds, processes etc., a large portion of the claimed TS and/or CBI are just convenient allowed legal terms being taken advantage of soley to hide the knowledge of how dangerous use and exposure to Appleton's ccp could be. This should not only apply to human exposure but also the environment. I do not make these claims lightly. I have first hand knowledge of such information. By filing court motions, I was able to review thousands of pages of internal documents that had been presented in litigation again Appleton. Although Appleton defied the court order and only provided a few thousands pages rather than about ten thousands pages, 10,000 pages, that should have been made available to me,

what I saw and reviewed was more than telling about the policies of Appleton. I was injured by use and exposure to Appleton's. ccp in an office environment in Virginia. 1 have never been anywhere close to the Lower Fox River, Appleton or any ccp manufacturing plant location. Because of the severe injuries I suffered as a direct result of simple use and exposure to Appleton's ccp as part of my job function, I became convinced that it was not just the chemicals, formulations and related information that Appleton was trying to hide in the court orders and protective orders claiming TS and CBI. After reviewing the internal documents (with an attorney of Appleton present at all times), my belief that Appleton was really trying to hide their knowledge of how dangerous use and exposure to their products could be to the normal user were affirmed. In reviewing the internal documents, it was all telling to me that about twenty (20) pages of documents, in three (3) separate documents, that were in these so called TS *ICBI* documents were actually not trying to protect the chemicals, formaldehyde, that is used in Appleton's ccp , but the high levels of formaldehyde, the intense interest in testing, the manipulation, many discussions within, and great attempts to keep secreted how dangerous use and exposure from normal use and exposure to Appleton's ccp could be. Appleton wanted. the entire documents "redacted" so that no one would be able to see the real truth of the inside knowledge of Appleton of how dangerous the high levels to consumers, like me, could be. This should also apply to the employees and citizens of the Fox River area and the millions of consumers over the last several decades. 1 am under a Protective Court Order, obtained by Appleton, not to reveal any of the "redactions" they claimed to be TS/CBI in these documents. In fact, I am under threat of going to jail by Appleton if I reveal anymore information than this. In one document that I have that is not stamped as TS/CBI, this reviews testing of formaldehyde by Appleton that shows levels of formaldehyde up to 200 ppm from Donna1 use and exposure. The allowed acceptable limit by OSHA is .75 ppm. That is over 266% higher than is acceptable. This is only one chemical that is among the hundreds that are in Appleton's ccp and other products. Because I am under Court Order regarding these documents, I cannot reveal any other information. However, the EPA, OSHA or other interested parties can obtain these and other documents via a subpoena or court order. I have copies of the claimed redactions and many of the documents that are claimed to be under this court order which I can provide via a court order.

. It is important for the residents of the Fox River area, employees of the companies involved and consumers of their products to be made aware of

the potential for damages. It has amazed me that the citizens in the Fox River area have not filed litigation for possible injuries they may have suffered as a result of the PCB damage. If the environment has been so severely damaged, it is only common sense that the humans in this area should also be just as severely damaged or more so. I know that Appleton has had many product liability lawsuits from consumers because of injuries suffered by consumers like myself. It is logical that the citizens in that area. may have suffered these same types of injuries since they are possibly exposed at higher levels of chemicals. Appleton has claimed for decades that their products do not cause adverse health problems or only very minor skin irritation. That is the opposite of what is true. While not all exposed persons may suffer, the chance is great for additional adverse health problems as a direct result of use and exposure to the chemicals and products they use. As an example, in Ohio, there were recently two lawsuits filed by employees and residents from the West Carrollton plant and area. This nature of the lawsuit is "This is a civil action on behalf of Plaintiffs and other class members for compensatory damages, punitive damages, and injunctive relief, including, but not limited to, medical monitoring, the provision of safe, non-contaminated water, can costs incurred and to be incurred by Plaintiffs and other class members for bodily injury, emotional distress and property damage arising from the intentional, knowing, reckless, and/or negligent acts or omissions of Defendant (Appleton) in causing Plaintiffs and other class members persons and properties to become contaminated with toxic chemicals. The contamination occurred in connection with Defendants manufacture, production, processing, use, release, discharge, and/or disposal of various toxic and/or hazardous chemical, including, but not limited to, polychlorinated biphenyls, (PCBS) , pert1uorooctanosulfate (PFOS), perfluorooctanoic acid, (PFOA), and dioxin, (hereafter " Toxic Chemicals'") , at its manufacturing facility and wastewater treatment plant located in West Carrollton Ohio) collectively, the" Facilities"). "

Appleton purchased the PFOA, CS, PFOS from 3M and then from Dupont, according to records. These chemicals are the subject of great concern to the EPA and 3M , Dupont and others have suffered hundred of millions in losses from fines and penalties and other litigation so far, and are the subject of the current *$S* billion lawsuit involving Dupont-Teflon.

The Material Safety Data Sheets, MSDS, of Appleton have always indicated that there are no adverse health problems from use and exposure to their products, including their ccp. Recently, a "revision" was made to a couple of

their products that are part of the ccp finished product that they now admit what has been true , and secreted, for decades of potential adverse health effects from use and exposure. These adverse health effects can include, but not limited to, mucous membrane and respiratory irritation, central nervous system depression with symptoms of headaches, dizziness, drowsiness, tingling, numbness and shooting pains in hands and arms, nausea, vomiting, burning sensation of the nose and throat, watering of eyes, blurred vision, clouded or double vision, changes in color perception. vertigo, blindness, weakness, fatigue, leg cramps, restlessness, confusion, drunken behavior, skin irritation, dermatitis, defatting of skin ringing in ears, insomnia, trembling, unsteady gait, liver and kidney damage, unconsciousness, co cancer and death. Reproductive and birth defects include damage to the central nervous system damage of fetus, fetal alcohol syndrome, mental and physical retardation, disturbances in learning, motor and language deficiencies, behavioral disorders, small head size, decreased sperm count and testicular atrophy. This is only a sample of the adverse health effects that can occur from use and exposure to ccp and the chemical components that are now admitted to by Appleton. It would seem logical that the local residents and employees could suffer even greater or quicker damages than the consumers of ccp.

The following is a partial list of chemicals that are used by Appleton and the other parties in the Fox River Superfund site should also have used and possibly contributed to the damage of the citizens in the area of the Fox River, and possibly their customers, consumers, employees, as well as the environment. I will be glad to provide supporting documentation if needed and help answer any questions that concerned residents, the EPA, the DNR and others may have.

Formaldehyde
Propylene Glycol
Ethanol
Methanol
2-Ethoxyethanol (ethylene glycol smoothly ether)
Pert1uorooctanoic acid (PFOA C8)- used in Schotchban
Perfluorooctane sulfonate (PFOS)
SUBSTITUTE PCBS INCLUDING THE FOLLOWING lsopropylbiphenyls Sure so] 250- including isopropyl, dimetriisomers, isopropyl. triisopropyI, monoisopropyl biphenyl, isopropyl biphenyl, 1, I-biphenyl (l-methyl ethyl),

biphenyl isopropyl, diisopropylbiphenyl, propylene, dielectric fluid, capacitors as PCB replacements, isopropyldiphenyl, diethyl sulfate Alkylate 215-including c-lO-c131inar alkyl benzenes, 1-(butyIOhexyl) benzene, l-(propyl-heptyl)benzens, 1-(ethyl-octal)benzene, l-(methylnonyl) benzene, l-(butyl-heptyl)benzene, l-(propyI-octal)benzene, l-(ethyI nonyl)benzene, 1-(methyl..decyl)benzene, l-(butyl-octaI)benzene, l-(propyl nonyl)benzene .

Santosoll SO includes Dimethyl phenylmethane, benzyl-dimethyl diphenylmethane, dibenzyl-dimethyl-dipbenylmethane, 1,3-dimethyltris(phenyl methyl) -benzene, dimethyl(phenyl methyl)-benzene, dimethyl dibenzyl benzene, 3,S-dimethyl-dpm, 2,6-dimethyl-dpm, 2,4dimethyl-dpm, methyl-benzyl-dimethyl-dpm, benzyl-dimethyl-dpm, benzylated m-xylene. dibenzyl xylene, tribenzyl xylene

Sanatasol I OO-including ethyl-diphenylmethane, benzyl-ethyl-biphenyl methane, dibenzyl-ethyl-biphenyl methane, benzyl-ethyl.;dpm, l-(ethyl-deey1), l-(methyl-undecyl), (hexyls-heptyl), l_(pentyl-octal), l-(butyl.. nonyl),

Diisopropylnaphthalene (DIPN) (DIPN is a very toxic chemical that has been found in recycled pulp and paper products, then in the food containers then into the food also in such products as Pizza Hut Pizza, McDonalds fries, rice, cereal and other food products.

Dipropyl naphthalene
IsopropylnaphthaIene
Triethyl naphthalene
TriisopropylnaphthaIene
isopropyl biphenyl (IPB)
Diisopropylbiphenyl(DlPB)
Triisopropylbiphenyl(DlfB)
Triisopropylbiphenyl(TJPB)
3-isopropyl biphenyl
4-isopropyl biphenyl
m-isopropyl biphenyl
Biphenyl A
Di...sec-butyJ biphenyl
Ethyl biphenyl
Diethyl biphenyl
Triethyl biphenyl\

Sure sol 290- includes see-butyl biphenyl. Di-sec-but)rlbiphenyl, etc. Aroclor,

Ammonia (amino polymers) Hexamethylen.etetramine Ammonium-

hydroxide,
MIPB
CVV=crystal violet lactone
Durez resin
Resorcinol
Benzyl benzoate
Benzyl benzoate velsicol Carbazol-dibenzothjophene Naphthalene
Methylated melamine formaldehyde resin Alkylated benzene
Alkylated biphenyl
EthyJene malefic anhydride
Sodium bromide
Alkyl phenol novolac resin Dipromocetoni e
Cyanogens bromide 2,2-dibrorno-3-nitrilopropion amide Monobromo-3-nitrilopropinamide Magnesium nitrate
Magnesium sulfate
Magnesium chloride 5-chloro-2-methyl-4-isothiazolin-3-one 2-methyl-4-isothiazolin-3-one

I will be adding more submissions before the January deadline. Please make this public at the meeting on December 5, 2006 for all residents.

Regards,

Brenda Smith

Agency Response

A Baseline Risk Assessment evaluated over 300 contaminants at the Site. From this evaluation, and consistent with USEPA's guidance (U.S. EPA, "Risk Assessment Guidance for Superfund Volume 1," EPA/1-89/002), USEPA focused on the "most significant" chemicals. Based on this analysIs, eight chemicals were evaluated in the final stage of the risk assessment process ("Final Baseline Human Health and Ecological Risk Assessment," December 2002, by The Retec Group). It was then determined that PCBs presented by far the greatest risk, with mercury a distant second. In general, these analyses concluded that other chemicals were shown to either not be present or to not have significant risk to human health and the environment. If new information is available that indicates otherwise, the agencies would consider this in modifying cleanup plans.

Sediment Management Work Group
Comments on the Proposed Modifications to the Fox River ROD

U.S. EPA Region V
January 11, 2007

Introduction

The Sediment Management Work Group (SMWG)[1] is pleased to provide comments to the United States Environmental Protection Agency (EPA) on the proposed amendment to the Fox River ROD for OUs 2-5.

Executive Summary

In the June 16, 2006 Fox River Basis of Design Report (Basis of Design Report), U.S. EPA proposed an Optimized Remedy for OUs 2-5 as an alternative to the remedy set forth in the Fox River Records of Decision (December 2002 for OUs 1-2, June 2003 for OUs 3-5) (collectively "ROD" or "ROD Remedy"). Using adaptive management principles, the Optimized Remedy incorporates the results of considerable additional data collected in 2004 and 2005 (more than 1,400 sediment cores and 10,000 sediment samples). The Optimized Remedy was described in detail in the Basis of Design Report, and was summarized in the Lower Fox River/Green Bay Site Technical Memorandum: Current and Proposed Plan (Technical Memorandum).

The Optimized Remedy embodies EPA's national policy on contaminated sediment, as reflected in the *Contaminated Sediment Remediation Guidance for*

[1] The Sediment Management Work Group is an ad hoc group of industry and government parties actively involved in the evaluation and management of contaminated sediments. (See Exhibit "A" for a list of its Members.) The Group is dedicated to the use of sound science and risk-based evaluation of contaminated sediment management options. The SMWG recognizes that the management of sites involving contaminated sediments frequently involves unique and complex scientific and technical issues, including assessment methodologies and evaluation of risk and risk reduction options. As an active participant in the national discussions on sediment management issues, the SMWG welcomes the opportunity to offer observations and comments on the Proposed Modifications to the Fox River ROD for OUs 2-5.

Hazardous Waste Sites, December 2005 (Guidance). In particular, the Optimized Remedy focuses on overall risk reduction, as well as the specific net risk reduction that realistically can be achieved by the available remedial alternatives. The Optimized Remedy appropriately took into consideration the limitations of dredging when developing an alternative to the ROD Remedy.

Consistent with the Guidance's emphasis on risk reduction, the Optimized Remedy will achieve lower surface weighted average concentrations (SWAC) of PCBs in both OU 3 and OU 4 (OU 3: 0.28-0.49 ppm (Optimized Remedy) v. 0.31-0.57 ppm (ROD); OU 4: 0.25-2.9 ppm (Optimized Remedy) v. 0.32-3.7 ppm (ROD)) in a shorter time frame than the ROD Remedy, is more protective of human health and the environment, and is more cost effective ($390 million (Optimized Remedy) v. more than $580 million (ROD)). The Guidance supports implementation of remedies that are more effective in the short-term, more implementable, more cost-effective, and that can be completed earlier. Thus, the Optimized Remedy, which is more consistent with the Guidance than the ROD Remedy (which was issued prior to the Guidance), should be approved. In addition, the Guidance's adaptive management concepts and risk management framework should continue to be applied at the Fox River, permitting the Optimized Remedy to be further refined and improved as new information is obtained and more refined engineering analyses are conducted during the remedial design phase.

EPA's National Contaminated Sediment Policy

In December 2005, EPA issued the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*. This Guidance embodies national policy on contaminated sediment and should be followed at all contaminated sediment sites. The Guidance provides a risk management decision-making framework to assist with selecting appropriate remedies. There are six key principles in the Guidance. First, the focus of remediation should be on risk reduction, not simply on contaminant removal or on the number of cubic yards of dredged sediment (*Guidance*, p. 7-1, 7-16). The Guidance reinforces the focus on risk reduction by stating that contaminated sediment that is not bioavailable or bioaccessible and that is reasonably stable, meaning that the contaminants are unlikely to be released from the sediment in concentrations which will pose an

unacceptable risk to human health and the environment, does not necessarily contribute to site risks (*Guidance*, p. 7-3).

Second, a realistic, site-specific evaluation of the potential effectiveness of each sediment management option, including dredging, capping, and monitored natural recovery, should be incorporated into the selection of remedies at a site (*Guidance*, p. 7-3).

Third, as part of the remedy selection process, an appropriate evaluation of the comparative net risk reduction potential of the various sediment management options, including a realistic evaluation of their respective advantages and site-specific limitations should be conducted (*Guidance*, p. 7-13, 7-14). This evaluation includes the risks introduced by implementing the remedial alternatives (*Guidance*, p. 7-14). For example, the risks associated with implementing a dredging remedy include contaminant resuspension and releases during sediment removal, transport, and disposal, continued exposure to contaminants during the construction and implementation phases, residual contamination, disruption of the benthic community, destruction of habitat, worker risk during sediment removal and handling, and community impacts including accidents, truck traffic volume, noise, lights, residential and/or commercial disruption (*Guidance*, p. 7-14).

Fourth, at large and/or complex sites, consideration of the use of combinations of remedies may be appropriate (*Guidance*, p. 7-3).

Fifth, adaptive management concepts, which recognize the need for reconsideration of the original remedy chosen where new data and/or results of pilots suggest the appropriateness of revising the original approach, should be applied (*Guidance*, p. 2-22, 3-1, 7-16).

Sixth, comparing and contrasting the costs and benefits of the various remedies is part of the risk management decision-making framework (*Guidance*, p. 7-1). These six principles, if applied appropriately, will lead to protective remedies that are also cost effective as required by CERCLA.

Issues with the ROD Remedy

After the Fox River RODs were finalized, more than 1,400 sediment cores and 10,000 sediment samples were collected as part of the remedial design (*Basis of Design Report*, p. 14-17). The data derived from these samples identified site characteristics "that are substantively different than those contemplated at the time of the ROD" (*Basis of Design Report*, p. 142-43). These differences include the following site characteristics, which are important to the remedial design and indicate that the ROD should be amended:

- Deeply buried, stable contaminated sediments below the authorized federal navigation channel are covered by cleaner sediments at a depth below the bottom of the navigation channel. Removal of these deeply buried contaminated sediments "would require dredging of considerable

additional volumes (greater than 1.0 million cy) of less contaminated non-neatline sediments" (*Basis of Design Report*, p. 143).

- Several areas are covered by a thin layer (up to 6 inches thick) of sediments with PCB concentrations between 1 and 2 ppm. "While such low-risk areas collectively represent only about 0.5% of the total PCB mass in OUs 2 to 5, such areas represent nearly 18 percent of the remedial action area and about 5% of the volume of sediments that would be dredged under the ROD" (*Basis of Design Report*, p. 143). Dredging of these areas "would remove substantial volumes of sediment at or below the 1 ppm remedial action level and would provide little or no net environmental benefit" (*Technical Memorandum*, p. 7) (emphasis added).

- Due to an undulating neatline surface and the necessary overdredge allowance, achieving the 1 ppm remedial action level would require dredging 2.0 – 2.6 million cy of sediments with PCB concentrations at or below the remedial action level. This approach "may result in unnecessary remediation of uncontaminated sediment, straining the available disposal site capacity, prolonging the cleanup process, and potentially resulting in relatively ineffective use of cleanup resources with little or no risk reduction" (*Basis of Design Report*, p. 143) (emphasis added).

- Substantial thicknesses (more than 13 feet in some locations) of contaminated sediments were discovered along several areas of developed shoreline. Dredging all the contaminated sediments is not practicable because of the predicted adverse impacts on the stability of the shoreline and shoreline infrastructure (*Basis of Design Report*, p. 79, 144; *Technical Memorandum*, p. 6).

- Limited landfill disposal capacity may be insufficient to handle the large sediment volumes that would be generated under the ROD (*Basis of Design Report*, p. 144).

In addition to the site characteristics identified above, several other issues with the ROD Remedy were identified in the Basis of Design Report and Technical Memorandum. First, the limitations of dredging, even with modern equipment, have become apparent (*Basis of Design Report*, p. 144). Residuals are "commonly spread both within the dredged areas and off site" and can "potentially result in post remediation surface concentrations that are similar to pre-remediation levels" (*Basis of Design Report*, p. 94-95). In fact, the post-dredge SWAC for OU 4 is predicted to be 3.7 ppm without implementation of a residuals management plan (post-dredging sand cover), which is higher than the existing SWAC – 3.2 ppm (*Basis of Design Report*, p. 95). The post-dredge SWAC for both OU 3 (0.57 ppm before implementation of the residuals management plan and 0.31 ppm after) and OU 4 (3.7 ppm before implementation of the residuals management plan and 0.32 ppm after) is predicted to be higher than the remedial goal of 0.25 ppm (*Basis of Design Report*, p. 95; *Technical Memorandum*, p. 2, 4, 11). Thus, dredging as contemplated in the ROD Remedy is unlikely to achieve the target SWAC.

Second, there are serious issues associated with dredging around utilities and infrastructure located in the River (*Technical Memorandum*, p. 7). Utilities and infrastructure include road and railway bridges, submerged pipelines, submerged cables, overhead cables, outfalls, and other submerged structures (*Basis of Design Report*, p. 22). Dredging would require relocation of the utilities, which is neither practicable nor feasible (*Basis of Design Report*, Appendix D, p. 4).

Landfill capacity is also a serious issue. There is limited landfill disposal capacity in the region, and very few regional landfills have the capacity or the willingness to accept large volumes of sediment (*Basis of Design Report*, p. 144). Moreover, the duration of the required easements for pipelines to carry sediments from the staging areas to the regional landfills may not cover the entire cleanup period, which leads to uncertainty on the feasibility of the ROD's transportation and disposal plan. (*Basis of Design Report*, p. 144). Thus, the "judicious use of regional landfill capacity" needs to be considered (*Basis of Design Report*, p. 144).

The Optimized Remedy Utilizes the Principles of EPA's December 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites.

The Guidance encourages the use of adaptive management concepts in managing contaminated sediment sites (*Guidance*, p. 7-16). At the Fox River, a more comprehensive sampling and analysis program implemented during remedial design, along with a more detailed review of recently completed environmental dredging projects, led to important, new information on site characteristics and clarified the limitations of dredging. Using adaptive management concepts, this new information was incorporated into a modified remedy, the Optimized Remedy, that follows the risk management framework of the Guidance (*Basis of Design Report*, p. 147, *Technical Memorandum*, p. 9).

In proposing the Optimized Remedy, both the Basis of Design Report and the Technical Memorandum appropriately focus on risk reduction and the comparative net risk potential of each alternative. Four examples of this focus on risk reduction and comparative net risk follow.

- Sand Cover v. Dredging: The Optimized Remedy recognizes that due to the limitations of dredging, removal of areas with a thin "veneer" of PCBs (1 – 2 ppm in a thin layer (six inches or less) overlying cleaner sediments) will not provide a net environmental benefit (*Technical Memorandum*, p. 7). Rather, placing a 6 inch sand cover will more effectively reduce risk than attempting to dredge these areas, as originally proposed in the ROD.

- Engineered Capping v. Dredging: The Optimized Remedy recognizes that, due to the limitations of dredging (e.g., resuspension, residuals, submerged utilities, and shoreline stability), and the lower risk posed by deeply buried stable contaminants, engineered capping will be more effective and feasible (i.e., implementable) in certain areas than the originally proposed dredging (*Technical Memorandum*, p. 6).

- Use of Dredging/Capping Combinations**:** The Optimized Remedy provides for the use of combinations of dredging and engineered capping in certain areas, as determined to be appropriate during the remedial design, to make use of the

demonstrated strengths of both dredging and engineered capping (*Technical Memorandum*, p. 5). The Optimized Remedy provides for more targeted dredging by focusing on the sediments posing the most risk and supplements dredging with a combination of engineered capping and placement of sand covers. The result is more protective of human health and the environment compared to the ROD Remedy, with an expected lower SWAC of PCBs (OU 3: 0.28 – 0.49 (Optimized Remedy) v. 0.31 – 0.57 ppm (ROD); OU 4: 0.25 – 2.9 ppm (Optimized Remedy) v. 0.32 – 3.7 ppm (ROD)), due to having fewer areas with post-dredging residuals, and, as noted below, resulting in earlier lifting of the fish consumption advisories. (*Technical Memorandum*, p. 11). In fact, under the ROD Remedy for OU 4, dredging would increase the SWAC if no residual management (i.e., sand cover) is implemented (*Technical Memorandum*, p. 11). The Optimized Remedy "would achieve a lower SWAC than the [ROD] after construction due to having fewer areas with dredging residuals" (*Technical Memorandum*, p. 11) (emphasis added). Thus, the Optimized Remedy provides better risk reduction and is more protective of human health and the environment than the ROD Remedy.

- Reduced Implementation Time**:** Implementation is expected to be completed between 6 and 15 years earlier under the Optimized Remedy (9 years (Optimized Remedy) v. 15 – 24 years (ROD Remedy)). In fact, the ROD Remedy's estimate is likely overly optimistic considering the relatively large number of substantive implementability issues listed in the Basis of Design Report. The Optimized Remedy's earlier completion, in turn, is expected to reduce water and fish tissue concentrations faster than the plan under the ROD, resulting in earlier lifting of the fish consumption advisories (*Technical Memorandum*, p. 12).

By applying the Guidance's principles and risk management framework to the substantial additional technical information developed since the ROD was issued, the Optimized Remedy more realistically addresses the limitations of dredging and the benefits of alternative remedial methods. The resulting Optimized Remedy is superior to the ROD Remedy for a number of reasons. It utilizes targeted dredging and incorporates engineered capping and the use of sand covers in order to maximize overall risk reduction. In addition, with the Optimized Remedy post-dredging residuals will be reduced, the SWACs will be improved, implementation time will be decreased, less landfill space will be required, and areas where dredging is infeasible, such as those areas

with shoreline stability concerns or utility issues, will be effectively remediated. Thus, the Optimized Remedy is more protective of human health and the environment than the ROD Remedy.

SMWG Support for the Optimized Remedy.

The Optimized Remedy embodies EPA's national policy on contaminated sediment, as reflected in the Guidance, by focusing on risk reduction and appropriately evaluating the comparative net risk reduction of remedial options by realistically considering the limitations of dredging in designing an appropriate and effective remedial plan. The Optimized Remedy's expected achievement of lower SWACs in two operable units in a shorter time frame than the ROD Remedy is more protective of human health and the environment. The Optimized Remedy is also more cost effective than the ROD Remedy ($390 million (Optimized Remedy) v. more than $580 million (ROD)) (*Technical Memorandum*, p. 13). The Guidance supports implementation of remedies that are more effective in the short-term, more implementable, more cost-effective, and that can be completed earlier. Thus, the Optimized Remedy, which is more consistent with the Guidance than the ROD Remedy, should be approved. The Guidance's adaptive management concepts and risk management framework should continue to be applied at the Fox River such that the Optimized Remedy can be further improved as new information is obtained and more refined engineering analyses are conducted during the final stages of remedial design.

The SMWG would be pleased to answer any questions about its comments on the Fox River Optimized Remedy. For further information, please feel free to contact the SMWG's Coordinating Director, Steven C. Nadeau, c/o Honigman Miller Schwartz and Cohn LLP, 2290 First National Building, 660 Woodward Avenue, Detroit, MI 48226, (313) 465-7492, snadeau@honigman.com.

Respectfully submitted,

Steven C. Nadeau, Coordinating Director
Sediment Management Work Group

EXHIBIT A
MEMBERSHIP IN THE SEDIMENT MANAGEMENT WORK GROUP

ALCOA, Inc.
Atlantic Richfield (a BP company)
BASF Corporation
Beazer East, Inc.
Boeing Company, The
CBS Corporation
Chevron Energy Technology Company
Consumers Energy
Dow Chemical Company
DTE Energy
E.I. duPont de Nemours and Company
El Paso Corporation
ExxonMobil
General Electric Company
General Motors Corporation
Georgia-Pacific Corporation
Glenn Springs Holdings, Inc.
Honeywell International, Inc.
Monsanto Company
NW Natural
Phelps Dodge Corporation
PPG Industries, Inc.
Rohm and Haas Company
Sherwin Williams Co.
Tierra Solutions, Inc.
U.S. Steel Group
WE Energies
WTM I
American Chemistry Council (ACC)
American Forest & Paper Association
American Gas Association
American Petroleum Institute
Centre for Advanced Analytical Chemistry
Council of Great Lakes Industries (CGLI)
EPRI
International Lead Zinc Research Organization
National Council of Paper Industry for Air & Stream Improvement
Norwegian Institute for Water
U.S. Army Corps of Engineers, Waterways Experiment Station
U.S. Navy Space and Naval Warfare Systems Center, San Diego
U.S. Navy Naval Facilities Eng. Command
Utility Solid Waste Activities Group

Agency Response

Thank you for your comments.

Section 3. PUBLIC MEETING TRANSCRIPT AND AGENCY RESPONSES

A public meeting was held December 5, 2006. Approximately 300 people attended this meeting. The transcript of the comment portion of this meeting and written Agency responses are below. The complete meeting transcript, including a presentation by the agencies and questions and answers can be found in the Administrative Record.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

LOWER FOX RIVER/GREEN BAY SITE
PROPOSED PLAN MEETING

PUBLIC MEETING
BROWN COUNTY LIBRARY
515 Pine Street
Green Bay, WI

TUESDAY, DECEMBER 5, 2006
7:00 p.m.

I N D E X

MR. JADIN: My name is Paul Jadin, 2847 Lobelia Court in Green Bay. And I'm here representing the Green Bay Chamber of Commerce, but I also want to point out that I also was the mayor in 1995 to 2003. And I make that point because this was an issue when I took office in 1995 and it was an issue when I left office in 2003. And I would like for it not to be an issue when I leave the Chamber of Commerce or perhaps even die in Green Bay.

So, having said that, first of all, I also want to commend you for being here tonight and for the diplomacy you have shown to this point. But, having said that, I think it's important for

everyone to appreciate that this is, I believe, the first real opportunity we have had to see something done on the Fox River in the last at least decade. And I think that when I left office the primary message I was sending to the EPA and the DNR was please base your remedy on sound science. And I was delighted that just not more than two hours ago I left a meeting with the Governor in which he was echoing that very same sentiment.

I think that you have shown that you have applied sound science to this whole effort. I'm seeing that there is collaboration, there is compromise, and, indeed, a scientific solution. And that's evidenced in not just the efforts of the DNA and the EPA, but also the various engineering firms that you have brought into the process. I believe that you have come up with a more efficient proposal, and, as I stated, I want to refer to the document, the table that you put together showing the comparison.

OU-3 has an estimated PCB concentration after remediation of .31 to .57 parts per million under the current plan. Under the proposed plan it goes to .28 to .49. OU-4 goes from .32 to .37 down to .25 to 2.9. That obviously is a more efficient

way to do things.

The second thing that's very critical in my opinion is, as I watched these various hearings over the years, particularly the most recent one that dealt with the west side landfill, it's become quite apparent that, whatever happens, there is still going to be conflict with respect to landfilling these sediments. And this is a solution that I think obviates some of that controversy, that dialogue, because of the pipeline situation, because of the lower amounts of sediment that have to be landfilled.

And, while it came up several times during the questions, I think it's important to reemphasize the cost situation. We have gone from a $334 million plan to a $395 million plan, which arguably was going to be a $580 million plan. Obviously, we can't discount the whole issue of what this is going to do to one of our larger employers or several of our larger employers in the area.

Ultimately, the only question that remains here is: Is capping sound science? I have not seen any evidence to the contrary. I have researched it thoroughly, as most of the people here have, and I'm satisfied that the way you've engineered this and

the way you are going to monitor it and maintain it does give us the ability to be assured that either it's going to do the job short-term and long-term or there is going to be a mid-term remedy that you are going to be able to bring to the table to resolve that. So I'm here to tell you that I'm in support of this remedy and I thank you for your efforts.

Agency Response

Thank you for your comment.

MS. PASTOR: Number two. Keep your comments to like around three minutes. I have someone kind of watching so that we can keep it going, so please.

MR. ANDERSEN: My name is Curt Andersen. That's Curt with a C-u-r-t, A-n-d-e-r-s-e-n, 2942 Jack Pine Lane, Green Bay, Wisconsin, and that's actually a Suamico address.

In the spirit of the secret meetings that were held over the last few years without all parties being represented, I want to tell everybody here that my wife and I have had several secret meetings to determine the actual cost for cleaning up the pollution left by some bad actor paper mills. The actual costs involved removing Renard Island, that's a toxic pile of crap dumped into the bay and a recreation area by sissy politicians, bad public policy, and several large gorilla corporations that

know how to both reward and threaten. The actual costs include dredging the entire southern end of Green Bay and removing the spoils to a proper landfill. And oh, look there on the stream, there is a branch in the water. I wonder if a whole tree would fall in and roll around back and forth a few times and punch that stupid cap up.

The actual costs involve lost economics from a clean river, healthy tourism in Brown County, a one hundred year lack of demand for river lots that only changed since the clean-up plans were announced, and a thriving commercial fishing industry on the river bay of Lake Michigan. Monitoring for a hundred years is imperative so the citizens can be sure that dredging has been properly executed and public safety assured. I do not trust the Army Corps of Engineers, since they are also the ones that have been monitoring Kitty Island.

A cost settlement lower than conservative cost determinations is ass backwards. It costs what it costs to do a clean-up. This is not a vegetable fall in the Punjab. We do not barter here. Capping

is an idiotic measure and indicates the level of corruption we have in our city, state, county, and federal governments from the top down. What we have

in Green Bay and in the river is due to corruption headed by former Governor Tommy Thompson, current Governor Jim Doyle, and the ultimately corrupt President George Bush, who have weakened DNR and EPA so that they are only convenient names for public relations actions.

Based on these points, my wife and I have determined that the new costs of cleaning the river and bay with toxic dredge spoils being removed likely to Detroit is $4.75 billion. All of you can go home now, because we have decided this, it's done. That's the new cost, and we have decided that a further wasting of time by the paper industry, they should be penalized at the rate of $50,000 a day per paper mill. So time is a wasting, you paper mills. Start writing those checks. Get on with it.

Agency Response

The commenter raises several issues -- some concerning the Proposed Plan and some relating to other government efforts addressing the Lower Fox River and Green Bay. He asserts that caps will not be protective over the long term and he asserts the need for long-term monitoring. The Agencies' responses to similar issues raised by other commenters are discussed above.

The commenter also raises a series of issues regarding matters not addressed by the Proposed Plan. For example, he seems to question the adequacy of the remedy for Green Bay that was selected by the 2003 ROD. The Proposed Plan did not include a change to that remedy, so the agencies are not reconsidering the remedy for Green Bay at this time. The commenter also suggests that the agencies should be pursuing recovery of economic losses (for things like "a one hundred year lack of demand for river lots") for past pollution of the River and penalties for delayed cleanup. The governing law does not allow such sweeping relief, although it does authorize recovery of some types of damages and it imposes penalties in certain situations. The Superfund statute allows recovery of damages for injuries to natural resources caused by releases of hazardous substances, but only for public losses since enactment of the statute in 1980. The Superfund statute also imposes penalties for non-compliance with administrative orders or information requests issues by the federal government, but penalties do not accrue for delays that do not amount to violation of an order.

MS. PASTOR: Number three.
MS. GARRELS: My name is Josie Garrels, G-a-r-r-e-l-s, and I live at 219 13th Avenue in Green Bay. I first want to thank you for the opportunity to comment. I'm a resident in Green Bay and so I'm speaking as a resident, but I'm also speaking on behalf of the Wisconsin League of Conservation Voters, which is a nonprofit and non-partisan organization that works for (inaudible)

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public health and natural resources here in Wisconsin.
I've lived in central Wisconsin all my life, but until I moved to Green Bay about a year and a half ago I don't know if I could have even told you where the Fox River was, let alone the detailed history of PCB contamination in the river or the saga of the clean-up efforts. And I deliberately use the word "saga", because the people in this community and others have struggled for years to make the river swimable and fishable again and to ask corporations to be responsible for their hazardous waste.
Decades have passed with PCB's being dumped into the river and then toxicity was brought to light, and then all the studies, public comment periods, hearings, and meetings were conducted. And all the while the contamination sat there at the bottom of the Fox River, being absorbed by all the organisms, accumulating in the fish we eat, and affecting our health in measurable and immeasurable ways.
By the time we determined that the best solution (inaudible) required removal of the toxins, the parties involved signed a record of decision and

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the people of Green Bay and other cities along the Fox River finally gained some peace of mind. But today we find the contamination issue is being revisited to allow the (inaudible). To reopen the record of decision because it's costing too much to clean up the toxic mess they left behind in the pursuit of profit is a slap in the face to citizens who stopped fishing in the Fox River, to the parents who do not let their children splash on the shore, and to the city for trying to overcome the stigma of a toxic waste site. Backing down from the original well researched clean-up plan does not provide the same level of protection for public health and natural resources.
We would like to ask you to: One, uphold the original record of decision; two, clean up, not

cover up the PCB's in the Fox River; and, three, make sure liable pollutors bear responsibility and pay to clean up their toxic mess. Green Bay and Fox Valley residents in this whole area (inaudible) water and our future. So, as you think about the kind of gifts you want to give your children this holiday season, I would like you to ask yourselves if you would like to be giving them a toxic mess. And thank you for the opportunity to comment.

Agency Response

The agencies consulted experts in environmental engineering and considered their input and their conclusions considered to ensure that caps would maintain long-term stability and effectively contain PCB contamination and be protective of human health and the environment. Stability of the cap is ensured by conservative evaluations regarding high water flows during storms or floods, ice scour, propeller wash, bioturbation and possible impacts from man-induced activities. Additionally, a margin of safety was added, to increase the caps stability and long-term effectiveness. Additionally, monitoring will continue to evaluate whether capping is continuing to provide effective containment of the PCBs. If monitoring shows that caps are not effective in containing PCBs, then maintenance would be performed as needed. In summary, caps in combination with a robust monitoring program will be protective of human health and the environment.

More detailed responses to these issues are also addressed in Agency responses to Peter DeFur, Section 2, DeFur, pages 20 - 73.

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MS. PASTOR: Number four.
MS. DIAZ: My name is Kim Diaz, D-i-a-z, and I live at 13th Avenue here in Green Bay, a couple of blocks away from the Fox River, and I am just representing myself. And I just wanted to make a comment that I feel like we are cleaning up the Fox River now, and that's good. It's about time. And I think that we should do a good job and not do half measures and just cover it up. I think we should stick with the original plan to clean it and not do the capping, because the river runs and it's going to run out into the bay and then it's going to run into Lake Michigan. We don't have a lot of fresh water in this world. We need to protect that. And I wanted to say also that we should take care of this problem because we are responsible for it and not leave it for our grandchildren.

Agency Response

The Agency believes that capping will effectively contain the contaminants and should improve the water quality significantly.

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: Thank you. Number five.
MR. HOWLETT: My name is George Howlett, environmental scientist living at 422 Koynee (phonetic) Street in Seymour, Wisconsin. I began life on the Fox River in Green Bay when I was a baby at three months old in a sailboat. I am a researcher who did work starting in 1968, both for my dissertation research on the west shore and for

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the sea grant program under Dr. Sager and Doctors Wierzma (phonetic). I have a formal statement being submitted. It's very, very technical. Before I go any further, I want to say Jim, you did a very good job of explaining it to me. I understand fully. I fully support the proposal. (inaudible) for scientific engineering reasons.
I am in part an algologist and a hydrologist. I understand why the cap, the armored cap works, and I want to present some information on why algae are part of the situation and why the capping will stop the movement of PCB's to the bay and eventually to Lake Michigan.
Before we go any further, I have a most recent book, 2006, showing that the PCB's, in fact, are beginning to bioremediate bacterial action, bioremedial compounds. They have been proven to be doing so in the Hudson River, the Milwaukee River, the Sheboygan River, and there is every sign that it's happening here in the Fox River. I want to go on to the main part, and that is some quoting from my paper.
First of all, yesterday I had a conversation with Steven Westerbrook, USGS scientist now assigned to the project for the PCB's at

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Madison, and he replaces Eric Stollers (phonetic), who was doing the PCB work, and I am reporting back out of things that I saw in Eric Fitzgerald's paper,

that the algae are the principal carriers of PCB's to the river. The main thing to do is to stop that transfer. And I will explain a little bit here.

First of all, the algae that are the ones that are carrying it are principally cyanobacteria, which means they are bluegreen algae. The cyanobacteria are gram negative. I don't know if anybody here has any background in bacteriology, but the gram negative have an external membrane which is a saccharide but it's also a lipid, lipopolysaccharide. And the reason I say that is because that shell makes contact in the bottom when the bottom is exposed, exposed because it's a sediment.

The algae also have gas vacuoles. They sink into the bottom, pick up phosphate, and in the process contact and also come in contact with other gram negative bacteria which decomposes. So it's a mix of decomposed bacteria and cyanobacteria that are contacting the bottom. This bottom then is giving them the PCB's, because both are nonpolar rather than polar materials. The PCB is of a

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variety of polarities of 209 containers, but most of them are very water insoluble and very lipid soluble. And so they pass to the bacteria and the cyanobacteria, which rise again because of their gas vacuoles and carry this until the next time that they fall down.

And this is a reservoir, it is not a river. It's very important to understand the hydrology of this system, because the flows in the river from the bottom only at the time when the tainter gates are open during flood stage. Otherwise, all those are over the top because that flow that goes into the paper mills for power and to the power generated rapid crush, those have to have fall. You don't get power without fall.

MS. PASTOR: We need you to wrap up.

MR. HOWLETT: Okay. The principal point is that it is the algae that are the carriers, and the mechanisms of the algae and the paper will explain more. And one thing that I can add that was found this morning when I looked at my bacteriology manual was that point on the polysaccharides and the lipid A. Lipid A plus slimes, and I'll mention plus the slimes. And vanderwall forces. Vanderwall forces are doing all the work.

Agency Response

Responses to these comments are included in the agencies response to comments by Mr. Howlett, page 152, Section 2 above.

MS. PASTOR: Number six.
MS. KATERS: My name is Rebecca Katers. I'm the Associate Director of the Clean Water Action Council. My address is 2484 Manitowoc Road in Green Bay. The Clean Water Action Council absolutely opposes this plan. We are not happy with the last plan because of the weaknesses that were inserted in that one. But this plan goes far beyond what is acceptable. We cannot support it. We are going to be submitting technical comments, but I wanted to devote my three minutes to talk about the processes, because I think the process is the most disturbing to me.

I have worked on this issue for 20 years now on and off as part of the official planning process and then the unofficial planning process. I was part of the original Remedial Action Plan Committee. But the last three-and-a-half years have been entirely closed-door secret meetings between the corporations and agencies. Completely imbalanced. You talk about science. Why were you not willing to allow our experts to be present to participate in those meetings or even to observe those meetings? They were shut. The doors were shut. You and the corporations getting together and

discussing all the details at length, without any public input or even observation. That is ** corruption.

And you come here talking about science. You give us three minutes. Industry has had access to you people for three-and-a-half years. You give us three minutes to comment on it. We have a document this thick (indicating), but you give us three minutes to comment on it. That's an outrage.

Other things have been happening. You pick the busiest season of the year, of course. It's finals for students, it's holiday for adults. It's the same night as the Green Bay City Council. Our aldermen should be here, our mayor should be here. Don't you people check the schedules? Governor Doyle planned his Town Hall meeting tonight just a couple hours ago. Is that deliberate? An effort to waylay the media and dominate the media coverage tonight so that the public doesn't hear what happened here?

You only made seven copies of the Basis of Design Report for the public. We got a copy because we are the technical advisory grant group, but we had to send it to Virginia where our expert is. You claim you mailed a copy, a second copy, but Fed Ex

lost it, and you refused to file a claim and get us another copy. I'm sorry, but the corporations should be paying for anybody to get a copy of these documents well in advance so we have time to review them. They are very thick, they are they technical. You are talking about science, this is science based. Well, let us have a chance to look at the science and have a document to look at. You cannot study this material on line, you can't look at a disk and go through hundreds of pages of technical jargon on a computer screen at the same ability that you have with a paper document. It is simply not possible, especially when you don't number the pages accurately and you are referring to diagrams and tables that are misnumbered. Try to do that on a disk on your computer, sort your way through it.

And why did the DNR not have their website updated? And why couldn't people open the documents on your website for months on end? You have the wrong contact named, you had two-year outdated information on who to contact at DNR. You had your statement there that there were no public meetings planned. Finally you put a little box in the corner of your Fox River page that says that there is a public hearing tonight. Kind of late. I have been

checking the website. You are not providing the information. There are no news releases posted, there was no meeting posted until just recently, and people couldn't open the documents to even study them. You talk about a public involvement plan. This is a lousy excuse for it. But industry had access to you people for three-and-a-half years on this.

Agency Response

Responses to these comments are included in agencies responses to written comments by Ms. Katers in Section 2, pages 87 – 100 above.

MS. PASTOR: Number seven. State your name for the record.

MR. HICKS: My name is George Hicks, and I represent the design team of Shaw Environmental and Anger Environmental. We are actually doing this project of remedial design on behalf of Georgia Pacific and NCR and under the watchful eye of EPA and DNR. We are designing the largest environmental dredging project in the United States, if not the world. This project is based on sampling, on analysis that's been done over the last three years. We have 1400 locations as opposed to 400. We have

10,000 samples that we have analyzed over the last three years.

And, by analyzing these samples, we have determined differences in the river than there were previously thought of. There is different

concentrations, there is different areas. We talked about earlier tonight there are areas of higher concentrations that weren't discovered before down below the DePere dam. We are addressing those next year. They are being dredged by the paper companies next year.

All this work has given us a much, much clearer picture, and I think there is -- some of the other aspects should be that there are deeply buried material is cleaner, there is deeply buried contaminated material is cleaner (inaudible) that lend themselves to capping. There is a thin layer of material that is barely over the 1 ppm RAL that lends themselves to capping.

This summer we submitted the report, BODR, Basis of Design Report, recommending remedial approaches to each of the areas that we found during our studies. Our report received intense scrutiny from DNR, EPA, their experts, and national engineers and scientists from throughout the United States. The DNR and EPA ultimately approved the report, and now we are proposing and they are now proposing to update this clean-up plan in light of the new information provided within this report.

The core idea of the proposed remedy is to

tailor the clean-up to different parts of the river using different remedies, be it dredging, dredging and cap, capping by itself. Dredging these areas would still remove 74 percent of the PCB mass from the river that the ROD remedy would have also removed. At the same time, the dredging would be more focusing in the areas of higher PCB concentration so that millions of cubic yards of sediment containing one ppm or less doesn't go into Wisconsin landfills. This allows the proposed remedy to achieve an environmental target of an ROD about half the size of the original, or nine years versus 15 plus, all the way up to 24 years.

The proposed remedy applies capping where the petula (phonetic) is better suited than dredging to address particular areas of the river, specifically in areas where dredging would be harmful to the shoreline, to existing bulkheads, to piers, utilities. This will insure that we don't undermine docks or public or private facilities.

The proposed remedy still follows the one ppm action level the agency set forth for this project. In the proposed remedy every spot in the river that's over one ppm will be addressed, either through dredging or capping. Importantly, the

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proposed remedy achieves a lower average surface concentration than the original ROD remedy.

And then I want to emphasize that the proposed combination of dredging and engineered capping is a permanent remedy for the PCB in sediments. We are using basic engineering principles, governmental guidance set by the EPA, and a large margin of safety to design these caps so they can withstand the forces three times the highest flows recorded in the river. That is, these caps are designed to withstand all plausible combinations of ice scour, low flow, severe storms, winds, floods, and boat traffic.

The proposed remedy will enable the river to recover faster than the original remedy, the clean-up will take half the time, and will leave lower surface PCB concentrations in less time as well as fast removal of the fish consumption advisories. This combination of dredging and capping will also make the clean-up much more cost-effective.

As closing, I want to say we are proud to be doing this vital remedial action, remedial design, and that the Fox River will still be the largest dredging project ever conducted by tailoring

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the remedial technologies to localized sediment conditions. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: Number eight.

MR. SAPPERSTEIN: My name is Zalman T. Sapperstein. I live at 3155 Gibraltor Road in Fish Creek, although I lived in California, Los Angeles, from 1931 till about 1965. I'm an old fart.

First of all, I'm going to make three statements. This plan is wrong. I say that as a research engineer, going for my doctorate when I was drafted into the Korean War. I worked in engineering research my whole life. My fields included material turbulence flow, mass flow, heat transfer, structures, and on. I'm a Fellow of the American Society of Metals. And, just to give another bit, I am also a member of the (inaudible) Research Society, American (inaudible) Research

Society of the United States of America. And I ask all of you to become a water warrior. Demand safe water now.

I now would like to read from a sheet that I took out today. Last revised Tuesday, November 21, 2006. Okay? Three weeks ago maybe. This is on the www.dnrstate.wius/org_water_wn/foxriver/happyhtml. I can give you that later.

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Depending on the erosive forces present at the site an in situ cap may have to be armored with stone or other materials to keep the cap intact. The potential for large commercial vessels to scour the river bottom would necessitate a very large armor stone, making in situ capping difficult in an area most active navigation channel.

The active navigation channel in the Fox River extends from Green Bay upstream to the turning basin at Fort James Paper Corporation. The federally authorized navigation channel extends from Green Bay to the outlet of Lake Winnebego. Goes on to say, "November 21, 2006, besides capping, other in situ approaches to managing contaminated sediments exist." And then it goes on to say, "In situ caps may further reduce water depths to levels that are not safe for existing or planned recreational boating or may eliminate shallow water aquatic habitat. Construction of an in situ cap represents a deliberate change to the shape of the bottom of a waterway. Future human and ecological uses of the waterway may be limited by this change. Sites that are capped require perpetual maintenance, and there is always the risk that the cap could erode from flooding, aquatic organisms, stream bank

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erosion, navigation, and recreational forces."

MS. PASTOR: You'd better wrap up.

MR. SAPPERSTEIN: Ma'am, this other gentlemen took five minutes and I have taken less than three, and I think you are unfair. You are biasing this one way. And I think I should be allowed at least two more minutes.

MS. PASTOR: Two more minutes and then we have 40 more people.

MR. SAPPERSTEIN: Fine. I understand. But we have been listening to a lot of deception.

The most recent research done by Alcoa shows that the capping methods that they studied in 2004 were subject to ice erosion and ice shoves. Do you want that? Of course, ice doesn't exist in the Fox River or in Green Bay. And, in fact, the PCB

levels went up in the sediment rather than went down. Now, wait a minute, let me -- you gave him much time. I'm going to read one other thing.

Those of you who are for this, this is a staged affair. I want to say one other -- I have questions that I will ask, then ask one final -- it's not a question to be answered. Why do the paper companies in Wisconsin use PCB's in the manufacture of products for more than 25 years

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beginning in 1954 when they knew that the wastewater discharges would contaminated the water? Why did the use of existing stocks of PCB's continue after production of PCB's was banned in the U.S. in 1979? Why did the political administrations in Wisconsin of Thompson, McCullum, and Doyle, and the elected Assemblymen and Senators over the last 30 years allow PCB contamination's persistence after the production ban? Why do paper companies continue to use this deadly chemical even after production was banned? Why does PCB contamination remain in northeastern Wisconsin after more than 17 years has lapsed since our elected Wisconsin government officials in the Thompson administration and paper industry executives agree to a comprehensive PCB removal plan?

MS. PASTOR: Sir, we need to move on.

MR. SAPPERSTEIN: And I strongly urge everyone here to stand up and oppose this farcical remedy that is done strictly for economic reasons to benefit the corporations and the government.

Agency Response

Responses to these comments are addressed in the agencies responses to written comments by Peter L. DeFur, Section 2, pages 20 – 73 above.

MS. PASTOR: Number nine.

MR. WOLFF: My name is Kelly Wolff. K-e-l-l-y, W-o-l-f-f, and I'm here wearing two hats tonight. The first one is Vice-President of

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Operations for Georgia Pacific here in Green Bay, and the second and more important is as a citizen of this community, long-term community citizen. My wife and I raised our family here, and are very concerned about this (indicating).

I want to applaud the Agency for this plan. This is a very good plan, and we should be very excited about our ability to move forward based

on sound science. Thousands of hours of engineering studies have gone into this. I personally have asked all of the questions that you folks have asked here tonight and applaud all of you for asking those questions. As a steward of a company, I have the responsibility of making sure anytime we spend large sums of money in investments that we know that we are going to get the result. This plan achieves that result.

So, if you look at the multi-faceted plan that you put together, with dredging, capping, the combination of the two, it's going to insure that we have the best plan. It's quicker, it achieves it in half the time. And the capping really does separate the organisms, so we are going to get a much quicker effect in the river, less PCB's in the river. So it's a good plan, again.

I'm going to be very brief. I know there is a lot of other people who would like to talk. but, again, for both of my hats, this comprehensive plan that you have put together meets the needs, and we need to support it. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: Number ten.

MR. GARARDI: My name is Don Garardi. I live at 6590 Aspen Drive. Last name, G-a-r-a-r-d-i. I've lived and worked in Green Bay for ten years. I'm also an avid sailor, member of Windjammer Sailing Club. Love the South Bay, think South Bay Fox River a very valuable resource. Studied the plan. I think it's a very good plan. I think it's the best chance we have of seeing this river restored in our lifetimes and would like to see it move forward. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: Eleven.

MR. FRISK: Charles Frisk, 3560 Sunrise Circle, Green Bay, Wisconsin. I'm also speaking on behalf of the Northeast Wisconsin Autobon. I'm not an engineer or anything like that, but I am a person who spent a lot of my whole life messing around on rivers, fishing, swimming, canoeing, and so on. I can tell you that you can have a river completely memorized, where the deep holes are, where the

shallow holes are, where the ripples are, and if you stay away from that river for ten years and come back, it's not the same river. It doesn't need a hundred-year flood, it doesn't need a 200-year flood. Rivers move sediments around. They move huge sediments around. They move giant boulders around. The idea that you can put sediment down on top of other sediment and expect it to stay there, because that's all this is, you are putting sediment on sediment, that stuff moves around.

The DNR did a huge dredging project up in the Wolf River a few years ago to make deeper holes for trout fishing. They were just impressive as all get out for the first season. Two years later, it's all gone back to kind of the way it was before. Rivers have the places where they put the things. They cut material out, they move it.

Some of these caps will stay in place. Some of the caps may actually get buried under more sediment. But some of the caps are going to get eroded completely away. Anybody that's spent a lot of time on rivers knows that you can't put sediment down and expect it to stay in place. It's just a common sense thing. We are going to get one real good chance to clean up this river, and I don't

think that this is the way to do it, because this isn't going to stay in place. Thank you.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: Number twelve.

MS. SCHAEFER: I'm Patty Bernard Schaefer from the Fox Valley Sierra group, and I am disappointed to be here tonight. I have been attending these meetings and hearings for many years. I was at the June 23 meeting for the record of decision, and I remember pointing out at that meeting a very large loophole in the record of decision, a loophole that's too big to close and much too big to cap. That loophole is letting the DNR and the EPA change their plan based solely on economic interests rather than on human health interest. The DNR and the EPA should be doing a river clean-up, not a river cover-up.

Capping is not the permanent solution to the problem facing us. The PCB's in the Fox River need to be removed from the river and they need to be treated and destroyed effectively and disposed of in a fashion that protects human health. Removal and destruction of the PCB-contaminated sediments should be the goal of the clean-up, not just covering up those sediments.

If the DNR and the EPA do insist on

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capping parts of the river, then liability must go along with the cap. Covering up does not destroy the PCB's. Covering up does not dissolve liability for the PCB's either. I support removal and destruction of the PCB's, not covering them up. I support a permanent, not a temporary, solution.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: Thirteen.

MR. KRANING: My name is a Lawrence Kraning. I live in Little Suamico. The Weeping Willow up here is an apt symbol for the EPA and its statistics and generalities presented tonight. This is not a clean-up. This is a cover-up which was presented to you. We have had 30 years of cover-up on this river. Relying on statistics from other industry self-monitoring studies is absolutely a farce. How much common sense has gone into your statistics and the analyzing of them? You need to change your name. You need to change your initials to POP, pawn of the paper companies.

The paper companies put it in there. They put the PCB's in there knowingly, they covered it up knowingly. Let them get it out knowingly. Too bad that there's got to be a little cave-in of the riverfront, okay, the shoreline. Too bad you got to go around some pipes, too bad you got to go around

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some docks. Isn't the health and welfare of the citizens of this state worth it? What do we care whether it costs this much or that much? Are you going to do your job responsibly or not? As far as I am concerned, the EPA is a wasteland.

We faced a terrible environmental problem a few years ago with the Exxon Crandon mine, and over 60 organizations got together to defeat it.

And, if necessary, those same organizations are going to get up and we are going to clean up the Fox River. The same delaying tactics are going on on the Hudson River with GE. We are not going to put up with it. Perhaps what we need to do is hit the paper companies where it really hurts, their bottom line. Maybe we should call a worldwide boycott on all their manufactured products. We are tired of this. This is serious business to the people that live in this community. Thank you.

Agency Response

USEPA is employing CERCLA at this site to develop a remedy that is protective of human health and the environment. The basis for USEPA's decision is the NCP's nine criteria (described in detail in Section XI, page 17 of the Amended Remedy). Under this authority, parties identified by the agencies as Potentially Responsible Parties (PRPs) are obligated to address the contamination under CERCLA and the NCP. Therefore, the PRPs will be obligated to implement the final decision described in this Amended Remedy which the Agency has determined to be protective and effective.

MS. PASTOR: Fourteen.

MS. SKVARA: Thank you for listening to me tonight. My name is Carolyn Skvara, S-k-v-a-r-a. I live in Arapaho Trail in Hobart. My voice is a small one, but I would like to share a small portion of information with you. My husband was a scientist. His firm was Scientific Ecology Group in

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Oakridge, Tennessee. He invented a process which handled nuclear waste as well as PCB's, et cetera. He also did a great deal of work in Europe and was responsible for the clean-up of two major rivers which find their way into the ocean. It was his dream to clean up these areas which are on tonight's agenda. Unfortunately, he died before he could accomplish this. He had associations with the EPA, DNR, the Nuclear Regulatory Association, et cetera. He discussed his dream with me, and I have committed this to memory. I am thankful to be here, because his cause has become my passion and my heart's desire, and I really want to finish this for him.

As it's been stated, we are here tonight because the lower Fox river project involves a clean-up of sediment contaminated with PCB's and other things, as well as restoring the natural resources which have been destroyed and damaged. Time is of the essence with PCB clean-up, and, even though dredging is expensive and people believe that there are areas which cannot be reached, I need to say this simply. How can we define success? How

can we place a dollar amount on success?
Don proposed to dredge, then burn in a portable incinerator, which will reduce the volume

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by over one-half. It can then be transported per rail car to Nevada or Utah, which has toxic burial waste, and they will accept this. Vegetation can then be planted to further help our cause.
We need to do this for ourselves and for those who follow us. I pray that through mutual respect, understanding, and action, we will come together and turn this into a wonderful plan of action. If I have offended anyone, I do apologize, but I do truly know this is a correct and vital plan. Don would love it. I know I am not in control, but I hope this committee will be receptive to hearing and seriously considering my solution. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: Fifteen.
MR. HARKNESS: Good evening. My name is Larry Harkness, 5908 Moonflower Drive in Appleton. I speak to you as an avid fisherman. I've fished the Fox River for more than 29 years and know literally every bend of that river very well.
I support this project for three reasons. One, it's sound scientifically, its methodologies have been used elsewhere and are proven. Two, the capping process places cobble on top that provides for an ecosystem which is very conducive to game

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fish, and it's been proven that in less than two years the game fish population can increase dramatically. Third, it provides for timely remediation, and I would like to see that happen in my lifetime. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: Sixteen.
MS. FOSSEN-RADES: Good evening. My name is Christine Fossen-Rades. Not only am I on the Board of Directors for the Clean Water Action Council, but I also teach biology and environmental science at East DePere, although this evening I'm

not wearing either of those hats. I'm wearing my newest hat, which is mommy. I have two toddlers at home, and to know that -- to think that we have a toxic waste dump in our back yard and we are just going to throw gravel and dirt and sand and then to knowingly let our children play in and around that toxic waste dump to me is unfathomable. I do not have any other way to put it than that. It is completely unacceptable to pass this on to our children and to our children's children, because by not removing, that is what we are doing. The caps cannot theoretically last forever. The PCB's will still be there and we are just passing this dilemma on to our children, and that cannot happen.

Agency Response

Based on Risk Assessments previously developed for the site, risks to children or others having direct exposures to PCB-contaminated sediment are negligible. Risks to human health result from consumption of contaminated fish over the long term, which this remedy will address. After the remedy is completed and a period of recovery occurs for aquatic life, fish consumption advisories should be reduced, with unlimited consumption eventually acceptable.

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MS. PASTOR: Seventeen.
MR. GRAVES: My name is Ken Graves, 3131 Westview Road in Green Bay. I was born and raised in this area, I raised my family in this area, and throughout my whole life. I went to school at UWGB and got my degree in science and environmental change, so I'm well vested in this area and have a lot of experience. I'm also Environmental Program Manager at Georgia Pacific, and I have been doing that for 20 years.
Many of you can remember back in the early seventies and late sixties the Fox River between the dam and the mouth of the bay was a dead river. Fish didn't go up the river because there was no dissolved oxygen. There was freezing point depression in the winter. In other words, the level of pollution in the river was such that the river actually would freeze at a lower temperature, 29 or 30 degrees, versus what you would normally expect.
Being on the end of a highly regulated thing we are talking about here, one of the things I wanted to point out, and a lot of people haven't really thought about this, but over the past 30 years there's been a deliberate and effective process in place to manage the health of the Fox

River. It started out bad. Right now it's a very high class fishery. We went from no fish, dead, a river that looked like a flowing mud stream, to now is a very healthy ecosystem with respect to the fishery that's there and has been a highly valued resource to sport fishermen.

I am convinced that the project in the way that it has been proposed is going to deliver the most effective results in the shortest period of time. What we are driving here towards is overall environmental ecosystem health. The data and the facts, the statistics, the research, have all been done by what I believe and I am convinced are some of the world's experts in this field. And I have been exposed to this long enough to know where this is taking us, and I am truly convinced that, as we go forward in this process, what's been proposed, capping in combination with all the other technologies, is going to take us to the fastest recovery of the Fox River ecosystem in the shortest period of time.

I have a long history in this area and I plan on staying in this area, and I want to lend my support to the fact that there is credibility in the management of the DNR and EPA, as much as sometimes

it doesn't feel like it as part of a person that's been regulated. It's been absolutely successful, and I'm convinced that it's going to be successful going forward on this project the way it's been proposed. The data and the facts support that, and we will get there. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: Eighteen.

MR. WILUSZ: My name is Ed Wilusz. Last name spelled W-i-l-u-s-z. I represent the Wisconsin Paper Council of Neenah, Wisconsin. The Paper Council is the trade association for the paper industry here in Wisconsin, and the Paper Council is here to support the revised Fox River clean-up plan. The affected companies understand that they have clean-up responsibilities and are committed to meeting them. However, economic realities dictate that these responsibilities be fulfilled effectively, quickly, and at the least cost. To

succeed at meeting these goals is for the major affected parties to reach a voluntary agreement that will avoid the Super Fund legal process, a process that could add years to the schedule and millions of dollars to the cost of the clean-up.

The process is working as it should. An extensive clean-up and design effort supervised by

EPA and DNR generated significant new information that allowed the best and most informed decisions to be made. This new information points to a different mix of technologies that involves less dredging, combined with the use of engineered caps. The result is a revised clean-up plan that meets all evaluation criteria, will result in lower PCB levels in less time, and cost an estimated $109 million less than the original plan. This is clearly a win-win proposal.

Some are concerned about the use of the engineered caps. We do not share this concern. Capping is only being allowed in limited areas and must be as effective in risk reduction as dredging. Stability and performance of cap design is thoroughly evaluated against the effects of high river flows, storms, high waves, and from shipping and recreational use. Long-term monitoring is required to make sure the caps remain effective. We urge the EPA and DNR to approve the revised cap to allow the clean-up to begin.

Agency Response

Thank you for your comment.

MS. PASTOR: Nineteen. Who has 19? Going once, going twice. Twenty.

MR. SAMPSON: Thank you. My name is Dick Sampson, S-a-m-p-s-o-n, 1013 East North Street in

Appleton 54911. I share the skepticism of many on the caps, but I also have noticed that there is neglect of new river input of PCB's along the Fox, particularly in Neenah at what is called Arrowhead Park, which is a local poison source. I lived at one point back in the fifties, I lived in Schenectady, New York, and happened to have visited the confluence of the two rivers in Albany, and they had a lethal beauty. I hope that we will get rid of any lethal beauty like that in the Fox River. Of course, anything made by people is imperfect. There

is only one source of perfection. And I think these -- I'm really concerned about the existence of Renard Island and the particular examples of these leaking landfills. We don't need that lethal beauty leaking into them. Thank you very much.

Agency Response

Responses to these comments are included in written comments in Section 1, response number 7 (pages 10 – 11), and response number 13 (pages 16 - 18).

MS. PASTOR: Thank you. Twenty-one.

MS. MOLDENHAUER: My name is Janet Moldenhauer. I'm from Oshkosh, Wisconsin. I am a boater and a swimmer and canoeist and a sailor. I think that there should be some changes and revisions in this plan from what was presented three years ago, but I don't like to be threatened by the paper companies that if you don't do it our way right now it's going to be held up another 30 years.

I think that's kind of ridiculous. And everyone is refusing to go back to vitrification, which would burn up the PCB's and we would be done with them forever.

Oshkosh is one of the towns that refuses to have PCB's in its landfill. And the reason this is being brought up right now is that it's getting expensive to ship the PCB's over to Michigan. This is money. That's all there is to it. And we are supposed to think of the sound science, the sound science of the EPA. The EPA, whose administrator, Steve Johnson, is closing all the libraries and doing away with all the research that has ever been collected by the EPA. We are supposed to listen to the sound science of the DNR, a DNR that is so emasculated they don't even have people to do the jobs that are assigned to them, much less add some more. I am not in favor of this. I'm in favor of some changes, but not just a cover-up. We need a clean-up. Thank you.

Agency Response

The agencies share your interest in using vitrification to permanently destroy PCBs in lieu of disposal. However, for the reasons discussed in prior responses dealing with vitrification, the agencies do not believe vitrification is a viable remedy for the Fox River Site at this time.

MS. PASTOR: Twenty-two.
MS. RONSMAN: My name is Taku Ronsman. I live at 1688 Beaver Dam Drive in Green Bay.
MS. PASTOR: I think you need to spell that for her, pelase.

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MS. RONSMAN: It's phonetic. T-a-k-u. Ronsman, R-o-n-s-m-a-n. And I'm always very torn when I come to events like this, because I understand and believe in the importance of our businesses to have a very strong community, but I also feel very strongly that when a wrong has been done, which the PCB's being dumped, that was a wrong that occurred, and that the price has to be paid. It's human nature to figure out the best ways to reduce the cost and so I can't say oh, this is horrible that Georgia Pacific and the other mills are figuring out ways to save money. I mean they should try to do that. But I also believe that sometimes you just really do have to pay the price.
And I wholly support a permanent solution and not, as they have been saying, the covering up or figuring out what's going to be the most cost-effective for a temporary solution. Let's clean it up for real. Let's get rid of it, the problem, for real, even if it costs a lot, because that's the price you pay when you pollute.
And I guess part of what I am saying is that, even though I want these companies to be able to continue to make a profit so they can exist, I also want them to hurt a little bit so that lessons

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are learned and that they don't get to keep getting away with cutting corners and doing things that are harmful to the public.
And my last comment is boy, I sure miss having a public intervenor, and I'm looking forward to the day when we have the process, what Becky said about the process, where the public gets to know right from the get-go so it doesn't become us against the businesses, because that's what this has been reduced to, the people against the businesses. And it shouldn't be that way. We are all part of the same community. So let's have a clean -- I want to see it clean enough where we can swim in this again, you know, swim in any of the waters in this area, even be able to drink it.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: Thanks. 23. 24. 25.
MS. EFEBVRE: Kathy Efebvre. Kathy with a K. Last name is spelled Efebvre. I live at 1731 East Shore Circle. I am about two blocks, maybe, from Kinney Island. I've lived on the shore since 1971, raised my daughter there, my husband and I. So I've lived there a long time. One thing was mentioned, that the reason the bay was taken out of the clean-up is because the PCB's aren't bad in the bay, it's fine. Well, then how come someone told me

the discussion was someone went to the DNR, mentioned to him that something happened to Renard Island or Kinney Island here, the walls, and there was a large spill out of what's in there, that they would only demand that the walls be redone on the island. Why? Because there is so much pollution of PCB's around Kinney Island now that they wouldn't know where to start or finish. This tells me that there is a lot of PCB's out there.

I went through the flood of '73, and at that time my husband was a teacher. He taught out at Howard/Suamico and we did not have the Tower bridge. We had just the three bridges that are right in Green Bay. I was told, I heard on the news that they were going to close the bridges. So I called him and told him to get home. Because the water during this flood, the bay pushes up the river past all the bridges, what do you think happens when that bay, when the wind stops, what happened to that water? I'd say it was probably like flushing a toilet. It goes up; when that wind stops, it's just going to go right out.

Now, during that time, did anybody measure, actually measure how much sediment or give a real good guess how much sediment was moved out of

that river during that flood in '73? And that was only a 20-year storm. Even when there is just a rain. Three, four years ago we had a heavy, heavy rain in spring where people were being flooded all over their back yards and little creeks and everything were flooding. I went over Tower Drive bridge. The whole bay, you could just see, and it's mainly on the east side, you could just see brown as far as you could see. How much sediment was moved out of that at that event?

You can have all the models that you want,

computer models, and it ain't going to tell you the whole truth. You have to know how much in a 20-year storm was moved out, actually moved out. Because you talk about sound science, computer models, world class engineers. They got two examples. Wait a minute. They use computer models to predict the weather. Well, today they can't predict from one day to the next. You'd better listen in the morning to know what that day's weather might be. Also, what about, and I had to mention it, the World Trade Center. You had world class engineers designing this building, and it wasn't supposed to happen what happened. I mean the results. But it came down. Tragically. I want to just quick a couple other

things.

MS. PASTOR: We need to move along.

MS. EFEBVRE: Are you aware that between Kinney Island and the shore, which is a dike, doesn't move, there are 10 to 15 acres of sediment build-up? That all came out of the river since the -- we know it's there since Kinney Island was built. That's in the late seventies. That's almost half an acre a year just coming out naturally. This is after the big flood. So we need to know all this.

And I also want to hold you responsible for this, the EPA and the DNR, to finally stand up like you used to. You can tell the people who are responsible to clean-up their mess, and you can give them a date and you can start fining them if they don't do it. Don't give us this crap that they -- oh, if we don't do this plan they are not going to play. Come on. You are the power, not them. You work for everybody, not just the paper mills. You work for the public, for everybody. So stand up and have some guts and do it.

Agency Response

Responses to these comments are included in Section 1, comment response number 13, pages 16 – 18, and repeated in Section 2, pages 104 – 105.

MS. PASTOR: 26. 27 is on deck.

MR. MAHONEY: My name is Mark Mahoney, and I live in the village of Howard here in the Green Bay area. And I've lived in northeast Wisconsin for

about 30 years. I'm glad to see that a number of younger people are here today, because I'm here today because of something that happened to me when

I was their age, and it had to do with a river. When I was their age I lived on the Illinois River, and I heard my grandfather talk about what a marvelous fishery that was in his day, all the clams that were in the river, all the species of fish, how clean it was, and how you could eat the fish. And when I was their age the Illinois River was a disaster and it was nothing like it was with my grandfather. And I thought how could that happen? How could anybody get away with this? How could that happen? How could somebody poison and destroy this river I love to fish in?

So I did a little bit of research, and I found out that part of the problem was that the City of Chicago didn't want to pollute its own back yard, which was Lake Michigan, so they reversed the course of the Chicago River. So instead of flowing into Lake Michigan they sent all their junk down the Illinois River. And when I heard that, I thought how could you possibly get away with that?

And you say well, what does that have to do with this river here? Well, I've never forgotten

that, ever since I was their age. And I thought how could that be? How could people get away with poisoning a valuable resource like this? And how can they get away with it? It has to do with just cutting corners. The paper companies saw here we can save some money if we just get rid of this waste and put it into the river, we can save some money, save some dollars. So now, once again, we are faced here with the issue of either we are going to cut corners or we are not going to cut corners.

I think about my own situation. If I were to throw this piece of paper outside my window on the way home, that's littering. If a cop saw me, he would pull me over, fine me, it would be against the law. If I took a trailer up to Lake Shawano and dumped a bunch of stuff into the river, what would the police say to that? I would be lucky if they said well, cap it and we will see if it's okay. No. I would be in jail, and I don't know if I would ever get out. I wouldn't be able to get away with it.

So let me just conclude by saying that, if I could be so bold, I don't know who would speak for the river. We have the corporations speaking apparently to the regulators here, we've got the public talking perhaps when it's too late and the

decisions have been made. But who speaks for the river? And if I may be so bold, I would say that

the river says somebody put this poison in the river, take it out. Thank you.

Agency Response

Responses to these comments are included in the written response to comments by Mr. Garrels, page 176 above.

MS. PASTOR: 27. 28.

MR. VANDERLOOP: Ron VanderLoop, V-a-n-d-e-r-capital-L-o-o-p. In listening to the introduction today, we heard quite a few things, and several times I heard the word "Super Fund." And I questioned myself what is that word being talked about at this meeting today? We are not -- I understand we are not in a Super Fund, we are in a negotiated process and it's not being forced by federal.

And I'm thinking of well, it's used so that it kind of covers up some things. And that's the part I don't like and don't understand. And I didn't ask the question earlier, because I want you to think about this for a much longer period of time. That is totally ridiculous. As I understood it, it's a separate deal. So why those words were used in here is to make it look well, if this doesn't work, the Super Fund is going to put in to do this. I kind of doubt that.

So you've come up with too many poor,

negative suggestions. And this program, this covering up, there was a few that was mentioned earlier in previous sessions that there would be a few places we would have to do that. Now all of a sudden all kinds of them are good. Bull.

Agency Response

Thank you for your comment.

MS. PASTOR: 29.

MR. RUSS: My name is Ben Russ, that's R-u-s-s, and I live at 302 East Allouiez Avenue. I'm speaking partially on behalf of the East High Environmental Club. And we believe that this issue is not just about funds or whatever, it's about morality versus reality, and what that boils down to is really right versus wrong. It's wrong to leave those PCB's in the river. Twenty, thirty, forty years down the road when I am in the prime of my life and many of these people here are too old to

care, it's still going to be an issue. If you don't get those PCB's out, they are still going to be there when I am starting a family.

Unfortunately, I'm just 16 right now. A 16-year-old doesn't have a whole lot of questions. I'm sure I care about this issue just as much as anyone else here, but I am only 16. A 16-year-old doesn't really matter much. A little more than a week ago the East High Environmental Club found out

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about this issue, and we mobilized. We held an emergency meeting, and hundreds and hundreds of students were very passionate about this issue. Lists like this (indicating) signed by, this was 27 students, were all over the school. There are hundreds of students that signed up for this. We all care, but we couldn't be here today. There were 20 people from East High here, protesting this issue, and they had to go. Students have curfews, we have homework, we have to get up tomorrow morning, and we were not allowed to be here because of the time. I think that's wrong. And I think that we should be considered.

I think that these people from these various corporations should step down from their comfortable pedestals. They should think about the people who this issue is the future to. It is the future. That's all it really is. I'm fully against this capping, and I think we should get rid of these PCB's. And, on behalf of my fellow peers, I think that these suits and ties should consider us. Thank you.

Agency Response

The agencies have rigorously evaluated the Proposal and have determined that it will provide effective long-term containment of the PCBS, as discussed in previous comment responses. Long-term monitoring should confirm that the remedy is protective and that it is meeting risk reduction goals. If the remedy is shown to not achieve an adequate level of protectiveness, then the agencies would likely re-evaluate the remedy and require additional actions.

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: Number thirty. Thirty-one on deck.

MS. HELGESEN: Gusta Helgesen, 2372

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Jubilee Drive, Green Bay. H-e-l-g-e-s-e-n. I am also speaking on behalf of the Environmental Club at Green Bay East High. I am 18 years old and I am currently a senior. I plan to go to college, and I have decided to (inaudible) to help environmental problems like this problem right here get solved. All my life I have had to deal with the contamination of the Fox River. I have seen families fish in the river, families that do not have enough money for food but need to fish in the water to eat. My dream is to swim in this water and to be able to fish in this water without worrying about PCB's and other contaminants. It's not only my own dream, but also many in this community, many people in this room.

The caps are temporary solutions, not a permanent one. We need to clean this water. I know my 18 years of experience in life may not seem as much, but I have learned one important thing in my life. There are no shortcuts in it. Why take a chance in a shortcut for the Fox River to clean up this plan? That would pose more problems for future generations when we can take care of it the right way, which is now.

The caps might cost less, but in the long

run where will it put us? It will cost more money if it screws up. But money shouldn't even be a factor. It will cost more then, more time and more money. We need to clean up, not cover up, as everyone basically here said. For future generations, for me, for you, for everyone, the person next to you, the world. People need water. We need to clean it now.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: 31.

MR. KRIEG: My name is Rich Krieg. I live in Green Bay at 118 South Washington Street. First of all, I just want to talk as somebody who loves rivers. I've been looking at that picture all day, and I just think it's morally and ethically wrong to turn a river into a landfill. To me, a river is sacred, and this will just be one more insult to this natural system that we have.

And, secondly, I guess I'm more a man of

science. I understand how science works. I understand science, I have a science degree, and I do know one thing: You can find a scientist to say just about anything. I can find a Ph.D. scientist to tell us tonight that the earth is flat. And that's the truth. I can find a Ph.D. scientist to tell us tonight that the earth is only three

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thousand years old. That's the truth. But I'll tell you I couldn't find one scientist in this country or in the world that says a cap on the bottom of the river is a permanent solution to this problem and that those caps would last forever. And that's where we stop with science and go to values and ethics.

People, the citizens, want a permanent solution to this problem. Businesses want a permanent solution to this problem. That's what's going to be good for our economy and good for business. And I just think this is morally -- the solution is morally wrong.

And I do have a problem with the process. I wanted to talk about that last. Something is wrong with the process when they propose a landfill, and it's a state of the art landfill, and because some wealthy influential people don't like that proposal, within a couple of weeks we are not going to use that landfill. Now, maybe it's that we shouldn't be doing that, but, still, in a couple of weeks all of a sudden we are not going to use that landfill. But it takes citizens like this hours of signing cards and petitions and having meetings and going to hearings and writing to lawmakers to get

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anything done and to get people to do the right thing. There is something wrong with the process. Thanks.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: 32.

MR. GLEASON: My name is Ryan Gleason. I'm on behalf of the Ecology Club at DePere East High School. I may not be the strongest voice and I may not be the most experienced person. I'm only 15. But I would rather, I don't know, I would

rather decide not to do this only because of certain reasons. I read this only cleans up 74 percent of the river. 74 percent. That's impressive. That's a great way to get rid of it for to the maximum of two hundred years. Two hundred years will last through us, so a few people consider this a good idea.

Well, you are just saying well, instead of fixing the problem, how about we wait another two hundred years and maybe a better scientist could figure a way out, when we could actually wait, spend less money and time and effort for this, and try and figure out a different solution. If I have to spend the rest of my life, and this thing has actually got me very interested into ecological sciences, I would spend the rest of my life working to find a cure for

this permanently than to actually help spend money towards fixing it for temporarily. I would rather decide not to do this, because it's unethical. There is no real reason to do this. You are just wasting time and money on a solution that will wait to be fixed. Thanks.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: 33. I just sent one of my colleagues out to see of the library will really throw us out at ten o'clock or if we can go a little bit longer. We gave out 58 numbers, we are only halfway there, so we will see if we can go a little while longer.

MR. SCHALLER: Good evening, ladies and gentlemen. My name is Mark Schaller. My residence is 1500 Greenfield Avenue in Green Bay, Wisconsin, and I have been a life-long resident of this community. My wife and I have enjoyed the bay, we have boated on it for over thirty, forty years, and we are very concerned with the waterways.

We find your plan reasonable and well thought out. We support this plan wholeheartedly. It's time that things get under way and that the river begins to be cleaned up. There are no perfect solutions, there is no one hundred percent guarantee, and there never will be, but it's time we

get this started. This plan makes sense. It makes

sense in dollars and cents and it makes sense in common sense. We support this plan, and I believe the vast majority of the community does as well. Thank you for your efforts to bring the plan to this point, and we hope it goes forward. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: 33.
MS. DELACRUZ: Denise Delacruz. D-e-l-a-c-r-u-z. I don't believe the capping is the right way to go. I believe that we should get this problem over with, get it done, clean it up, do it for generations to come, do it for us, do it now.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: 34. 35. 36.
MR. REIGEL: Jim Reigel, R-e-i-g-e-l, from Oneida or Hobart. I would like to add another bit of piece to the puzzle, so I'll be very brief and very quick and add a couple of pieces. There is one entity here that has escaped any focus or any criticism, and that is the Brown County Solid Waste Board. They are active participants in this plan. They are at ground zero point. They are the ones who own the landfill that they want to take the spoils to, and they have been very quiet in the meetings but very, very active behind the scenes.
You may not have any leverage with the

EPA, you may not have any leverage with the DNR, but I would strongly encourage you to contact your County Board Supervisor, because the Brown County Solid Waste Board is influenced by what the County Board does. They are gambling in this because they will make tens of millions of dollars for every ton of spoils which goes to the Holland landfill. So this is a gigantic crap shoot by the Brown County Solid Waste Board, and if anybody wants the details I'll be glad to give it to you.
It's been going back, it started with the Town of Holland agreement in the eighties all the way up to the Tri-County agreement. The reason we are hauling our garbage to Oshkosh is for the PCB's to go to Holland, just so they will (inaudible) in

terms of caps and dredging versus dredging.
I just wanted to raise one additional point, that even though the caps may now handle a short-term problem, it makes remedial action later very difficult. If 10, 20, 40 years down the way there are additional contaminants in the river, what do you do? Add on another foot and a half to the cap? Pretty soon you have berms going down the middle of the river. Correction for additional contamination becomes extremely difficult, and the

higher you go with these caps the more likely they are to be affected by turbulence. The University of Wisconsin at their (inaudible) complex uses the most complex computers in the world to deal with turbulence, and they can't get a handle on it. And so it's a little bit arrogant to think that with lesser computers we can deal with the turbulence matters of the Fox River and be so sure much how they are going to move sediment around. Thank you.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: 37.
MR. HARBATH: Thank you. My name is Randy Harbath, H-a-r-b-a-t-h. I live at 3101 Westview Road in Green Bay, Wisconsin. I have lived here in the Green Bay area for the past 29 years. I'm employed at Georgia Pacific for those 29 years. I have worked at the Broadway facility in a number of technical and management positions, including the operation of the wastewater treatment plant, as well as the recycling facility there. Over those years, the folks that work for me and work with me are extremely proud of our operation of our treatment plant, which for years has operated well below our discharge permit levels.
The PCB's that we discharged into the river were not done out of spite. They were not

done -- they came to us in the waste paper that we recycled that we kept out of the landfills. In fact, Green Bay and many of the municipalities sent their waste paper to us to be recycled. We did this and went through this and operated our plant at extremely low efficiencies and, as I said, well below the discharge limits.

I believe that, if you look at it, you look at this plan, it's got the technological base that's necessary. In the years of being in management, I've learned that you listen to the technical experts, you look at the things that have been done elsewhere in the country, and you follow these leads. Therefore, I wholly endorse this plan and urge you to get on with the clean-up of the river. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: 38. 39.
MR. CRADLER: Fred Cradler, C-r-a-d-l-e-r, 3418 Nicolet Drive. I don't understand the science, I worry about my politicians, and really don't know about you guys, but I do know one thing. If you put a certain provision into this plan I'll buy it wholeheartedly, and it's made up of two parts. One, you have the corporations sign a warrant of liability that if this plan doesn't work that they

pay for the remediation; and, secondly, that you have an independent agency do the evaluations of how well the plan is working. Thank you.

Agency Response.

Thank you for your comment.

MS. PASTOR: 40. 41. 42. 43.
MR. HERMANSON: I'm 42. John Hermanson, and I live in Luxemburg, Wisconsin. And I just wanted to comment on making sure that all the things have been thought of. And one of those, like the sediment washing, is something that can be done, even to detoxify the PCB's rather than try to, of course, bury them. I think people are not too happy about that plan. And so I think that's something that should be strongly considered. I know that it costs from forty to two hundred dollars a ton, from the literature I have seen, to process sediment to get rid of the PCB's. So I hope that that's looked into and I hope that was considered in this plan. If not, I think it should be revisited. If we are going to revisit this whole plan, I hope that that's been currently considered. Thanks.

Agency Response

Treatment technologies were evaluated during the original decision-making process and were not found to be cost-effective. While the agencies are open to new information and evaluations, currently there appear to be no new or treatment technologies that have changed substantially from when the evaluations in support of the original decisions were completed.

MS. PASTOR: 43. 44. 45. 46.
MR. SERVAIS: James Servais, 4607 Reforestation Road, Green Bay, Wisconsin. Just a few notes, I guess, in listening. I have been following this thing for a long time. Born here,

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raised here, raised a family here. I, too, am a fisherman, canoeer. Been sailing on the bay off and on for over 40 years. Even with George's brothers. My point is I got a few little points here. Where were all these people that gathered all of this recent data over the last 18 months? Where were they with all the money and engineers and sampling power for the decades before the plan was made? If they were that interested in the river, seems to me they would have been on deck themselves.
Capping was sold to the people in Michigan on a river that flows from the Selon (phonetic) bay. They planned for I think a hundred-year storm, figured that capping would do it, but they got a storm bigger than that just within a year or two of the time they put it in, and I guess it's scoured the river bottom right down to the bedrock. We have been told they will do monitoring on all of these caps, but what good does it really do to look at a cap after a storm has taken it off out into the bay along with the PCB's? All the monitoring does is say yes, there it goes. It doesn't stop it.
Rivers change, they have been changing for thousands, millions of years, and they will continue to. This is truly temporary. I don't want my

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children exposed to it. It is a cheap way to get out. It was a loophole put into the original contract so that they could pull this stunt. For all we know they had it planned that they are going to swoop in, gather new data, and secretly hold their meeting and then descend upon us suddenly with this whole new idea that would save them tons of money and we should buy it.
I think we should keep in mind that some of the people promoting this thing or many people promoting it or people working for people promoting it have an interest in the money and some people's

jobs depend on it. And I can understand that, but I also know, and I can't quote this directly, probably, but something to the effect that when a man's job depends on understanding something you won't be able to. If it threatens his job, he can't quite get his mind around it, if it is going to get him out of work or lose money.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MS. PASTOR: 47. 48. 49. 50. 51. Anybody got anything in the fifties? What do you have?
UNIDENTIFIED SPEAKER: 57.
UNIDENTIFIED SPEAKER: 52.
MS. PASTOR: 52, come on down.

MR. WESTBERG: Randy Westberg. I live at 1815 East Shore Drive. We live on the bay, right across from the toxic dump. My main comment is it kind of boils down to a matter of trust here. What's been presented tonight sounds good to me. It could work. I'm not a scientist, so I don't know. What I do know is removing the PCB's will work. So everybody has got to search their own conscience. And where do you see your trust lie? In a maybe or a yes, this will definitely work? Thank you.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

MR. WANG: Louis Wang, W-a-n-g. I live in Green Bay. I am a mechanical engineer, and I live in Green Bay. I have two of my kids sitting back there, and I believe that this solution that has been shown to us today is very solid. One of the things I do like about this is that I've heard it termed as an engineered armor cap, and a lot goes into that term. And some of the people have talked about this. The algae, the cyanobacteria growth that help to adhere to the PCB particles in the sediment and then be able to cover that and hold it down and then make sure that it is sound. That is a very, very solid idea, especially that you can have wildlife growing there within two years.
I'm thinking of my kids, and if it was not

that, if the other alternative was taken where dredging was done and then you are talking 15 years, I'd like to fish, and with my kids there, very soon. And if I wait 15 years, my kids, my daughter, Jade, she would be 22, my other daughter, Tiffany, she would be 26. And by then the thrill, they would be gone, they are in college. They are carrying on with their lives. And I would like to take advantage of this time to enjoy the river now.

So then I think also I've heard, and correct me if I am wrong, that the level of PCB's that we are talking about capping with this engineered capping is about one part per million. And then I also know, understand, that the fish that we eat, I love to eat fish, fish makes up the majority of my diet, the limit for commercial fish is above that, several times above that. I'm thinking if we have a scientific, engineered and proven technology, we haven't heard anything that showed otherwise, that this, that the levels of PCB's around one part per million can be permanently capped with the 74 percent removed. I would say that that is the best solution.

We talk about economics. I mean I am an engineer. Of course, what we do design, we don't

design the ideal, most expensive, throw in all the bucks and make this happen, no. We want to be feasible. We are Americans. I am American. I am American born. I am Chinese, but I'm American born. And we know that we do want to preserve our business.

And the lady before earlier had talked about how we want a solution that's good for the business as well as the public. Well, Green Bay, Wisconsin, makes up the bulk of our paper industry. Right here in Green Bay. And, like I said, I am Chinese. I just read today that China is invading the tissue business. Kimberly-Clark, Proctor & Gamble, Georgia Pacific, we are all going to be affected. Heavy infiltration of low-cost paper. This is only one thing that is affecting the entire economy. And so if we are this close to a solution for a multi-million dollar armored engineered capping along with 75 percent of dredging, that's the best of both worlds and the best of both technologies. Let's pool together and make that happen and focus our attention towards preventing our economy in other places. Thank you.

Agency Response

Thank you for your comment.

MS. PASTOR: 54 still here? 55. 56. I know 57 said he was here.

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MR. LAURENT: Allen Laurent. 153 North Breeze Drive, Appleton. I'm representing myself, really, but I'm also a Sierra Club member and one of their leaders. I worry, I guess, about the permanence of the solution. I worry about the quality of the job and will it last forever, and I worry about who will pay for any future monitoring and clean-up, which it sounds like the capping is something that will last forever. I think that is a private system and stuff that for several hundred million dollars of cost we had better be able to demand a very good job. I don't want something that's just temporary.

I worry that capping becomes future dredging and future disposal problems down the road. I worry that capping takes lots of material, lots of trucking, lots of fuel, lots of highway traffic. The stuff that they want to cap with, the stone, the gravel, the sand, that all has to come from somewhere, and that's a bad environmental thing also. I worry about putting stuff in the river. A river wants to carve out. That's why it's there. It's dug out the ground for millions of years and it will continue to do that. I worry that putting stuff in it changes the shape of it, the depth of

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it, the width of the flow, flooding the ecology. Who knows what it will do. It's not going to be something that we like.

Landfilling ought to be local. It's our problem. We have to deal with it. We should not ship it to Michigan. It's not reasonable that we should have to go that far. We should not allow local landfill problems to dictate the type of clean-up that we are doing here. Landfilling is believed to be safe and relatively permanent, but burning or vitrification at high temperatures can be even safer and is very permanent and offers very minimal landfilling needs.

I understand that there are also other kinds of contamination other than PCB's in the rivers. I don't know that much about them, but they are there. Dredging certainly also deals with those things. The proposed changes to the clean-up plan

are based on higher-than-planned cost, and I wonder, partially because I've seen all the trucks going to the little Butimore place where they are doing some of this stuff, I have seen hundreds, maybe many hundreds of trucks hauling stuff, and I wonder how can we be sure that their money is not actually being wasted in this effort? Hundreds of millions

of dollars ought to be able to do a very good job, and maybe it's being wasted somewhere. That's not a good reason to change the clean-up plan.

We need to make sure that people, businesses, whatever, are accountable. So for hundreds of millions of dollars we should be able to demand a good job. Thanks.

Agency Response

This comment is addressed in the agencies response to Mr. Garrels, page 176, above.

Regarding landfill locations, wherever possible disposal will be done at local facilities. However, it should be noted that strong community opposition has consistently occurred in recent years relative to approval of disposal facilities for "TSCA" sediments (with PCB concentration greater or equal to 50 ppm).

MS. PASTOR: Thank you. And thank you for hanging in there. We're right up to ten o'clock. If you didn't get a chance to make a comment and you want to, if you want to say more, e-mail us, fax us, write us. You've got till January 1. Any questions or anything, give us a call, e-mail us. We are there, we will be happy to answer your questions. Thank you.

(The hearing concluded at 10:00 p.m.)

C E R T I F I C A T E

STATE OF WISCONSIN)
)

COUNTY OF KEWAUNEE)

I, Nancy M. Baux, Certified Professional Reporter, hereby certify that I reported in shorthand the proceedings had at the Public Meeting for the Lower Fox River/Green Bay Site and that I have carefully compared the foregoing with my stenographic notes and that the same is a true and correct transcript.

Dated this 18th day of December, 2006.

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Nancy M. Baux
Certified Professional Reporter

Attachment 1. Summary of Contaminated Sediment Capping Projects

Sediment Project	Chemicals of Concern	Site Conditions	Design Thickness (feet)	Cap Material	Year Constructed	Performance Results	Comments
Great Lakes Region							
Sheboygan River/Harbor Wisconsin	PCBs		Composite of geotextile on fabric, 6" aggregate, geotextile, 6" cobble, with the perimeter anchored with gabions	armored stone composite	1989–1990	• Undetermined cap effectiveness • Some erosion of fine-grained material • WDNR/EPA order cap removal in ROD	Demonstration bench-scale project. Composite armored cap required as sediments were located in high-energy river environment. Gabions placed around the corners for anchoring. Additional course material placed into voids/gaps.
Wausau Steel Site Wisconsin	lead, zinc, mercury	Oxbow on the Big Rib River, nearshore cap	2	composite:s and over geotextile	1997	• Chemical isolation failed • Cap not physically stable	Methane gas trapped under the geotextile forced cap to rise in the center, pulling away geotextile from the edge. Sand erosion also occurred in the nearshore areas.
Manistique Capping Project Michigan (pilot)	PCBs		40-mil (0.1')	HDPE	1993	• Physical inspection of the temporary cap approximately 1 year after installation showed cap was physically intact and most anchors still in place, but was methane-filled	A 240' by 100' HDPE temporary cap was anchored by 38 2-ton concrete blocks placed around the perimeter of the cap. This temporary cap was installed to prevent erosion of contaminated sediments within a river hotspot with elevated surface concentrations.
Hamilton Harbor Ontario, Canada	PAHs		1.6	sand (2.5 acres) (in situ)	1995	• Chemical isolation effective • No erosion of cap	Cap monitoring in porewater ongoing.
Puget Sound Region							
Duwamish Waterway Seattle, Washington	heavy metals, PCBs		1–3	sand (4,000 cy)	1984	• Chemical isolation effective • No erosion of cap	Monitoring as recent as 1996 showed cap remains effective and stable. Split-hull dump barge placed sand over relocated sediments (CAD site) in 70' water.

Sediment Project	Chemicals of Concern	Site Conditions	Design Thickness (feet)	Cap Material	Year Constructed	Performance Results	Comments
One Tree Island Olympia, Washington	heavy metals, PAHs		4	sand	1987	• Chemical isolation effective • No erosion of cap	Last monitoring occurred in 1989 showed that sediment contaminants were contained.
St. Paul Waterway Tacoma, Washington	phenols, PAHs, dioxins		2–12	coarse sand	1988	• Chemical isolation effective • Cap within specifications	Some redistribution of cap materials has occurred, but overall remains >1.5 m (4.9'). C. californieus found in sediments, but never >1 m (3.3').
Pier 51 Ferry Terminal Seattle, Washington	mercury, PAHs, PCBs		1.5	coarse sand (4 acres) (in situ)	1989	• Chemical isolation effective • Cap within specifications • Recolonization observed	As recent as 1994, cap thickness remained within design specifications. While benthic infauna have recolonized the cap, there is no indication of cap breach due to bioturbation.
Denny Way CSO Seattle, Washington	heavy metals, PAHs, PCBs	water depth 18'–50'	2–3	sand (3 acres)	1990	• Chemical isolation effective • Cap within specifications • Recolonization observed	Cores taken in 1996 show that while cap surface chemistry shows signs of recontamination, there is no migration of isolated chemicals through the cap.
Piers 53–55 CSO Seattle, Washington	heavy metals, PAHs		1.3–2.6	sand (4.5 acres) (in situ)	1992	• Chemical isolation effective • Cap stable, and increased by 15 cm (6") of new deposition	Pre-cap infaunal communities were destroyed in the rapid burial associated with cap construction, but had recovered by 1996. The initial community established in the sand over time shifted as fine-grained material was redeposited on the cap.
Pier 64 Seattle, Washington	heavy metals, PAHs, phthalates, dibenzofuran		0.5–1.5	sand	1994	• Some loss of cap thickness • Reduction in surface chemical concentrations	Thin-layer capping was used to enhance natural recovery and to reduce resuspension of contaminants during pile driving.
GP lagoon Bellingham, Washington (in situ)	mercury	Shallow intertidal lagoon	3	sand	2001	• Chemical isolation effective at 3-months • Cap successfully placed	Ongoing monitoring.
East Eagle Harbor/Wyckoff Bainbridge Island, Washington	mercury, PAHs		1–3	sand (275,000 cy)	1994	• Chemical isolation effective • Cap erosion in ferry lanes • Some recontamination observed due to off-site sources	Cap erosion measured within first year of monitoring only in area proximal to heavily-used Washington ferry lane. Chemicals also observed in sediment traps. Ongoing monitoring.

Sediment Project	Chemicals of Concern	Site Conditions	Design Thickness (feet)	Cap Material	Year Constructed	Performance Results	Comments
West Eagle Harbor/Wyckoff Bainbridge Island, Washington (in situ)	mercury, PAHs	500-acre site	Thin cap 0.5' over 6 acres and thick cap 3' over 0.6 acre	sand (22,600 tons for thin cap and 7,400 tons for thick cap)	partial dredge and cap 1997	• Chemical isolation effective	To date, post-verification surface sediment samples have met the cleanup criteria established for the project. Ongoing monitoring.
California and Oregon							
PSWH Los Angeles, California	heavy metals, PAHs	15		sand	1995	• No data to date	Overall effective cap was >15'. This was not a function of design, but rather a function of the low contaminated-to-clean sediment volume.
Convair Lagoon San Diego, California	PCBs	5.7-acre cap in 10-acre site; water depth 10'–18'	2' of sand over 1' rock	sand over crushed rock	1998	• Chemical isolation effective • Cap was successfully placed • Some chemicals observed in cap	Ongoing monitoring for 20 to 50 years including diver inspection, cap coring, biological monitoring.
McCormick and Baxter Portland, Oregon	heavy metals, PAHs	15 acres of nearshore sediments and soils	NA	sand	planned, but not constructed	• No data to date	Long-term monitoring, OMMP, and institutional controls were also specified.
New England/New York							
Stamford-New Haven-N New Haven, Connecticut	metals, PAHs		1.6	sand	1978	• Chemical isolation effective	Cores collected in 1990.
Stamford-New Haven-S New Haven, Connecticut	metals, PAHs		1.6	silt	1978	• Chemical isolation effective	Cores collected in 1990.
New York Mud Dump Disposal Site New York	metals (from multiple harbor sources)		unknown	sand (12 million cy)	1980	• Chemical isolation effective	Cores taken in 1993 (3.5 years later) showed cap integrity over relocated sediments in 80' of water.

Sediment Project	Chemicals of Concern	Site Conditions	Design Thickness (feet)	Cap Material	Year Constructed	Performance Results	Comments
Mill-Quinniapiac River Connecticut	metals, PAHs		1.6	silt	1981	• Required additional cap	Cores collected in 1991.
Norwalk, Connecticut	metals, PAHs		1.6	silt	1981	• No problems	Routine monitoring.
Central Long Island Sound Disposal Site (CLIS) New York	multiple harbor sources		unknown	sand	1979–1983	• Some cores uniform structure with low-level chemicals • Some cores chemical isolation effective • Some slumping	Extensive coring study at multiple mounds showed cap stable at many locations. Poor recolonization in many areas.
Cap Site 1 Connecticut	metals, PAHs		1.6	silt	1983	• Chemical isolation effective	Cores collected in 1990.
Cap Site 2 Connecticut	metals, PAHs		1.6	sand	1983	• Required additional cap	Cores collected in 1990.
Experimental Mud Dam New York	metals, PAHs		3.3	sand	1983	• Chemical isolation effective	Cores collected in 1990.
New Haven Harbor New Haven, Connecticut	metals, PAHs		1.6	silt	1993	• Chemical isolation effective	Extensive coring study.
Port Newark/Elizabeth New York	metals, PAHs		5.3	sand	1993	• Chemical isolation effective	Extensive coring study.
52 Smaller Projects New England	metals, PAHs		1.6	silt	1980–1995	• Chemical isolation effective	Routine monitoring.

Sediment Project	Chemicals of Concern	Site Conditions	Design Thickness (feet)	Cap Material	Year Constructed	Performance Results	Comments
Other North American Projects							
Soda Lake, Wyoming	oil refinery residuals	soft, unconsolidated sediments	3	sand	2000	• Chemical isolation effective	Demonstration project that showed successful placement over soft sediments and isolation of PAHs and metals in refinery residuals.
International Projects							
Rotterdam Harbor Netherlands	oils	water depth5 to 12 m	2–3	silt/clay sediments	1984	• No available monitoring data	As pollution of groundwater was a potential concern, the site was lined with clay prior to sediment disposal and capping.
Hiroshima Bay Japan		Waterdepth 21 m	5.3	sand	1983	• No available data	

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
LOWER FOX RIVER/GREEN BAY SITE
OPERABLE UNITS 2-5

UPDATE #2
JUNE 26, 2007

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	11/28/06-04/19/07	Various	U.S. EPA	Comments Received from Local Government Entities and Representatives re: Proposed Change in the Cleanup for Operable Units 2-5 at the Lower Fox River Site	32
2	11/13/06-01/11/07	Fox Valley Sierra Club	Gade, M., U.S. EPA	Pre-Printed Public Comment Post Cards re: Proposed Change in the Cleanup for Operable Units 2-5 at the Lower Fox River Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	232
3	12/01/06-01/18/07	Various	U.S. EPA	Comments Received from Local Business, Organizations and Associations re: Proposed Change in the Cleanup for Operable Units 2-5 at the Lower Fox River Site	114
4	11/13/06-01/11/07	Concerned Citizens	U.S. EPA	Comments Received from Concerned Citizens re: Proposed Change in the Cleanup for Operable Units 2-5 at the Lower Fox River Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	936
5	01/10/07	Georgia-Pacific	U.S. EPA	Signed Petition re: Revised Cleanup Plan for Operable Units 2-5 at the Lower Fox River Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	64
6	06/26/07	U.S. EPA	Public	Responsiveness Summary for Operable Unit 2 (Deposit DD), Operable Unit 3, Operable Unit 4 and Operable Unit 5	216

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
7	06/26/07	U.S. EPA	Public	Record of Decision Amendment for Operable Unit 2 (Deposit DD), Operable Unit 3, Oper- Unit 4 and Operable Unit 5 (River Mouth)	51