Record of Decision Amendment

Operable Unit 1

Lower Fox River and Green Bay Superfund Site

June 2008

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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, Operable Unit 1, Lower Fox River and Green Bay Superfund Site
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cy	cubic yards
footprint	Areas that encompass the 1 ppm PCB Remedial Action Level
kg	Kilograms
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
Design Supplement	OU1 Design Supplement, Lower Fox River Operable Unit 1, November 2007
SWAC	Surface Weighted Average Concentration
TSCA	Toxic Substances Control Act
EPA	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 1
Outagamie and Winnebago Counties, Wisconsin

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 Unit 1 (OU 1) of the Site, dated December 20, 2002 (2002 ROD). The ROD Amendment for Operable Units 2, 3, 4, and 5, dated June 26, 2007 (2007 ROD Amendment), is not affected by this amendment. This ROD Amendment is being issued by the United States Environmental Protection Agency (EPA) 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 2002 ROD was issued. The 2002 ROD selected dredging and a contingency remedy (which allowed capping). This 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 for OU 1. For example, a wealth of new sediment data was collected and analyzed during 2003-2004 and 2006-2007 sediment collection activities in OU 1, including more than 5949 sediment samples at 996 locations, with 129 locations having no recoverable sediments. This new information can be found in the Administrative Record.[1]

Most of the new information for OU 1 is compiled and analyzed in the "OU1 Design Supplement Lower Fox River Operable Unit 1," dated November 16, 2007 (Design Supplement), approved by EPA and WDNR on November 20, 2007. The Design Supplement was developed by two Potentially Responsible Parties (PRPs), P.H. Glatfelter Company and WTMI Company, as part of the remedial design for OU 1. In addition to the Design Supplement, the PRPs submitted a document entitled "Concept Paper, Lower Fox River Operable Unit 1," dated November 19, 2007 (Concept Paper) which summarized and explained key aspects of the proposed design changes. The remedial design and remedial actions required under the 2002 ROD have been funded and implemented under a settlement agreement between the PRPs and EPA and WDNR. EPA and WDNR are overseeing all aspects of design evaluations prepared by the PRPs, as well as remedial actions required by the 2002 ROD.

[1] The Administrative Record contains detailed information EPA considered in selection of this Amended Remedy, and is available at the DNR Northeast Region office, 2984 Shawano Ave., Green Bay, Wis.; DNR Bureau of Watershed Management, 3rd Floor, 101 S. Webster St., Madison, Wis.; and the EPA Records Center, 7th floor, 77 W. Jackson Blvd., Chicago, Ill.

The new data and analyses presented in the Design Supplement and the Concept Paper showed that:

1. Polychlorinated biphenyls (PCBs) are more heavily concentrated in discrete areas in OU 1; and

2. The total PCB mass in the 1.0 ppm prism2 is less than predicted in the ROD, amounting to 2/3 of the 2002 ROD estimate; and

3. PCBs are present at low concentrations (i.e., slightly above the PCB Remedial Action Level (RAL) of 1.0 ppm) in areas containing large volumes and relatively thin deposits of contaminated sediment.

Additionally, operational experience shows that:

1. A specified dredge-line can only be attained if a dredging contractor is provided with an overcut allowance. Based on dredging experience in OU 1, an average 4-inch overcut is necessary to attain a dredge cut line to a degree of accuracy that attains remediation results that are acceptable to the Agencies. This results in additional dredging volume. This additional volume of material was not accounted for in the 2002 ROD and thus the total dredging cost was underestimated.

2. When the 1.0 ppm RAL cutline (elevation) is achieved, experience in OU 1 has demonstrated that all sediment containing more than 1.0 ppm PCBs can often be removed by dredging. However, generated dredge residuals sometimes remain above 1.0 ppm PCBs. Thus, a sand cover over selected areas having dredge residuals would be required in order to meet the Surface Weighted Average Concentration (SWAC) goal specified in the 2002 ROD. Sand cover costs were also not accounted for in the 2002 ROD estimate.

3 The cost of implementing the all-dredging remedy set forth in the 2002 ROD would be more than twice the cost estimated in the 2002 ROD. Based on additional data and operational experience discussed above, the current estimate for the 2002 ROD Remedy is $144 million, an increase of $78 million compared to the $66 million estimated by the 2002 ROD.

4. Dredging, capping and sand covering options are all implementable and environmentally protective.

Based upon this newly–obtained information, WDNR and EPA have determined that it is appropriate to modify the 2002 ROD remedy by selecting the Amended Remedy described in this ROD Amendment. WDNR and EPA are jointly signing this ROD

[2] The 1 ppm PCB dredge prism is the area and volume of sediments that includes all contaminated sediments that have PCB concentrations 1 ppm or greater.

Amendment. This Amended Remedy will be comparably protective or more protective, be completed faster, reduce risks sooner, and be more cost effective than the 2002 ROD Remedy.

II. Site History

For many years, a large number of paper production facilities have been and continue to be concentrated along the Lower Fox River. Some of the facilities manufactured a particular type of carbonless copy paper containing PCBs. 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. As a result, PCB contaminated sediments are found in 39 mile stretch of the Lower Fox River and Green Bay.

Additional details on Site history appear in the 2002 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 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.

EPA and WDNR have organized the Site into five Operable Units (OUs) and those OUs are addressed by two RODs and the 2007 ROD Amendment. These OUs, divided on the basis of similar features, characteristics and dam locations, are described in Table 1 and shown in Figure 1 below.

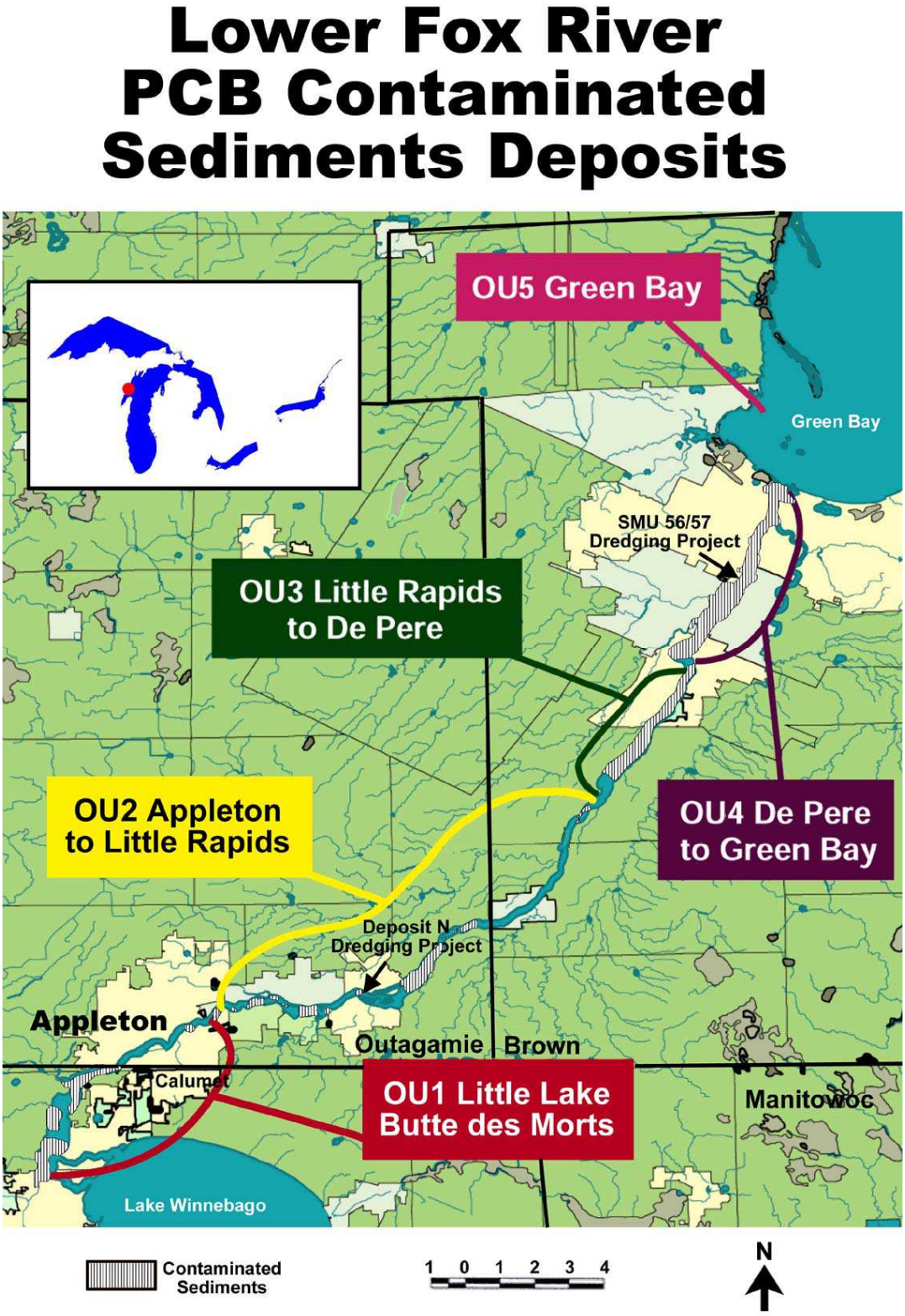

Figure 1. Lower Fox River PCB-Contaminated Sediment Deposits and Operable Units

TABLE 1. Operable Units and Previously Selected 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
2007 ROD Amendment	3 (and OU 2 Deposit DD)	Little Rapids to De Pere	Dredging and disposal, Capping and Sand Covers
	4	De Pere to Green Bay	Dredging and disposal, Capping and Sand Covers
2007 ROD Amendment and 2003 ROD	5	Green Bay	Monitored Natural Recovery

This ROD Amendment addresses OU 1. With the exception of the remedial activities at Deposit DD, the remedy for OU 2 is unchanged from the 2002 ROD.

IV. Site Characteristics

Section 6 of the 2002 ROD provides a complete description of the characteristics of the Site. Additional post-ROD information regarding Site characteristics is in the Design Supplement, and is summarized in the Introduction above (new information).

V. Site Risks

Section 8 of the 2002 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:

- The primary contaminant of concern is PCBs.
- Human health and ecological receptors are at risk from PCB bioaccumulation.

- Fish consumption is the exposure pathway presenting the greatest risk for human health and ecological receptors.

VI. Agency Evaluations and Decisions

A. Site Evaluations and 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 2002 and 2003 RODs.

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 finalization of 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, EPA and WDNR signed the ROD for OU 1 and OU 2. The 2002 ROD called for active remediation in OU 1 (i.e., dredging, with a capping contingency remedy) 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. The 2003 ROD called for active remediation in OU 2 (deposit DD), OU 3, OU 4 and MNR for OU 5. In 2006, upon completion of collecting additional sediment data and based upon additional analyses, the Agencies issued a Proposed Plan to modify the 2003 ROD for OUs 2 (deposit DD), OU 3, OU 4 and OU 5 (near the mouth of the river). Comments received from the public were incorporated into the 2007 ROD Amendment, which modified the original decision for OU 3, 4 and 5 from all-dredging to a combination of dredging, capping and sand covers.

B. Remedial Action Objectives

The 2002 and 2003 RODs adopted the same Site-wide Remedial Action Objectives (RAOs). 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 PCB chemical concentration levels established using the human and ecological risk assessments performed at the Site. As discussed in detail in Section 9 of the 2002 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 EPA 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 EPA 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 EPA 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 2003-2004 and 2006-2007 Sampling and 2004-2007 Remedial Activities and Its Bearing on the 2002 ROD

During sampling and analysis in 2003-2004 and 2006-2007, new PCB data from more than 5,900 sediment samples at 996 core locations was collected and analyzed in OU 1.[3] The results of that sampling are presented in the Design Supplement, and several significant findings based on that sampling data are summarized above in

[3] From page 10 of the Design Supplement.

Section I. Four of those findings are discussed in greater detail below, namely: (1) PCBs are more heavily concentrated in discrete areas in OU 1; (2) the total PCB mass in the prism that includes all contaminants above 1.0 ppm is less than predicted in the ROD, amounting to 2/3 of the 2002 ROD estimate; (3) it is now projected that the SWAC goals established by the 2002 ROD would not be met for a dredge only remedy even if the entire targeted volume of contaminated sediment were dredged; and (4) PCB concentrations in areas containing large volumes of contaminated sediment are low, with many areas only marginally above the Remedial Action Level (RAL) of 1.0 ppm.

Additionally, experience in dredging approximately 335,000 cy of PCB contaminated sediments and a cap placement test in OU 1 in 2007 demonstrated: (1) the need to "over-dredge" (discussed below); (2) some areas would still have elevated PCB concentrations even after dredging attempted to remove all contaminated sediments above the 1 ppm RAL (even after overdredging); and (3) both dredging and capping are implementable in OU 1.

1. PCBs are more heavily concentrated in discrete areas

As shown in Table 2 below, PCBs were determined to be more concentrated within discrete areas than was known prior to the 2002 ROD. For example, based on more recent data (i.e., 2003-2004 and 2006–2007 sampling and analysis), Sub-areas A, E and POG (shaded in Table 2 below) had 93.6 % of the total PCB mass compared to 63.5 % of the total mass based on the RIFS (1989 - 1999) data. Based on this information, recovery of a greater percentage of PCBs with targeted removal of the most highly contaminated sediments is expected.

Table 2. Comparison of OU 1 PCB Mass Estimates Within 1.0 ppm Prism

Sub-area	1989 - 1999 RIFS[1]		2003 – 2007 Post-RIFS[2]	
	kg	% of total	Kg	% of total
A	237	16.6	218.3	19.1
B	409	28.5	0	0
C	35	2.4	33.5	2.9
D	78	5.4	37.6	3.3
E	373	26.0	331.4	29.0
F	3	0.002	2.5	0.002
G	0	0	0	0
H	0.4	0.0003	0	0
POG	299	20.9	519.5	45.5
TOTAL	1,434.4	99.8[3]	1,142.8	99.8[3]

Table Notes:

Table adapted from Table 2-1, page 12, Design Supplement.

Shaded cells are contaminated sediment deposits removed during 2004 – 2007 dredging activities.

[1] Source: December 2002 RI, Table 5-14; December 2002 FS, Table 5-3. Data was compiled from data collected from 1989 – 1999.

[2] Source: Data collected in 2004 – 2004 and 2006 – 2007.

[3] Percent total is not 100 % because of rounding.

2. The Increased Sediment Volume Estimate

In order to ensure more complete removal of targeted sediments above the 1 ppm PCB RAL, OU 1 dredging operations demonstrated the need to remove an additional 4-inches of sediment. This additional dredge cut below the targeted dredge elevation is referred to as dredge overcut. With an average thickness of 1-foot of sediment to the 1 ppm PCB RAL in OU 1, an additional 4-inch overcut increases the actual dredge volume under the 2002 ROD remedy by 29% (from 721,200 cy to 928,400 cy). While the practical necessity of a dredge overcut was generally acknowledged in the Lower Fox River Feasibility Study (FS), the increased volume and cost implications was not addressed in the FS or the 2002 ROD.

3. The Revised SWAC Projections for the 2002 ROD Remedy

In addition to identifying a larger volume of sediment that would need to be removed under the 2002 ROD, the additional sampling and analyses performed during the remedial design process showed that dredging remedy alone would not meet the PCB SWAC goals as originally envisioned in the 2002 ROD. Specifically, concentrations would be reduced from an average PCB SWAC of 1.9 ppm to 0.48 ppm by dredging alone[4] whereas a combination of dredging higher concentration areas, capping and sand covers over lower concentrations would achieve a PCB SWAC of 0.25 ppm. There are two main reasons why dredging alone would not meet PCB 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 OU 1 and other dredging projects 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.”[5] The 2002 ROD stated that generated residuals could be addressed by re-dredging and/or placement of sand covers over dredged areas.

- 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.,

[4] From page 10 of the Concept Paper, November 19, 2007.

[5] 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.

in areas with no sediment exceeding the 1.0 ppm PCB RAL) might prevent an all-dredging remedy from reaching the OU-wide SWAC goals. If an all-dredging 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 sediment deposition processes (before RAOs could be achieved).

4. Operational Experience at OU 1

Approximately 335,000 cubic yards have been dredged at OU 1 from 2004-2007. Operations have been refined and improved based on contractor experience. For example, a sediment screening and thickener was added to the dewatering process in 2006, improving efficiency of the dewatering operation by reducing the volume of water being pumped into the geotextile tubes and significantly improving dewatering operations. A slight (i.e., approximately 3 to 4 days out of a total 30 days) reduction in the time needed for dewatering was realized.

In addition to dredging and sand covering operations dredged residuals, cap placement test studies were also conducted in 2007. These test studies demonstrated the ability to consistently place a 6-inch sand layer overlain by 7-inches of armor stone (i.e., ASTM C33 gradation for fine aggregates and 1 ¼ inch-minus stone meeting C33 gradation for coarse aggregate No. 467). Other aspects relating to capping construction that were successfully evaluated included methods of cap material placement, production rates of material placement, sediment consolidation, monitoring and verification procedures, stability of underlying sediment, and impact to water quality during placement (which has been minimal). Some of these aspects, such as sediment consolidation, and monitoring and verification procedures will be further evaluated after construction completion.

The dredging experience and cap placement test studies have both demonstrated the viability and implementability of these operations.

5. Summary of 2002 ROD Remedy and Relevance Regarding New Information and Findings

A comparison of the Remedy Amendment and the 2002 ROD remedy follows below, and in Table 6, page 42.

- **Sediment removal.** The 2002 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 928,400 cy of sediment would need to be dredged under the remedy selected by the 2002 ROD, in light of new sampling data and overdredge allowance. The 2002 ROD originally estimated approximately 784,200 cy would be removed, as it did not include overdredging volumes.

- **Sediment dewatering and disposal.** The 2002 ROD envisioned that contaminated sediment would be dewatered using mechanical processes similar to those used at other Fox River dredging projects (e.g., plate and frame presses). Experience at OU 1 has shown that geotextile tubes have proven to be effective for dewatering dredged sediments from OU 1.

- **Water treatment.** Water generated by dredging and dewatering operations will be treated prior to discharging it back to the Fox River to meet State and federal water quality standards, consistent with the 2002 ROD.

- **Capping.** A capping contingency plan included in the 2002 ROD allowed for the use of an engineered cap in limited areas it was shown to be protective and less costly than dredging. At a minimum, an Explanation of Significant Differenceswould have been required prior to implementation of capping. The capping portion of the Amended Remedy is consistent with the capping contingency allowed in the 2002 ROD.

- **Long-term monitoring.** Long-term monitoring of surface water and biota would continue until PCB concentrations and exposures are below risk levels.

- **Institutional controls.** 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 2002 ROD stated that SWAC levels of approximately 0.25 ppm PCB would be achieved 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 1 due to dredge-generated residuals remaining in dredge areas, then the 2002 ROD indicated that a SWAC of approximately 0.25 ppm for OU 1 could be met by other means, such as redredging, capping or placement of sand cover on dredged residual. The specific SWAC goals in the 2002 ROD were 0.25 ppm.

- **Natural recovery after remediation.** Although the 2002 ROD specified that the RAL requirement or SWAC goal would need to be met immediately after the completion of dredging in a particular OU, it was also recognized that it would take additional time for natural recovery before some of the RAOs would be achieved. For example, the 2002 ROD estimated that a SWAC of approximately 0.25 ppm PCBs would be achieved at construction completion, but the 2002 ROD also estimated that it would take another 14 years before reduced PCB levels in fish tissue would allow relatively safe consumption of walleye for high-intake consumers. If the 2002 ROD remedy did not achieve the SWAC goal, longer natural recovery periods would be required to meet RAOs.

- **Costs**. Based on new information gathered after issuing the 2002 ROD, the cost of implementing the 2002 ROD remedy in OU 1 is currently projected at $144 million. The 2002 ROD originally estimated the cost at $66.2 million. The lower cost estimate in the 2002 ROD did not include dredging overcut volumes. The additional volume is significant in OU 1 due to thin contaminant zones. The added volume increases costs for dewatering, transportation and disposal.

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 EPA proposes to fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost, then EPA is required to publish the proposed amendment and provide an opportunity for public comment. In this case, the decision by EPA 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, EPA and WDNR issued a Proposed Plan on November 26, 2007, and invited public comment on possible changes to the remedy in the 2002 ROD. After reviewing and fully considering the public comments submitted, EPA and WDNR have decided to modify the selected remedy. The 2002 ROD remedy required predominantly dredging PCB-contaminated sediments. This ROD Amendment employs a combination of the following actions:

- Dredging as the primary remedial approach

and the following alternate remedial approaches:

- capping, and

- sand covers for residuals management and as the sole remedial approach in certain areas.

In accordance with Section 300.825(a)(2) of the NCP, 40 C.F.R. § 300.825(a)(2), this ROD Amendment is part of the 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) EPA Records Center, 7th Floor, 77 West Jackson Boulevard, Chicago, Ill, 8 AM – 4 PM, Monday-Friday. An index of documents contained in the administrative record is attached as Appendix A to this ROD Amendment. Details of this Amended Remedy are described in Section XI below.

VIII. Community Relations

EPA and WDNR issued the Proposed Plan for a ROD Amendment to the public on November 26, 2006. This issuance began a 66 day public comment period on proposed changes to the 2002 ROD. EPA and WDNR held a public meeting on December 13, 2007 to discuss and receive comments on the proposed ROD Amendment at Lawrence University, Appleton, Wisconsin. The comment period ended on January 31, 2008. See Section 3 of the 2002 ROD for the community relations history prior to the December 2002 ROD.

Since the 2002 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,
- June 2006 -- OU 1 construction update meeting,
- December 5, 2006 – Public meeting for comments on the Proposed Plan to amend the 2003 ROD, and
- December 13, 2007 – Public meeting for comments on the Proposed Plan to amend the 2002 ROD.

Additionally, since the issuance of the 2002 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. Agency and company websites with information for OU 1 also include:

- http://www.epa.gov/region5/sites/foxriver/index.html,
- http://www.dnr.state.wi.us/org/water/wm/foxriver/reportsanddocs.html, and
- http://www.littlelakecleanup.com/.

IX. Development of the Remedial Action Alternatives

The ROD Amendment involves evaluation of two remedial action alternatives: (1) the 2002 ROD Remedy; and (2) the Amended Remedy described in Section XI.

The development of the 2002 ROD Remedy alternative was fully described in the 2002 ROD itself.

The Amended Remedy alternative was developed based on new information and new engineering analyses that were outgrowths of the remedial design and remedial actions from 2004 to 2007 conducted under the 2002 ROD and Consent Decree (03-C-0949), and as summarized in Sections I and VI. The Design Supplement summarized and presented that new information and analyses. The Design Supplement also proposed a remedial design based on the new sediment data and operational dredging experience at OU 1. Details regarding scheduling, monitoring and costs were also evaluated in the Design Supplement. This ROD Amendment modifies the 2002 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 is designed to have several advantages over the 2002 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 is projected to be completed by 2009 rather than 2014 under the 2002 ROD. The active remediation work will be done sooner (2 more years for the Amended Remedy, rather than 7 more years under the 2002 ROD Remedy – following 2007 cleanup activities). 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 2002 ROD Remedy.

- The Amended Remedy allows alternate remedial approaches that are much more efficient than dredging the relatively thin layer of PCB deposits found to be present in OU 1. Under the 2002 ROD Remedy a large volume of relatively clean sediment would need to be removed as the amount of overdredging (about 4-inches) would be significant due to the thin nature of the contaminated sediment deposits (in an average thickness of layers about 1-foot). Once removed, that relatively clean sediment would take up valuable disposal space since it would need 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, if specified criteria can be met. It is estimated that the Amended Remedy would thereby reduce the overdredge volume by 122,000 cubic yards.

X. Evaluation of Alternatives

A. Evaluation Criteria

Remedial alternatives are evaluated based on the nine criteria set forth in the NCP, 40 CFR § 300.430(e)(9)(iii). 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 (Applicable or Relevant and Appropriate Requirements). 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 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 2002 ROD Remedy

1. Overall Protection of Human Health and the Environment

Compared to the 2002 ROD Remedy, the Amended Remedy is more protective of human health and the environment in the short term, and at least as protective as the 2002 ROD Remedy in the long term.

In the short term, the Amended Remedy has the following advantages over the 2002 ROD remedy:

- The Amended Remedy is projected to achieve a lower PCB SWAC in OU 1 sediment than an all dredging remedy and thus reduce contaminant exposure sooner. The Amended Remedy will leave lower PCB surface concentrations in capped and sand cover 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 (e.g., placement of sand covers over undredged areas). Table 3 presents the estimated pre-remediation SWAC and the estimated SWAC results under the two remedial approaches, assuming a post-dredging sand cover for both remedies.

TABLE 3. Estimated Current PCB SWAC and Projected SWAC Results for OU 1 for an All-Dredging Remedy and Amended Remedy[6]

Pre-Remediation (ppm)	After all-dredging remedy (ppm)	After Amended Remedy (ppm)
1.9	0.48	0.25

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- The Amended Remedy will also achieve RAOs years before they would be achieved under the 2002 ROD Remedy. The active remediation work will be done sooner (within 2 more years under the Amended Remedy, rather than

[6] From the Concept Paper, page 10.

taking 7 more years under the 2002 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 2002 ROD remedy. That lower post-construction SWAC would yield lower PCB concentrations in fish tissue sooner.

The Amended Remedy and the 2002 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, 97% of all PCBs in OU 1 would still be removed, contained by a cap or sand cover.[7] The engineered caps that are allowed by the Amended Remedy are designed to remain protective over the long term, as 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 or damaged, EPA and WDNR could require that the cap be enhanced or removed (along with removal of the underlying sediment).

2. Compliance with ARARs

Both the 2002 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 sediment with PCB concentrations at or above 50 ppm PCBs (TSCA sediment). However, at OU 1 all TSCA sediments (with PCB concentrations equal to or greater than 50 ppm) were removed during dredging activities from 2004-2006. If additional TSCA sediments are discovered in subsequent sampling or remedial activities, TSCA sediment will be dredged from the River and that dredged material will be handled, stored, and disposed or capped in accordance with TSCA requirements.

3. Long-term Effectiveness and Permanence

Both the 2002 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.** The caps are designed to remain stable under maximum shear stresses for reasonable worst case scenarios (e.g., 100-year storm event). Experts in the fields of environmental engineering, hydrodynamic flow modeling, and sediment remediation have determined an

[7] 100% of PCBs are not addressed because some limited areas are inaccessible due to utilities or shoreline issues.

appropriately conservative design, reflected in the Amended Remedy.

- **Disruption from bioturbation (i.e., biological activity).** The caps are designed with thicknesses that will resist cap damage or exposure of underlying contamination due to bioturbation. Data from other similar Great Lakes sediment sites indicates that the potential bioturbation depth is approximately 4 inches. This is incorporated into the cap design.

- **Ice scour.** An independent expert evaluation of potential ice scour was conducted using available historic climate data, site visits, and interviews with local individuals who have significant experience on the Lower Fox River. Among other things, the evaluation considered the risk of frazil ice negatively impacting the capped areas (i.e., ice on the river bottom that occurs in super-cooled areas of the River with turbulent water). Areas in OU 1 with potential frazil ice formation were determined to be outside the areas that would be capped. Thus, the evaluation did not identify any areas where frazil ice or other ice forms (e.g., ice dams or jams) would be expected to cause erosion or damage to caps either directly from ice or indirectly from increased water velocities under the ice.

- **Scour from propeller wash.** The cap design criteria include minimum depth requirements (i.e., 6-foot water depth for post capped areas) and cap design requirements (such as an armor stone layer) to ensure that caps are resistant to propeller wash from recreational or commercial vessels. Those requirements were developed based on analyses of existing and possible future vessel types and river uses for OU 1, including physical tests and modeling.

- **Other technical considerations**. The caps are designed for stability, by requiring that 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 and Institutional Control requirements for caps as described in detail in Section XI.D.

Both the 2002 ROD Remedy and the Amended Remedy 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 2002 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 receive further treatment under either the 2002 ROD or the Amended Remedy. Dredging

carrier water will be treated to meet State standards to remove PCBs or other contaminants, and recycled/discharged back into the Lower Fox River. Contaminated sediments removed from the Lower Fox River will be dewatered, transported, and landfilled.

5. Short-Term Effectiveness

As discussed above, in the short term, the Amended Remedy would be more effective than the 2002 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 may be re-suspended and released during dredging. Those short-term impacts during remedy implementation would end sooner under the Amended Remedy because that remedy could be completed sooner (2 more years for the Amended Remedy versus 7 more years for the 2002 ROD Remedy to complete remediation after 2007 remediation).

6. Implementability

As discussed in Section VI.C.4 above, operational experience at OU 1 during dredging operations from 2004-2007 has demonstrated that sediment removal, transportation, dewatering and disposal methods envisioned by the 2002 ROD and the Amended Remedy are implementable. Additionally cap placement tests conducted during 2007 demonstrated that cap materials could be reliably and effectively placed, consistent with design standards discussed in the Design Supplement.

Services, materials and equipment would be locally available for both the 2002 ROD Remedy and the Amended Remedy (described in Section XI below). For example, materials required for capping (i.e., sand and armor stone) under the Amended Remedy are readily available in the area.

7. Cost

Table 4 below summarizes the most recent cost estimates for the 2002 ROD Remedy and the Amended Remedy, as presented in the Design Supplement. The original cost estimate for the 2002 ROD Remedy was $66 million. The most recent cost estimate for the 2002 ROD Remedy is $144 million, an increase of $78 million compared to the estimate in the 2002 ROD. 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, based on new sampling and recent estimates of overdredge requirements. Sampling and analysis of PCB contaminated sediments in 2003-2004 and 2006-2007 identified numerous thin layer PCB deposits in OU 1. Under the 2002 ROD Remedy, a significant volume of relatively clean sediment would need to be removed as overdredge allowance for dredging thin layer 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 $102 million. The Amended Remedy allows alternate remedial approaches that are much more efficient than dredging thin layer PCB deposits. The Amended Remedy would allow caps or sand covers in some areas with thin layer deposits, if specified criteria can be met (discussed detail in Section XI.A.2 below). It is estimated that the Amended Remedy would thereby reduce the overdredge volume by 122,000 cubic yards.

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 approximately $42 million less than the 2002 ROD Remedy, and the Amended Remedy will achieve comparable or better results, it is more cost effective than the 2002 ROD Remedy.

TABLE 4. Comparative Costs of the 2002 ROD Remedy and Amended Remedy.

Item		2002 ROD	Amended Remedy
2004-2007 Dredging/dewatering/water treatment and disposal		$ 67,000,000	$ 67,000,000[1]
Post-2007	Dredging/dewatering/water treatment and disposal	$ 56,250,000[2]	$ 6,450,000[2]
	Capping	0	$ 9,650,000
	Sand Cover	$ 17,150,000[2]	$ 8,700,000[2]
	Demobilization	$ 1,750,000[2]	$ 1,750,000[2]
	Monitoring and Maintenance	$ 2,000,000	$ 4,650,000
	Contingency	0[3]	$ 4,050,000
	TOTAL	$ 144,150,000	$102,250,000

Table Notes:

Costs are from the Design Supplement, Sections 7.2.2 and 7.3, pages 50 and 51, respectively.

[1] Although these costs were for cleanup actions completed consistent with the 2002 ROD, they are listed here to allow comparison of overall cleanup costs.

[2] Averages are used for the estimated cost ranges.

[3] No contingency is used for the 2002 ROD costs because experience at OU 1 gives a high confidence based on actual operating expenses from dredging completed during 2004 to 2007 (with 335,000 cy of sediments dredged).

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 44 comments on the Proposed Plan. The majority of the public comments supported a remedial action addressing the PCB contamination at the Site. A number of comments expressed support for the Proposed Plan because it would achieve remedial goals sooner, and would be more cost effective, as compared to the 2002 ROD Remedy. Some 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. 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 2002 ROD Remedy and the Amended Remedy meet the threshold criteria described above. Both would provide for protection of human health and the environment; and meet state and federal ARARs.

The Amended Remedy has distinct advantages under the balancing criteria described above. It would be more effective than the 2002 ROD Remedy in achieving risk-reduction SWAC goals, and would be more cost-effective. Recent analyses also suggest that the 2002 ROD Remedy would be more difficult and take longer to implement.

The two alternatives have also been evaluated under the modifying criteria described above. 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 remedy selection criteria, and fully considering comments from the public, EPA and WDNR have decided to change the remedy for the Site by amending the 2002 ROD, as described below.

XI. Description of the Amended Remedy

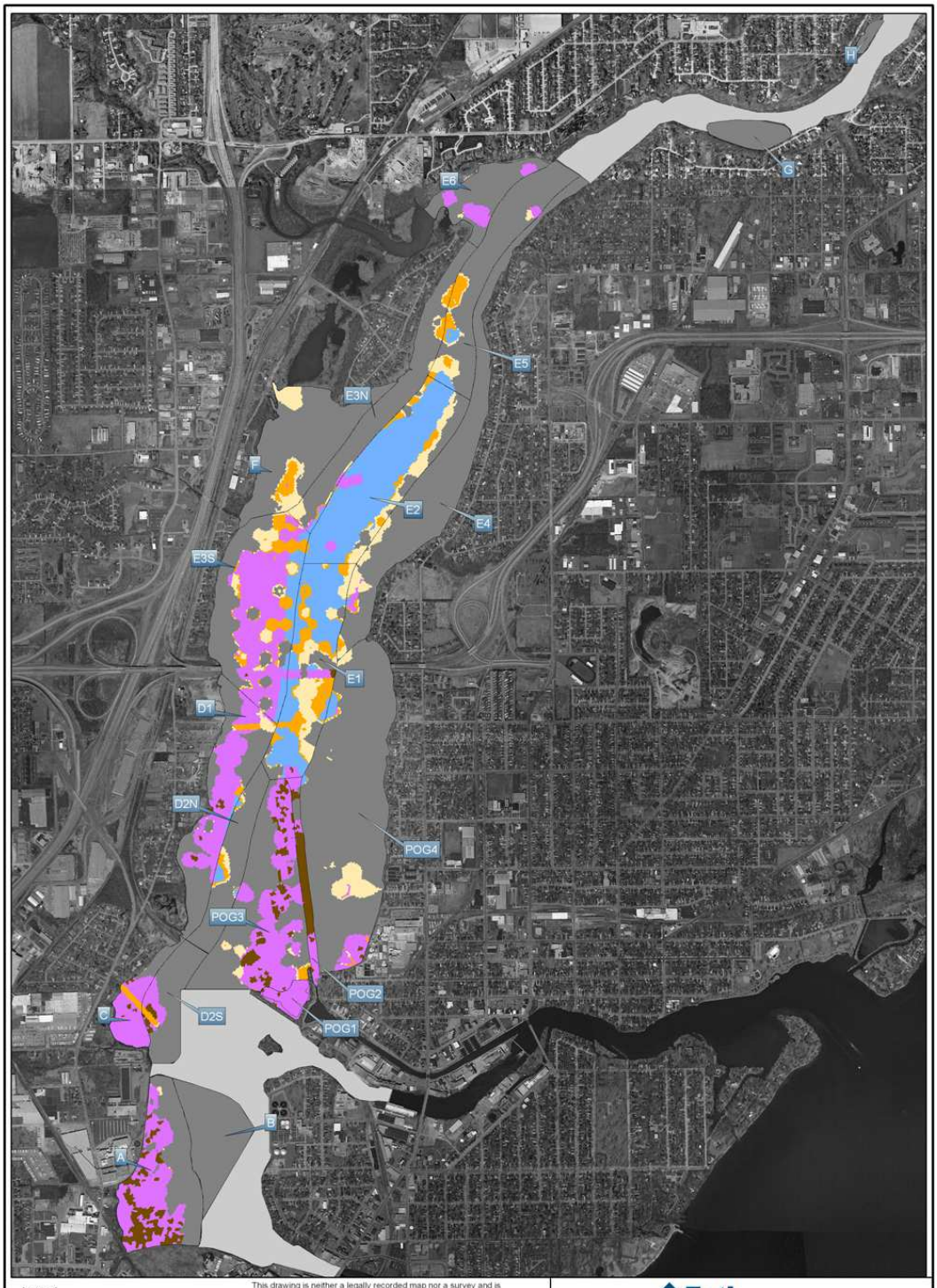
The Amended Remedy addresses all areas of OU 1 containing sediment with PCB concentrations greater than the 1.0 ppm RAL. The Amended Remedy adopts removal of contaminated sediments with dredging as the primary remedial approach for sediment exceeding the 1.0 ppm PCB RAL, but it allows alternative remedial approaches to be used instead of dredging (i.e., capping 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 OU 1 to meet the RAL and/or 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 application of 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 necessary to meet the SWAC goals in many areas where dredging occurs. The Amended Remedy remains consistent with the 2002 Remedy as sediment removal is still the primary remediation approach at this Site. However the additional remedial measures selected here will fully achieve the original cleanup requirements in a shorter period of time.

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 could have unacceptably high levels of PCBs, and may continue to pose a risk unless the primary approach is modified. 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 alternate approaches can help achieve the overall remedial objectives more quickly, more effectively, 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 are designed such 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 caps that are installed, to confirm that the long-term objectives of the Amended Remedy are achieved.

The ROD Amendment establishes general criteria governing use of the primary remedial approach and the alternate remedial approaches in areas within OU 1, but more specific plans will be developed during the remedial design process. A conceptual design for dredging, capping, and sand covering areas is shown in Figures 2 and 3 below, and summarized in Table 5. As discussed in greater detail in the Design Supplement, that design would involve removing an estimated total of 406,100 cubic yards of sediment with PCB concentrations greater than 1.0 ppm by dredging, and containing 503,900 cubic yards by capping or a sand cover. The final remedial action design and implementation details will be subject to approval by EPA and WDNR, and the Agencies will require the remedial action to be consistent with all criteria and requirements of the Amended Remedy, as outlined below.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C
D2S
B
A
Legend
Sub-area/DMU Boundaries
OU1 Optimized Remedy
Engineered Cap
Dredge Areas
Interdeposit (less than 1.0 ppm PCBs)
Null
3 Inch Sand Cover
6 Inch Sand Cover
Residual Sand Cover
This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data used for reference purposes only.
Source: Orthophoto flown by Winnebago County
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FIGURE 2
AMENDED REMEDY
MOSAIC OF REMEDIAL ACTION
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Date: NOVEMBER 2007
Drawn By: SGL
Checked By: SJL1
Scope: 07G017
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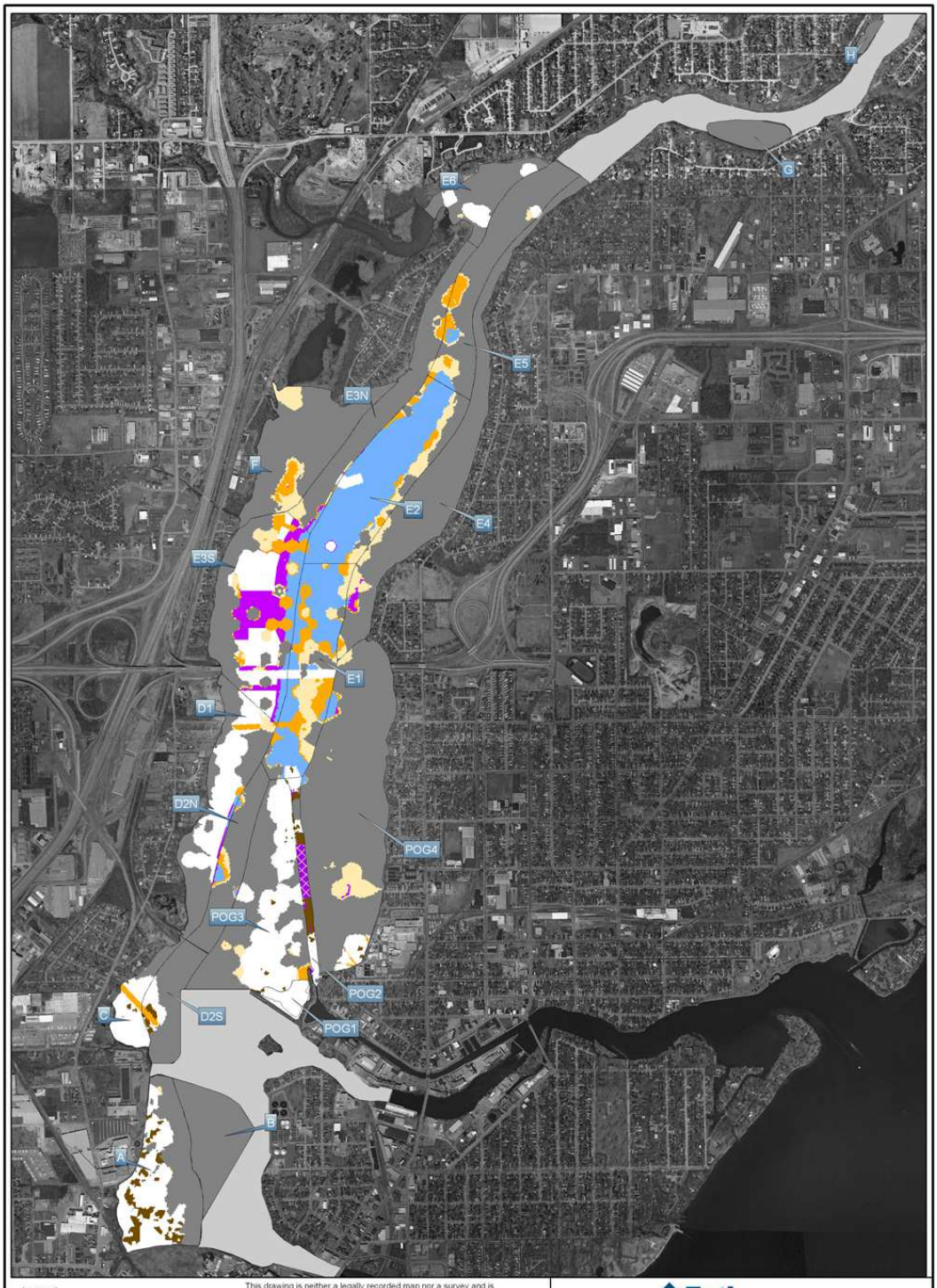
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POG2
POG1
C
D2S
B
A
Legend
Sub-area/DMU Boundaries
OU1 Optimized Remedy
Engineered Cap
Dredge Areas
Dredge and 9" Sand Cover
Interdeposit (less than 1.0 ppm PCBs)
Null
3 Inch Sand Cover
6 Inch Sand Cover
Residual Sand Cover
This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data used for reference purposes only.
Source: Orthophoto flown by Winnebago County
N
X:\GB\IE\2008\08G007\GIS\mxd\Figures_for_EPA\OU1FinalPlanOptimalRemedyPost2008.mxd
Foth
Foth Infrastructure & Environment, LLC
GW PARTNERS
FIGURE 3
AMENDED REMEDY
MOSAIC OF REMEDIAL ACTION
POST 2007 PROJECT WORK
OPERABLE UNIT 1
Scale: 0 800 1,600 Feet
Date: NOVEMBER 2007
Drawn By: SGL
Checked By: SJL1
Scope: 07G017

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.

Any final remedial action 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 1 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 2003-2004, 2006-2007 and 2008 sampling data and data interpolation), including an overdredge allowance, as appropriate; and (2) includes any remaining sediments with PCB concentrations greater or equal to 50 ppm.

- **Sediment removal methods and precautions.** Sediment removal will be conducted using a dredge appropriate to Site conditions. In-water pipelines or other appropriate methods will transport the dredged sediment from the dredge to the staging area(s). Dredging experience at OU 1 from 2004 – 2007 has shown that with careful operation of environmental dredges, silt curtains or other containment devices generally are not necessary during dredging activities. However, if future operations indicate that controls are necessary to ensure protectiveness, then additional measures or modifications to the dredging process will be employed, as appropriate. Turbidity will be monitored during dredging operations. Buoys and other waterway markers will be installed around the perimeter of the in-water work area.

- **Sediment dewatering and disposal**. Dewatering will be employed at the staging facility 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 PCB contaminated sediment before disposal. Based on dredging and dewatering from 2004 – 2007, it is expected that geotextile tubes will likely be used to complete the dewatering of dredged sediments for the remainder of the project. Dewatered contaminated 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. Based on previous

experience at OU 1, it is anticipated that trucks would be utilized to transport dredged PCB-contaminated sediments to an approved upland disposal facility. All known TSCA sediments were removed during dredging operations from 2004 to 2006. Although only non-TSCA sediments are expected to remain at OU 1, if TSCA sediments were found to still remain at OU 1, dewatered sediments subject to TSCA disposal requirements must be transported consistent with TSCA requirements by truck, rail, and/or barge to a landfill facility appropriately permitted to receive TSCA waste.

- **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 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 activities will be performed 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 results show 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 results in a particular area shows that 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 below the surface of the newly-dredged 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 one or more of the following must occur:

- **For management of generated residuals**

    - Generated residuals with a PCB concentration equal to or greater than 5.0 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 5.0 ppm must be covered with at least 6 inches of clean sand from an off-Site source (referred to as a "residual sand cover").

    - Place a residual sand cover as necessary to meet the SWAC goal for the OU of 0.25 ppm.

- **For management of undisturbed residuals**

    - Unless EPA and WDNR approve use of a different residuals management approach in a particular area within OU 1, 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. EPA and WDNR may evaluate and approve the use of a different residuals management approach (such as a cap or a sand cover) for undisturbed residuals in limited areas if the eligibility criteria for alternate remedial approaches in Section XI.A.2 below is met.

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 more cost-effective than dredging in certain areas identified in the Design Supplement, but the Design Supplement did not make final recommendations for all areas. Capping will only be allowed where the average PCB concentrations do not exceed 10.0 ppm in the top 8-inch interval of sediment underlying the cap.

The Design Supplement included alternate remedial approaches in some areas, but more specific plans for any alternate remedial approaches in OU 1 will be developed

before or during completion of the remedial action. Any final remedial action 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 will not be allowed in areas within the federally-authorized navigation channels. (Note: Sand covering will be allowed in the navigation channel(s) to manage dredged residuals. These sand covers must be at least 6 inches thick and must not impede navigation.)

    - Capping will be allowed in areas outside of the federally authorized navigation channel only if the top of the cap is at least 6 feet below the low water datum.

  - **Engineered caps of 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 and all of the following additional criteria are met:

    - The cap shall be constructed of at least 3 inches of clean sand covered by at least 4 inches of armor stone, with an overplacement allowance of 3 inches of sand and 3 inches of armor stone.

    - The PCB concentration in the sediment in the eight inches immediately beneath the cap[8] shall not exceed an average of 10.0 ppm.

  - **Initial post-construction cap monitoring.** Immediately after completion of capping construction activities for both sand and then separately for armor layers, a hydrographic survey shall be performed and direct cap thickness verification sampling shall be conducted. The post–construction thickness sampling 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

[8] This eight inches is comprised of two 4-inch sampling intervals.

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.

- **Sand covers in undredged areas.**

  - A cover composed of at least an average of 6 inches (3-inch minimum thickness) of uncontaminated sand from an off-Site source may 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 8-inch interval with PCB concentrations between 1.4 – 2.0 ppm.

  - A cover composed of at least an average of 3 inches (1.5-inch minimum) of uncontaminated sand from an off-Site source may 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 1.4 ppm at any depth within the sediment profile.

    - The sediment profile shall contain only one 8-inch interval with PCB concentrations between 1.0 – 1.4 ppm.

  Immediately after completion of sand cover placement activities, sand cover cores shall be collected. These initial post–construction cores or other measures approved by the agencies will verify that sand cover placement specifications have been met, including an evaluation of whether the sand cover is sufficient in areal coverage and thickness. If the initial post-construction sand cover monitoring in a particular area shows that the sand cover placement specifications 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.** EPA 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. EPA 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 or areas near utilities. The specific remedial approach for each exceptional area will be subject to review and approval by EPA 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 below.

TABLE 5. Summary of 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 and 7-inches of gravel		6 feet	<=10 ppm[1]	112 acres
Sand Cover	6-inches of sand	Varies	1.4 - 2.0 ppm[2]	46 acres
	3-inches of sand	Varies	1.0 – 1.4 ppm[2]	68
	6-inches of sand	Varies	Dredge residuals	30

Table Notes:

[1] PCB average concentration in 0 – 0.5 foot depth below mudline.

[2] Maximum PCB concentration in any 8-inch interval. Sand cover is assumed to completely mix with the top three (3) inches of underlying sediment and will achieve the 1.0 ppm RAL in the 0 – 0.5 foot depth below mudline.

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) 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 for OU 1: a RAL Performance Standard and a SWAC goal. As explained below, construction of the remedy will be deemed complete for OU 1 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 EPA, 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 2002 ROD, EPA and WDNR selected the 1.0 ppm PCB RAL because it would achieve cost-effective removal and/or containment of PCBs, and substantially reduce migration of PCBs downstream. 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 OU 1 is removed and/or contained using the primary remedial approach and/or the alternate remedial approaches, then construction of the remedy in OU 1 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 OU 1 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, or application of capping or a sand cover, of all sediment in OU 1 having 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 0.25 ppm. The SWAC goal in this instance is less than the RAL performance standard because a SWAC is calculated as an average concentration over the entire Operable Unit, after dredging, capping or placement of a sand cover in 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 2002 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 walleye, it would take an estimated 9 years for recreational fishers and 14 years for high-intake fish consumers). 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 OU 1 (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, the PCB SWAC goal for OU 1 is 0.25 ppm PCBs. If the SWAC calculation, as determined by the EPA and WDNR, is met within OU 1 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 OU 1 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. 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, contained or covered;

2. Installing 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 OU 1, the construction of the OU 1 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, water treatment, and material handling for cap and cover operations. Specific staging areas will likely be facilities previously utilized for the OU 1 project from 2004 to 2007. Docking facilities for dredging equipment and ancillary equipment for capping or sand covers at the existing facility will also likely be utilized.

- **Demobilization and staging area(s) restoration.** Demobilization, staging area(s) restoration, and decontamination of all equipment will require removing all equipment from the staging and work areas and restoring the staging area(s) as needed to meet the legal requirements or any agreement with 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 OU 1, it will take additional time for natural recovery before some of the remedial action objectives are achieved. Sediment Quality Thresholds 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 2002 ROD, because the 2002 ROD and the Amended Remedy selected the same RAL and comparable SWACs.

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

- **Monitored Natural Recovery and Institutional Controls.** This ROD Amendment does not change the original remedy for OU 2 in the 2002 ROD (i.e., Monitored Natural Recovery and Institutional Controls other than in Deposit DD).

- **Estimated costs.** Costs for the Amended Remedy are estimated to be approximately $102 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 action 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.

- **Long-term cap monitoring.** The Amended Remedy requires long-term monitoring of any engineered caps that are installed at the Site to confirm 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, EPA and WDNR may increase or decrease the frequency of periodic monitoring. EPA 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.

- **Monitoring for chemical containment.** Some 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 the 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 EPA 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 EPA 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.** EPA 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 Lower Fox 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 exposure to contaminants which may be released during construction activities such as 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 EPA 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, where dredging is not allowed (e.g., capped areas, buried utilities and near highway bridges) 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, new bridges 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.)

XII. Comparison of the Amended Remedy and the 2002 ROD Remedy

Table 6 summarizes the differences between the 2002 ROD Remedy and the Amended Remedy. Table 7 compares the estimated sediment volumes, contaminant masses, and acreages remediated under the 2002 ROD Remedy and the Amended Remedy.

TABLE 6. Summary of Changes to 2002 ROD

Remedy Element	2002 ROD	Amended Remedy
Remedial Action Level	1.0 ppm PCBs	1.0 ppm PCBs
SWAC Goal for OU 1	0.25 ppm PCBs	0.25 ppm PCBs
Dredging Volume removed	928,400 cubic yards	406,100 cubic yards
PCB Mass removed (kilograms)	1143	843
Engineered Cap	Allowed under contingent remedy	Estimated 112 acres or less
Sand cover over sediments with PCB concentrations 1.0 – 2.0 ppm and 8-inch thickness or less that exceed the 1.0 ppm PCB RAL	None (not allowed)	Estimated 114 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)	Estimated 30 acres
Transportation of dredge slurry from dredge to river-side facility	In-water pipeline	In-water pipeline
Separation of water from sediments	Mechanical presses	Geotextile tubes
Transportation of contaminated sediment from a river-side dewatering facility to landfill for final disposal	Trucks	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
Monitored Natural Recovery until contaminants are at acceptable levels	Required	Required
Long-term monitoring and maintenance of cap	Required for contingent remedy	Required
Time (from 2007) to complete remediation	7 years	2 years
Cost	$144 million	$102 million

Fundamental change 

Table 7. Comparison of Remedy Volumes, Mass Removal, and Remediation Areas for OU 1[1]

	Sediment Volume Addressed (cubic yards; cy)		Mass Removed (kilograms; kg)		Area Remediated (acres)	
Remedial Action	**2002 ROD**	**Amended Remedy**	**2002 ROD**	**Amended Remedy**	**2002 ROD**	**Amended Remedy**
Dredge/dispose [3]	928,400 [2]	406,100	1,143	843	426	216
Engineered cap [4]	0	325,100	0	0	0	112
Sand cover over PCB concentrations 1.0 - 2.0 ppm	0	178,800	0	0	0	114
Remedial action area total	928,400	910,000	1,143	843	426	442

Table Notes:

[1] Figures are modeled estimates except for dredge and residual sand cover components which are based on actual data. Because of variation between actual conditions and modeled estimates, the total acreage, sediment volume, and PCB mass projected for the Amended Remedy vary from the acreage, sediment volume and PCB mass estimate for the 2002 ROD Remedy.

[2] The ROD estimate did not account for overcut. In addition, the 928,400 cubic yard volume estimate is a modeled estimate and does not account for "high subgrade" (i.e., areas that have a hard undredgable surface at higher than expected elevation underneath the zone of contaminated sediments, resulting in a lower volume than predicted of contaminated sediments). Based on actual dredging experience, high subgrade is estimated to reduce the total dredge volume by up to 90,000 cubic yards.

[3] Values indicated are based on actual data for the 2004-2006 RA activities and projections for the 2007 and 2008 RA activities. This Amended Remedy includes dredging in the following areas beyond those areas already identified by the 2007 RA Work Plan: re-dredge of Sub-Area POG2 and areas north of the trestle trail with residual concentrations above 5.0 ppm; 7-8 acres in Sub-Area D1; 40 acres in Sub-Areas D2N, E3 North, E3 South, E4, POG4, and F (due to capping constraints, based on a 6-foot post-cap water depth requirement); and 0.7 acres in Sub-Area E2.

[4] Approximate average of 13-inches includes 3-inch overplacement allowances in both the sand and armor layers.

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 legal 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 and achieve the RAOs discussed in Section IV above, through the following actions:

- **Dredging and off-site disposal of PCB-contaminated sediment.** Dredging is focused on sediments with higher PCB concentrations.

- **In-place containment of PCB contaminated sediments under engineered caps designed to provide long-term stability.** Capping will generally be performed where PCB concentrations are lower and contaminated deposits are relatively thin.

- **Enhanced natural recovery by placement of a sand cover.** Natural recovery will be accelerated 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 eight inches or less.

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

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

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

- **Implementation of an Institutional Control Implementation and Assurance Plan.**

The Amended Remedy will address sediment with PCB concentrations exceeding the 1.0 ppm RAL. The estimated post remediation PCB SWAC will meet the SWAC goals if

the RAL is not achieved in all areas within OU 1.

Implementation of the Amended Remedy in OU 1 will result in reductions in fish tissue PCB concentrations to acceptable levels within a reasonable time and in a shorter time than the 2002 ROD Remedy. Monitoring will help assess achievement of remedial action objectives. 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 2002 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 EPA 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. However, all known TSCA sediments in OU 1 have been removed during dredging operations from 2004 to 2006. This is unchanged from the 2002 ROD and all TSCA requirements for off-site disposal will still be met.

3. Cost Effectiveness

The Amended Remedy will cost approximately $42 million less to implement than the 2002 ROD Remedy. A significant portion of the cost savings is due to the smaller volume of relatively clean sediment that will be disposed of at a landfill under the Amended Remedy. The Amended Remedy will generally achieve equivalent or better results at lower cost, so it is more cost-effective than the 2002 ROD Remedy.

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

EPA and WDNR have determined 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 2002 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 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). However, water separated from dredged sediments will be treated prior to discharge back to the Lower Fox River.

6. Five Year Review Requirements

CERCLA Section 121(c), 42 U.S.C. § 9621(c) and the NCP at 40 C.F.R. § 300.430(f)(4)(ii), require 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 Section 117(b), 42 U.S.C. § 9617(b), and the NCP at 40 C.F.R. §§ 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 C.F.R. §§ 300.435(c)(2)(ii) have been met.

The Proposed Plan was released for public comment on November 26, 2007. It proposed modifying the 2002 ROD Remedy from an all-dredging remedy with a capping contingency to: 1) dredging, 2) capping, and 3) sand cover. Compared to the 2002 ROD, the RAL and the SWAC goals are unchanged. Agency responses to all significant public comments are included in the Responsiveness Summary, attached to this ROD Amendment as Appendix A`.

XV. New Information Obtained During the Public Comment Period

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

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

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

Date 6/12/08

Bruce Baker, Deputy Administrator
Water Division

Date June 6, 2008