Five-Year Review Report

First Five-Year Review Report

for

Fox River NRDA/PCB Releases Site

Brown, Door, Marinette, Oconto, Outagamie, Kewaunee, and Winnebago Counties, Wisconsin, and Delta and Menominee Counties, Michigan

July 2009

PREPARED BY:

United States Environmental Protection Agency
Region 5
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Approved by:

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Date: 7-17-09

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Five-Year Review Report

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List of Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Community Involvement Coordinator
COCs	Contaminants of Concern
cy	cubic yards
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
ICIAP	Institutional Control Implementation and Assurance Plan
ICs	Institutional Controls
kg	Kilograms
L	Liter
mg	Milligram
MNR	Monitored Natural Recovery
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng	Nanogram
ng/L	Nanograms per Liter
NPL	National Priorities List
NRDA	Natural Resource Damage Assessment
OU	Operable Unit
OU 1	Operable Unit 1 (a.k.a., Little Lake Butte des Morts reach)
OU1 Design Supplement	GW Partners, OU1 Design Supplement, Lower Fox River Operable Unit 1, November 2007
OU 2	Operable Unit 2 (Appleton to Little Rapids reach)
OU 3	Operable Unit 3 (Little Rapids to De Pere reach)
OU 4	Operable Unit 4 (De Pere to Green Bay reach)
OU 5	Operable Unit 5 (Green Bay)

PCB	polychlorinated biphenyl
ppm	parts per million (mg/kg)
PRPs	Potentially Responsible Parties under CERCLA
RAL	Remedial Action Level
RAO	Remedial Action Objective
Response Agencies	Wisconsin Department of Natural Resources and United States Environmental Protection Agency
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
Site	Fox River NRDA/PCB Releases Site
SMU	Sediment Management Unit
SWAC	Surface Weighted Average Concentration
UU/UE	unlimited use or unrestricted exposure
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
2007 ROD Amendment	Record of Decision Amendment, Operable Unit 2 (Deposit DD), Operable Unit 3, Operable Unit 4, and Operable Unit 5, June 2007
2008 ROD Amendment	Record of Decision Amendment, Operable Unit 1, Lower Fox River and Green Bay Site, June 2008

Executive Summary

The Fox River NRDA PCB Releases Site, also known as the Fox River and Green Bay Superfund Site (Site), includes 39 miles of river and 2700 square miles of Green Bay. The major contaminants are polychlorinated biphenyls (PCBs) located in the river channel and Green Bay sediments. Site risks include risks to humans and ecological receptors via consumption of PCB-contaminated fish. Fish consumption advisories have been in effect since 1976.

The Wisconsin Department of Natural Resources (WDNR) is the lead technical agency at the Site, and the United States Environmental Protection Agency (EPA) is the lead enforcement agency at the Site. (Collectively, EPA and WDNR are referred to in this document as "Response Agencies.") Records of Decision (RODs) were issued in 2002 and 2003 for dredging/disposal of PCB-contaminated sediments. ROD Amendments were issued in 2007 and 2008 that modified the original decisions from dredging/disposal to a combination of dredging/disposal, armored caps, and sand covers.

In 2004, under a federal Consent Decree, the WTM I and P.H. Glatfelter companies started the cleanup of PCB-contaminated sediments in operable unit (OU) 1 (a.k.a., "Little Lake Butte des Morts") at the Site. Cleanup actions included dredging, capping with sand and armor stone and sand covering, completed on May 19, 2009. For the downstream 12 miles of river, similar cleanup actions are being conducted, and dredging began April 28, 2009. This work is being performed under a Unilateral Administrative Order. The most recent estimated total Site (i.e., OU 1 – OU 5) cleanup cost is approximately $700 million.

The remedial action implemented at OU 1 (i.e., dredging, capping and covering) is expected to be protective, although it may take some additional time for fish tissue concentrations to decrease. Although construction work in OU 1 was completed on May 19, 2009, additional required long-term monitoring has not yet been conducted.

The remedial actions being implemented at OU 2 and OU 3 (i.e., dredging, capping and covering) are expected to be protective after they are completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. It is expected that the remedial actions for OUs 2 and 3 will be completed by 2012, after which construction confirmation, follow-up sampling and long-term monitoring will be conducted.

The remedial actions being implemented at OU 4 and OU 5 (i.e., dredging, capping and covering) are expected to be protective after they are completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. It is expected that the remedial actions for OUs 4 and 5 will be completed by 2017, after which construction confirmation, follow-up sampling and long-term monitoring will be conducted.

Completion of the remedial actions in OU 4 - 5 should complete cleanup work at the Site. Following the completion of the remedial action and after evaluation of additional information, EPA will make a site-wide protectiveness determination.

Long-term protectiveness of the remedy will require compliance with effective institutional controls (ICs). Compliance with ICs will be ensured by maintaining, monitoring and enforcing ICs, as well as maintaining the remedy components at the Site.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: **Fox River NRDA/PCB Releases**		
EPA ID *(from WasteLAN)*: **WID0001954841**		
Region: 5	**State: WI/MI**	**City/County: Brown, Door, Marinette, Oconto, Outagamie, Kewaunee, and Winnebago Counties, Wisconsin, and Delta and Menominee Counties, Michigan**

SITE STATUS	
NPL status: ☐ Final ☐ Deleted x Other (specify) - Proposed	
Remediation status (choose all that apply): X Under Construction ☐ Operating ☐ Complete	
Multiple OUs?* X YES ☐ NO	**Construction completion date:** NOT COMPLETE
Has site been put into reuse? ☐ YES X NO	

REVIEW STATUS	
Lead agency: X EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____	
Author name: James Hahnenberg	
Author title: Remedial Project Manager	**Author affiliation: U.S. EPA**
Review period: 10/1/2008 to July 2009	
Date(s) of site inspection: 11/5/2008	
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only X Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion	
Review number: X 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____	
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Construction Completion ☐ Other (specify)	X Actual RA Start at OU# 1 ☐ Previous Five-Year Review Report
Triggering action date *(from WasteLAN)*: 9/9/2004	
Due date *(five years after triggering action date)*: 9/9/2009	

Five-Year Review Summary Form, cont'd.

Issues:

(1) Construction of the remedy is not yet complete.
(2) Long-term monitoring of fish and surface water has not begun.
(3) ICs have not been evaluated.

Recommendations and Follow-up Actions:

(1) Complete remedial actions and confirm that remedial actions have met requirements in the RODs and ROD Amendments.
(2) Conduct monitoring of fish and surface water upon completion of remedial actions.
(3) Complete Institutional Control Implementation and Assurance Plan (ICIAP) and implement as set forth in RODs and ROD Amendments.

Protectiveness Statement(s):

The remedial action being implemented at OU 1 (i.e., dredging, capping and covering) is expected to be protective, although it may take some additional time for fish tissue concentrations to decrease. Although construction work in OU 1 was completed on May 19, 2009, additional required long-term monitoring has not yet been conducted.

The remedial actions being implemented at OU 2 and OU 3 (i.e., dredging, capping and covering) are expected to be protective after they are completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. It is expected that the remedial actions for OUs 2 and 3 will be completed by 2012, after which construction confirmation, follow-up sampling and long-term monitoring will be conducted.

The remedial actions being implemented at OU 4 and OU 5 (i.e., dredging, capping and covering) are expected to be protective after they are completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. It is expected that the remedial actions for OUs 4 and 5 will be completed by 2017, after which construction confirmation, follow-up sampling and long-term monitoring will be conducted.

Completion of the remedial actions in OU 4 – 5 should complete cleanup work at the Site. Following the completion of the remedial action and after evaluation of additional information, EPA will make a site-wide protectiveness determination.

Long-term protectiveness of the remedy will require compliance with effective ICs. Compliance with ICs will be ensured by maintaining, monitoring and enforcing ICs, as well as maintaining the site remedy components.

Other Comments: none.

Fill in the data below:

Date of last Regional review of Human Exposure Indicator (from WasteLAN): 11/5/2007
Human Exposure Survey Status (from WasteLAN): Current Human Exposure Not Controlled
Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): Not a groundwater site
Groundwater Migration Survey Status (from WasteLAN): Not a groundwater site
Ready for Reuse Determination Status (from WasteLAN): N/A

Five-Year Review Report

I. Introduction

The purpose of a five-year review is to determine whether the remedy at a site is expected to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this five-year review pursuant to CERCLA § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

EPA interpreted this requirement further in the NCP at 40 CFR § 300.430(f)(4)(ii) which states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA Region 5 has conducted a five-year review of the remedial actions implemented at the Lower Fox River and Green Bay Superfund Site in northeastern Wisconsin. This statutory review was conducted from October 2008 through July 2009. This report documents the results of the review.

This is the first five-year review for the Site. The triggering action for this review is the date of the remedial action start for OU 1 as shown in EPA's WasteLAN database which is September 9, 2004. Once completed, remedial actions at the Site will leave PCBs at concentrations above the Remedial Action Level (RAL) exposures, but PCBs in these areas will be contained beneath engineered caps or mitigated with enhanced natural recovery using sand covers.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Initial discovery of problem or contamination - fish advisories issued by Wisconsin Department of Natural Resources	1976
NPL listing proposal	July 28, 1998
Deposit N dredging demonstration	1998-1999
Remedial Investigation/Feasibility Study made available to the public	March 1999
Dredging demonstration project and removal actions (SMU 56/57)	1999-2000
Proposed Plan identifying EPA's preferred remedy issued to the public for review and comment	October 5, 2001
Judicial Consent Decree for $41,500,000 to fund past costs and Fox River Projects	December 10, 2001
Remedial Investigation/Feasibility Study complete	December 20, 2002
ROD signature – OU 1 - 2	December 20, 2002
Site restoration plan completed by U.S Fish and Wildlife Service	June 2003
ROD signature – OU 3 - 5	June 30, 2003
Administrative Order on Consent for OU 1 design	July 1, 2003
Administrative Order on Consent for design for OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (river mouth)	March 5, 2004
Judicial Consent Decree for OU 1 design and remediation	April 12, 2004
Remedial action start (OU 1)	September 9, 2004
OU 1 remediation	2004-2009
Judicial Consent Decree for "Phase 1" remediation	November 3, 2006
ROD Amendment OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (river mouth)	June 26, 2007
Unilateral Administrative Order for OU 2 - 5 remediation	November 13, 2007
ROD Amendment OU 1	June 12, 2008
Remedial action start (OU 2, OU3, and OU4)	April 28, 2009

III. Background

Physical Characteristics

The Site comprises a 39-mile stretch of the Lower Fox River as well as the bay of Green Bay (Figure 1). 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. The Site has been divided into five discrete operable units by the Response Agencies. An OU is a geographical area designated for the purpose of analyzing and implementing remedial actions, and is defined on the basis of similar features and characteristics (e.g., physical and geographic properties). The river and the bay operable units are:

- OU 1 – Little Lake Butte des Morts
- OU 2 – Appleton to Little Rapids
- OU 3 – Little Rapids to De Pere
- OU 4 – De Pere to Green Bay
- OU 5 – Green Bay

Land Resource and Use

The river and areas bordering the river include the following uses: recreational (with subsistence fishing), residential, commercial, agricultural and industrial. Residential areas are concentrated in the upriver (Neenah/Menasha and Appleton areas) but are also present from De Pere to Green Bay. Industrial use is present in the Neenah/Menasha and Appleton area, and is scattered along the river up to and including Green Bay. Agricultural use is located mainly between Appleton and De Pere.

History of Contamination

For many years, a large number of paper production facilities have been and continue to be concentrated along the river. Some of the facilities manufactured and/or recycled PCB-containing carbonless copy paper from 1954 to 1971. PCBs were released from the paper production facilities to the Fox River directly, or after passing through municipal wastewater treatment plants. Based on purchase, manufacturing, and discharge records, conservative estimates have shown that approximately 313,600 kilograms (690,000 pounds) of PCBs were released to the Fox River environment during this time. Ninety-eight percent of the total PCBs released into the Lower Fox River had been released by the end of 1971. PCBs were then transported within the river system as PCBs have a tendency to sink and adhere to sediments in the river bottom. PCBs have contaminated areas in the 39-mile length of the Lower Fox River, and Green Bay.

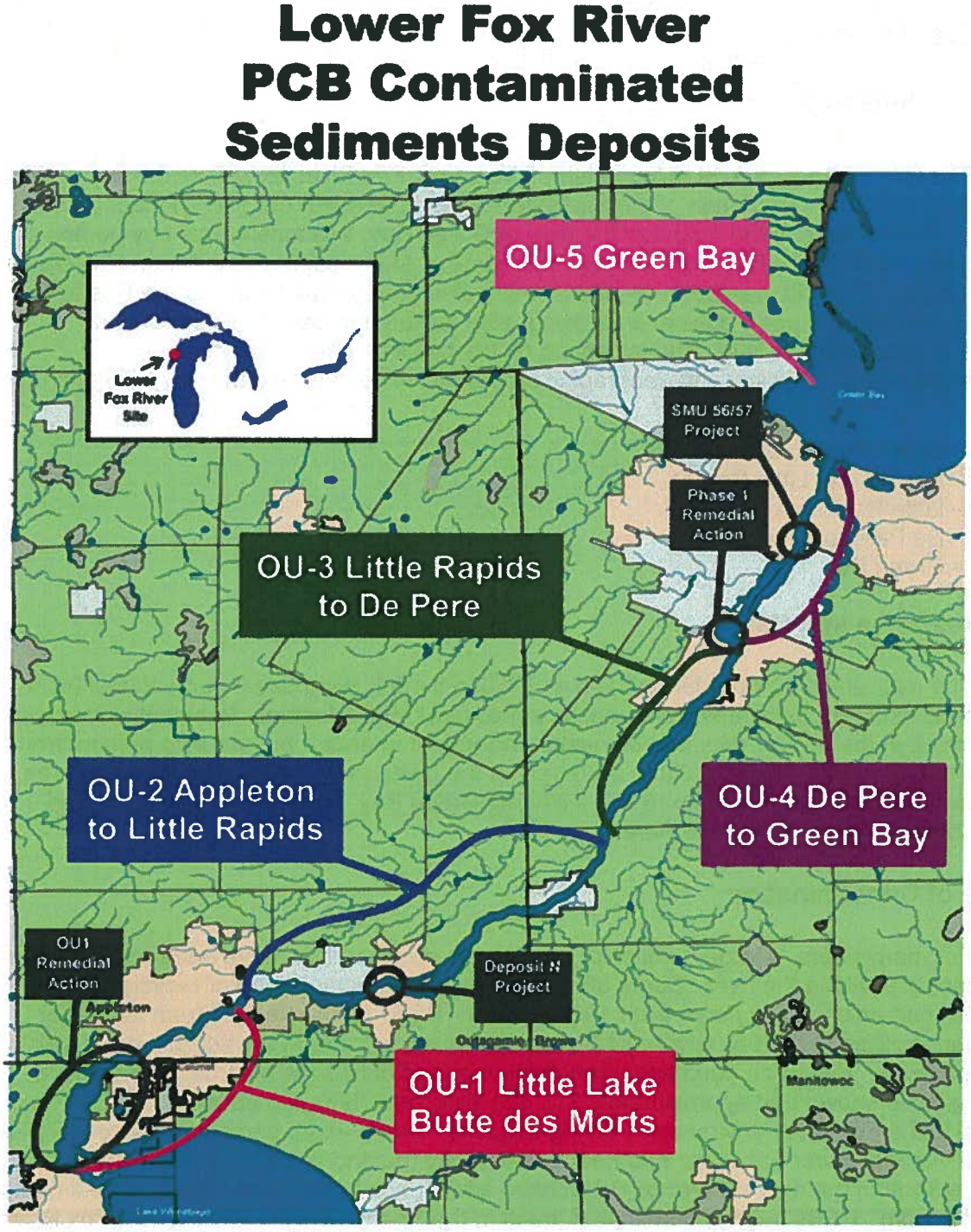

Figure 1. Fox River NRDA PCB Releases Site, projects to-date

Investigations, Initial Responses, Agency Decisions, and Legal Actions

The Site was proposed for the National Priorities List (NPL) on July 28, 1998. The Site's placement on the NPL was deferred, pending cooperation of the Potentially Responsible Parties (PRPs).

The Response 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 [SMU 56/57]) from 1998 – 2000. Details of these projects are discussed in the 2003 ROD. In 2000, the SMU 56/57 project was completed as a time-critical removal action. A total of 90,000 cubic yards (cy) of PCB-contaminated sediments were removed and disposed off-site during these dredging projects.

In March 1998, WDNR began a Remedial Investigation (RI), Feasibility Study (FS) and Risk Assessment with funding and technical assistance from the EPA. WDNR released the draft Remedial Investigation/Feasibility Study (RI/FS) and Risk Assessment for public review and comment in March 1999. The early release in the planning process of the draft RI/FS for public comment allowed the Response Agencies to evaluate public acceptance of cleanup alternatives. Comments were received from governmental agencies, the public, environmental groups, and private-sector entities. These comments were used to revise and refine the scope of work that led to the RI/FS and Proposed Plan released for public comment in October 2001. Comments received from PRPs, the public, and independent peer review committees were incorporated into the final RI/FS, as appropriate. In December 2002, EPA and WDNR signed the ROD for OU 1 and OU 2 which called for active remediation in OU 1 and "Monitored Natural Recovery" (MNR) in most of OU 2. In June 2003, a ROD was signed by EPA and WDNR for OU 3, OU 4 and OU 5. That 2003 ROD called for active remediation in OU 2 (deposit DD), OU 3, OU 4 and MNR for OU 5 (near river mouth).

Remedial activities for OU1 began in 2004, with 370,000 cy of PCB-contaminated sediment dredged and disposed off-site, and 260 acres capped or covered. This portion of the river cleanup was completed May 19, 2009.

An interim action identified as Phase 1 was completed in 2007. This dredging project was located in OU 4 just downstream of the De Pere Dam (see Figure 1), and removed 130,000 cy of more highly-contaminated PCB sediments. This action was consistent with the 2003 ROD and 2007 ROD Amendment (discussion below).

Table 2 summarizes dredging actions (i.e., demonstration projects, time-critical removal action, OU 1 remedial actions and the Phase 1 remedial action) discussed above.

The ROD Amendment for the Site signed June 26, 2007, made changes to certain aspects of the 2003 ROD for all or part of the following OUs: OU 2 (Deposit DD), OU 3, OU 4, and OU 5 (near the mouth of the river). Another ROD Amendment, signed June 12, 2008, made changes to parts of the remedy described in the 2002 ROD for OU1. These ROD Amendments modified the 2002 and 2003 RODs from all-dredging to a combination of dredging, capping, and covering. All public comments on these ROD Amendments were considered in the final decisions. These decisions are summarized in Table 3.

Table 2. Dredging projects to-date

Project name and Operable Unit	Years	Volume Removed (cy)	Project Type
Deposit N (OU 2)	1998 – 1999	10,000	Demonstration
SMU 56/57 (OU 4)	1999	30,000	Demonstration
	2000	50,000	Time-critical removal
Phase 1 (OU 4)	2007	130,000	Remedial action
OU 1	2004 – 2009	370,500	Remedial action
TOTAL to-date	1998 - 2009	590,500	

Table 3. Decisions summary

Operable Units	RODs		ROD Amendments	
	Remedy	Signature Date	Remedy Amendment	Signature Date
1	Dredging/disposal Capping contingency	December 20, 2002 (2002 ROD)	Dredging/disposal Capping Covering	June 12, 2008 (2008 ROD Amendment)
2	Monitored Natural Recovery[1]		Monitored Natural Recovery[1]	
3	Dredging/disposal Capping contingency	June 30, 2003 (2003 ROD)	Dredging/disposal Capping Covering	June 26, 2007 (2007 ROD Amendment)
4				
5	Monitored Natural Recovery[2]		Monitored Natural Recovery[2]	

[1] Except for Deposit DD

[2] Except near the mouth of the Fox River

Legal agreements that have contributed to the Site cleanup activities discussed above are summarized in Table 4 below. These orders and agreements provide for PRPs to conduct design activities, implement remedial actions and demonstration projects, and provide funding. PRPs are presently complying with a Unilateral Administrative Order, issued November 13, 2007, for the final remediation in OUs 2-5. This remedial action began on April 28, 2009. The anticipated date for completion of the OU 2-5 cleanup is 2017. These actions have been undertaken with WDNR as the technical lead and under EPA enforcement authority.

Table 4. Legal summary

Legal vehicle	Date of Entry or Signature	PRP signatories or Respondents	Scope
Administrative Order on Consent	May 26, 2000	• Ft. James Corporation and Fort James Operating Company	SMU 56/57 Remediation
Judicial Consent Decree	December 10, 2001	• Appleton Papers, Inc. and NCR Corporation	Funding of $41,500,000 for past costs and Fox River projects
Administrative Order on Consent	July 1, 2003	• WTM I Company (formerly Wisconsin Tissue)	OU 1 Design
Judicial Consent Decree	April 12, 2004	• P.H. Glatfelter Company • WTM I Company	OU 1 Design and Remediation
Administrative Order on Consent	March 5, 2004	• NCR Corporation and Fort James Operating Company	OU 2 – 5 Design
Judicial Consent Decree	November 3, 2006	• NCR Corporation • Sonoco-U.S. Mills Inc.	Phase 1 Remediation
Unilateral Administrative Order	November 13, 2007	• Appleton Papers, Inc. • CBC Coating, Inc. • Georgia-Pacific Consumer Products LP (a.k.a., Ft. James Corporation and Fort James Operating Company) • Menasha Corporation • NCR Corporation • P.H. Glatfelter • U.S. Paper Mills Corporation (a.k.a Sonoco U.S. Mills Inc.) • WTM I Company	OU 2 – 5 Remediation
Amended Administrative Order on Consent and Judicial Consent Decree Supplement	August 13, 2008, and November 13, 2007	• Menasha Corporation • P.H. Glatfelter Company • WTM I Company	$7 million added to the settlement by Menasha Corporation

- **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. The Response Agencies 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 Site to Lake Michigan.** The objective of this RAO is to reduce the transport of PCBs from the river into Green Bay and Lake Michigan as quickly as possible. The Response Agencies defined the transport expectation as a reduction in PCB loading to Green Bay and Lake Michigan to levels comparable to the PCB loading from other Lake Michigan tributaries. This RAO applies to each OU encompassing part of the river.

- **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.

Remedies Summary

OU 1 (a.k.a. Little Lake Butte des Morts)

Operable Unit 1 consists of the first six upstream miles of the Lower Fox River, commonly known as Little Lake Butte des Morts.

The ROD Amendment for OU 1 was signed on June 12, 2008, modifying the ROD signed on December 20, 2002. This modification was based on new information compiled and analyzed in the *OU 1 Design Supplement, Lower Fox River Operable Unit 1*, dated November 16, 2007 (Design Supplement). The remedy consists of the following actions for all sediments with PCB concentrations greater than 1 ppm:

- Dredging and off-site disposal.
- 7-inch thick engineered cap of sand and armor stone.
- 3- to 6-inch thick sand cover for areas with PCB concentrations less than 2 ppm and where the contaminant interval is less than 8-inches in thickness.
- Long-term monitoring and maintenance. Monitoring will consist of monitoring fish and surface water, and cap integrity and containment effectiveness. If cap integrity is compromised, either cap repair or removal (along with removal of underlying contamination) would be conducted.

The RAL for the major contaminant, PCBs, is 1 ppm, with a goal for a PCB average surface weighted average concentration (SWAC) of 0.25 ppm for the Operable Unit. This compares to a pre-remediation SWAC of 1.9 ppm. Except for construction limitations in capped areas, the goal for the Site is unrestricted use.

Basis for Taking Action

The Site is presently contaminated with PCBs, a hazardous substance and probable human carcinogen. It has been estimated that the 14 million cy of contaminated river sediments contain over 65,000 pounds of PCBs, and at least several hundred million cy of sediments in Green Bay are contaminated with as much as 150,000 pounds of PCBs. Because fish and wildlife are contaminated with PCBs, people who eat contaminated fish or waterfowl may suffer adverse health effects. Fish consumption advisories for the Site were first issued in 1976 and 1977 by WDNR and the state of Michigan, respectively. The advisories are still in effect. Wildlife also has documented adverse impacts.

In conjunction with the RI/FS, an ecological risk and exposure assessment for the Site was completed in December 2002. The results of the risk assessment are summarized in the 2002 and 2003 RODs. The conclusions of the evaluations (which are still valid since Site conditions are relatively unchanged since the 2002 ROD) are:

- Human health and ecological receptors are at risk in each operable unit.
- Fish consumption is the exposure pathway representing the greatest level of risk for human and ecological receptors, other than the direct risks posed to benthic invertebrates via direct exposure to contaminated sediments.
- The primary contaminant of concern is PCBs.

IV. Remedial Actions

Remedy Selection

Remedial Action Objectives

The 2002 and 2003 RODs and the 2007 and 2008 ROD Amendments adopted the same Site-wide Remedial Action Objectives (RAOs). The following five RAOs have been established for the Site:

- **RAO 1: Achieve, to the extent practicable, surface water quality criteria throughout the Site.** 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 animal's) 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 Response Agencies 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, following remedy completion.

OU 2

The remedy consists of Monitored Natural Recovery (MNR), including measuring PCB and mercury levels in water, sediment, invertebrates, fish, and birds. Baseline monitoring has been completed and long-term monitoring will begin upon completion of the long-term monitoring plan, which is scheduled for September 2009.

OU 2 (Deposit DD), OU 3, OU 4 and OU 5 (river mouth)

Remedial actions for OU 2 - 5 are being undertaken in the downstream 12 miles of the Lower Fox River (Figures 5a – 5e).

The ROD Amendment for OU 2 - 5 was signed on June 26, 2007, modifying the ROD signed on June 30, 2003. This modification was based on new information compiled and analyzed in the *Basis of Design Report* for OUs 2 - 5, dated June 16, 2006. The remedy consists of the following actions for all sediments with PCB concentrations greater than 1 ppm:

- Dredging and off-site disposal.
- An engineered cap of sand and armor stone from 13-inches to 33-inches thickness.
- A 6-inch thick sand cover for areas with PCB concentrations less than 2 ppm, and where the contaminant interval is less than 6 inches in thickness.
- Long-term monitoring and maintenance. This will consist of monitoring fish, surface water, and cap integrity. If cap integrity is compromised, either cap repair or removal (with removal of underlying contamination) will be conducted.

. The RAL for the major contaminant, PCBs, is 1 ppm. There is a post-remediation goal for a PCB SWAC of 0.25 ppm for OU 3 and OU 4, compared to a pre-remediation SWAC of 1.8 ppm for OU 3, and 3.6 for OU 4. Except for construction limitations in capped areas, the goal for the Site is unrestricted use.

OU 5 (except near river mouth)

The selected remedy for OU 5 is MNR with institutional controls. Activities will include monitoring to confirm long-term recovery of Green Bay through reliance on natural processes, primarily dispersion.

Remedy Implementation

OU 1

From 2004 to 2009, 370,500 cy of PCB-contaminated sediment in OU 1 were dredged and 260 acres capped with sand and armor stone or covered with sand. Dredged sediments were disposed offsite. Table 5 and Figures 2, 3 and 4 below summarize these actions. Final remedial actions for OU 1 were completed on May 19, 2009. These actions provide a final average surface PCB SWAC concentration of 0.22 ppm, less the 2008 ROD Amendment goal of 0.25 ppm.

Table 5. Summary of OU 1 remedial actions

Remedial Actions	Years Completed	Volume Removed (cy)	Areas Addressed (acres)
Dredging	2004 – 2008	370,500	220
Capping	2007 – 2009	--	110
Covering*	2007 - 2008	--	150
All actions (dredging, capping and covering)	2004 - 2009	370,500	480

* Includes areas with sand covers that still had PCB concentrations greater than 1 ppm after dredging (i.e., "residual" contaminated sediments).

Figures 2, 3 and 4 show areas where dredging, capping, and sand covering, respectfully, were completed through May 19, 2009.

OU 2 (excluding Deposit DD)

The OU 2 remedy includes a 30-year monitoring program for measuring PCB and mercury levels in water, sediment, invertebrates, fish, and birds. However, the Agencies may modify monitoring activities, based on additional sampling analysis and other evaluations.

OU 2 (Deposit DD), OU 3, OU 4 and OU 5 (near river mouth)

To date, 80,000 cy of PCB-contaminated sediment have been removed in the SMU 56/57 project and 130,000 cy of PCB-contaminated sediment have been removed in the Phase 1 project, conducted in 1999-2000 and in 2007, respectively. These two dredging projects addressed the highest PCB concentrations in the river with PCB concentrations as high as 3,000 ppm.

Remedial activities began in late April 2009 in OU 2, OU3 and OU 4. These activities will continue until completion in 2017 when all remedial activities will be complete, although long-term monitoring will continue until the PCB concentrations in fish reach acceptable concentrations. Table 6 provides the schedule, volumes, and acreage for remedial activities at OUs 2 - 5. Figures 5a – 5e show areas for planned remedial actions.

OU 5 (except near river mouth)

The selected remedy for OU 5 is MNR with ICs and dredging, capping or covering PCB-contaminated sediments near the mouth of the Lower Fox River (discussed above). Long-term monitoring will be implemented upon completion of dredging, capping and covering actions near the mouth of the river.

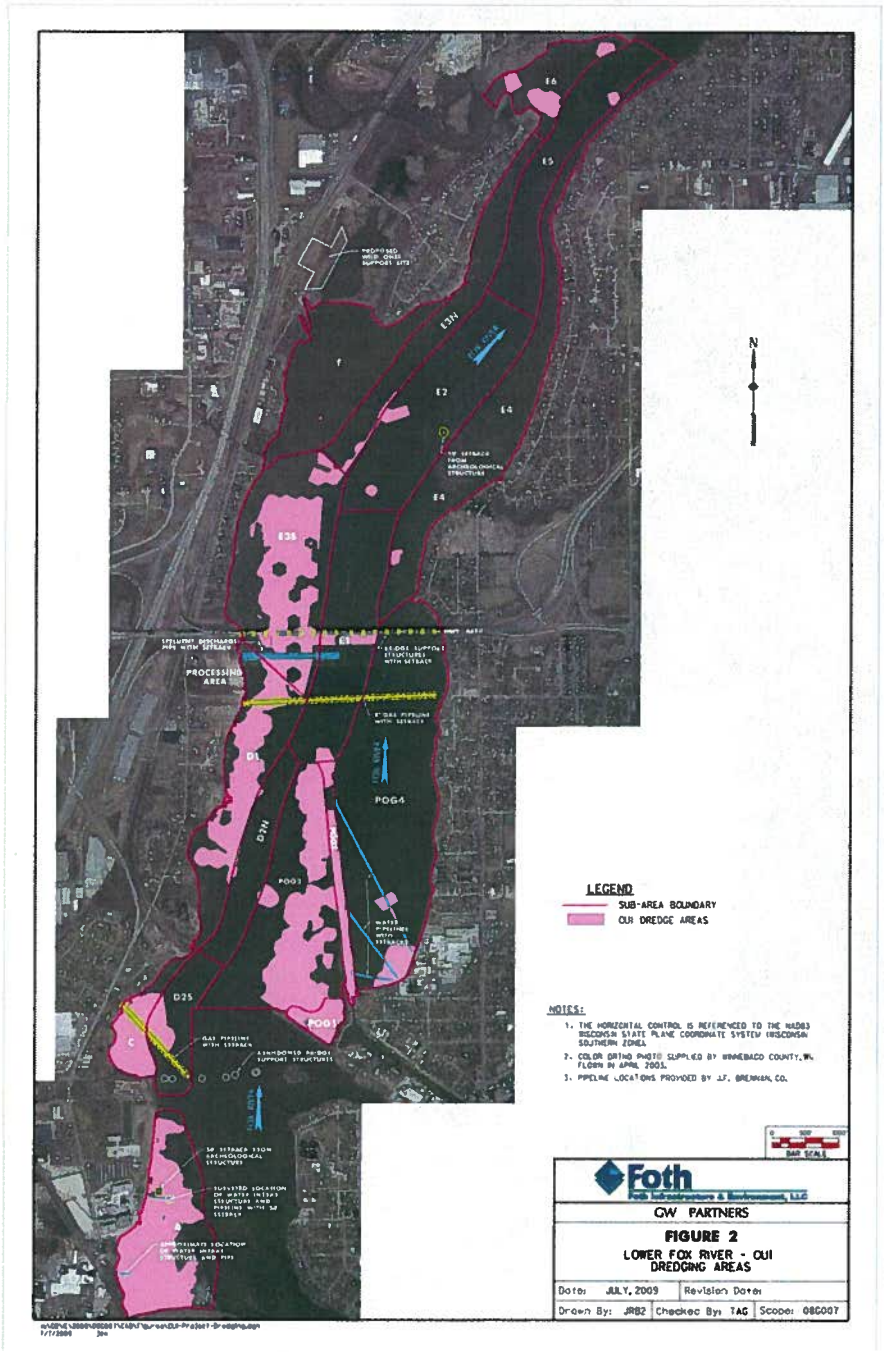

Figure 2. OU 1 areas dredged from 2004 to 2008

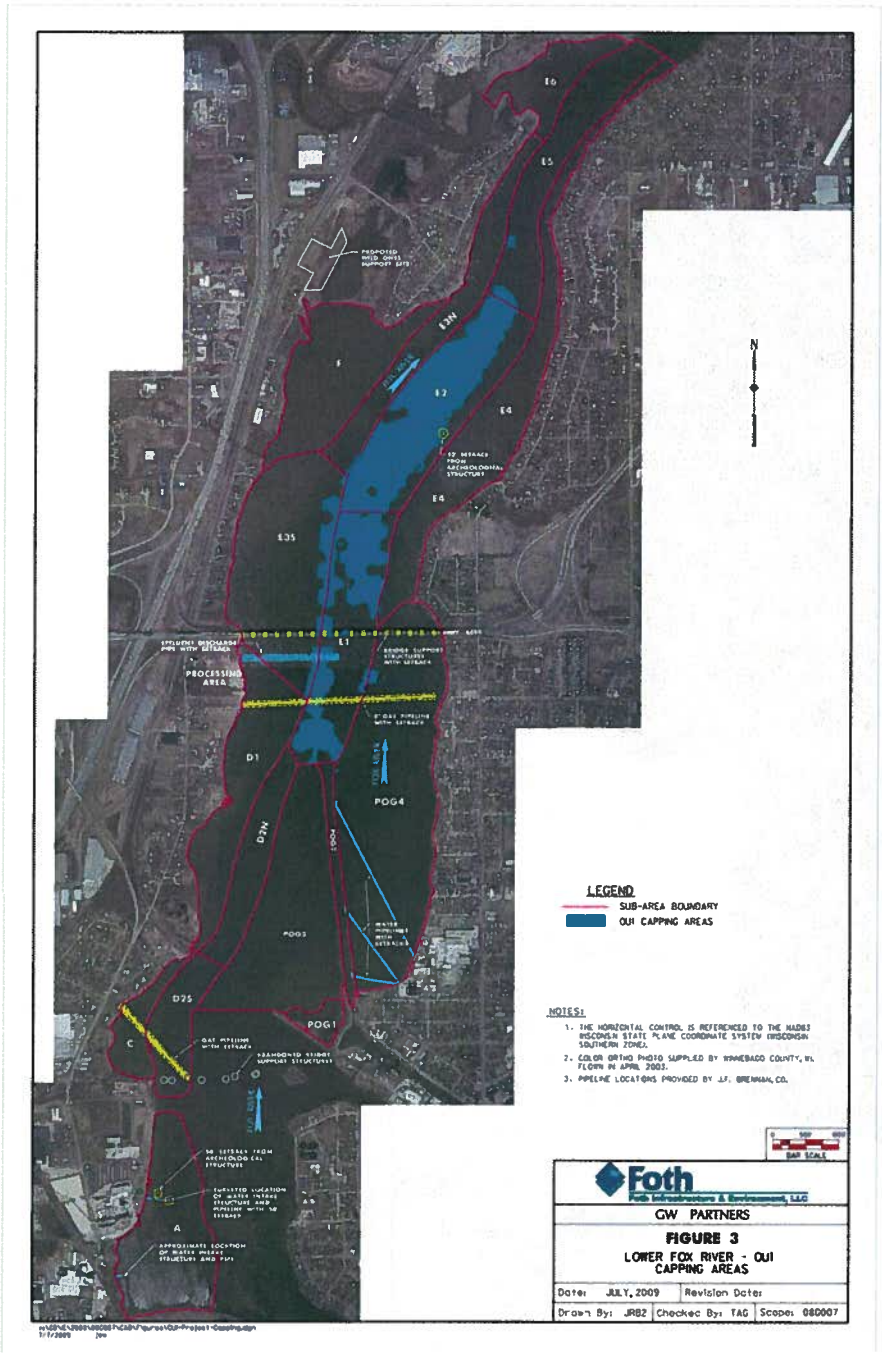

Figure 3. OU 1 areas capped from 2007 to 2008

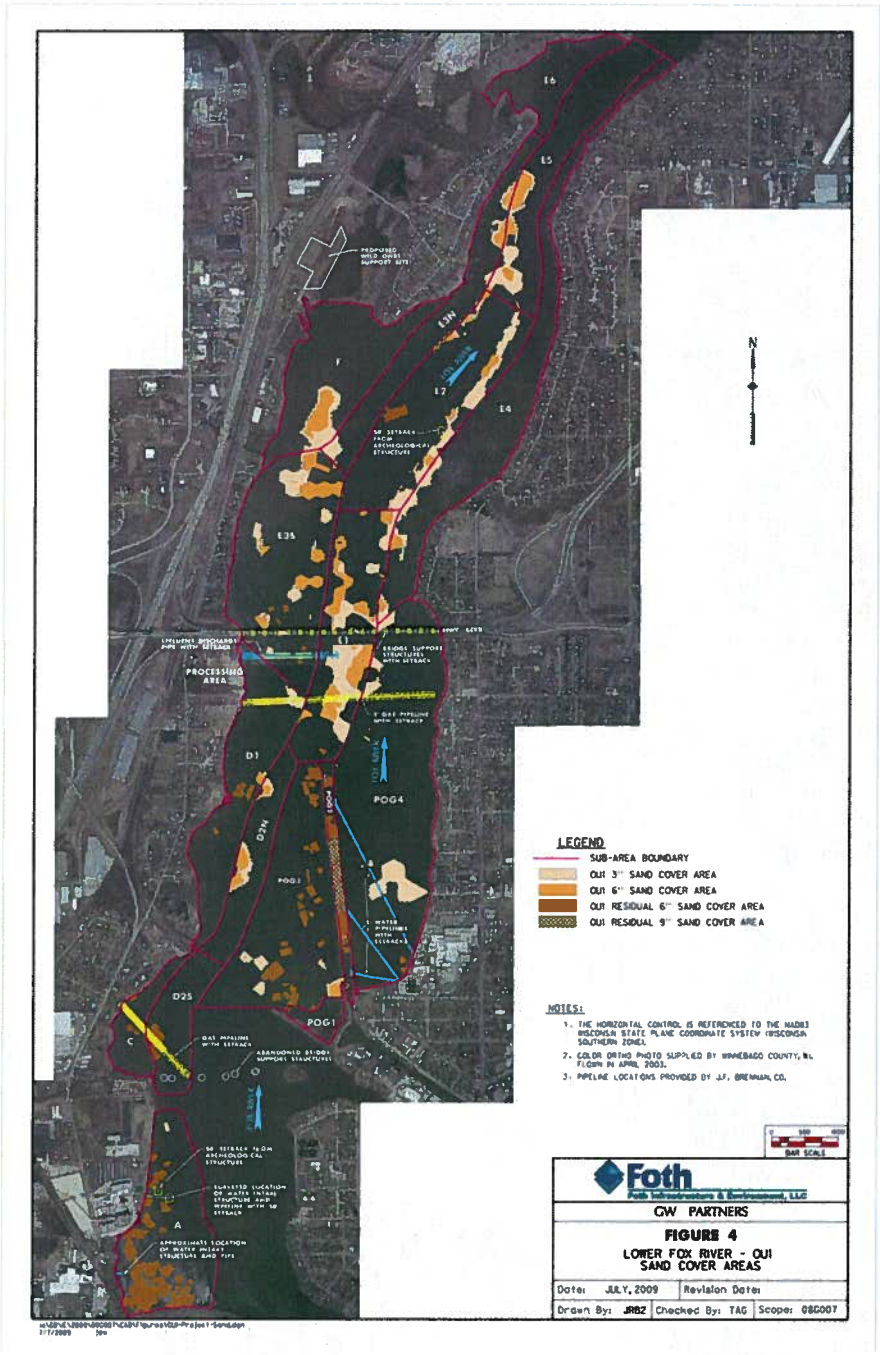

Figure 4. OU 1 areas sand covered from 2008 to 2009

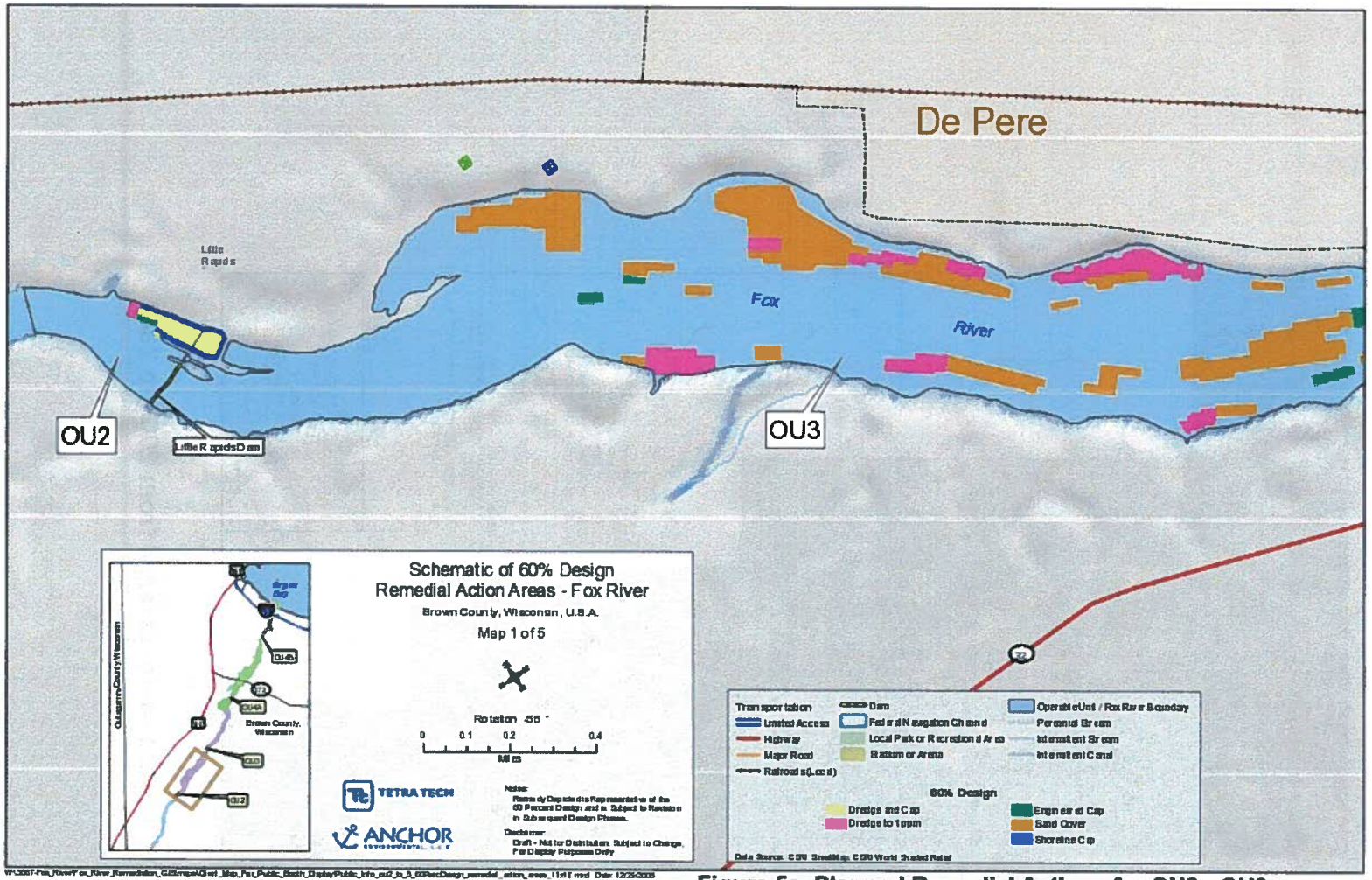

Figure 5a. Planned Remedial Actions for OU2 - OU3

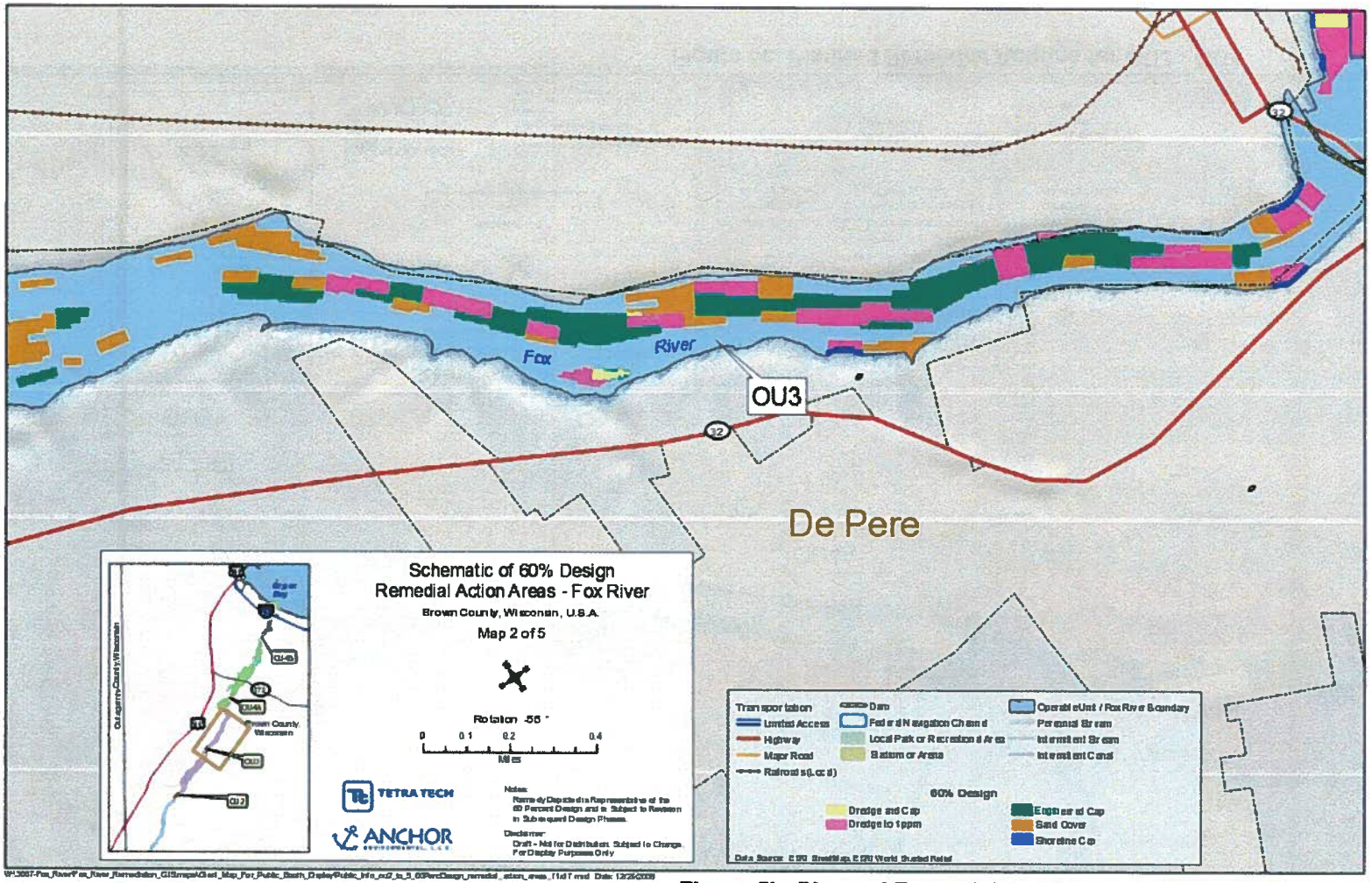

Figure 5b. Planned Remedial Actions for OU3 - OU4

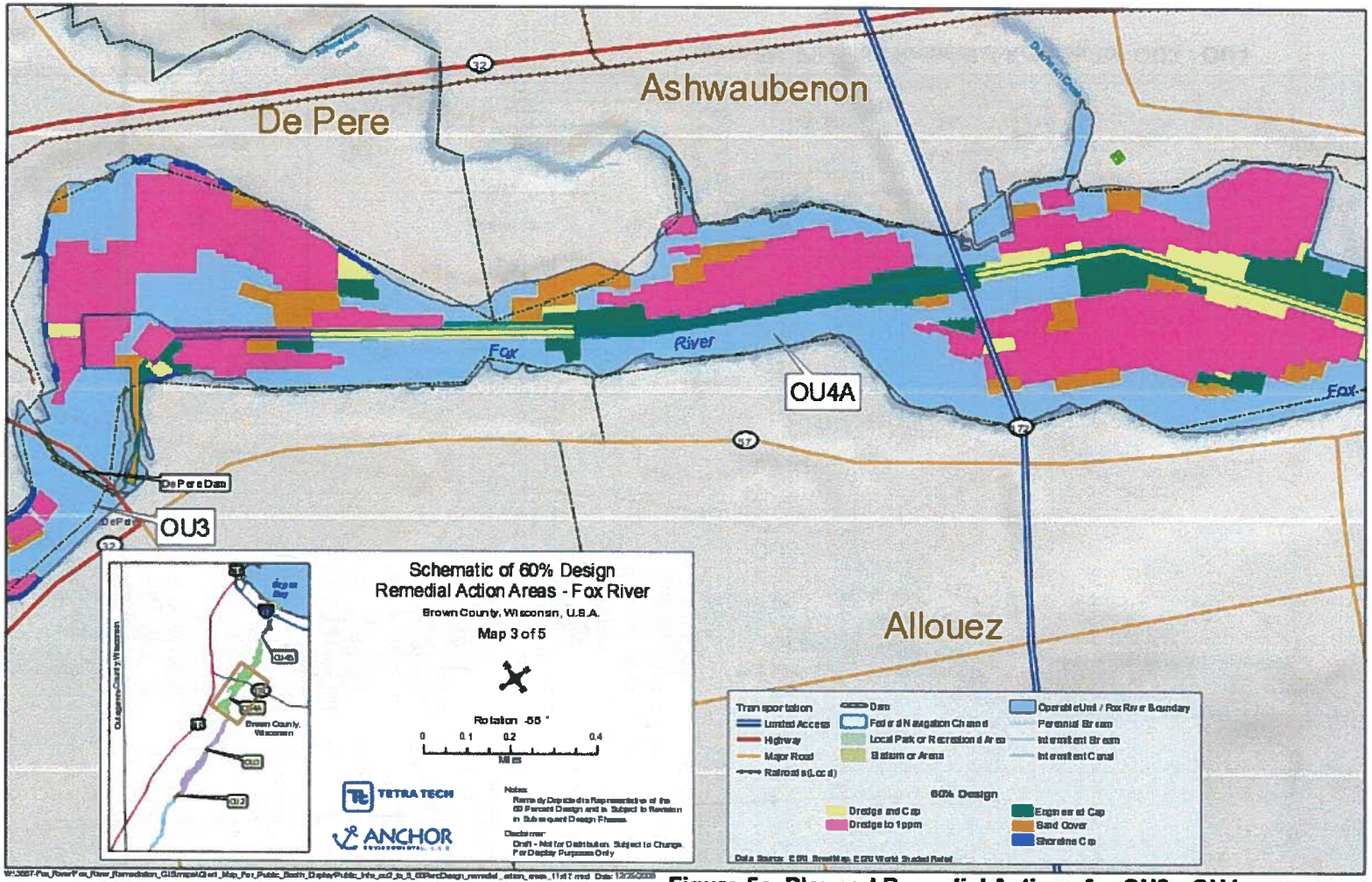

Figure 5c. Planned Remedial Actions for OU3 - OU4

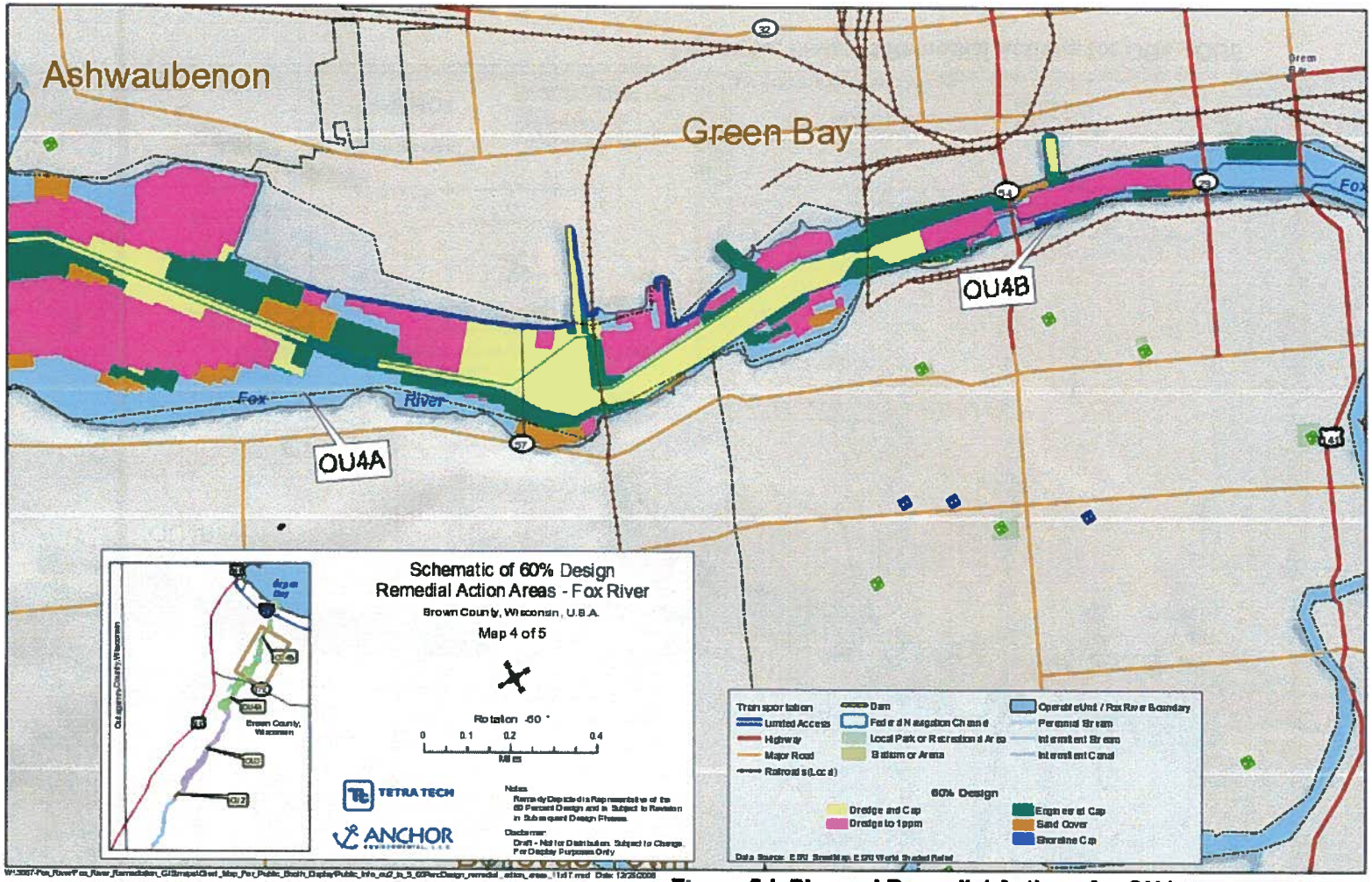

Figure 5d. Planned Remedial Actions for OU4

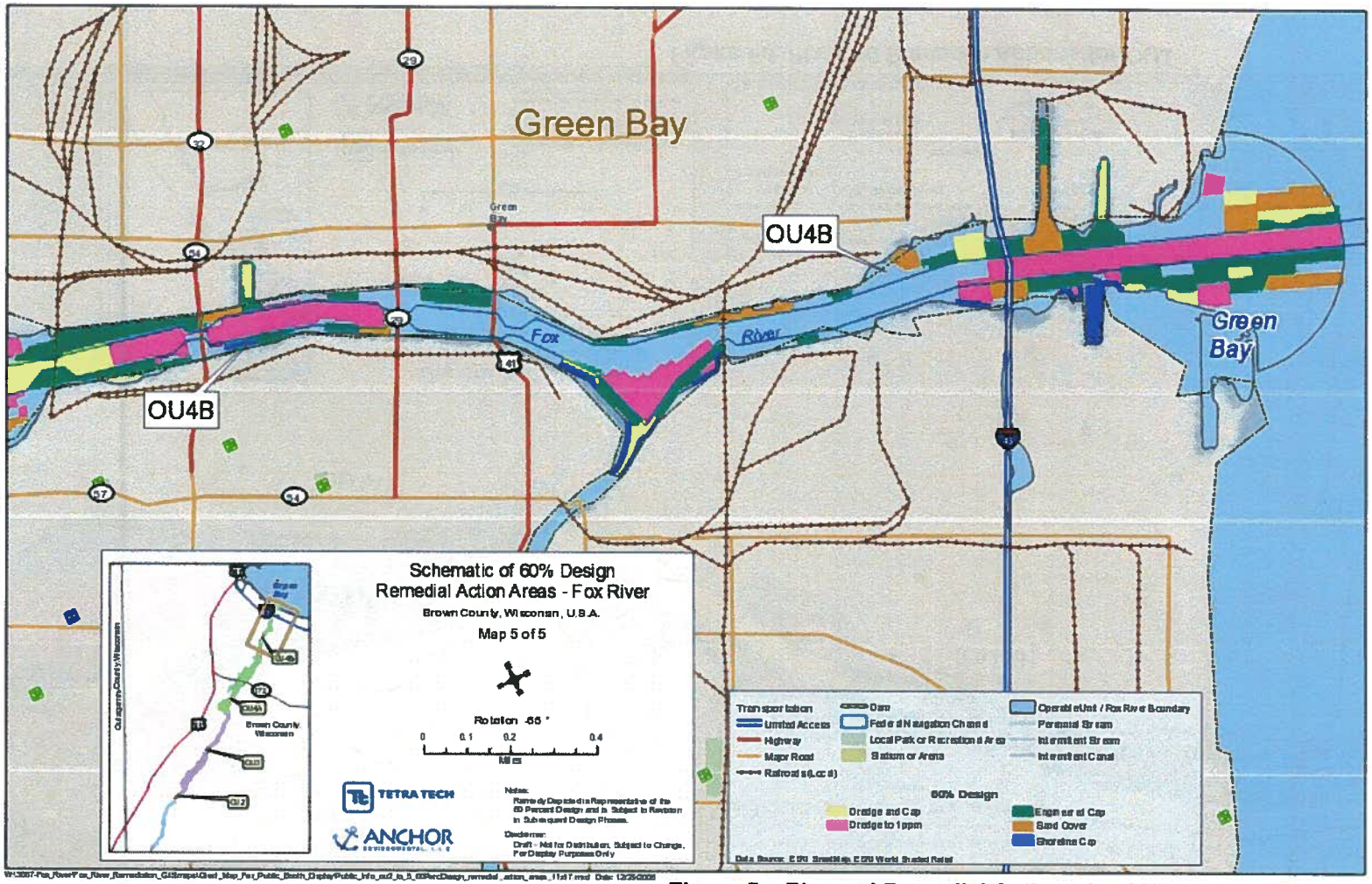

Figure 5e. Planned Remedial Actions for OU4 - OU5

Table 6. Schedule, volumes, acreages and areas to be remediated for OU 2 - 5

Year	Dredging		Capping		Sand Covering*	
	Volume (cubic yards)	Operable Units	Acres	Operable Units	Acres	Operable Units
2009	460,000	2, 3, and 4	0	---	0	---
2010	660,000	3 and 4	37	2 and 3	84	2, 3 and 4
2011	510,000	4	32	2 and 3	98	2, 3 and 4
2012	660,000	4	43	2, 3 and 4	67	4
2013	660,000	4	52	4	74	4
2014	610,000	4	66	4	47	4
2015	440,000	4 and 5	63	4	31	4
2016	0	---	28	4	3	4
2017	0	---	94	4 and 5	55	4 and 5
Total	4,000,000	2, 3, 4, and 5	415	2, 3, 4 and 5	459	2, 3, 4 and 5

* Includes both sand cover as the primary remedial action and, where necessary, for residuals over dredge areas.

Institutional Controls

Institutional controls are required to ensure the protectiveness of the remedy as is described in the RODs (as amended) and summarized below. Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any area which does not allow for unlimited use or unrestricted exposure (UU/UE).

The figures cited in Table 7 below identify the areas that will not allow for UU/UE. The table below summarizes ICs for these restricted areas.

Table 7. Institutional controls summary

Media, Engineered Controls, & Areas that Do Not Support UU/UE Based on Current Conditions.	IC Objective	Title of Institutional Control Instrument Implemented (note if planned)
Capped areas in OU 1 - OU 5 - - identified in Figures 3 and 5a – 5e.	Prohibit interference with capped area and prohibit inconsistent uses	ICIAP being developed
OU 1 – OU 5	Limit fish consumption	Fish Advisories (currently in place; effectiveness under review)

ICs have not been implemented as the remedy is not yet complete. The PRPs are developing an Institutional Control Implementation and Assurance Plan (ICIAP) for EPA review and approval. The ICIAP will be implemented after EPA approval and construction completion. The ICIAP will specify the types and details for the ICs, including a schedule for implementation, and will include a monitoring plan to ensure long-term stewardship. Anticipated ICs are non-engineered instruments such as administrative and/or legal controls that would minimize potential for exposure to contamination and protect the integrity of the remedy. Additionally, fish advisories, currently in place, would likely be required until contaminant concentrations in fish

are reduced such that unrestricted consumption would not present a risk. The effectiveness of the fish advisories will be evaluated in the ICIAP, along with recommendations to ensure that the advisories are further communicated to the general public (if necessary). Compliance with ICs will be required to assure long-term protectiveness for any area which does not allow for unlimited use and unrestricted exposure and will ensure the remedy continues to function as intended. Once ICs are implemented, long-term stewardship procedures will be developed to ensure that the ICs are maintained, monitored and enforced. The long-term stewardship plan will be included in the ICIAP.

Long-term Monitoring and Maintenance

After construction completion and verification that the 2007 and 2008 ROD Amendments' standards have been met, the Site will be monitored on a regular basis. For OU 1, the remedial action will be initially evaluated in a final construction report in 2010. Furthermore, based on the schedule described in Table 6, there will also be a final construction report for OU 2 and OU 3 by 2013. Finally, in 2018 a final construction report would be completed for OU 4 and OU 5, the final areas at the Site that require remedial actions. Currently a long-term monitoring plan is being developed that will identify the long-term monitoring activities that will be conducted at the Site.

Completion of the remedial actions in 2017 in OU 4 – 5 should complete cleanup work at the Site. Following the completion of the remedial action, additional information to be obtained will consist of the following:

- Post-remediation sampling of residual sediments in dredged areas that do not have a cap or sand cover.
- Post-construction monitoring to determine if caps and covers are installed as designed.
- Long-term monitoring of caps to confirm their containment effectiveness. If necessary, additional maintenance of caps will be conducted.
- Long-term monitoring of surface water and fish for confirmation of environmental improvements.

These same monitoring actions will also be done at OU 1, with post-construction monitoring having begun, with other actions to follow.

V. Progress Since the Last Review

This is the first Five-Year Review for the Site. The triggering action for this review is the date of initiation of the remedial action in OU 1 at the Site which is September 9, 2004, the start of dredging in OU 1. This Five-Year Review is required because hazardous substances, pollutants, or contaminants remain above levels that do not allow for unlimited use and unrestricted exposure. Since 2004, 500,000 cy of PCB-contaminated sediment have been removed from the Site and 245,000 cy have been capped or covered.

VI. Five-Year Review Process

Administrative Components

During October 2008, EPA notified the PRPs that it was undertaking a Five-Year Review. EPA also sent a letter to Greg Hill, the Project Coordinator for WDNR, on October 30, 2008, notifying WDNR that EPA was initiating a Five-Year Review.

Community Notification and Involvement

On October 23, 2008, via advertisements placed in the "Green Bay Press Gazette" and the Appleton Post Crescent, EPA informed the community that a Five-Year Review Report compilation effort had commenced for the Site. Readers of the notice were given information as to the location of local Site information repositories, and were provided names, mailing addresses, toll-free and direct dial phone numbers, and e-mail addresses of both the Community Involvement Coordinator (CIC) and the Remedial Project Manager (RPM) for further information. The notice requested that interested persons relay any information of interest, comments, or Site matters to either the CIC or the RPM. EPA received no comments from Support Agencies or the community regarding the five-year review.

Additionally, notice regarding the initiation of EPA's Five-Year Review was featured in the Response Agencies newsletter, the Fox River *Current*, summer 2008. This newsletter was mailed to about 16,000 people, and was posted on the EPA Fox River Site webpage at: http://www.epa.gov/region5/sites/foxriver/index.html. The Fox River site webpage also featured an October 2008 Site update describing this Five-Year Review.

Although no community interviews were conducted specifically for this five-year review, extensive community involvement activities have been ongoing at the Site. Since the 2002 ROD, the following major public meetings and press conferences have occurred:

- Oct. 2003 -- OU 1 Remedial design/remedial action Consent Decree press conference,
- Aug 2004 -- OU 1 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 1 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.

In addition to the meetings and other frequent informal communications with the community, for each of the RODs and ROD Amendments, comments were submitted to the Response Agencies and the Response Agencies responded to all comments. Finally, since the issuance of the 2002 ROD, staff of both Response Agencies have also made presentations at, or attended, approximately 50 meetings or community events to discuss Site cleanup, restoration or other Site-related issues, as requested by local officials, citizen groups, universities and other schools, unions, etc. The Response Agencies also continue to send the Fox River *Current* newsletter to 16,000 addresses.

Further information regarding recent Site construction and remediation-related activities can be found at the following website, maintained and updated by Region 5's Community Involvement Section: **http://www.epa.gov/region5/sites/foxriver/index.html**

Additionally, PRPs doing work at OUs 2 - 5 have posted photos and Site construction updates at the following website, maintained by the PRPs: http://www.foxrivercleanup.com/

Document Review

For OU 1, the majority of EPA's document review is based on review of analytical results, design evaluations, and post-remediation sampling. For OUs 2 - 5, the majority of EPA's review is based on review of analytical results and design evaluations. Attachment 1 contains a list of the documents reviewed for purposes of conducting this five-year review.

Data Review

Pre-remediation sediment, fish, and surface water data was collected and evaluated during the RI/FS and considered in the 2002 and 2003 RODs. Additionally, pre-remediation sediment data was collected as part of design activities and considered in the 2007 and 2008 ROD Amendments. For OU 1, for areas where dredging was completed from 2004 to 2008, confirmation sediment data was taken and considered to ensure that removal was sufficient in those areas to comply with the 2002 ROD requirements. Upon completion of remedial actions in OU 1, OU 2, OU 3, OU 4 and OU 5, additional post-remediation data will be collected and evaluated.

Site Inspection

EPA arranged for PRP representatives to be present at the Five-Year Review Site inspection conducted on November 5, 2008. The Five-Year Review Site inspection examined the river to determine if Site conditions had changed and to confirm the status of ongoing remedial activities. The Site Inspection Checklist is included as Attachment 2.

VII. Technical Assessment

- ***Question A: Is the remedy functioning as intended by the decision documents?***

The remedy is currently under construction and is being constructed in accordance with the requirements of the RODs (as amended) and the design specifications. The remedy is expected to be protective after it is completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. Upon completion of remedial actions, long-term monitoring will be conducted and EPA will determine if the remedy is functioning as intended and described in the RODs and ROD amendments. Fish consumption advisories are presently in-place. ICs have not been implemented because the remedy is not yet complete. However, an ICIAP is being developed that will specify the types and details of the necessary ICs.

- ***Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action objectives (RAOs) used at the time of remedy selection still valid?***

Yes. Site conditions are essentially unchanged and there are no new cleanup standards applicable to the Site.

- ***Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No. At this time, nothing has come to light that would call into question the protectiveness of the remedy.

Technical Assessment Summary

The remedy is currently under construction and is being constructed in accordance with the requirements of the RODs (as amended) and design specifications. The remedy is expected to be protective after it is completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. EPA will determine whether the remedy is functioning as intended once the response actions for OU 1, OU 2, OU 3, OU 4 and OU 5 are completed. The evaluation will measure PCB concentrations in dredged/uncovered areas, and will evaluate whether the caps and covers have been installed as required by the 2007 and 2008 ROD Amendments. A determination about long-term protectiveness will be made after evaluating the results of long-term monitoring of surface water and fish.

VIII. Issues

Construction of the remedy, follow-up monitoring, and final determination of ICs have not been completed. Completion of the remedy, construction confirmation, monitoring and implementing and maintaining ICs will be required to assure protectiveness of the remedy. An ICIAP is currently being developed in the design for OUs 2 - 5. The completion of the ICIAP is scheduled for December 2009. Implementation of ICs is expected to begin after 2009 for OU 1, after 2012 for OU 2 and OU 3 and after 2017 for OU 4 and OU 5.

Table 8. Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Remedy is not yet complete	Y	Y
Long-term monitoring of fish and surface water has not begun	N	Y
ICs have not been evaluated	N	Y

IX. Recommendations and Follow-up Actions

Table 9. Recommendations and follow-up actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Remedy is not yet complete	Complete remedial actions and confirm that remedial actions have met requirements in the RODs and ROD Amendments	PRPs	EPA and WDNR	2017[1]	Y	Y
Long-term monitoring of fish and surface water has not begun	Conduct monitoring of fish and surface water upon completion of remedial actions	PRPs	EPA and WDNR	2012[2]	N	Y
ICs have not been evaluated	Complete ICIAP and implement as set forth in RODs and ROD Amendments	PRPs	EPA and WDNR	Within 6 months of completion of 5-Year Review	N	Y

[1] All areas are anticipated to have remedial actions completed by 2017. Remedial actions for OU 1 were completed May 19, 2009. Other portions of the site planned for completion of remedial actions are OU 2 - 3 in 2012, and OU 4 - 5 in 2017.

[2] Most of the long-term monitoring will begin in 2012 for OU 1, in 2014 for OU 3, and 2019 for OUs 4 - 5.

X. Protectiveness Statement(s)

The remedial action being implemented at OU 1 (i.e., dredging, capping and covering) is expected to be protective, although it may take some additional time for fish tissue concentrations to decrease. Although construction work in OU 1 was completed on May 19, 2009, additional required long-term monitoring has not yet been conducted.

The remedial actions being implemented at OU 2 and OU 3 (i.e., dredging, capping and covering) are expected to be protective after they are completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. It is expected that the remedial actions for OUs 2 and 3 will be completed by 2012, after which construction confirmation, follow-up sampling and long-term monitoring will be conducted.

The remedial actions being implemented at OU 4 and OU 5 (i.e., dredging, capping and covering) are expected to be protective after they are completed, although it may take some time after completion of remediation for fish tissue concentrations to decrease. It is expected

that the remedial actions for OUs 4 and 5 will be completed by 2017, after which construction confirmation, follow-up sampling and long-term monitoring will be conducted.

Completion of the remedial actions in OU 4 – 5 should complete cleanup work at the Site. Following the completion of the remedial action and after evaluation of additional information, EPA will make a site-wide protectiveness determination.

Long-term protectiveness of the remedy will require compliance with effective ICs. Compliance with ICs will be ensured by maintaining, monitoring and enforcing ICs, as well as maintaining the remedy components at the Site.

XI. Next Review

The next Five-Year Review for the Lower Fox River and Green Bay Site is required by July 2014, five years from the date of this review.

Attachment 1 – List of documents reviewed

Appleton Papers, Inc., Georgia-Pacific Consumers Products LP, NCR Corporation, Lower Fox River Remedial Design, 60% Design Report for 2010 and Beyond Remedial Actions, Volume 2 of 2, June 2008.

Appleton Papers, Inc., Georgia-Pacific Consumers Products LP, NCR Corporation, Lower Fox River Remedial Design, 60% Design Report for 2009 Remedial Actions, Volume 1 of 2, June 2008.

Fort James Operating Company and NCR Corporation, Basis of Design Report, June 2006 for OUs 2- 5, Lower Fox River and Green Bay Site.

GW Partners, OU 1 Design Supplement Lower Fox River Operable Unit 1, dated November 2007 (Design Supplement).

United States Environmental Protection Agency, Record of Decision, Operable Units 1 and 2, Lower Fox River and Green Bay Site, December 2002.

United States Environmental Protection Agency, Record of Decision, Operable Units 3, 4, and 5, Lower Fox River and Green Bay Site, June 2003.

United States Environmental Protection Agency, Record of Decision Amendment, Operable Unit 2 (Deposit DD), Operable Unit 3, Operable Unit 4, and Operable Unit 5 (River Mouth), Lower Fox River and Green Bay Site, June 2007.

United States Environmental Protection Agency EPA, Record of Decision Amendment, Operable Unit 1, Lower Fox River and Green Bay Site, June 2008.

Attachment 2 – Site inspection checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Lower Fox River and Green Bay	**Date of inspection:** 11/5/08
Location and Region: NE Wisconsin, Region 5	**EPA ID:** WID000195481
Agency, office, or company leading the five-year review: U.S. EPA, Region 5	**Weather/temperature:** Partly cloudy, 60's

Remedy Includes: (Check all that apply)

Landfill cover/containment	Monitored natural attenuation
Access controls	Groundwater containment
Institutional controls	Vertical barrier walls
Groundwater pump and treatment	
Surface water collection and treatment	

Other Dredging/disposal, capping, sand covering, monitoring & maintenance

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** N/A _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** N/A _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A - remedial actions not yet completed.
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - O&M manual — Readily available — Up to date — (N/A)
   - As-built drawings — Readily available — Up to date — (N/A)
   - Maintenance logs — Readily available — Up to date — (N/A)

   Remarks_____

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — (N/A)
   - Contingency plan/emergency response plan — Readily available — Up to date — (N/A)

   Remarks_____

3. **O&M and OSHA Training Records** — Readily available — Up to date — (N/A)

   Remarks_____

4. **Permits and Service Agreements**
   - Air discharge permit — Readily available — Up to date — (N/A)
   - Effluent discharge — Readily available — Up to date — (N/A)
   - Waste disposal, POTW — Readily available — Up to date — (N/A)
   - Other permits_____ — Readily available — Up to date — (N/A)

   Remarks_____

5. **Gas Generation Records** — Readily available — Up to date — (N/A)

   Remarks_____

6. **Settlement Monument Records** — Readily available — Up to date — (N/A)

   Remarks_____

7. **Groundwater Monitoring Records** — Readily available — Up to date — (N/A)

   Remarks_____

8. **Leachate Extraction Records** — Readily available — Up to date — (N/A)

   Remarks_____

9. **Discharge Compliance Records**
   - Air — Readily available — Up to date — (N/A)
   - Water (effluent) — Readily available — Up to date — (N/A)

   Remarks_____

10. **Daily Access/Security Logs** — Readily available — Up to date — (N/A)

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

State in-house — Contractor for State
PRP in-house — Contractor for PRP
Federal Facility in-house — Contractor for Federal Facility
Other N/A

2. **O&M Cost Records**

Readily available — Up to date
Funding mechanism/agreement in place
Original O&M cost estimate 10,450,000* — Breakdown attached
*Some overlap for OU2 - costs developed by different contractors.
Total annual cost by year for review period if available

From _____ (Date) To _____ (Date) _____ (Total cost) — Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) — Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) — Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) — Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) — Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS

Applicable (N/A)

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A
Remarks

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A
Remarks

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes No N/A
Site conditions imply ICs not being fully enforced — Yes No N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date — Yes No N/A
Reports are verified by the lead agency — Yes No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — Yes No N/A
Other problems or suggestions: Report attached

_____
_____
_____
_____

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks _____
_____
_____

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks _____
_____

2. **Land use changes on site** N/A
Remarks _____
_____

3. **Land use changes off site** N/A
Remarks _____
_____

VI. GENERAL SITE CONDITIONS

A. Roads Applicable (N/A)

1. **Roads damaged** Location shown on site map Roads adequate N/A
Remarks _____
_____

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS Applicable (N/A)

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____
   _____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches Applicable N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels Applicable N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment	Applicable	N/A
1. **Gas Treatment Facilities** Flaring Thermal destruction Collection for reuse Good condition Needs Maintenance Remarks_____		
2. **Gas Collection Wells, Manifolds and Piping** Good condition Needs Maintenance Remarks_____		
3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) Good condition Needs Maintenance N/A Remarks_____		
F. Cover Drainage Layer	Applicable	N/A
1. **Outlet Pipes Inspected** Remarks_____	Functioning	N/A
2. **Outlet Rock Inspected** Remarks_____	Functioning	N/A
G. Detention/Sedimentation Ponds	Applicable	N/A
1. **Siltation** Areal extent_____ Depth_____ N/A Siltation not evident Remarks_____		
2. **Erosion** Areal extent_____ Depth_____ Erosion not evident Remarks_____		
3. **Outlet Works** Remarks_____	Functioning	N/A
4. **Dam** Remarks_____	Functioning	N/A

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES Applicable (N/A)

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal
   - Oil/water separation
   - Bioremediation
   - Air stripping
   - Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition
   - Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A Good condition Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A Good condition Proper secondary containment Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A Good condition Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   N/A Good condition (esp. roof and doorways) Needs repair
   Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Remedy is still underway - construction expected to be complete by 2017. Generally site conditions are unchanged from when ~~[illegible]~~ decisions for site cleanup were made

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

N/A (not implemented yet)

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

N/A
(Remedial actions not yet completed)

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

N/A
(remedial actions not yet completed)