



## Sheboygan River and Harbor Superfund Site

# **Lower River Remedial Design Work Plan (LRRDWP)**

June 2009

*Prepared for*  
United States Environmental Protection Agency  
Region 5  
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# 1 Introduction

This Lower River Remedial Design Work Plan (LRRDWP) for the Lower River (i.e. Middle River, Lower River, and Inner Harbor) portion of the Sheboygan River and Harbor Superfund Site has been prepared in response of the selected remedy as set forth in the *Record of Decision (ROD)* and in accordance with the *Administrative Order on Consent for the Remedial Design for the Lower River Portions of the ROD (AOC)* and *Lower River Remedial Design Statement of Work (LRRDSOW)* for achievement of the Performance Standards. This LRRDWP was developed consistent with the following U.S. EPA guidance documents:

- *Guidance on U.S. EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, Interim Final*, OSWER Directive No. 9355.5-01. P5-6. April 1990
- *U.S. EPA Remedial Design/Remedial Action Handbook*, OSWER Directive No. 9355.0-4B. June 1995

This LRRDWP discusses the contents of the submitted plans, project organization, and schedule required for the implementation of the pre-design and design phases. The LRRDWP will not detail the Lower River remedy until the Pre-Design Investigation is complete. The design components will be similar to those used during the Upper River Sediment Removal. A brief description is provided in Section 7.

## 1.1 Site Description

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County. The Lower River includes the 11 miles of the river from the Waelderhaus Dam downstream to Lake Michigan and is comprised of the Middle River, Lower River, and Inner Harbor reaches. These reaches were defined by the U.S. EPA during the Remedial Investigations (RI), based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River reach of the site was completed in 2007. Each Lower River reach is described below and presented on Figure 1:

Middle River - extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge.

Lower River - extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan.

Inner Harbor - extends from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break-walls.

## 1.2 Record of Decision (ROD) Lower River Remedial Action

### 1.2.1 Remediation Objectives

The Remediation Objectives as defined in the ROD, page 32, Section H as it applies to the Lower River are as follows:

1. *Protect human health and the environment from imminent and substantial endangerment due to the PCBs attributed to the Site.*

*To achieve this remediation objective, PCB-contaminated Soft Sediment will be removed so that the entire river will reach an average PCB sediment concentration of 0.5 ppm or less over time. An average PCB sediment concentration of 0.5 ppm results in a excess human health carcinogenic risk of  $1.0 \times 10^{-4}$ , or less over time, through the consumption of PCB-contaminated fish.*

*Based on site specific biota to sediment accumulation factors, the corresponding PCB tissue levels for resident fish are:*

***Sport Fish***

*Small Mouth Bass: 0.31 ppm, Walleye: 0.63, Trout: 0.09 ppm*

***Bottom Feeders***

*Carp: 2.58 ppm, Catfish: 2.53 ppm*

### **1.2.2 ROD Selected Remedy**

The Selected Remedy summarized in the ROD, pages 66-79, Section H as it applies to the Lower River is described below.

#### **1.2.2.1 Middle River Selected Remedy**

Due to the presence of PCB contamination and the dynamic nature of the river, this component of the river will be characterized to establish a baseline for evaluating natural process trends and tracking Soft Sediment concentrations toward a Soft Sediment SWAC of 0.5 ppm for the Middle River over time.<sup>1</sup> If during baseline characterization PCB concentrations equal to or greater than 26 ppm are found, these Soft Sediment deposits will be removed as they would significantly impair the over Middle River Soft Sediment SWAC from achieving a PCB concentration of 0.5 ppm, or less over time.

An extensive monitoring program would be implemented to gauge the condition of the river and potential human health impacts over time. Long-term monitoring will provide valuable information on changing conditions that may warrant removal of PCB-contaminated sediment. Annual fish sampling will occur. Sediment samples will be taken every five years to document natural process and to ensure that over time the entire river reaches an average PCB sediment concentration of 0.5 ppm, or less.

#### **1.2.2.2 Lower River Selected Remedy**

The Lower River remedy includes characterization and a PCB Soft Sediment SWAC of 0.5 ppm, or less over time.<sup>2</sup> Since the river is a dynamic environment and significant time has lapsed since it was last characterized, the Lower River will be characterized to obtain an accurate picture of contaminant distribution in Soft Sediments and to determine if removal of PCB-contaminated Soft Sediment deposits is warranted. PCB-contaminated sediment excess of 26 ppm within the top foot will be removed where water depths are greater than 5 feet and PCB-contaminated sediment in excess of 26 ppm with the top two feet will be removed where water depths are less than 5 feet. Any excavated areas of the Lower River will be backfilled with clean sediment in a manner to minimize the resuspension or disturbance of any remaining contaminated sediments.

Excavation depths and volumes may be increased if through a bathymetry analysis, certain sediment areas are subject to scour greater than the effects of boat disturbance and those areas coincide with areas of high PCB concentration, or if it is determined through a re-evaluation of the Lower River sediment data that Soft Sediment must be removed to achieve a PCB Soft Sediment SWAC of 0.5 ppm. This may take the form of an Explanation of Significant Differences (ESD) or ROD Amendment.

Lastly, like the Upper River reaches, since contamination is left in place, the Lower River will undergo a long-term monitoring program to assess sediment and fish tissue concentrations over time. Annual fish sampling will occur. Sediment samples will be taken at least once every five years to document natural

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<sup>1</sup> The LRRDSOW states that the location, surface area, volume and PCB concentration of all Soft Sediment in the Middle River shall be documented.

<sup>2</sup> See footnote 1, this also applies to the Lower River.

process and to ensure that over time the entire river will reach an average PCB sediment concentration of 0.5 ppm, or less. Annual bathymetric surveys of the Lower River will be conducted to assess sediment profile changes and determine if buried PCB-contaminated sediment, equal to or greater than 26 ppm, is vulnerable to disturbance and release.

### **1.2.2.3 Inner Harbor Selected Remedy**

The Inner Harbor remedy includes characterization and removal of 2 feet of contaminated sediment from the Pennsylvania Avenue Bridge to just past the 8<sup>th</sup> Street Bridge which is depicted as Area A. An additional two feet of sediment will be removed in those areas of the Inner Harbor where the bathymetry analysis shows scour greater than 2 feet. These areas are noted as Area B and Area C. Characterization of PCB contamination may also reveal that areas between the 8<sup>th</sup> Street Bridge and the Inner Harbor mouth contain PCB concentrations above 26 ppm in areas historically vulnerable to scour or within the top foot of the sediment surface. Under these circumstances, contaminated sediment will also be removed between the 8<sup>th</sup> Street Bridge and the Inner Harbor mouth.<sup>3</sup> Any excavated areas of the Inner Harbor will be backfilled with clean sediment in a manner to minimize resuspension or disturbance of contaminated sediments.

Lastly, to keep the most highly contaminated sediment in place, maintenance of the Outer Harbor breakwalls is necessary. Like the other river segments, a long-term monitoring program will be implemented to assess sediment and fish tissue levels over time. Annual fish sampling will occur. Sediment samples will be taken at least once every five years to document natural process and to ensure that over time the entire river will reach an average PCB sediment concentration of 0.5 ppm, or less. Annual bathymetric surveys of the Lower River will be conducted to assess sediment profile changes and determine if buried PCB-contaminated sediment, equal to or greater than 26 ppm, is vulnerable to disturbance and release.

## **1.3 Remedial Design Submission Organization**

The Remedial Design will be prepared through a iterative process with a series of submissions prepared related to the overall management of the remedial design; investigation of existing conditions and verification of the location of impacted sediment; calculations of sediment removal, preliminary plans for the physical activities; and finally, the detailed construction or remediation plans and specifications that will be followed to meet the Lower River Remedial Action (LRRA) objectives. The remedial design is organized into four specific groups of submissions that will be approved by the U.S. EPA. The Remedial Design submission groups are:

- Remedial Design Work Plan, this document
- Field Sampling Plan, called the Pre-design Investigation Plan
- 50% Draft Design
- 100% Final Design

The content and description of these documents are described in the following sections.

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<sup>3</sup> See footnote 1, this also applies to the Inner Harbor.

## **2 Remedial Design Work Plan Submissions**

The LRRDWP includes the following submittals provided as Appendices to this LRRDWP or transmitted independently.

### **2.1 Submittal Register**

The Submittal Register will be used to track the distribution, review, and approval of the required work plans associated with the Lower River Remedial Design. The Submittal Register will be updated as needed and revisions will be included in the monthly progress reports. A Submittal Register is provided in Appendix A.

### **2.2 Applicable or Relevant and Appropriate Requirements (ARARs)**

The Applicable or Relevant and Appropriate Requirements (ARARs) set forth in Section M (pages 83-86) of the ROD will be addressed to meet the requirements under Section VIII, paragraph 37 of the AOC. A preliminary list of the ARARs necessary to appropriately design the Remedial Action is provided in Appendix B.

### **2.3 Project Organizational Chart**

The Project Organization Chart will list the key personnel involved with the design process and incorporate the requirements of Section IV, Task 1 of the LRRDSOW. A Project Organizational Chart is provided in Appendix C and includes the qualifications of key personnel and roles/responsibilities in directing the remedial design.

### **2.4 Project Schedule**

The Project Schedule will meet the requirements under Section IV, Task 1 of the LRRDSOW. The Project Schedule will be updated as needed and revisions will be included in the monthly progress reports and during the design phase development. A Project Schedule is provided in Appendix D.

### **2.5 Quality Assurance Project Plan**

A Site-specific Quality Assurance Project Plan (QAPP) will be submitted independently to the U.S. EPA covering sample analysis and data handling for samples collected in all portions of future Site work, based upon the AOC and most recent guidance issued by U.S. EPA. The QAPP is consistent with the requirements of the *“Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures”* (OSWER Directive No. 9360.4-01, April 1, 1990). The laboratories chosen meet the requirements of the U.S. EPA Contract Lab Program (CLP) and have a documented Quality System that complies with *ANSI/ASQC E-4 1994, “Specification and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs”* (American National Standard, January 5, 1995), and *“EPA Requirements for Quality Management Plans (QA/R-2)”* (EPA/240/B-01/002, March 2001). The QAPP may be modified to incorporate new quality measures for newly planned activities. The minimum requirements for the QAPP can be found in the LRRDSOW, Section V.

### **2.6 Health and Safety Plan**

A Health and Safety Plan (HASP) will be submitted independently to the U.S. EPA for review and approval. The HASP is designed to protect on-site personnel and area residents from physical, chemical, and other hazards posed by this remedial action. The HASP shall follow U.S. EPA’s *“Standard Operating Safety Guide”* (PUB 9285.1-03, PB 92-963414, June 1992) and comply with Occupational Safety and Health Administration (OSHA) regulations found at 29 CFR Part 1910.

### **3 Pre-Design Investigation Submissions**

#### **3.1 Pre-Design Investigation Plan**

A Pre-Design Investigation Plan (PIP), describing the field sampling activities associated with the Pre-Design Investigation will be prepared and submitted, following the details of the LRRDSOW, an appendix to the Administrative Order of Consent. The PIP will be developed in accordance with “*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Chapter 3*”, OSWER Directive 9355.3-01, October 1988 and be submitted to the U.S. EPA for review and approval. The Pre-Design Investigation of Soft Sediment will consist of probing or other approved method suitable for deep sediments depths followed by sediment sampling. GPS station location information will be delivered in decimal degree e-format, or other electronic format approved by the U.S. EPA in accordance with the Submittal Register.

##### **3.1.1 Standard Operating Procedures**

Standard Operating Procedures (SOPs), describing the procedures necessary to conduct the Pre-design Investigation activities, will be developed and submitted to the U.S. EPA for review and approval.

##### **3.1.2 Drawings**

Drawings will be made part of the Pre-Design Investigation and submitted to the U.S. EPA for review and approval. The Drawings will detail the investigation areas and specific locations where sediment will be measured. The Drawings will be provided at the smallest practical scale that allows sampling locations to be shown on a single-sheet. The sheet size will be based to allow the reader/reviewer a clear understanding of the presentation and the sheets could range from 8½" x 11" to 11" x 17" up to ANSI D (22" x 34"). The drawings will be as follow:

- Middle River Probe Locations for Sediment Deposits;
- Lower River Probe Locations for Sediment Deposits;
- Lower River Grid Boundaries for Continuous Bottom Sediment; and
- Inner Harbor Grid Boundaries for Continuous Bottom Sediment

#### **3.2 Pre-Design Investigation Report Outline**

The results from the sampling will be summarized and reported in a format acceptable to the U.S. EPA. To assure the quality of the Pre Design Investigation Report, an outline of the report will be submitted to the U.S. EPA for review and approval. The Outline will be the Table of Contents for the Pre-Design Investigation Report.

#### **3.3 Pre-Design Investigation Report**

The Pre-Design Investigation Report will be submitted to the U.S. EPA for review and approval. The information documented the Pre-Design Investigation Report, shall include the following information:

- Sediment locations;
- Water depth, based upon an approved low water datum;
- Sediment volumes;
- PCB concentration and PCB mass depicted in 3-D for documentation activities, as follows:
  - Plan view drawing(s) of the sediment location and surface concentrations
  - Cross section drawing(s) (Cross Section through River Right and River Left and Depth) with PCB concentrations at interval
  - Table of Volume, Mass, PCB concentration by X, Y, and Z
  - By way of reference, please refer to the example provided in Figure 2; and

- An analysis of the surface weighted average concentration (SWAC) of the Soft Sediments, calculated in accordance with the methodology presented in the Feasibility Study for the Site.
  - A SWAC Calculation procedure is provided in Appendix E, *SWAC Calculation Procedure*.

This document will not provide information regarding the extent of dredging and other design-related calculations. PCB results obtained from the Camp Marina Site with similar quality control/assurance will be used as part of the entire data set to determine the design for the remedial action and will be part of the pre-design investigation report. To the extent practicable, redundant sampling will be avoided.

#### 4 50% Draft Design Submissions

The documents listed in this section must be prepared and submitted as outlined in the Section IV of the LRRDSOW. The following provides a brief description of the required contents of each of these supporting plans. Because the Remedial Design is an iterative process involving the conclusions of the Pre-Design Investigation, ***the 50% Draft Design is the combination of completed and approved documents listed below.*** The 50% Draft Design will be deemed complete when the design efforts have approval from the U.S. EPA for following submittals, transmitted for review independently:

- Results of additional field sampling (if applicable)
- Design Calculations based on the Pre-Design Investigation data that shall designate specific Soft Sediment deposits for removal consistent with the Lower River Sections of the ROD in order to attain the 0.5 ppm SWAC over time. Data analysis will include an evaluation of the data distribution, calculation of the mean concentration at specific depths calculated based on the data distribution, the SWAC, and calculation of the appropriate upper confidence level (UCL) based on the specific distribution. The U.S. EPA software program, ProUCL will be used for the distribution analysis and UCL calculation.
- Draft plans, drawings, schematics;
  - i. Middle River sediment removal locations
  - ii. Lower River sediment removal locations
  - iii. Inner Harbor sediment removal locations
- Design assumptions and parameters, including design restrictions, process performance criteria, appropriate unit process for the treatment train, and expected removal or treatment efficiencies for both the process and waste (concentration and volume), as applicable.
- Sediment Removal Verification Plan, including the proposed cleanup verification methods, probing methods and compliance with Applicable or Relevant and Appropriate Requirements (ARARs).
- Outline of required specifications
- Proposed siting/locations of processes/construction activity related to dredging and de-watering.
- Mitigation Plan
- Post-remediation Monitoring Plan revisions, including the requirement for annual bathymetric surveys of the Lower River and Inner Harbor to be conducted to assess sediment profile changes and determine if buried PCB contaminated sediment is vulnerable to disturbance and release.
- Real estate, easement, and permit requirements
- Project schedule revisions

## **5 100% Final Design Submissions**

The Final Design shall fully address all comments made to the 50% Draft Design. Like the 50% Draft Design, the 100% Final Design is the combination of the independent submissions, listed below, approved by the U.S. EPA for Remediation or Construction, as well as, the submissions made and approved in the 50% Draft Design that support the remediation effort. The documents below constitute the submissions in addition to the approved 50% Draft Design submission necessary for the 100% Final Design.

- Draft Construction Quality Assurance Project Plan (CQAPP)
- Health and Safety Plan
- Sediment Removal Verification Plan
- Operation and Maintenance Plan
- Final Post Remediation Monitoring Plan, including the requirement for annual bathymetric surveys of the Lower River and Inner Harbor to be conducted to assess sediment profile changes and determine if buried PCB contaminated sediment is vulnerable to disturbance and release.
- Contingency Plan
- Capital, Operation and Maintenance, and Post Remediation Monitoring Cost Estimate. This cost estimate shall refine the FS cost estimate to reflect the detail presented in the Final Design.
- Final Project Schedule for the construction and implementation of the Remedial Action which identifies timing for initiation and completion of all critical path tasks. The final Project Schedule submitted as part of the Final Design shall include specific dates for completion of the project and major milestones.

## **6 Other Submissions**

### **6.1 Monthly Progress Reports**

As described in the Administrative Order on Consent (AOC), Section X, monthly progress reports will be submitted to the U.S. EPA delineating the status of the site. These progress reports will be submitted to the U.S. EPA and WDNR no later than the 15th day of each month. The progress reports will include:

- Activities conducted during the period
- Problems encountered during the period
- Schedule variances and corrective actions, if necessary
- Updates to the Submittal Register
- Projected Activities for the Next Period

## **7 Description of Design Components**

Remedial Design Components are reference to specific parts of the remedy (sediment removal) that must be designed using standards, specifications or technical requirements. A brief description of the design components is provided in the following sections. Additional detailed information on the design components, such as site plan, dewatering technology, and design features, will be provided with future submission of the 50% Draft and 100% Final Design documents.

### **7.1 Hydraulic Dredging**

The primary tool to remove the impacted or contaminated sediment will be a hydraulic dredge. The 8” Swinging Ladder Cutterhead dredge with ancillary booster pumps will be used to convey sediment to a dewatering area. The dredging design will be similar to that used during the Upper River Sediment Removal.

### **7.2 Dewatering Area**

#### **7.2.1 *Settling Basin Option***

Hydraulic dredging of sediment will be pumped via a HDPE pipe line to a land base area located upstream approximately 4 miles. The land base area will contain a settling basin to perform the dewatering of the sediment slurry. This process will require an access of approximately 15 acres.

#### **7.2.2 *Geo-tube Option***

Hydraulic dredging of sediment will be pumped via a HDPE pipe line to a land base area located upstream approximately 3 miles. The land base area will contain the necessary Geo-tubes to perform the dewatering of the sediment slurry. This process is similar to that used in the Upper River Sediment Removal and requires an access of approximately 2 acres.

### **7.3 Wastewater Treatment**

The Wastewater Treatment Plant (WWTP) will consist of a series of multi-media vessels followed by a series of granulated activated carbon (GAC) vessels and will treat the carriage water generated from the dewatering process. The WWTP design will be similar to that used during the Upper River Sediment Removal to fulfill the requirements of the Wisconsin Pollution Discharge Elimination System (WPDES) permit.

### **7.4 Sediment Transport and Disposal Design Options**

Dewatered non-TSCA sediment (< 50 ppm) will be transported and disposed at an in-state facility capable/licensed to accept this material. Dewatered TSCA sediment (> 50 ppm) will be transported and disposed at an out-of-state facility capable/licensed to accept this material.

## 8 References

U.S. EPA. 1990a. *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, Interim Final*. OSWER Directive 9355.5-01. P5-6. April 1990

U.S. EPA. 1995b. *Remedial Design/Remedial Action Handbook*. OSWER Directive 9355.0-4B. June 1995

U.S. EPA. 2000. *U.S. EPA Superfund Record of Decision, Sheboygan River and Harbor, Sheboygan, Wisconsin*, May 2000.

U.S. EPA. 2008. *Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD*. January 2009.

U.S. EPA. 2008. *Statement of Work for the Lower River Remedial Design for the Sheboygan River and Harbor Superfund Site, Sheboygan County, Sheboygan, Wisconsin*. January 2009.