Lincoln Park and Milwaukee River Channels
Sediment Remediation Options Report for Phase I Area

This document outlines the process used to make decisions needed to move forward from the Feasibility Study process to design phase for the Lincoln Park and Milwaukee River Channels Phase I remediation area. The Lincoln Park/Milwaukee River channels Phase I area (Figure 1) contains the most significant deposits of PCBs known within the Milwaukee River system. The source of the PCBs has not been specifically identified, or linked to a particular industry. However, the majority of contaminants within the impoundment are within the area influenced by Lincoln Creek, which has a long industrial history. One study concluded that the Milwaukee River above the impoundment was not considered to be a significant source of contamination (Baird & Associates, 1997).

The Phase I area contains nearly 100,000 cubic yards of sediment containing over 4,000 pounds of PCBs. A Feasibility Study was completed that outlined the remedial action objectives and evaluated seven alternatives for addressing this site.

Project alternatives screening

The following alternatives were evaluated by the Feasibility Study and are also summarized in Table 1.

Alternative 1: No Action. Under this alternative, no remedial response is performed. This alternative was evaluated as a baseline to which other remedial options are compared.

Alternative 2: Monitored Natural Recovery. No additional remedial actions would be conducted. Periodic monitoring for water column, sediment and fish tissue will be conducted. Natural PCB degradation is not likely to occur within a reasonable time period because of persistence of PCBs. Costs are the assumed monitoring cost for 30 years.

Alternative 3: Containment. This alternative consists of capping the sediment in Lincoln Creek and the western oxbow of the Milwaukee River. Minimal sediment removal would be required to provide room for the cap, which would provide a physical isolation barrier over the sediments.

Alternative 4: In Situ Treatment. This is similar to Alternative 3, but includes in situ treatment integrated with a reactive cap. Cap types include biological, chemical and immobilization.

Alternative 5: Partial Excavation and Cap. This alternative would remove all sediment with PCB concentrations greater than or equal to 50 mg/kg (ppm). The remaining areas would be capped. The amount of sediment removed would be about 14,000 cubic yards, containing about 2800 pounds of PCBs.

Alternative 6: Excavation and Off-site Disposal. This alternative would remove all sediment with PCB concentrations greater than or equal to 1 mg/kg (ppm). The amount of sediment removed would be about 98,000 cubic yards, containing about 4,000 pounds of PCBs.

Alternative 7: Excavation, Ex Situ Treatment and Off-site Disposal. This alternative is similar to Alternative 6 with the addition of particle size separation to separate clays and silts from sand particles. The sand would be tested to confirm that it is cleaned and could be returned to the project area or used as clean fill at another location.

Figure 1. Project Area Overview

Table 1. Alternatives Table

Alternative	Description	Estimated Volume of PCB Contaminated Sediment Removed (Cubic Yards)	Estimated Mass of PCBs Removed (Pounds)	Estimated Cost (Million $)
1. No Action	No additional remedial actions would be conducted. This alternative is for comparisons only.	0	0	$0.0
2. Monitored Natural Recovery	No additional remedial actions would be conducted. Periodic monitoring for water column, sediment and fish tissue conducted. Natural PCB degradation not likely to occur within a reasonable time period because of persistence of PCBs. Costs are the assumed monitoring cost for 30 years.	0	0	$2.2
3. Containment*	Minimal removal of sediment to provide room for protective cap. Cap designed to provide physical isolation of sediment contaminants. Stabilization would prevent resuspension and transport of sediment.	450	91	$6.5
4. In-Situ Treatment*	Similar to Alternative 3 but with the addition of a reactive cap to decrease PCB contamination over time.	450	91	$11.5
5. Partial Excavation & Cap	Excavate all sediments with PCB concentration greater than or equal to 50 parts per million (pm). Disposal in an out-of-state landfill. Cap similar to Alternative 3.	14,000	2,829	$11.2
6. Excavation & Off-Site Disposal	Remove all sediments with PCB concentrations greater than or equal to 1 ppm. Sediments with concentrations greater than 50 ppm will be disposed of in an out-of-state landfill.	98,000	4,075	$20.2
7 Excavation, Ex-Situ Treatment & Off-Site Disposal	Similar to Alternative 6, but with treatment to separate clean sand from sediment for potential reuse. If selected, the viability of this alternative would need to be verified by additional testing and evaluation.	98,000	4,075	$20.3

Alternatives Analysis and Remedy Selection Criteria

The seven alternatives identified were evaluated in detail in the Feasibility Study. Each alternative was evaluated individually against five evaluation criteria. The alternatives were then compared to each other with respect to the six criteria.

The criteria used are:

Compliance with applicable federal, state and local regulations: to evaluate if the alternative meets clean-up standards, standards of control and other applicable environmental statutes or regulations.

Short and long-term effectiveness: to evaluate the extent to which implementing the remedy will ensure protection of human health and the environment in the long and short-term. A remedy is protective if it adequately eliminates, reduces or controls current and potential risks posed by the site through each exposure pathway.

Engineering implementability, reliability and constructability: to evaluate the availability of goods and services needed for implementation, reliability of the action and the ease of constructing the remedial action.

Technical feasibility: to evaluate the feasibility of successfully implementing the remedial action.

Cost: to evaluate the cost effectiveness of the alternative over the life of the project. The cost estimates for each alternative were developed for comparison between alternatives. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, the implementation schedule, and other variable; therefore final project costs will vary from the cost estimates.

The no action alternative did not meet evaluation criteria for compliance with applicable federal, state and local regulations and therefore is not considered an option. It was retained for comparison purposes only for the comparative evaluation. The alternatives were evaluated further against specific criteria identified in Table 2 and scored on a scale of 0 to 4 with zero being the lowest and 4 being the highest.

Table 2. Comparative Alternatives Analysis

Alternative	Balancing Criteria														
	Overall Protection of Human Health and Environment	Protection of workers during remedial action	Protection of community during remedial action	Environmental Impacts of Remedial Action	Support Removal of BUIs within Estuary AOC	Minimize potential human health and environmental risks during remedial action	Improve Habitat through restoration	Magnitude of Residual Risks	Adequacy and reliability of controls	Minimize transport of contaminated sediment	Availability of services and materials	Reliability	Constructability	Technical Feasibility	**Average Ranking**
1	0	N/A	N/A	N/A	0	N/A	0	0	0	0	4	4	4	4	**1.60**
2	0	3	4	4	0	4	0	0	0	0	4	4	4	4	**2.21**
3	2	2	3	2	1	2	2	1	1	2	2	2	2	4	**2.00**
4	2	2	3	2	1	2	2	1	1	2	2	2	2	2	**1.86**
5	3	2	2	1	1	1	2	2	1	2	2	2	2	4	**1.93**
6	4	1	2	1	4	1	4	4	4	4	4	4	4	4	**3.21**
7	4	0	2	1	4	1	4	4	4	4	4	3	3	3	**2.93**

The comparative analysis indicates that Alternative 6 has the highest ranking. Although Alternative 6 ranks low in comparison to other alternatives for short-term impacts during the remedial action, the impacts can be mitigated during the design and implementation stages with standard measures. Based on the above comparison, the recommended alternative is Alternative 6, Excavation and Offsite Disposal.

Public Comments

A public information open house was held on November 10, 2009 at the Lincoln Park Golf Course Club House from 3:00 to 7:00 p.m. Representatives from U.S. EPA Legacy Program, their contractors, Milwaukee County and Wisconsin DNR were in attendance to accept comment about the feasibility study and answer questions. Sixty seven (67) people attended.

Written comments and questions were received from 13 individuals. Below is a brief summary of comments:

- In general, the comments received were supportive of the recommended alternative for excavation and off-site disposal of all PCB contaminated sediments greater than 1.0 mg/kg (ppm) from the phase I area.
- There was interest in including clean-up in the phase II area as part of the remedial action, specifically debris and sediment behind the Estabrook Park Dam and fixed crest spillway.
- Concerns were expressed that the implementation of the remedial alternative does not interfere with efforts to repair or operate the Estabrook Park Dam.
- Concerns that erosion control measures must be adequate to keep sediments from migrating off-site during the remedial action.
- Suggestions made for stronger outreach and educational materials focusing on safety, environmental contamination and the progress of the remediation project.
- Many of the comments addressed operation of the Estabrook Park Dam.
- Suggestions were made to have habitat restoration and sediment removal follow the footprint of the oxbow pond.
- Specific comments were made that removal of sediments rather than capping is preferred.

Proposed Alternative

Based upon the results of the feasibility study and discussion with the public, U.S. EPA, Wisconsin DNR and Milwaukee County agreed to move forward with design work for Alternative 6, Excavation and Off-site Disposal. Design work is anticipated to begin in late March 2010.