# REMEDIAL ACTION OPTIONS REPORT

## SITE DESCRIPTION

The Blatz Pavilion Bay area South of Hampton Avenue in Lincoln Park in the City of Milwaukee, Milwaukee County

## CURRENT STATE OF THE PROJECT AREA

The Blatz Pavilion Bay is located in Lincoln Park on the Milwaukee River within the impoundment formed by the Estabrook Dam. The Blatz Pavilion represents a historic Milwaukee structure located within Lincoln Park and directly upstream of Estabrook Park. Lincoln and Estabrook Parks are an integral part of the Milwaukee County Park system, and continue to serve as recreational points for local residents. Within Lincoln Park, in the vicinity of the Blatz Pavilion, there are picnic areas as well as numerous athletic fields, a swimming pool, and walking trails. There are three designated access areas for canoeing and kayaking in Estabrook Park. The relative location of these areas to the Blatz Pavilion affords easy access to the river, which increases the possibility of exposure by the public to contamination in river sediments.

Studies by the WDNR and others have identified contaminants of concern in the sediments in the bay. The Wisconsin Department of Natural Resources (WDNR) contracted with Natural Resource Technologies to complete a remedial investigation/feasibility (RI/FS) study for this site. The RI/FS evaluated the site, identify risk posed by contaminants in the sediment, assessed available alternatives to manage the risk, and recommended a remedial strategy.

This bay has approximately 3,900 cubic yards of the contaminated sediment containing 300 pounds of the PCBs, the principal contaminant of concern. Data from the site show PCBs at levels that are a risk to humans and the environment and carry the potential for being transported downstream in the Milwaukee River. The Blatz Pavilion area is isolated from the other contaminated areas in the Estabrook impoundment and has easy public access. The entire project site is in Lincoln Park on Milwaukee County property.

The Estabrook Impoundment dam backs up water approximately two and one-half miles to a point about 0.3 miles upstream of Silver Spring Road on the Milwaukee River, creating a 103 acre pool. The dam has been operated to keep it open during the winter months and shut in the summer. Periodic opening of the dam has caused the contaminated sediment to be periodically dewatered and resulted in some compaction of

the sediment in the impoundment. With the dam open the area is also subject to flooding during high flows in the Milwaukee River.

Sediments observed at the site are generally comprised of silt and clay with organic material, ranging in color from dark gray and dark brown to black. The average sediment thickness is slightly more than three feet and the maximum and minimum thickness observed at the site was 4.8 feet and 1.5 feet, respectively. The sediment overlies native gray clay till.

A screening level risk assessment was performed to evaluate the risk posed by PCB contaminated sediment. Exposure pathways were identified for humans via dermal contact and ingestion of sediment and fish tissues and ecological receptors such as fish and benthic invertebrates.

Remedial action objectives were established for the purpose of evaluating remedial options. The general objectives are to reduce the potential for dermal contact and ingestion of contaminated sediment or fish tissue.

Based on experience at other contaminated sediment sites and a review of available technologies general response actions and potential alternatives were identified to address the remedial action objectives. Additional objectives identified by the RI/FS include minimizing disruption to the community during remediation, maintaining public access to the community space at the Blatz Pavilion, and restoring the bay for recreational use.

## PROJECT ALTERNATIVES SCREENING

**Proposed Alternatives**

The following four alternatives were evaluated in detail by the RI/FS study.

**Option 1: Removal and Landfilling** – This option includes removal of PCB impacted sediments to less than 1 mg/kg and off-site licensed landfill disposal. The removal operation would take place during the time period when dam is open and sediments are exposed. The greater than 50 mg/kg material would be disposed in an approved out-of state landfill and the less than 50 mg/kg material would be disposed of at local landfill approved for special waste disposal. Shoring along the eastern boundary of the embayment would likely be necessary for removal and dewatering of the sediments near the water edge. Following removal, clean backfill material (ie sand type) would be placed to the previous sediment elevation to reduce sediment re-deposition.

■ **Option 2: Capping** - This option includes placing a sand cap over the sediments which would remain in-place. Approximately 1 foot of sand would be placed over the sand either during a frozen, exposed sediment time period or placed through the water with a barge operation when the dam is closed. This option involves long-term monitoring and maintenance of the sand cap.

■ **Option 3: In-situ or Ex-situ Treatment** – This option could include several different technologies such as in-situ stabilization, in-situ vitrification and ex-situ sediment washing. These technologies require bench-scale testing and subsequent pilot testing to determine their effectiveness in treating, immobilizing

or destroying PCBs. The stabilization and vitrification technologies would transform the sediment into a hardened monolith, whereas the sediment washing would remove the PCBs from the sediments to an acceptable level. These technologies are further discussed below.

■ **Option 4 – No Action** – This option would consist of implementing long term institutional controls to restrict access to the embayment and would be combined with monitored natural recovery.

**Remedy Selection Criteria**

In general the evaluation criteria as outlined below are directly or indirectly related to the overall project objectives that are to improve the water quality, and to reduce the risks posed by the contaminated sediments to human health and environment. Specific benefits upon the completion of the project include, environmental benefits from removal of PCB and PAH mass out of the Milwaukee River and reduction of the toxicity and the risks of the contaminated sediments to aquatic life and human health. The following is the list of the valuation criteria:

**Overall protection of human health and environment:** to evaluate the reduction of the potential risks imposed by the contaminants in the sediment to human health and the environment.

**Short-term effectiveness**: to evaluate the reduction of toxicity and mobility of the contaminants in sediment immediately after the implementation of the alternative.

**Long-term effectiveness**: to evaluate the reduction of toxicity and mobility in a long term time period (possibly for 25 years).

**Implementability**: to evaluate the technical and administrative feasibility of a remedy, including the availability of materials and services to implement a particular option.

**Cost-effectiveness**: to evaluate the cost-effectiveness of a remedy with regard to the project objective that is to improve the navigational condition and to clean up the contaminated sediments. The costs include the estimated capital costs, annual operation and maintenance costs and net present value of capital and operation and maintenance costs.

**Public acceptance**: to evaluate whether the public will have an objection to a remedy.

## ALTERNATIVE ANALYSIS

In-situ Stabilization – This technology was eliminated from further consideration based on lack of demonstration of long-term effectiveness on sediments, implementability and cost concerns. The technology has been used primarily on soils with demonstrated effectiveness. Because the technology relies on stabilization with cement-based reagents, the long-term effectiveness (minimal leaching of PCBs from the stabilized sediment) with a submerged sediment scenario is less demonstrated. In addition, implementation of this technology would cause an undesirable expansion of the sediment volume, for which a substantial volume would require disposal. Based on these

considerations, capital costs for implementation of this technology would likely be high in the range of $1,200,000 to $1,800,000.

Vitrification – This technology was eliminated from further consideration based on implementability, restoration time-frame and cost concerns. Equipment and utility requirements for this technology are substantial as the sediments are heated to a glass state, destroying the PCBs. Implementation of this technology requires off-gas collection and treatment and high moisture content sediments are required to be dried out before the melting process can begin. This drying process requires large amounts of energy. The technology requires a considerable time-frame to complete as only small volumes of material can be vitrified at one time. Based on these considerations, capital costs for implementation of this technology would likely be high in the range of $2,300,000 to $3,500,000.

Sediment Washing – This technology was eliminated from further consideration based on implementability, restoration time-frame and cost concerns. Equipment and utility requirements for this technology are substantial as the sediments are treated ex-situ with bioremediating surfactants. Implementation of this technology requires several washing units and tanks, shaker screens, sediment processor, hydrocyclones, water blasters, compressors, and water treatment equipment. The technology requires a considerable time-frame to complete as only small volumes of material can be treated at one time (typically 35 to 50 tons/hour). Costs would depend on the number of treatment cycles required to meet the target clean-up goal. Based on these considerations, capital costs for implementation of this technology would likely be high in the range of $1,500,000 to $1,800,000.

***No Action***

The No Action option was eliminated from further consideration based on the direct contact risk with PCB concentrations greater then 50 mg/kg existing at the sediment surface and that monitored natural recovery processes would not effectively reduce contaminant mass or toxicity.

Removal and landfilling was evaluated in more detail along with capping. After reviewing the factors, summarized on the table below, capping was eliminated because of the lack of long term effectiveness, continued maintenance and the need for institutional controls.

## Remedial Options Screening Summary

(**+** is a favorable factor; **-** is an unfavorable factor)

| CRITERIA | REMOVAL AND LANDFILLING | CAPPING |
|---|---|---|
| LONG TERM EFFECTIVENESS | **+** All PCB impacts >1 ppm would be removed<br>**+** Direct contact human exposure would be eliminated.<br>**+** Fish/Benthic community exposure eliminated | **-** PCB Impacts remain in place with potential future exposure if cap is breached/eroded<br>**-** Regular cap inspection and maintenance required for eroded/disturbed areas |

| CRITERIA | REMOVAL AND LANDFILLING | CAPPING |
|---|---|---|
| | | |
| SHORT TERM EFFECTIVENESS | - Short-term disturbance/direct contact exposure to embayment area during project<br>+ Only limited disturbance to river | + Relatively low disturbance/direct contact exposure during cap installation.<br>+ Human/benthic/fish exposure minimized with new cap. |
| IMPLEMENTABILITY | + Excavation contractors and shoring equipment are readily available.<br>+ Local special waste landfill within Milwaukee area, >50 ppm disposal landfill relatively close (Michigan).<br>+ Shoring system installation feasible with a backfilled work platform.<br>+ Imported soil for backfill material readily available. | - Undesirable increased in bottom elevation of embayment (shallow water depth)<br>- Capping required to be performed under frozen sediment conditions or placed through water.<br>+ Materials and contractors are readily available. |
| RESTORATION TIME FRAME | + Removal of sediment and backfilling expected to be complete within 1 month | + Capping expected to be completed in 1-2 Weeks, as site conditions allow |
| ENGINEERING AND INSTITUTIONAL CONTROLS | + None | - Institutional controls required to maintain cap integrity (e.g., prevent boats from disturbing cap) |
| ECONOMIC FEASIBILITY | LOW TO MODERATE RELATIVE TOTAL COST<br>• Moderate Capital Costs<br>• No Annual Maintenance Costs | LOW TO MODERATE RELATIVE TOTAL COST<br>• Low capital costs<br>• Annual Maintenance Costs |

**PROPOSED ALTERNATIVE**

Based upon the preceding discussions, the most cost effective alternative to address the remedial action objectives for this site is Option 1: Removal and Landfilling at an estimated cost of $1,139,000.

External partners:

The Department will work with Milwaukee County to move forward on this project. All work will be performed on Milwaukee County park property.

## DECISION

The Department of Natural Resources has selected Removal and Landfilling for the Blatz Pavilion Restoration Project, based on the findings of facts set forth:

Noted: _____
Gloria L. McCutcheon, Regional Director, Southeast Region

Approved:

Dated this ____ day of _____, 2007

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

_____
Scott Hassett, Secretary