

**Developing a Strategy for PAH-Contaminated Sediments in the
St. Louis River Area of Concern
Discussion Paper**

May 28, 2004

Background, Purpose, and Next Steps:

This discussion paper was prepared through a grant from the Wisconsin Great Lakes Protection Fund to the St. Louis River Citizens Action Committee in 2002. The primary purpose of this grant was to pursue development of a coordinated strategy for the St. Louis River Area of Concern (AOC) by facilitating discussions between the Wisconsin and Minnesota state agencies and other parties concerning the issues of PAH contaminated sediments in the St. Louis River AOC. These discussions resumed the coordination between the states that occurred in the early 1990s, and which resulted in the contaminated strategy that appears in the 1995 Stage 2 Remedial Action Plan for the St. Louis River System Area of Concern. Progress for the St. Louis River AOC requires agencies and stakeholders in both states to address the issues on a consistent basis and to pursue the resources needed to rehabilitate the Area of Concern. Contaminated sediments in the AOC remain as a burden on the river ecosystem and on the economy and quality of life of the area.

The discussions sponsored by this grant and the government programs in use or under consideration are summarized in Appendix A. A glossary of terms, abbreviations, and references is found at the end of this document.

In late 2003, the U.S. Environmental Protection Agency approved funding for the Minnesota Pollution Control Agency to continue development of a contaminated sediment strategy for the Area of Concern. This discussion paper can serve as a building block for these continuing efforts. This paper is intended to spur discussion toward development of a comprehensive contaminated sediment strategy for the AOC.

Introduction:

This project is one step in a long process to develop strategies and implement remediation of contaminated sediments in the St. Louis River Area of Concern. The Stage 1 Remedial Action Plan for the St. Louis River Area of Concern noted that contaminated sediments are linked to seven of the nine identified Beneficial Use Impairments in the AOC (MPCA and WDNR, 1992). The Stage 2 Remedial Action Plan (MPCA and WDNR, 1995) included a three-phase strategy for identification of impacted sediments and recommended that contaminated sediments be identified and remediated. During development of the RAP, it was known that contaminated sediments were located in several “hot spots” such as the two St. Louis River Superfund sites and other known sites. Other less defined sites were known or thought to exist that required additional investigations by the agencies vested in implementing cleanup. The Lower St. Louis River Habitat Plan (SLRCAC, 2002) evaluated habitat types, their characteristics, and potential across the Area of Concern. The plan presents contaminated sediment strategies in the context of habitat rehabilitation for impacted habitats. The Habitat Plan advocates development and implementation of remedial alternatives for each contaminated sediment area of the St. Louis River AOC as soon as possible and restoration of

affected resources in accordance with appropriate conservation goals for the area. The RAP and the Habitat Plan also advocate control of sources to prevent re-contamination of the AOC.

Numerous studies have been conducted in the area to implement the three-phase sediment strategy of the RAP and to further support efforts leading toward remediation at several known contaminated sites. A great deal has been learned about contaminated sediments in the Area of Concern since the 1995 strategy. Some of the sediment quality data have been incorporated into a Phase I GIS-based sediment quality database for the St. Louis River AOC (Appendix B-1). The Phase I GIS project also includes the Level I and Level II sediment quality targets (SQTs) for the protection of sediment-dwelling organisms that are used by the Minnesota Pollution Control Agency. The phase II GIS project is currently underway to add more sediment quality data sets to the database (Appendix B-2). In addition, the consensus-based sediment quality guidelines used by the Wisconsin Department of Natural Resources will be added to the Phase II database.

Several sites throughout the Area of Concern are impacted by polycyclic aromatic hydrocarbons (PAHs), causing sediment toxicity and impairing habitat value. The cumulative habitat impact of contamination at these individual sites is such that PAHs have emerged as an issue for the entire Area of Concern. However, it should be noted that there are other contaminants such as mercury and other heavy metals of widespread concern in the AOC.

Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances. There are more than 100 different PAHs. PAHs generally occur as complex mixtures (for example, as part of combustion products such as soot). PAHs are contained in asphalt used in road construction. They can also be found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar.

PAHs are widespread contaminants of potential concern in the sediments of the lower St. Louis River estuary. The Duluth-Superior Harbor area had a high historical use of coal during the past 100 years through the storage and transport of coal along the waterfront, the presence of several coal gasification plants, and the manufacture of coal-powered ships, especially during WWI. In addition, historical coal tar production plants, coking plants, and oil refineries emitted PAHs into the lower St. Louis River. Since PAHs do not easily dissolve in water, these compounds tend to stick to solid particles and settle to the bottom sediments. The transport and fate of PAHs in aquatic systems is important to consider, as PAHs are not always bioavailable to organisms. Thus, a weight-of-evidence approach that considers other sediment quality indicators (e.g., sediment toxicity, benthic invertebrate community structure, tissue chemistry, the physical characteristics of sediments, and biomarkers in fish) needs to be used for assessing the effects of PAH-contaminated sediments on the beneficial uses of this aquatic ecosystem.

For the purposes of this project, information on the contaminated sites that are being addressed through the state agencies' remediation programs is summarized and strategy statements, objectives, and milestones are proposed. It is hoped that the MPCA's sediment strategy project can summarize broader information on the PAH distribution and impacts and further refine the strategies, objectives, and milestones presented below.

Proposed Strategy Statements, Objectives, Milestones, and Approach:

Goal: to restore natural resource habitats and public beneficial uses of the affected areas in the St. Louis River AOC. To obtain this goal, contaminated sediments in the river and estuary must be remediated.

Strategy: To restore the beneficial uses to PAH-contaminated sediment areas within the St. Louis River Area of Concern. To remediate contaminated sediments as soon as possible and institute source controls where needed as soon as possible (Lower SLR Habitat Plan, 2002). It is likely that a combination of strategies may be needed at each contaminated sediment site. Management decision-makers for contaminated sediments need to consider technical, social, and economic factors in selecting remedial alternatives.

Proposed objectives and associated milestones:

| Objectives | Milestones |
|---|--|
| Develop narrative goals for cleanup and rehabilitation | Goals for cleanup and rehabilitation are developed and have community support |
| Pursue and obtain funding for the remediation of contaminated sites in the St. Louis River Area of Concern | Funding obtained for the remediation of contaminated sites in the AOC |
| <ul style="list-style-type: none">• Restore bays contaminated by historic industrial, commercial, and residential contamination. Most industrially influenced bays in the AOC, when restored, would function as sheltered bay habitat.• Address contaminated sediments in slips. Most industrial slips in the St. Louis River Harbor are valuable to the economic viability of the region. | <ul style="list-style-type: none">• Half of PAH-impacted acreage is remediated by 2015 (baseline: sites listed in Table 1)• Increase by one-fifth, the acreage of sheltered bays, one of the most valuable habitat types in the St. Louis River estuary |
| Control on-going sources of point and nonpoint PAH inputs | Appropriate source controls are developed for each contaminated sediment area |
| Support stormwater management plans in the St. Louis River AOC | Stormwater controls and BMPs are in place to avoid loading of PAHs and other pollutants |

Approach:

The proposal to meet the outlined milestones is an interagency, cooperative, ecosystem-based approach as opposed to each agency working independently and focusing only on specific sites. Agencies would share information on the development of remedial alternatives and collaborate on obtaining funding. The following agencies would work together to pursue funding for PAH-contaminated site rehabilitation: state agencies of Wisconsin Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Department of Natural Resources; the federal agencies of Environmental Protection Agency, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Army Corps of Engineers; tribal organizations: the Fond du Lac Band of Lake Superior Chippewa, the 1854 Authority, the Great Lakes Indian Fish and Wildlife Commission, the Responsible Parties and Potential Responsible Parties, the St. Louis River Citizens Action Committee, and other local organizations and units of government.

Table 1. Preliminary summary of PAH-contaminated sites that are currently under investigation toward remediation in the St. Louis River Area of Concern. There are other areas with known or suspected PAH contaminated sediment in the Area of Concern that are not included in this list. Preliminary estimates of volumes were provided by state agencies. Rough estimates of cleanup costs are presented for comparison purposes only.

| Currently Known Sites under active investigation toward remediation | Acres | Volume in cubic yards | Cost Estimate \$ | Comment |
|---|-----------------|-----------------------|------------------|--|
| Howard's Bay | 3 | 3000 | 450,000 | at \$150/yd ³ ¹ |
| Newton Creek | 60 | 4000 | | \$1,450,000 spent as of 2003 |
| Hog Island Inlet ² | 17 | 40000 | 5,200,000 | From Hog Island Feasibility Study 11/03 |
| Crawford Creek | 60 | 2300 | 345,000 | At \$150/yd ³ |
| St. Louis River/Interlake/Duluth Tar Superfund Site (SLRIDT) ³ | 60 ⁴ | 455000 | 43-48 million | From SLRIDT Feasibility Study 5/04 |
| USX ³ | 90 | 150,000-300,000 | 15-30 million | Based on cost/yard from SLRIDT Feas. Study |
| Slip C ³ | 8 | 5,000-10,000 | 400,000-800,000 | Based on SLRIDT Feas. Study |
| Minnesota Slip ³ | 4 | | | |
| 21 st Ave West | 8 | 10000 | 1,500,000 | at \$150/yd ³ |
| | | | | |
| Totals | 310 | | | |

¹ \$150/yd³ based on general Great Lakes remediation costs – used for comparison purposes when no site specific cost information was available from the agencies

² 2004 Great Lakes Legacy Act funding application for Hog Island Inlet

³ May 20, 2004 email from Doug Beckwith, MPCA

⁴ www.pca.state.mn.us/cleanup/sites/slriddt-proposedsedimentplan-042704.pdf

Note: Future work with the St. Louis River contaminated sediment database will allow better determination of sediment volumes exceeding contaminant guidelines or thresholds. Although volumes given in this table are from site feasibility studies for some sites, for others the estimates are very preliminary and provided only for comparison purposes.

Habitat Benefits of Remediation

Habitat impacts at PAH contaminated sites largely stem from toxicity to benthic macroinvertebrates. Health effects to fish and wildlife not as easily documented, but may also occur because of PAH contaminated sediments. With remediation, much of the PAH impacted area could function as sheltered bay habitat because benthic macroinvertebrate communities would be restored. If half of the site area listed in Table 1 were remediated, there would potentially be an increase, by one-fifth, of the acreage of sheltered bays, one of the most valuable habitat types in the St. Louis River estuary.

Table 2. Aquatic Habitat types in the lower St. Louis River per Habitat Plan

| Aquatic Habitat Type | Acres | Comments |
|---|--------------|---|
| Large Riverine Reach | 132 | |
| Industrial Slips | 514 | 2% area known contaminated and inn remediation programs |
| Upper Estuarine (Undredged) River Channel | 742 | |
| Industrially-Influenced Bay | 886 | 20% area known contaminated and in remediation programs |
| Clay-Influenced Bay | 986 | |
| Sheltered Bays | 1021 | |
| Clay-Influenced River Mouths | 1247 | |
| Lower Estuarine (Dredged) Channel | 1797 | |
| Upper Estuarine Flats | 2057 | |
| Lower Estuary (Industrial Harbor) Flats | 2952 | |
| Totals | 12,334 | |

Presently, 1021 acres of the aquatic habitat types of the St. Louis River are identified as Sheltered Bays. Currently, 178 acres of aquatic habitat are identified as currently known contaminated sites that if restored would become sheltered bays.

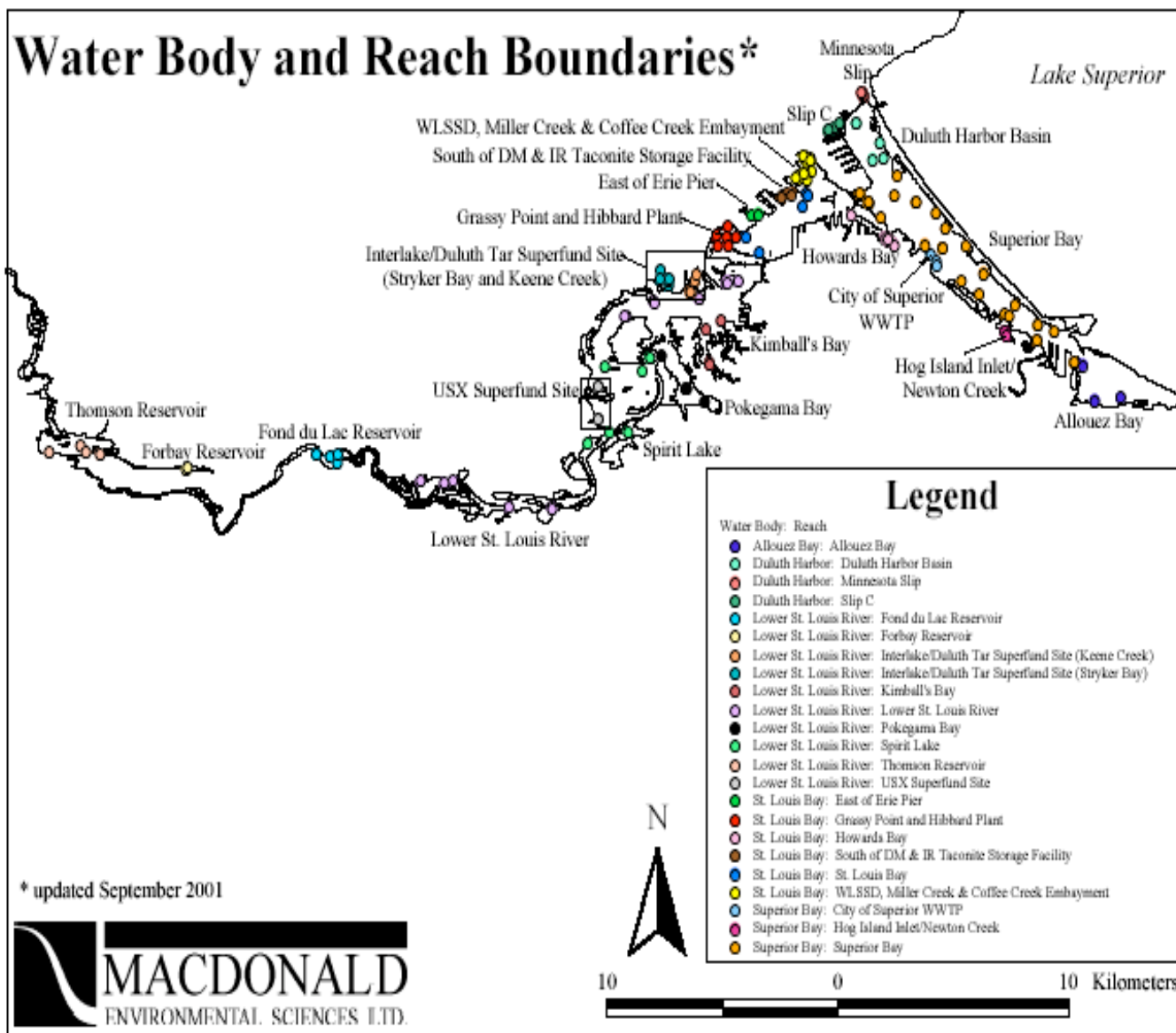


Fig. 1 Location of sediment sampling sites included in the matching sediment chemistry and toxicity database for the St. Louis River AOC. Major water body locations are shown on the map (Crane and MacDonald, 2003).

Physical Description and Major Issues Associated with “ Hot Spots”

Eight sites are under “active” investigation toward remediation in the St. Louis River Area of Concern. However, there are several other sites with PAH contaminated sediments within the St. Louis River Area of Concern, including the bays north and south of the Hibbard Plant, the areas around the Western Lake Superior Sanitary District and Miller and Coffee Creeks, and in Superior Bay off of the Superior wastewater treatment plant. The following section summarizes presentations given by the site managers at the interstate meetings sponsored by this project in 2002 and 2003. (see appendix A for meeting summaries). Some of the summaries were reviewed and revised by the respective project managers or other state agency staff.

1- USX (Formerly U.S. Steel)

The U.S. Steel plant is located approximately 4 miles southwest of the Duluth Central business district in the community of Morgan Park. The site is located on Spirit Lake, a wide lake-like area within the St. Louis River. The site covers 640 acres and includes about one mile of St. Louis River shoreline. Because the site is located on Spirit Lake, it has many features of a lake as well as a riverine environment. Wind, wave, ice heave and the Lake Superior seiche are all factors that can cause resuspension and transport of pollutants from sediment layers thought to be long since isolated from the water column.

The U.S. Steel Duluth Works was an integrated steel mill that included coke production, iron and steel making, casting, primary rolling and roughing, hot and cold finishing, and galvanizing. All of the structures standing at the time of closure are now demolished.

PAHs and mercury are the main pollutants at the site. Originally, the U.S. Steel site was thought to contain 500,000 cubic yards of contaminated sediments in need of remediation. Current survey results indicate there may be significantly less than that amount. Sampling performed in the fall of 2003 will allow the Minnesota Pollution Control Agency to more accurately determine the volume.

There are three principal areas of sediment contamination including the area defined as the estuary off the delta of Steel Creek, the sediments off-shore of the Wire Mill Settling Basin, and the sediments within the Wire Mill Settling Basin itself. Although there is a large amount of coal tar waste buried under many feet of natural river deposits in both Steel Creek and St. Louis River, the site team does not have accurate estimates at this time. The Wire Mill Pond was mostly cleaned out in 1997- with an unknown but probably small amount of contaminated sediment left under clean fill, a cover and aquatic plantings. Note that the MPCA (and the Morgan Park community) refer to the creek as "Steel Creek".

Approximate maximum contaminate concentrations for the sediments are 2,000 mg/kg (parts-per-million) PAHs, 1.5 ppm Mercury, 550 ppm Lead, and 1,500 ppm Zinc. More data will be available from the Fall 2003 sampling. In March 2002, a laser fluorescent tool was used through the ice to provide further quantification of PAHs in the bay floor. No remediation has yet been attempted or ordered on these sediment areas.

The US Steel site is in the Superfund program under state leadership. USS Corporation assumed site clean up responsibilities in 1985 after negotiating a Response Order by Consent with the MPCA.

Sampling should be finished at USX in 2004. In 2005, results will go before the MPCA Citizens Board which may recommend amending the Record of Decision (ROD). In 2006, the MPCA will begin to implement action approved by Board. Two main options are available for the site: dredging or capping. On-site storage could be a part of a dredging option. Any solution that allowed capping would have to take ice heave and wave action into account.

The U.S. Steel/Duluth Works Site and the Interlake Steel/Duluth Tar and Chemical are collectively referred to as the St. Louis River Superfund Site.

2- Slip C

The Slip C site is located approximately three quarters of a mile southwest of Duluth central business district. This industrially-influenced slip is still an active loading and unloading facility. The slip is at least 21 feet deep and about 2,500 feet long. Superwood Duluth Barge Slip 7, a former harbor slip, is located adjacent to the area.

Moderate amounts of PAHs and mercury contamination are found at this site. Higher than background concentrations of PAHs and lead have been measured at Slip C. Concentrations of mercury and PCBs are present at lower levels. From the preliminary assessment, it is estimated that approximately 7,000 cubic yards of contaminated sediments are present in the Slip C site.

There has not been significant activity regarding Slip C since MPCA completed the preliminary assessment of contaminated sediments. Slip C remediation is currently unfunded. The site has been given a low priority by the MPCA.

3- 21st Avenue East

The 21st Avenue East site is located approximately one mile southwest of Duluth central business district. This slip is a part of the authorized navigation channel although it has not been dredged for a number of years and is slated for deauthorization. Miller Creek, a designated trout stream, and Coffee Creek drain into the western end of the slip, and Interstate Island, a bird sanctuary, is at the eastern end. WLSSD is just south of the slip.

Moderate amounts of PAHs and mercury contamination have been found at this site. Moderate concentrations of PCBs are present. Approximately 10,000 cubic yards of contaminated sediments are present in the 21st Avenue East site.

The 21st Avenue East site is an orphan site. Funding has been sought in the past to evaluate the contamination levels. Some preliminary evaluation has been completed by the U.S. ACOE. Proposals for wildlife habitat construction using dredged materials at 21st Avenue West have not moved forward. The \$175,000 U.S. EPA Great Lakes National Program Office money

obtained by the MPCA for an evaluation study was redirected towards development of a holistic sediment strategy (approved in 2003).

4- Minnesota Slip

Minnesota Slip site is located adjacent to the Duluth central business district. The slip is the center of water recreation and tourist activities including two private marinas, the William A. Irving boat tours, and the Vista Fleet. The slip is 14 to 16 feet deep and about 1000 feet long.

Contamination in the slip is heterogeneous. PAHs, PCBs, lead, mercury, and zinc are elevated in the slip, with PAHs being the primary contaminant of concern. Significant sediment toxicity was observed in portions of the slip. A rough estimate of the volume of contaminants was made for the upper depth segments for which sediment quality data were available. MN Slip has at least 4000 cubic yards of contaminated material. However further work needs to be completed to develop better volume estimates.

The U.S. ACOE recently dredged 700 cubic yards from Minnesota Slip and placed the material in two “cells” at Erie Pier. The U.S. ACOE and the University of Minnesota Natural Resources Research Institute (NRRI) are conducting a study to evaluate whether an alternative remediation technology, Electrochemical Geo-oxidation (ECGO), can be used to treat sediments contaminated with PAHs. If successful this could lead to treating contaminated sediments in place. Although there are still high levels of other contaminants in Minnesota slip that are not being assessed in the U.S. ACOE’s study.

5- Newton Creek

The Newton Creek site is located approximately 4 miles east of the Superior central business district. Newton Creek is approximately 3 feet wide and 1 1/2 feet deep. It is now about 4 feet wide after contaminated sediment removal in 2003. The creek flows through many culverts under residential streets. These constrictions previously caused back-ups in the stream flow that may have lead to resuspension of particles with associated contaminants. The creek is used for many recreational activities. There are municipal parks, bike trails, and hiking trails along creek. Newton Creek begins near the Murphy Oil USA refinery. After flowing for approximately two miles, the creek flows into Hog Island Inlet of Superior Bay.

The creek had intermittent high PAH concentrations from storm events and/or sediment disturbance and suspension. The WDNR’s 1995 study (Redman, 1995) found Diesel Range Organics (DRO) at severe levels of 1200 ppm. Lead was also found at high levels. Tree swallow and fish cage studies for toxicity have been completed. A 2000 study found additional toxicity to benthic organisms due to UV activation of PAHs. In 2003, a remedial investigation confirmed the WDNR’s findings. Approximately 4000 cubic yards of contaminated sediments have been removed from Newton Creek as of 2003.

The Newton Creek site is a RCRA site and is operating under the Wisconsin State Spill Law. In October 2000, the results of environmental investigations of Newton Creek were presented by the Wisconsin Department of Natural Resources to the public to develop community based

partnerships, clean up the Newton Creek and Hog Island Inlet system, protect human health and the environment, provide for healthy and safe recreational areas, and produce quality aquatic habitat in the inlet. The investigation defined the degree and extent of sediment contamination, defined soil contamination in the floodplain, assessed the human health risk, assessed the ecological risk, and modeled the 10 year and 100 year floods.

During 2003, the accessible contamination found in the creek bed and flood plain at the culverts was removed. The sediment quality objectives defined by considering net environmental effects, including health, safety and welfare, natural recovery rates, engineering feasibility, costs, and compliance with applicable laws and regulations were met. Remediation was funded through a combination of a U.S. EPA Great Lakes National Program Office grant, a Wisconsin Coastal Management Program grant, and other state funds.

6- Hog Island Inlet

Hog Island Inlet of Superior Bay is located approximately 4 miles east of the Superior central business district. It is used for many recreational activities. There are trails in the riparian area surrounding this industrially influenced bay. The inlet is less than two miles from the Superior entry to Lake Superior. Hog Island Inlet is a unique area due to the sheltered wetland with emergent fringing vegetation habitat. The Inlet has a high potential for spawning habitat for sport fish. This habitat type, once common, is now rare because of the development of the harbor.

The headwaters of Newton Creek begin at the Murphy Oil USA and flow into Hog Island Inlet. The Lakehead Pipeline Terminal previously operated adjacent to the Inlet with petroleum products transported and transferred.

A 1995 study done by WDNR found Diesel Range Organics at severe levels of 1200 ppm. Lead was also found at levels above 50 ppm. Toxicity studies have included studies of impacts to tree swallows and caged fish. A 2000 study found additional toxicity due to UV light activation of PAH toxicity. In 2003, a remedial investigation confirmed the WDNR's findings. Approximately 20,000 to 40,000 cubic yards of contaminated sediments are found in Hog Island Inlet.

The Hog Island and Newton Creek site are considered a single Area of Concern and are operating under the Wisconsin State Spill Law. Investigations have defined the degree and extent of sediment contamination, defined soil contamination in the floodplain, assessed the human health risk, assessed the ecological risk, and modeled the 10 year and 100 year floods. The results of the Hog Island Inlet Feasibility Study were presented to the public in late 2003.

Remediation has been completed in Newton Creek, except for Segment L (the last 500 feet before discharging to Hog Island Inlet). The WDNR preferred alternative for Hog Island Inlet and Newton Creek Segment L is dredging and removal of approximately 40,000 cubic yards of contaminated sediment. Funding will be needed to complete the system-wide clean up, which is currently being pursued in part under the Great Lakes Legacy Act.

7- Crawford Creek

The Crawford Creek site is located approximately six miles east of Superior central business district. It is a tributary to the Nemadji River, a major tributary to Superior Bay and Lake Superior.

Koppers Industries, Incorporated produces treated wood products with creosote and formerly with pentachlorophenol. Water from the plant site, approximately 112 acres, has drained to Crawford Creek. A drainage ditch with layers of creosote also flows from the plant. Some of the plant site also drains toward Bluff Creek, a tributary to Allouez Bay.

This was a RCRA site with EPA lead until 1995, when WDNR assumed the lead for the site. Soil and sediment evaluations are underway with the Responsible Party under RCRA corrective action. Benthic macroinvertebrate studies have been done at the site. Visible contamination ends about halfway between the plant and the Nemadji River. Soils and water at the site have been sampled for dioxin. Off-site sediment sampling has detected various PAH compounds at the stormwater outfall discharging to Bluff Creek and in the wetland adjacent to the facility that drains into Crawford Creek. At least 2,300 yds³ of contaminated sediments are present in the creek and surrounding wetland.

8- The St. Louis River/Interlake/Duluth-Tar (SLRIDT)

The St. Louis River/Interlake/Duluth-Tar (SLRIDT) site is located approximately 3 miles southwest of the Duluth central business district. The site includes the region lying east of the 63rd Avenue Peninsula over to and including the 54th Avenue Peninsula. The site includes approximately 230 acres of land and river/embayment area. The aquatic portion of the site is made up of an industrially-influenced sheltered bay, Stryker Bay, that is 4-5 feet deep with a constricted opening to the St. Louis River that is <3' deep and two industrially-influenced slips, Slips 6 & 7, that are approximately 23 feet deep.

The St. Louis River/Interlake Iron/Duluth Tar (SLRIDT) Site is the former location of steel and iron plants, foundry, pig iron, coking, water gas, and separate tar and chemical companies which utilized byproducts of the steel plant coking operations. The property is currently occupied by the Hallett Dock Company.

PAHs, mercury, and heavy metals are the main contaminants found here. PAHs are one of the primary contaminants of concern at this site; the PAHs are due primarily to tar contamination of the sediments and land. Oil blooms occur frequently in the summer. The blooms are cordoned off with booms to help prevent oil and tar from going over to residential area on other side of bay. There are approximately 400,000 cubic yards of contaminated sediment at this site.

The SLRIDT site has been a "MPCA Enforcement Deferral Pilot Project" since 1995, which means the MPCA can make site decisions without EPA review or oversight. The site is often referred to as a state-lead Superfund site and must follow the Superfund program process. The Responsible Parties (RPs) - the Interlake Corporation, Domtar, Inc. and AlliedSignal, Inc.- have been identified and are cooperating in the remedy evaluation and selection. The fourth

RPs, Beazer East, Inc., has not been cooperating in these activities.

Since 2000, MPCA staff has been reviewing the capping versus dredging questions. In April 2004 the MPCA announced its proposed plan for the sediment operable unit at the site. The proposal is termed the “Revised Dredge/Cap Hybrid.” It involves dredging approximately 25 acres of sediment contaminated with PAHs, metals and mercury in Stryker Bay, Slip 6, and the Minnesota Channel. The proposed plan also includes capping approximately 7 acres of contaminated sediment in Stryker Bay and capping 28 acres of contaminated sediments in Keene creek Bay/ Slip 7. Public comment on the proposal ends in May 2004.

9. Howard’s Pocket (Bay)

The Howard’s Pocket site is located approximately one mile north of Superior central business district. Two thirds of the southern side of the bay is dredged to hard clay bottom of about 22 feet. The northern side is about 14 feet deep and has more soft sediment. Boat traffic disturbs the sediment. The movement of the boats in and out of the bay moves the contaminants around and makes difficult to characterize contamination at the site.

Fraser Shipyard, with drydock facilities, Barko Hydraulics, not currently active, and Cenex Harvest States are located on Howard’s Pocket.

The 1994 AOC “hot spot” (Crane and Schubauer-Berigan, 1997) evaluation indicated PAHs contamination would be likely. The investigation found the contaminants of concern for this area include arsenic, lead, copper, nickel, zinc and mercury. Paint chips and oily materials were found. Lead found in previous studies probably came from the paint that was removed from ships. Tributyltin is also a contaminant of potential concern at this site.

Currently, the area is under RCRA enforcement action with a potential Responsible Party (RP). Other RPs may be involved in future. The site has been submitted to the Superfund program. The Howard’s Pocket site has been on hold by WDNR since 1993. When additional data is available, further actions will be determined.

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GLOSSARY OF TERMS AND ABBREVIATIONS

AOC

Area of Concern; a geographic area that fails to meet the objectives of the Great Lakes Water Quality Agreement [between Canada and the United States] and where such failure has caused or is likely to cause impairment of beneficial uses of the area's ability to support aquatic life.

aquatic

Living or growing in or on water.

benthic

Pertaining to the bottom of a body of water; usually refers to a bottom-dwelling organism.

SLRCAC: St. Louis River Citizens Action Committee

community

An association of interacting populations defined by their interactions or by the place in which they live. A community typically demonstrates a repeating pattern of associations in similar environmental conditions. Usually used as a shorthand notation for plant associations or plant communities; however it also may refer to human communities, depending on the context.

ecological function

A role or service provided to the ecosystem. For example, primary production is an ecological function provided by green plants as they turn solar energy (an ecological component) into chemical energy (another ecological component).

ecological process

Describes changes in, actions by, or interactions between ecological components. For example, erosion is an ecological process that carries sediment or soil from one location to another.

ecological system

Ecological system or ecosystem; a living system made up of all the organisms in a given area together with the non-living components (e.g., climate, geology, etc.) that are present and the interactions between them. A group of plant associations that (1) occur together on the landscape; (2) are linked by ecological processes, underlying environmental features (e.g., soils, geology, topography), or environmental gradients (e.g., elevation, precipitation, temperature); and (3) form a robust, cohesive, and distinguishable unit on the ground.

ecosystem

A group of interacting species combined with the physical environment.

EPA: Environmental Protection Agency

estuary

Freshwater estuaries are areas of interaction between a river and nearshore lake water, where seiche activity and river flow create a mixing of lake and river water; may include bays, mouths of rivers, marshes, and lagoons. These ecosystems shelter and feed fish, birds, and wildlife. Most importantly, Great Lakes estuaries provide habitat for wildlife and for young-of-the-year and juvenile fish.

GIS

Geographic Information System; a computer-based system used to store and manipulate geographic information. A GIS is designed for the collection, storage, and analysis of objects and phenomena where geographic location is an important characteristic or is critical to the analysis.

habitat

A broad term used to describe an identifiable area where a particular species or group of species live; a given habitat can be described by either physical features (such as water depth) or biological features (such as plant associations) or a combination of both.

HTAC: Harbor Technical Advisory Committee

IJC: International Joint Commission

industrial slip

For the purposes of this Plan, industrial slips include active and inactive boat slips used for industry, commerce, and recreation.

industrially-influenced bays

For the purposes of this Plan, industrially-influenced bays have been impacted by commercial and residential development as well as industry.

MDNR: Minnesota Department of Natural Resources

MPCA: Minnesota Pollution Control Agency

PAH

Polynuclear aromatic hydrocarbons; a family of organic chemicals based on the chemical structure of benzene. PAHs result from incomplete combustion of organic chemicals and are associated with grease and other components derived from petroleum byproducts. Some examples of the many PAH compounds include; benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, chrysene, phenanthrene, and pyrene.

PCB

Polychlorinated biphenyls; PCBs are a group of over 200 nonflammable compounds formerly used in heating and cooling equipment, electrical insulation, hydraulic and lubricating fluids, and various inks, adhesives, and paints. These compounds are highly toxic to aquatic life, persist in the environment for long periods of time, and are

bioaccumulative. PCBs are suspected carcinogens and are linked to infant development problems.

peak flow

The highest discharge of a stream.

RAP

Remedial Action Plan; a plan developed for an Area of Concern, describing the environmental problem, defining impaired uses, evaluating in-place and alternative remedial measures, identifying agencies responsible for implementation, evaluating implementation, describing surveillance and monitoring, and confirming restoration of uses.

seiche

A tidal-like rise and fall of water in large lakes, which occurs after water is piled up on one side of the lake by wind or high barometric pressure; when this force diminishes, the water rocks back and forth from one shore to the other with decreasing amplitude.

terrestrial

Living or growing on land.

UMD: University of Minnesota - Duluth

UMD-NRRI: University of Minnesota - Natural Resources Research Institute

U.S. ACOE: United States Army Corps of Engineers

U.S. EPA: United States Environmental Protection Agency

U.S. FWS: United States Fish and Wildlife Service

UWS: University of Wisconsin - Superior

viability

The overall current health of a system in a given location; viability is assessed according to the size, condition, and landscape context in the given location.

WDNR: Wisconsin Department of Natural Resources

WLSSD: Western Lake Superior Sanitary District