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Binnational Public Advisory Council for the

St. Marys River Area of Concern

REPORT ON

**SCOPE OF CONTAMINATED SEDIMENTS
IN THE
ST. MARYS RIVER AREA OF CONCERN**

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1.0 EXECUTIVE SUMMARY

The St. Marys River is a binational waterway between Ontario and Michigan that has been identified by the International Joint Commission Water Quality Board as one of 43 Areas of Concern within the Great Lakes Basin. Designation of this river as an AOC is based in part on beneficial uses impairments directly related to contaminated sediments. Governmental agencies, including Environment Canada, Ontario Ministry of Environment, the U.S. Environmental Protection Agency, and the Michigan Department of Environmental Quality, have identified several locations within the St. Marys River AOC that contain contaminated sediments. Progress of remediation and restoration at each of these sites is varied and ranges from industrial and municipal pollution control measures to removal of contaminated sediment from the river. Two sites identified on the Michigan shoreline will have contaminated sediments removed; these projects are scheduled for completion in 2005. Canadian sites identified with ongoing contaminated sediment issues have not yet reached the remediation stage and agencies are still in the process of prioritizing these sites.

The Binational Public Advisory Council held a series of three workshops between November 2004 and April 2005 designed to provide information on the status of agency involvement in the identification and cleanup of contaminated sediments within the St. Marys River AOC. This report will address the current progress of contaminated sediment remediation efforts and provide a consolidated document for stakeholders.

2.0 INTRODUCTION

Between November 2004 and April 2005, the Binational Public Advisory Council (BPAC) presented a series of three workshops to summarize the status of agency involvement in the identification and cleanup of contaminated sediments within the St. Marys River Area of Concern and to obtain citizen input on the remediation process.

As a binational waterway, the shoreline of the St. Marys River is the most biologically diverse within the Great Lakes Basin. It is also a significant North American waterfowl flyway and provides habitat for a variety of fish species, and was designated as a Canadian Heritage river in 2000. Stresses on the St. Marys River system include contaminants from point and non-point sources such as heavy metals, polycyclic aromatic hydrocarbons (PAHs), oil and grease, mercury, arsenic, phenols, and bacteria. These contaminants, as well as nickel, copper, phosphorus, trace organics, and chromium, bind to sediments in the river and affect water quality. Sediment studies performed since 1968 by Ontario and Michigan governmental agencies have identified specific locations within the St. Marys River contaminated with these pollutants. Concern about water quality issues such as fish consumption advisories, impact on biota, and contaminated sediment resulted in the identification of the St. Marys River system as one of 43 Areas of Concern (AOCs) recognized within the Great Lakes Basin by the International Joint Commission in 1987.

Designed to provide information on the current progress of contaminated sediment remediation efforts, the BPAC workshop series offered citizens a means of expressing their concerns about specific remediation plans. As a culmination of the workshops, this report will address the

current progress of contaminated sediment remediation efforts and provide a consolidated document for stakeholders.

3.0 HISTORY OF THE RAP PROGRAM

The *Great Lakes Water Quality Agreement* of 1972 was signed by Canadian and U.S. Governments to address environmental concerns in the Great Lakes. In 1987, under Annex 2, the Remedial Action Plan (RAP) Program was created by the Water Quality Board of the International Joint Commission (IJC) and identified 43 Areas of Concern (AOCs) within the Great Lakes Basin. A list of 14 beneficial uses, designed to restore and protect the integrity of the Great Lakes water system, were used as criteria for inclusion as an AOC. Impairments of beneficial uses (BUIs) that adversely affect environmental quality include bacteria, impacted biota, contaminated sediments, fish consumption advisories, oil and grease, and phosphorus.

The St. Marys River is a binational waterway between Ontario and Michigan and extends from Whitefish Bay through St Joseph & West Neebish Channels (100-120 km, 62-75 miles). This area was identified as an AOC by the IJC based in part on BUIs directly related to contaminated sediments. These include restrictions on fish and wildlife consumption, degradation of benthos, and restrictions on dredging. Management of the St. Marys River AOC requires a cooperative effort between Canadian and U.S. Governments to coordinate the remedial action process. In 1998, a Letter of Commitment was signed by Environment Canada, the Ontario Ministry of the Environment, the U.S. Environmental Protection Agency, and the Michigan Department of Environmental Quality to oversee restoration and delisting of the St. Marys River AOC. These four agencies are responsible for coordination of development and review of the delisting criteria

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required for removal of the AOC by the IJC in accordance with the *Great Lakes Water Quality Agreement*. To date, the agencies have identified several locations within the St. Marys River AOC that contain contaminated sediments and actions to restore these areas are underway.

The goal of the RAP program is to restore ecosystem health of the Great Lakes and to delist the AOCs from the program. Accomplished through improvements of BUIs with local remediation and restoration efforts, RAP is designed to restore, protect, and maintain the environmental quality of the Great Lakes ecosystem. The approach for removal of the St. Marys River as an AOC is a three-stage process. The Stage 1 report, published in 1992 by the Ontario Ministry of Environment and the Michigan Department of Natural Resources, defined the problems (identified specific BUIs) that exist in the AOC. The Stage 2 report, produced by Environment Canada, Ontario MOE, U.S. EPA, and Michigan DEQ, was released in 2002. This report offered remedial and regulatory measures to improve the BUIs identified in the AOC. A review of the Stage 2 report, the *St. Marys River Remedial Action Plan Implementation*, was released in 2004. (Copies of these publications and others that pertain to the St. Marys River AOC are maintained in the library of the BPAC Resource Office at Lake Superior State University.) Completion of Stage 3 will occur when monitoring indicates that identified beneficial uses have been restored.

4.0 AGENCIES INVOLVED

The primary RAP agencies involved in restoration and delisting of the St. Marys River are Environment Canada, the Ontario Ministry of the Environment, the U.S. Environmental Protection Agency, and the Michigan Department of Environmental Quality. Collectively known as the “Four Agencies”, they are ultimately responsible for restoration and delisting of the

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St. Marys River AOC. Other RAP participants instrumental in achieving this goal include: St. Marys River Binational Public Advisory Council, Ontario Ministry of Natural Resources, Michigan Department of Natural Resources, Fisheries and Oceans Canada, Local First Nations and Native American communities, U.S. Army Corp of Engineers, Sault Ste. Marie Region Conservation Authority, the Great Lakes Sustainability Fund, and Transport Canada. The Cities of Sault Ste. Marie, Ontario and Michigan, Algoma Steel, and St. Marys Paper are also involved in restoration activities, as are a number of private organizations and citizens.

5.0 SEDIMENTS, CONTAMINANTS, AND BENTHOS

Types of sediment found in the St. Marys River are small particles, such as silt and clay, and medium to large particles that include sand, gravel, and rock. Contaminants specifically identified as contributing to the BUIs are oil & grease, cyanide, lead, mercury, zinc, iron, polycyclic aromatic hydrocarbons (PAHs), nickel, polychlorinated biphenyls (PCBs), copper, chromium, arsenic, and phosphorus. These contaminants are from both point and non-point sources, such as Algoma Steel, East End Water Pollution Control Plant, St. Marys Paper, urban runoff, Cannelton Industries Site, and the atmosphere (PCBs). Contaminants bind to smaller sediment particles easier than to larger particles and are thus more likely found in areas that contain smaller particles, such as shorelines or bays with lower currents.

Harmful concentrations of contaminants within the river system are determined by its affect on benthos – the community of organisms that live in or on the bottom of lakes, rivers, bays, etc. Contaminants enter the food chain through bioaccumulation (the increase in concentration of a pollutant from the environment in the first organism in a food chain, such as benthos) and tend to

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become more concentrated as they move from one link in the food chain to the next. As described in the Stage 1 Report, benthic communities are sedentary and thus good indicators of environmental conditions. Clean water will contain an increased diversity of benthic species, whereas polluted water will contain no aquatic life or very few pollution tolerant species.

In a report issued by the Ontario Ministry of Environment (1999), the status of benthos was documented for both Ontario and Michigan. On the Canadian side of the river, severe degradation of benthic communities was noted in Algoma Slip and downstream of the East End Water Pollution Control Plant. Moderate degradation was found in the Lake George Channel and Algoma Slag Dump and contaminated sediment concentrations in all of these areas were bioavailable and high enough to impact biological effects. The river was not considered to be recovered from the effects of contaminated sediments until it reached the southern end of Lake George (OME Report, 1999). On the Michigan side, benthos was moderately impaired near the Cannelton Industries Site and unimpaired along non-industrialized shoreline, upstream of pollutant sources, and Lake Nicolet.

6.0 SEDIMENT MANAGEMENT PROGRAM

The Summary of the St. Marys River RAP Stage 2 Report lists seven major goals for management of contaminated sediments. These are summarized as:

- assess each zone of contaminated sediments (for toxicity and bioavailability, etc.)
- develop a consistent method for identifying remediation options for each zone
- identify and control all major sources of toxins to prevent further sediment contamination
- monitor water and sediment quality near major sources of toxins to ensure that no further sediment contamination occurs

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- monitor and control the mixing of water and contaminated sediment during remediation activities where required to ensure water quality is maintained
- monitor and control the input of toxins from the air (from factory smokestack emissions, etc.) into the water and sediment of the St. Marys River
- conduct long term monitoring of sediment quality to ensure management is effective

7.0 AREAS OF CONTAMINATION

As noted in the March 2004 report submitted by Golder Associates Ltd. to Environment Canada, areas identified within the St. Marys River AOC that contained contaminants include:

- Algoma Slag Dump – borders the St. Marys River on the west end of Sault Ste. Marie, Ontario and identified as a potential source of heavy metals and PAHs
- Algoma Slip – located east of Algoma Slag Dump, contaminated by heavy metals and PAHs. Two tributary streams at the north end, East Davignon Creek and Bennet Creek, identified as possible routes of transport of contaminants.
- Bellevue Marine Park – located along Sault Ste. Marie, Ontario waterfront and considered the first depositional zone below Algoma Steel and St. Marys Paper. Contains heavy metals and PAHs, primarily from upstream sources.
- Tannery Bay (Cannelton Industries Site) – located on western end of Sault Ste. Marie, Michigan waterfront, contaminated by chromium and mercury.
- Lake George Channel – between Bellevue Marine Park and Little Lake George contains many depositional areas with contaminated sediment accumulation, including the East End Water Pollution Control Plant area.
- Little Lake George – contains contaminants from industrial sources, municipal discharges, and other upstream sources.
- Lake George – sediments in north end of lake contain elevated levels of metals, PCBs, and PAHs.

River flow within the St. Marys River directs the majority of water flow down the U.S. side of the channel and results in a greater number of depositional zones on the Canadian side. In

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addition, Ontario has more industrial sites along the river than does Michigan; this also contributes to the larger number of contaminated areas along the Canadian side of the St. Marys River AOC.

8.0 PROGRESS OF CONTAMINATED SEDIMENT REMEDIATION

8.1 ALGOMA SLAG DUMP AND ALGOMA SLIP

The north end of the Algoma Slip area was dredged in 1995 (after publication of the Stage 2 Report). In 2000, Algoma Steel Inc. contracted a private agency to perform a study on the dredged area to determine PAH levels. While this study showed that overall PAH concentrations had decreased, a survey of sediment and biological conditions in the St. Marys River performed by Environment Canada in 2002 showed that oil and grease, arsenic, chromium, copper, iron, lead, manganese, nickel, and zinc still exceed minimum Provincial Sediment Quality Guidelines (PSQG). Results of the 2002 Environment Canada survey showed that the Algoma Slag Dump also exceeds minimum PSQG for oil and grease, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc, as well as total PAHs. The Algoma Slag Dump is considered to be a possible source of contaminants to the St. Marys River system.

Since 1990, Algoma Steel Inc. has invested \$102 million to help reduce the output of trace organic chemicals, heavy metals, and phosphorus into the St. Marys River. In 2000, Algoma Steel Inc. signed an Environmental Management Agreement with Environment Canada and the Ontario Ministry of the Environment to voluntarily address the industrial impact on the river.

8.2 BELLEVUE MARINE SITE

This site contains arsenic, cadmium, chromium, copper, lead, manganese, nickel, zinc, and PAHs that exceed the minimum PSQG. Cyanide concentrations exceeded the Open Water Disposal Guidelines (OWDG) and, of all sites sampled in a 1995 study, were highest at this site. Toxicity and impairment of benthic communities was also noted. No information regarding remediation of this site is available at this time.

8.3 ST. MARYS PAPER

St. Marys Paper Ltd. Has invested \$14 million to install a wastewater treatment facility that will minimize the input of phosphorus and trace organic chemicals into the St. Marys River.

8.4 TANNERY BAY (CANNELTON INDUSTRIES SITE)

Contaminated sediment areas within the Cannelton Industries Site include Tannery Bay and an adjacent wetland area. Remediation of this site is scheduled for 2005 and includes removal of contaminated sediments and restoration of the Tannery Bay shoreline. The project is funded by Phelps-Dodge (current site owner) and U.S. EPA Great Lakes National Program Office and includes participation from MDEQ and the Army Corp of Engineers. This site is listed as a Superfund Site and is the only Michigan site listed in the AOC for contaminated sediments.

8.5 MGP SITE

Although not listed as part of the St. Marys River AOC, but also identified as an area containing contaminated sediments, is the Sault Ste. Marie, Michigan former Manufactured Gas Plant, located near the Coast Guard slip on the St. Marys River. Contaminants contained within this

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site are PAHs and BTEX (benzene, toluene, ethylbenzene, and xylenes). This site was previously owned by Consumers Energy and is currently undergoing sedimentation investigation with contaminated sediment removal and renovation of the shoreline scheduled to occur in 2005.

8.6 OTHER SITES

Lake George Channel, Little Lake George, and Lake George also contain heavy metals and PAHs that exceed minimum PSQG. No information regarding remediation of these sites is available at this time.

The governments of Canada and Ontario have invested \$40 million to improve the East End sewage treatment plant and sanitary sewer overflows. In Sault Ste. Marie, Ontario, improvement of sewage collection methods is underway, while Sault Ste. Marie, Michigan has begun work to eliminate combined sewage overflows. Both cities are committed to minimize phosphorus and bacterial inputs into the St. Marys River.

9.0 REMEDIATION METHODS

Methods suggested by governmental agencies and private corporations for remediation of contaminated sediments include natural sediment deposition, dredging, rockwall/sheetpile barrier, sediment capping, sediment removal, and air quality monitoring to prevent contamination from atmospheric deposition. Numerous citizen concerns regarding these methods exist, including:

- What are the differences between specific methods?
- Are all the methods safe, both environmentally and biologically? (i.e., will a rockwall barrier prevent fish or other aquatic species from accessing contaminated sediments?)

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- Can each method be used in all areas or can only specific methods be used in certain areas (e.g., shoreline areas accessible by the public, industrial shorelines, etc.)?
- What guidelines exist for sediment removal or for dredging?
- What processes are considered safe for decontamination of removed sediment? Are long-term studies available regarding these processes?
- Which agency determines where removed sediment will be stored? Which agency is responsible for monitoring sediment once it has been removed and placed in a landfill?
- Additional landfill issues such as watershed drainage concerns; lack of agency response to public inquiry about contamination issues from sediment disposal and monitoring of disposed sediments; information regarding designation process of public landfills that receive decontaminated sediments

Explanations and guidelines regarding these remediation methods and concerns (and any other methods not mentioned here that are considered for the cleanup of contaminated sediment in the St. Marys River) needs to be provided by the agencies – in a comprehensible and non-technical format – for concerned citizens. This would include any proprietary methods considered for use by contractors and/or private organizations involved in clean up activities.

10.0 CONCLUSION

The St. Marys River AOC contains several sites that require remediation of contaminated sediments. On the Michigan side of the river, removal from the two sites that contain contaminated sediments are scheduled to be completed in 2004 and 2005. Although many improvements have been made on the Canadian side to prevent further contamination of the river system (Algoma Steel, St. Marys Paper, East End Water Pollution Control Plant improvements), little action has been taken towards remediation of sites known to contain contaminated sediments.

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As part of the Workshop series, a representative for Environment Canada and the Ontario Ministry of Environment presented the development process of a Canada-Ontario decision-making framework for contaminated sediments. While this information is certainly relevant to the evaluation of contaminated sediment sites in the St. Marys River AOC, the proposal for this framework was initiated in 2002 and contains no specific actions for remediation of sites that contain contaminated sediments. Much of the work to date regarding local sediment contamination has been undertaken on a commercial scale (e.g., industrial improvements) or at the city level (sewage treatment plant upgrades, etc.), albeit at the request of concerned agencies. However, these measures do not address the well-documented contaminated sediment issues that perhaps require a greater level of intervention, such as at the Bellevue Marine Site. Cooperation on sediment studies and sharing results between the agencies involved is commendable, especially considering the binational aspects present; however, it is time for remediation at all identified sites.

Agencies Involved

- US Environmental Protection Agency (EPA)
- Michigan Dept of Environmental Quality (DEQ)
- Ontario Ministry of the Environment (OMOE)
- Environment Canada (EC)
- Great Lakes Sustainability Fund
- City of Sault Ste. Marie, Ontario
- City of Sault Ste. Marie, Michigan
- Algoma Steel
- St. Marys Paper
- Ontario Ministry of Natural Resources (MNR)
- Michigan Dept of Natural Resources (MDNR)
- Fisheries and Oceans Canada
- Health Canada
- St. Marys River Binational Public Advisory Council (BPAC)
- Local First Nations and Native American communities
- US Army Corp of Engineers (USACOE)
- Sault Ste. Marie Region Conservation Authority (SSMRCA)
- Transport Canada (TC)

St. Marys River Beneficial Use Impairments

The Great Lakes Water Quality Agreement calls for Remedial Action Plans (RAPs) to restore and protect 14 beneficial uses in Areas of Concern. Of the 14 beneficial uses, 9 are impaired in the St. Marys River AOC. An impaired beneficial use means a change in the chemical, physical, or biological integrity of the Great Lakes system sufficient to cause any of the following:

- ▶ Restrictions on fish and wildlife consumption (IMPAIRED)
- ▶ Tainting of fish and wildlife flavor
- ▶ Degradation of fish wildlife populations (IMPAIRED)
- ▶ Fish tumors or other deformities (IMPAIRED)
- ▶ Bird or animal deformities or reproduction problems
- ▶ Degradation of benthos (IMPAIRED)
- ▶ Restrictions on dredging activities (IMPAIRED)
- ▶ Eutrophication or undesirable algae (IMPAIRED)
- ▶ Restrictions on drinking water consumption, or taste and odor problems
- ▶ Beach closings (IMPAIRED)
- ▶ Degradation of aesthetics (IMPAIRED)
- ▶ Added costs to agriculture or industry
- ▶ Degradation of phytoplankton and zooplankton populations
- ▶ Loss of fish and wildlife habitat (IMPAIRED)

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References

Golder Associates Ltd. 2004. Synthesis of Sediment and Biological Investigations in the St. Marys River Area of Concern. March 2004.

International Joint Commission. 2003. The Status of Restoration Activities in the Great Lakes Areas of Concern. April 2003. 25 pp.

International Joint Commission. 2004. Twelfth Biennial Report on Great Lakes Water Quality. September 2004. 84 pp.

Kresin Engineering Corporation and Allan Wright, Shelby Environmental Services. 2004. St. Marys River Remedial Action Plan Implementation Review Project. March 31, 2004. 197 pp.

Moving Forward. Summary of the St. Marys River RAP Stage 2 Report. 8 pp.

Olsen, David and Ed Sloan. 2005. Consumers Energy and STS Consultants, Ltd. Former Sault Ste. Marie MGP Site Restoration Project. BPAC Workshop/Public Presentation. February 10, 2005.

Phelps-Dodge Corporation. 2005. Remediation of Tannery Bay/Wetland Sediments. BPAC Workshop/Public Presentation. February 10, 2005.

St. Marys River RAP. 2002. St. Marys River Area of Concern Remedial Strategies for Ecosystem Restoration. Remedial Action Plan Stage 2. December 2002. 145 pp.

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Links for more information

(not a complete list – many more can be found at these sites)

Binational Public Advisory Council

<http://www.lssu.edu/bpac/aoc.html>

Canadian Heritage Rivers System

http://www.chrs.ca/Rivers/StMarys/StMarys_e.htm

Environment Canada: St. Marys River Area of Concern

http://www.on.ec.gc.ca/water/raps/stmary/intro_e.html

http://www.on.ec.gc.ca/water/raps/map_e.html

Great Lakes Information Network

<http://www.great-lakes.net/envt/pollution/aoc.html>

International Joint Commission

St. Marys River Stage 2 Remedial Action Plan Review

http://www.ijc.org/php/publications/html/stmarys_rap2-e.htm

St. Marys River Area of Concern Status Assessment (December 1998)

<http://www.ijc.org/php/publications/html/stmarys/status.html>

Michigan Department of Environmental Quality

Great Lakes Areas of Concerns Program

http://www.michigan.gov/deq/0,1607,7-135-3313_3677_15430-35544--,00.html

<http://www.glc.org/spac/pdf/RAPsummaries.pdf>

Sault Ste. Marie Region Conservation Authority

http://www.ssmrca.ca/st_marys_river_rap_review.html

U.S. Environmental Protection Agency: St. Marys River Area of Concern

<http://www.epa.gov/glnpo/aoc/stmarys.html>