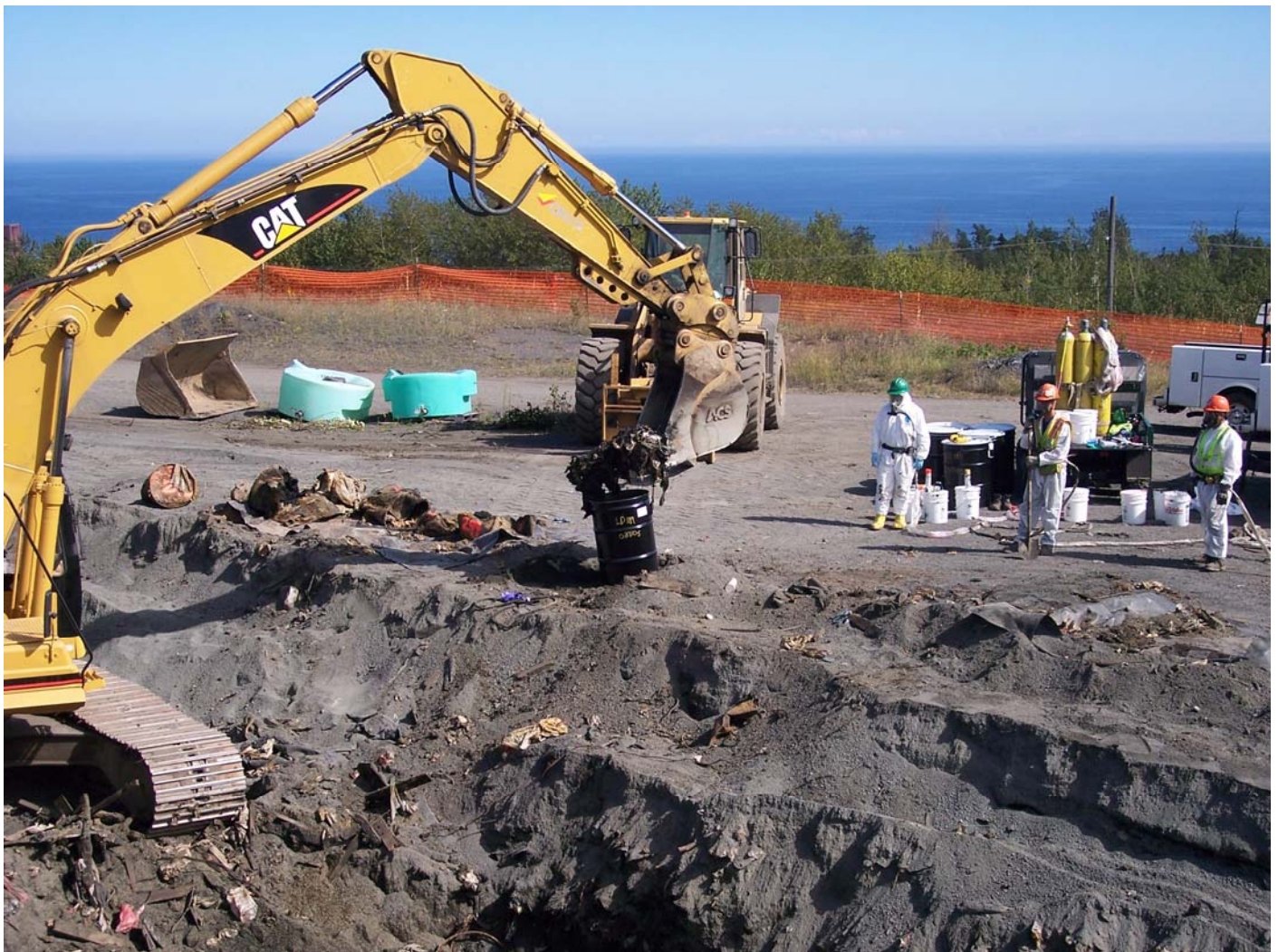


Chapter 4

Lake Superior Critical Pollutants Progress Report



Cleaning up the Reserve Mining barrel dump site. Photo credit:
Susan Johnson, Minnesota Pollution Control Agency

Lake Superior Lakewide Management Plan 2008

Chapter 4 Contents

4.0	THE ZERO DISCHARGE DEMONSTRATION PROGRAM	4-1
4.1	POLLUTANT CONCENTRATIONS IN THE ENVIRONMENT	4-2
4.2	LaMP ACCOMPLISHMENTS 2006 TO 2008	4-4
	4.2.1 Chemical Reduction Activities in the Lake Superior Basin	4-4
	4.2.2 New Regulations and Policies Aligned with LaMP Goals	4-22
4.3	CHALLENGES	4-29
	4.3.1 Overall Challenges	4-29
	4.3.2 Substances of Emerging Concern	4-30
4.4	NEXT STEPS	4-38
4.5	REFERENCES	4-38

Table 4-1.	Jurisdictional Lake Superior water quality yardsticks for some LaMP critical pollutants (ng/L).....	4-3
Table 4-2.	Concentrations (ng/L) of some critical pollutants in Lake Superior open lake water.....	4-3
Table 4-3.	Examples of common classes of substances of emerging concern, specific chemicals of interest in those groups, and their common uses	4-31
Table 4-4.	Existing critical pollutants for Lake Superior	4-34
Table 4-5.	Existing prevention pollutants for Lake Superior	4-35
Table 4-6.	Explanation of management categories	4-35

ADDENDUM 4A: CHAPTER 4 ACRONYMS	4A-1
---------------------------------------	------

ADDENDUM 4B: LAKE SUPERIOR ZERO DISCHARGE DEMONSTRATION PROGRAM AND CRITICAL CHEMICAL REDUCTION MILESTONES.....	4B-1
---	------

ADDENDUM 4C: CHEMICAL REDUCTION AND INVENTORY ACTIVITIES FOR 2010 LAKE SUPERIOR MILESTONE.....	4C-1
--	------

Chapter 4

Lake Superior Critical Pollutants Progress Report

4.0 THE ZERO DISCHARGE DEMONSTRATION PROGRAM

Reducing toxics loadings to Lake Superior is a key component in the effort to achieve a sustainable Lake Superior basin. The LaMP Stage 2 document sets a goal of eliminating discharges and emissions of nine critical pollutants in the Lake Superior basin by 2020, with interim targets in 2000, 2005, 2010, and 2015. The baseline for the reduction targets is 1990. The nine chemicals targeted for zero discharge and zero emission include chlordane, DDT, dieldrin, dioxin, hexachlorobenzene (HCB), mercury, octachlorostyrene (OCS), PCBs, and toxaphene. The Lake Superior Binational Program's Zero Discharge Demonstration Program (ZDDP) is a unique experimental program intended to end the use of these nine critical pollutants in industrial processes or products, and to prevent their release in the Lake Superior basin.

Chapter 4 updates information on concentrations of critical pollutants in Lake Superior, accomplishments in the 2006-2007 period, challenges to accomplishing the 2010 critical pollutant reduction milestones, and provides a strategy for substances of emerging concern. Acronyms for this chapter are included in Addendum 4A.

Why Zero Discharge for Lake Superior?

Among the Great Lakes, Lake Superior provides the best opportunity to achieve zero discharge and zero emission. The governments around Lake Superior announced *A Binational Program to Restore and Protect the Lake Superior Basin* in 1991, with an agreement to work together on the ZDDP and on broader ecosystem issues. The 1991 Agreement stresses voluntary pollution prevention but acknowledges that enhanced mandatory controls may be necessary.

What Progress Has Been Made toward Zero Discharge?

As noted in the LaMP 2006 Critical Pollutants Progress Report, Lake Superior partners were, at the time, preparing a report on progress toward the 2005 milestones. This report was released in October 2006 with a summary fact sheet released in 2007 (presented in Addendum 4B).

Reductions of note include:

- Mercury releases have dropped 71 percent since 1990;
- Dioxin releases have dropped 76-79 percent since 1990;
- PCBs continue to be phased-out; and
- More than 12,700 kg (28,000 lbs) of waste pesticides associated with the zero discharge demonstration have been collected since 1992.

4.1 POLLUTANT CONCENTRATIONS IN THE ENVIRONMENT

Enforcement of environmental regulations, changes in industrial development patterns, implementation of pollution prevention projects, and the efforts of individual citizens have significantly reduced pollutant releases to Lake Superior. However, the goal of zero discharge and zero emission is a challenging one with a significant amount of work remaining to be done.

The ZDDP, and other programs, are aimed at reducing toxic chemicals at their sources, resulting in the eventual reduction in the ecosystem. Concentrations of toxic organic contaminants, including the Lake Superior critical and lakewide remediation pollutants such as PCBs and DDT, have declined over time in many commonly-monitored environmental media including fish, water, air, and herring gull eggs. Much of the declines occurred immediately following government action to ban or restrict the use of these “legacy” pollutants in the 1970s and 1980s. Further declines of these chemicals in the Lake Superior environment have been difficult to measure for many reasons, including continued atmospheric inputs of pollutants from distant sources, the unique physical and chemical properties of Lake Superior, food web changes within the lake, and the inherent variability that occurs in measuring environmental contaminants, particularly at low concentrations.

Table 4-1 identifies “yardsticks” for water quality in Lake Superior. These are standards from the four Lake Superior jurisdictions, current as of January 2008. These yardsticks provide a way to monitor the status of Lake Superior critical chemicals in lake water as the ZDDP moves forward toward achieving its goals. Table 4-2 shows concentrations of some persistent bioaccumulative toxic chemicals in Lake Superior water resulting from 2005 US - Canada coordinated monitoring programs. Concentrations of PCBs, HCB, dieldrin, and toxaphene remain above one or more Lake Superior jurisdictional yardstick values.

Some chemicals also exceed yardsticks in other media. For example, mercury, PCBs, dioxin, and some pesticides exceed fish consumption advisory yardsticks in Lake Superior fish. Figure 2 in Addendum 4B demonstrates how mercury, which did not exceed the water quality yardstick in Table 4-1, does exceed the fish consumption yardstick. The figure also shows that PCBs exceed the fish consumption advisory yardstick.

While concentrations of many ZDDP and other legacy pollutants have declined in Lake Superior over time, a new set of chemical threats to the lake and its ecosystem has emerged over the past several years. “Substances of emerging concern” is a term often used to describe a whole suite of chemicals that are used in human society and can be detected in the environment. Awareness of the presence of many of these chemicals and their potential risk to ecosystem and human health is new and evolving rapidly as scientists investigate the scope of the issue.

Table 4-1. Jurisdictional Lake Superior water quality yardsticks for some LaMP critical pollutants (ng/L).

Pollutant	Water Quality Yardsticks (ng/L) ¹			
	MN ²	MI ²	WI ²	ON
PCBs	0.0045	0.026	0.003	1.0
HCB	0.074	0.30	0.22	6.5
Dieldrin	0.0012	0.0065	0.0027	1.0 (+Aldrin)
Chlordane	0.04	0.25	0.12	60
DDT	0.011	0.011	0.011	3.0 (∑DDE, DDD, DDT)
Mercury	1.3	1.3	1.3	200
Toxaphene	0.011	0.068	0.034	8.0
g-BHC (lindane)	80	25	18	10

¹ The purpose of listing available yardsticks from each jurisdiction is not to compare these numbers between jurisdictions, but to provide a reference for comparing water quality results to available yardsticks and determine if exceedences are occurring. For instance, Ontario's Provincial Water Quality Objectives (PWQOs) are intended to protect aquatic organisms based on no adverse effects on growth, reproduction or survival. PWQOs are not developed based on human health considerations or the protection of wildlife that consume aquatic organisms. Hence, Water Quality Criteria developed by U.S. jurisdictions tend to be more stringent than PWQOs for substances that bioaccumulate and, therefore, are not directly comparable (Ontario Ministry of the Environment, 1994).

² Water quality based standards for the Lake Superior states are based on the Great Lakes Water Quality Initiative.

Table 4-2. Concentrations (ng/L) of some critical pollutants in Lake Superior open lake water.

Pollutant	Open Lake Concentration (ng/L) ¹
PCBs (Values "Blank-Corrected", total of 132 congeners)	0.059 ± 0.022, n = 14
HCB	0.013 ± 0.001, n = 14
Dieldrin	0.112 ± 0.011, n = 14
Chlordane (cis + trans)	0.009 ± 0.003, n = 13
DDT (p,p'DDE + p,p'DDD+ p,p'DDT+ o,p'DDT)	0.014 ± 0.004, n = 13
Mercury	0.42 ± 0.14, n = 12
Toxaphene	1.014 ± 0.121 ²
g-BHC (lindane)	0.283 ± 0.038, n = 14

¹ Dove, A, Environment Canada. Personal communication (2005 data).

² Jantunen L., 2006 (2005 data).

Chemicals such as polybrominated diphenyl ethers (PBDEs) are increasing in fish tissue and sediment in Lake Superior (Figures 4-1a and 4-1b). On a concentration basis, perfluorinated alkyl acids (i.e., PFOS and PFOA) are now the predominant halogenated organic contaminants in Lake Superior waters (Muir, personal communication). Recognizing the importance of this issue, and in the spirit of the pollution prevention approach used by the ZDDP, the Lake Superior Binational Program has developed a strategy for addressing “substances of emerging concern.” The strategy folds substances of emerging concern into the LaMP process, creates a mechanism for identifying monitoring and management priorities for these substances, and calls for a pollution prevention management strategy. The strategy is described in detail within Section 4.3.2.

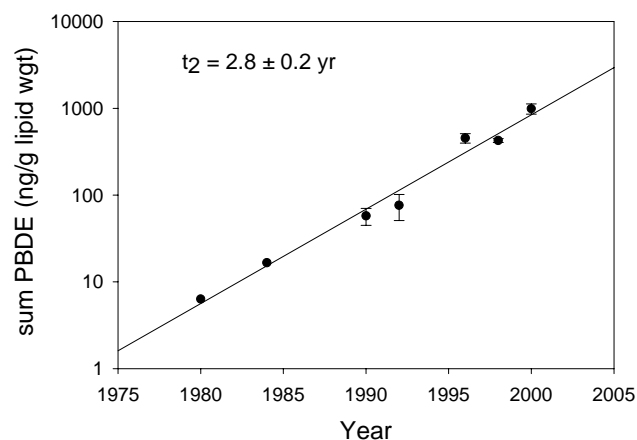


Figure 4-1a. Total PBDE concentrations in Lake Superior whole lake trout (Zhu and Hites 2004).

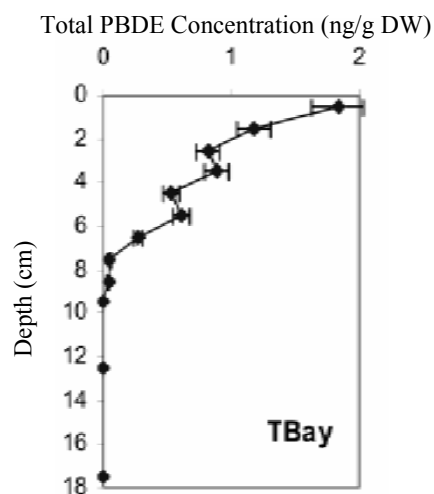


Figure 4-1b. Total PBDE concentrations with depth in a Lake Superior sediment core from near Thunder Bay, Ontario (Song et al. 2004).

4.2 LaMP ACCOMPLISHMENTS 2006 TO 2008

Actions undertaken or completed since the release of the LaMP 2006 report are summarized below. Earlier actions not reported in the 2006 update are also presented.

4.2.1 Chemical Reduction Activities in the Lake Superior Basin

The following descriptions of chemical reduction projects have been implemented in the Lake Superior basin since the LaMP 2006 update. They are either a direct result of the LaMP or are in alignment with LaMP goals. Items in italics are those that have an especially strong connection to the LaMP through funding sources, participation by LaMP staff, projects of the Superior Work Group or Forum Chemical Committees, or previous commitments to the Lake Superior Binational Program’s Zero Discharge Demonstration Program.

Collections

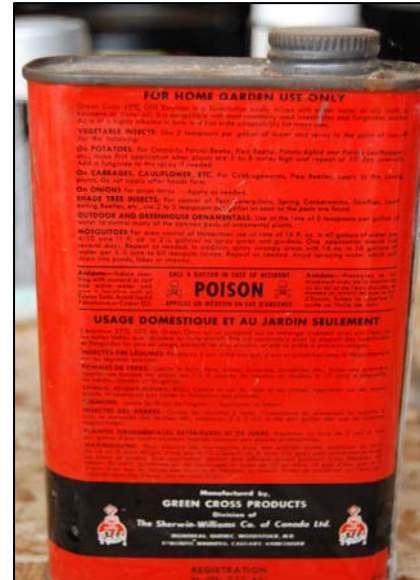
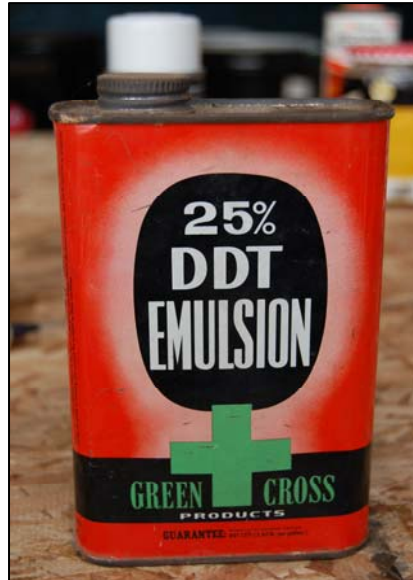
- *Under the Earth Keepers Initiative, the Superior Watershed Partnership coordinated events on Earth Day 2006 and 2007 using a grant from US EPA's Great Lakes National Program Office (GLNPO). Besides the 129 congregations in the Earth Keepers Coalition, the initiative includes a number of partners in Michigan's Upper Peninsula, including the Keweenaw Bay Indian Community (KBIC), The Cedar Tree Institute, The Nature Conservancy, Northern Michigan University, and others. In 2006, Earth Keepers sponsored an e-waste collection that brought in 320 tons of unwanted televisions, computers, and other waste electronics. In 2007, the Pharmaceutical Drop-off Day resulted in over a ton of unwanted medications, including \$500,000 worth of controlled substances.*
- *At the Marquette County Solid Waste Landfill, 28.8 kg of elemental mercury was collected in 2006 and 2007 as part of the county's Household Hazardous Waste (HHW) collection program.*
- *In 2006, Smurfit Stone Container Corporation in Ontonagon, Michigan, held a mercury thermometer exchange event. More than 100 fever thermometers, 13 lab grade thermometers, and 3 blood pressure units were collected.*
- *A program administered by EcoSuperior (a non-profit environmental organization in Thunder Bay, Ontario) that focuses on mercury reduction in schools is now entering its second year. The program includes collection of mercury-containing items and leftover chemicals from science rooms, presentations to students about mercury and use of a Lumex mercury vapor analyzer. Almost every school visited was found to have some mercury on hand. Over 4 kg of mercury was collected between April 2006 and March 2007.*
- *Fluorescent lamp recycling for the residential sector has been in place in Thunder Bay for several years. This EcoSuperior program has now been expanded to other Lake Superior basin communities including Red Rock, Wawa, Geraldton and Longlac (now formally known as Greenstone). In addition to the Ontario Ministry of the Environment, Ontario Power Generation continues to support this project.*
- *EcoSuperior has been collecting compact fluorescent lamps (CFLs) since the inception of this program and will continue to collect them. Due to the increased public attention being given to disposal issues, EcoSuperior has already begun to expand information on CFL acceptance centers; 5,000 lamps were collected between April 2006 and March 2007.*



Figure 4-2. EcoSuperior uses a Lumex instrument to detect sources of mercury vapor at schools. Photo credit: Jim Bailey, EcoSuperior.

- Although all members of the Ontario Automotive Recyclers Association now participate in the vehicle Mercury Switch Out program, many area recyclers are not members of this association. EcoSuperior is working with the Clean Air Foundation to identify those recyclers who are not Switch Out participants and to encourage them to join.
- EcoSuperior continues to promote the Thermostat Recycling program while private sector partners operate the depots. Shipping of collected thermostats is handled and paid for by Honeywell Inc. Operation by private sector partners makes this program sustainable over the long term. Approximately 800 thermostats were collected through this program between April 2006 and March 2007.

- EcoSuperior organized HHW collections in the Ontario north shore towns of Nipigon, Red Rock, Schreiber, and Wawa. This initiative was supported by the Ontario Ministry of the Environment, Environment Canada, and participating municipalities.



Events were well-publicized with high rates of participation.

Figure 4-3. Despite being banned decades ago, DDT is still turned in at HHW collections in the Lake Superior basin. As the label on the back of the container directs, DDT was at one time common “for home garden use only.” Photo credit: Jim Bailey, EcoSuperior.

- Mercury reduction programs have been sponsored by the City of Superior including, exchange programs, e-waste, dental amalgam waste separators, and shipping industry assistance. The City of Superior continues to accept mercury at the wastewater treatment facility and recycle it for free for residents. The City also collects fluorescent bulbs at the wastewater treatment plant and at a local hardware store. Murphy Oil pays for the recycling of them.
- The Northwest Regional Planning Commission (NWRPC) of Wisconsin continues to operate a ten-county hazardous waste collection program for Ashland, Bayfield, Burnett, Douglas, Iron, Price, Rusk, Sawyer, Taylor, and Washburn counties. The program has operated since 1995 and has collected well over one million pounds of hazardous wastes. The program also collects and recycles electronic waste. The program has highlighted the collection of mercury and mercury instruments in several of its operational years. In 2007, dental offices and mercury amalgam waste in the region were highlighted through a U.S. Department of Agriculture (USDA) Rural Development Administration grant. In 2008, residents will be allowed to bring in medications to Saturday collection events in each county.

- Superior has held several electronic-waste collections funded by grants from local businesses and foundations, including Best Buy and the Duluth Area Community Foundation.
- The City of Superior hosts an annual hazardous waste Clean Sweep. In addition industries in town can have a “milk run” sponsored by Northwest Regional Clean Sweep to pick up hazardous waste based on need.
- The Anishinabek of the Gitchi Gami Environmental Programs (AGGEP) has implemented the first curbside recycling at Fort William First Nation (FWFN). This two year curbside recycling pilot project, funded by Environment Canada, EcoAction and the Laidlaw Foundation, commenced in November 2007. Eighty FWFN residences, in a specific section of the community, are included in the pilot. Each home was provided with one year’s supply of blue recycling bags; residents in the trial area have been encouraged to participate. The curbside recycling pilot project was developed by AGGEP to engage FWFN citizens in progressive, solid waste management and education and to raise awareness of waste being dumped illegally in the community. After two years of piloting this project AGGEP hopes to expand recycling to other areas of Fort William First Nation.
- *KBIC is currently conducting mercury thermometer exchanges for tribal members. In addition, KBIC is in the process of collecting spent fluorescent light bulbs for proper disposal.*
- Grand Portage, Fond du Lac, Bad River, and Red Cliff either hold annual HHW collection events or offer sites where these materials can be brought for proper disposal. In addition, Fond du Lac runs an e-waste collection program.
- KBIC partnered with the Village of Baraga for an annual spring HHW cleanup event.
- *Western Lake Superior Sanitary District (WLSSD) held the first Medicine Cabinet Clean-Out Event at their hazardous waste center in Duluth with 166 households participating. WLSSD collected 229 lbs of non-controlled medications and 21 lbs of controlled substances, in addition to some miscellaneous drugs and drug waste. The total collection of material was 258 lbs, filling nearly three 55-gallon drums.*
- In Minnesota, ongoing hazardous waste collection programs are found in the Lake Superior basin at WLSSD (both business and household), St. Louis County, Lake County, and Carlton County. Cook County contracts with WLSSD to conduct collections.

Outreach/Education

- *The LaMP Chemical Committee planned and moderated the Toxic Contaminants session of the October 2007 Making A Great Lake Superior 2007 conference. Speakers and posters included new and emerging chemical threats; water, sediment, fish and eagle toxics monitoring projects; mercury cycling, atmospheric deposition; pollution prevention; and identifying sources of toxic contaminants.*
- *The Chemical Committee prepared and updated four posters for use at workshops and conferences in the Lake Superior basin. The four updated posters presented at the Making A Great Lake Superior 2007 conference included Lake Superior 2005 Chemical Milestones: Meeting the Target of Zero Discharge and Zero Emission in the Lake Superior Basin; Proposed Management Strategy for Substances of Emerging Concern in*

the Lake Superior Basin; An Overview of Mercury Reduction Activities in the Lake Superior Basin; and Actions to Prevent Open Burning of Trash in the Lake Superior Watershed.

- Great Lakes Indian Fish and Wildlife Commission (GLIFWC) staff presented information on critical chemicals in Lake Superior fish at Red Cliff and KBIC commercial fishing meetings. Following the presentations, staff drafted an article based on these presentations for GLIFWC's quarterly newspaper, the *Mazina'igan*.
- GLIFWC staff presented papers on *Reducing health risks to the Anishinaabe from methylmercury* at both the annual Midwest Society of Environmental Toxicology and Chemistry (SETAC) Chapter meeting in St. Cloud, Minnesota, and the *Eighth International Conference on Mercury as a Global Pollutant* in Madison, Wisconsin. GLIFWC staff also presented its work on mercury trends in walleye from northern Wisconsin lakes at the 2006 annual SETAC North America meeting in Montreal, Quebec, Canada.
- *GLIFWC presented New and Emerging Chemical Threats to the Lake Superior Ecosystem and Tribal Assessment of PBT Contaminant Concentrations Across Size Ranges of Four Commonly Harvested Lake Superior Fish at the Making a Great Lake Superior 2007 conference. The latter presentation was also given at the 2007 annual SETAC North America meeting in Milwaukee, Wisconsin.*
- Grand Portage continues to implement a pesticide use policy on the reservation to help avoid unnecessary and unscrupulous spraying of pesticides.
- The Bad River Air Quality Department initiated a burn barrel buy-back program in the fall of 2005. Based upon windshield surveys of burn barrels located on the reservation and surveys completed by tribal members who burn, this collection contributed to the reduction of approximately 2.5 tons/yr of garbage disposed by backyard burning and a 31 percent reduction of the total burn barrels on the reservation as of the end of 2006. The program is scheduled to continue in future years.
- *EcoSuperior summarized the open burning outreach that has been continued in the Lake Superior basin in Ontario with a view to conducting a follow-up survey to assess the effectiveness of the programs. The summary report is a good reference for what has happened and how to repeat it, but the report exposed some gaps in coverage. It will be used as a reference to develop a survey to assess the impact and effectiveness of outreach to date.*

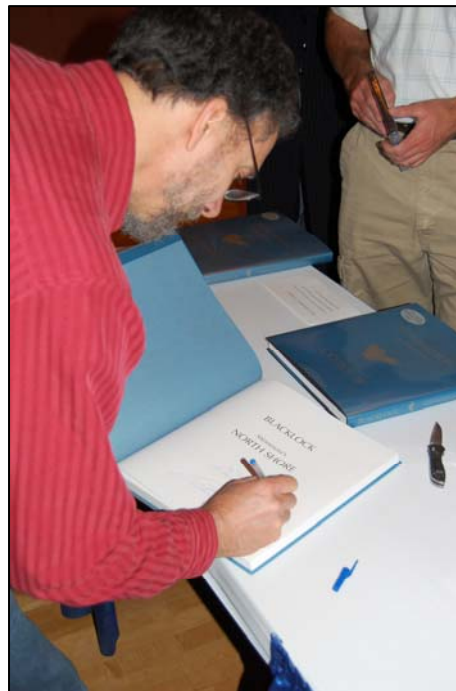


Figure 4-4. The *Making A Great Lake Superior 2007* conference, held in Duluth, Minnesota, in October 2007, was a great success, bringing together a wide range of people, groups, and agencies with an interest in protecting the Lake Superior basin environment. Here, at a session sponsored by the Minnesota Conservancy, Craig Blacklock signs a copy of his latest book of Lake Superior photos entitled, *Minnesota's North Shore*. Photo credit: Jim Bailey, EcoSuperior.

- A GLNPO grant to the Minnesota Pollution Control Agency (MPCA) on burn barrel abatement included projects in Carlton and St. Louis Counties that involved displays at county fairs and distribution of open burning materials developed by the counties. In St. Louis County, a billboard campaign continued, alerting stakeholders to the dangers of backyard trash burning. The county also developed an open burning video aimed at fire departments and distributed to fire departments an information kit including the video, plus brochures, a disk with a PowerPoint presentation, and a poster. Cook County used MPCA funding to contract with CLIMB, an education theater organization, to prepare and present open burning abatement mini-dramas in rural schools in all four Lake Superior counties.
- WLSSD served as the agent for an open burning outreach campaign in northeastern Minnesota counties.



Figure 4-5. A billboard in St. Louis County, Minnesota, warns residents of the unhealthy, unsafe, and illegal nature of open burning. Photo credit: Mary McReynolds, St. Louis County.

- The MPCA included Lake Superior Binational Program information at their display in the *Eighth International Mercury as a Global Pollutant Conference* in 2006. Approximately 500 mercury and 50 PCB use trees posters were distributed. The complete set of use trees (i.e., mercury, PCBs, dioxin, HCB, OCS, cadmium, polynuclear aromatic hydrocarbons (PAHs), and pentachlorophenol (PCP)) were also displayed at the *Making A Great Lake Superior 2007* conference.
- The MPCA provided graphics services, editing, and printing for 25,000 placemats for Lake Superior Day. Placemats included games and trivia to promote a sense of place

and also listed *12 Ways You Can Protect the Lake Everyday*. The placemats were divvied up and mailed to Forum and Superior Work Group members for distribution.

- The MPCA installed 20 watershed signs on Minnesota state and county roads at the watershed divide to raise awareness about the impact of human activities in the Lake Superior watershed and the physical extent of the watershed.



Figure 4-6. Twenty watershed signs were installed in the Minnesota portion of the Lake Superior basin by the MPCA. Photo credit: Joel Peterson, MPCA.

- The MPCA provided keypad polling technology and technical assistance for the Lake Superior session at the *State of the Lakes Ecosystem Conference 2006 (SOLEC 2006)* and the Toxic Chemical session at the *Making A Great Lake Superior 2007* conference.
- NWRPC provided burn barrel education through a GLNPO grant that targeted residents of Douglas, Bayfield, Ashland and Iron counties. Three public service announcements were developed and were broadcast on Duluth – Superior television networks. The project also surveyed all municipal elected officials in the four-county region to elicit their answers to questions relating to burn barrel usage and its dangers. A previous GLNPO grant was used to make a 15-minute video/DVD on burn barrel dangers. It was distributed to schools, municipalities, and the Northern Great Lakes Visitors Center for use in their theater.
- NWRPC provided solid, hazardous and medical waste audits to nine hospitals in its region in 2007 to help prepare them for future Wisconsin Department of Natural Resources (WDNR) environmental audits, and to introduce them to the “Hospitals for a Healthy Environment” web site, which addresses environmental issues that hospitals are confronted with. The focus was to ensure that hospital wastes are identified properly and handled according to state and federal regulations.
- The City of Superior has initiated a florescent light education campaign though local media to promote proper recycling. This was funded by Superior Light and Power.

- *In 2007, representatives from the City of Superior and WDNR visited six “Tier 1” industrial businesses within the Superior urban area. Each business was located on the shores of Lake Superior or contributed stormwater to the lake via storm sewers or drainage ways. The purpose of the visits was to assess how surface runoff was treated and otherwise managed prior to releasing the runoff offsite. Representatives from the city educated the industries about mercury and collected 20 lbs from Frazer Ship yards.*
- *Education initiatives in the City of Superior included Earth Week tours of the waste water plant, Pollution Prevention week presentations to local government officials, and a poster entitled ‘Coming About’ on Mercury: The Lake Superior Basin-wide Mercury Reduction Program presented by the City of Superior at the Eighth International Conference on Mercury as a Global Pollutant in 2006.*
- *The City of Superior’s Environmental Services and Parks and Recreation divisions are creating an outdoor classroom and developing a curriculum that Superior teachers can use to take advantage of the nearby habitat and forest. This project was funded by grants from the Wisconsin Coastal Management Program and Department of Natural Resources. The plan includes developing grade-specific lessons using the Wisconsin K-8 Forestry Field Lesson Guide by LEAF (Learning, Experience and Activities in Forestry).*
- *The City of Superior received a grant from the Great Lakes Commission for an erosion control awareness project; 100 volunteers have assisted city crews in plantings and restoration in Central Park on Faxon Creek.*

Mercury Products

- *As a follow-up to a joint Work Group-Forum-Industry mercury mentoring program conducted on the Canadian side of the Lake Superior basin in 2005/2006, a contractor was hired to extend the program in 2007-2008. The objectives were to follow up with companies who made commitments to the project. Follow-up actions included assessing any changes to practices for managing mercury-containing equipment and to their inventory of mercury-containing equipment. The contractor also offered workshops in 2007-2008 to facilities that were unwilling or unable to participate in the initial project. The contractor was guided by a steering committee of Work Group and Forum members. Final results from this project will be available in the spring of 2008.*
- *On the U.S. side of the basin, the joint Work Group-Forum-Industry project is being implemented by the City of Superior. During 2006-2007, the project focused on three mercury collections. In Two Harbors, Minnesota, 10 lbs of mercury-bearing equipment was collected and 40 thermometers exchanged in five hours. In Ironwood, Michigan, 100 thermometers were exchanged and 35 lbs of elemental mercury were turned in at a seven hour event. In Wisconsin, the project coordinator accompanied WDNR inspections at three facilities and provided information on mercury phase-out.*
- *The MPCA surveyed hardware stores and retailers in the Duluth area in preparation for mercury thermostat outreach. Of the 12 stores checked, three sold mercury thermostats. Stores that had pharmacies as well as hardware departments were checked for mercury thermometers, but none were found to be selling them (this is now illegal in Minnesota). Six stores also sold fluorescent lamps in bulk, and the individual lamps were not labeled as containing mercury.*

- *In an effort to reduce mercury discharge to the wastewater treatment facility and Lake Superior, the Superior Watershed Partnership gave a series of presentations to the Superior District Dental Society to inform area dentists of the extent of the problem and provide assistance to develop and implement a mercury reduction plan utilizing amalgam separators in their dental offices.*
- The Ishpeming, Michigan, wastewater treatment plant has tracked a reduction in mercury discharge since late 2005. In June of 2005, dentists in Ishpeming were notified that Sewer Use Ordinances were changed, requiring installation of 95 percent removal or better devices. Mercury amalgam separators were online by September 2005.
- *The City of Superior received a grant from GLNPO titled “City of Superior Basinwide Mercury Reduction” to work with the shipping industry to increase awareness of mercury and to recycle properly. To date, educational materials have been distributed to the industry through waterfront shipping facilities, and mercury has been recycled from one ship. In addition, a portion of this grant was dedicated to contract with WLSSD and NWRPC to collect mercury in underserved areas.*



Figure 4-7. Mercury reduction efforts have recently involved the shipping industry through education provided at waterfront shipping facilities. Photo credit: Frank Koshere, WDNR.

- The City of Superior is anticipated to sign the Green Tier Charter for Mercury. Superior was instrumental in crafting the Wisconsin state mercury minimization guidance.

Lake Superior Binational Forum Activities

- *The Forum Chemical Committee continues to track progress toward the chemical reduction targets developed by the Forum in 1995 and adopted by Lake Superior agencies in the LaMP Stage 2.*
- *The Forum Chemical Committee provided valuable input into the Critical Chemical Reduction Milestones (LSBP 2006) report which was released on Lake Superior Day 2006 for a 60-day consultation period. The final report was released at SOLEC in October 2006.*

- *The Forum Chemical Committee continued their support and input into the “Basin-Wide Mercury Reduction Project.” Committee members recommended that the government continue to fund this work and follow-up on recommendations contained in the March 30, 2006 report compiled by a contractor for Environment Canada.*
- *Committee members reviewed the 2006/2007 Forum work plan project to integrate LaMP goals and facilitate connective networks with Area of Concern (AOC) communities. Forum meeting notices are to be sent out to Remedial Action Plan (RAP) and Public Advisory Committee (PAC) members in those communities where public input sessions are to be held, inviting them to attend and discuss ways in which the Forum can help foster community involvement.*
- *The Committee planned and held a public input session on pharmaceuticals and personal care products (PPCPs) and their impact on the environment. Recommendations resulting from this session, held in Thunder Bay in November 2006, have been forwarded to the governments and various health organizations. The Committee suggested adding to the Forum work plan a joint Superior Work Group/Lake Superior Binational Forum project focusing on how best to conduct education and outreach on the proper disposal of PPCPs.*
- *The Committee provided input to a Superior Work Group proposal on substances of emerging concern in the Lake Superior basin.*
- *Committee members have provided input on the Realtor’s Outreach project, initiated by the Superior Work Group (see Chapter 2, Section 2.2.4). This project will inform/improve understanding of realtors, prospective buyers, and current landowners about environmental concerns associated with rural and residential properties in the Lake Superior basin, and to help change their attitudes and approaches to activities and the use of these types of properties.*

Emissions Controls

- Minnesota Power (MP) announced its Arrowhead Regional Emissions Abatement (AREA) project. Additional pollution control equipment will be installed at the Laskin and Taconite Harbor coal-fired power plants. The Taconite Harbor plant is currently being upgraded, and the new mercury control technology, MinPlus, is expected to capture up to 90 percent of the mercury emissions. MP has installed equipment designed to reduce NOx emissions by 66 percent and is exploring the potential to convert the Laskin boiler from coal to biomass.
- Smurfit Stone Container Corporation in Ontonagon, Michigan installed equipment in response to US EPA’s Clean Air Act’s regulation 40 CFR 63, Subpart DDDDD, National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial and Institutional Boilers and Process Heaters, commonly called the Boiler Maximum Achievable Control Technology (MACT). The Boiler MACT has since been remanded by Federal Court and is no longer in effect. The system controls emissions through more efficient combustion and sorbent injection.
- In 2006, Smurfit Stone Container Corporation committed an investment of more than \$4.5 million for pollution control equipment.

- The City of Sault Ste. Marie, Michigan, has adopted a new ordinance that bans outdoor wood burning stoves. Existing units are grandfathered but cannot be replaced. The benefit is a reduction of particulate matter in the atmosphere.

Energy Conservation

- In Duluth, St. Mary's Clinic First Street Building received a Leadership in Energy and Environmental Design (LEED) certification. At 236,000 square feet, it is the largest green health care facility in the country and one of only ten in the nation to receive LEED certification. The project achieved a 25 percent reduction in energy and a 30 percent reduction in water use.
- The non-profit organization Women in Construction completed construction of a house at the Hawk Ridge Estates subdivision in Duluth, Minnesota. The home, which will be on display into 2009, features solar panels and tubes for heating, reuse of wood building material, and kitchen countertops made completely of recycled paper.
- Bad River designated three members to participate in the Chequamegon Bay Area Green Team in 2007 as part of its Renewable Energy and Energy Efficiency Tribal Task Force.
- US EPA Region 5 has developed a climate change framework which emphasizes energy conservation, innovation, and reductions.

Green Energy

- The Brookfield Power Prince Wind Energy Project northeast of Sault Ste. Marie, Ontario, was completed in 2006. The largest wind farm in Canada, it has 126 turbines and is capable of generating 189 megawatts (MW).
- Under the Federation of Canadian Municipalities (FCM) Green Communities Fund, the Town of Marathon and Marathon Pulp Inc. (MPI) have entered into a joint venture to explore and research the potential of a mid-sized (20 to 50 MW) renewable wind energy farm situated along the coast of Lake Superior, within the town limits. Marathon is interested in the project because it would offer its residents increased energy independence and savings, environmental sustainability, improved human health, and the potential for economic development. The project could ultimately eliminate MPI's high fixed hydro cost and make it a more



Figure 4-8. Brookfield Power completed Prince Wind Energy Project in 2006. It is the largest wind farm in Canada. Photo credit: Gary Stewart, OMNR.

competitive operation, while gaining recognition as a leader in the use of sustainable renewable energy technologies. The 12-month on-site wind-monitoring field test will collect real data to demonstrate the project's economic feasibility. A business case and engineering design work will follow. It is estimated that the wind farm could provide an approximate annual reduction of 24,000 to 56,000 tonnes of carbon dioxide, 96 to 224 tonnes of nitrous oxide, and 28 to 64 tonnes of sulphur dioxide per year over the existing generation mix.

- More information about the fund can be found on the FCM Communities web site at <http://www.fcm.ca/english/gmf/gmf.html>
- A total of 575.18 MW of electrical generation from non-fuel sources has been proposed and are at various stages of approval and development in the Ontario portion of the Lake Superior basin. This includes:
 - Aguasabon River Hydro Power – 10 MW;
 - Coldwell Wind – 200 MW;
 - Providence Bay/Spring Bay wind – 15 MW;
 - Greenwich Wind near Ouimet Canyon – 200 MW;
 - McGraw Falls Hydro – 2 MW;
 - Gitch Animik Bezhig Hydro – 8.28 MW;
 - Gitchi Amik Nizh Hydro – 9.9 MW;
 - Ventus Energy Lakehead Wind Park – 100 MW;
 - Sault Ste. Marie Solar Photo Volteic – 20 MW;
 - Fort William First Nation Solar Farm Photo Volteic – 10 MW.
- MP added 90 MW of wind energy from the Oliver County Wind Energy Project in North Dakota to its energy portfolio in 2007. MP is also working on the Taconite Ridge wind energy project in Virginia, Minnesota, with a goal of having a system capable of producing 25 MW in 2008.
- Fond du Lac Band has received funding to pursue a biomass gasification unit which will be used at the Fond du Lac Ojibway School to reduce energy needs and costs. This unit will use wood left over from fire reduction work. The order for the unit has been placed with the manufacturer.
- Fond du Lac has installed two anemometers with ongoing data collection. Preliminary results show promise for the use of wind energy on one area of the reservation.
- In response to the need to deal with climate change, the Fond du Lac Environmental Program is developing a strategy for improvements in energy and fuel efficiency within their own program as well as reservation-wide.
- The Bad River Band has collected 3 years worth of anemometer data from three sites on the reservation and is working with a certified meteorologist to analyze their data to assess wind energy alternatives.
- KBIC is currently conducting anemometer studies at their Pequaming Hatchery and is pursuing funding for additional renewable energy projects.
- The Red Cliff Band is exploring the possibility of alternative energy sources on its reservation.
- The J.H. Warden Generating Station in L'Anse, Michigan, is being converted by the new owner, L'Anse Warden Electric Generating Company, from coal to biomass. The intent is to increase from 60 MW of coal burning to 80 MW using biomass in 2008. The

biomass will come in part from waste from the Smurfit-Stone Container paper mill, and steam from the plant will be used by a neighboring mineral ceilings plant.

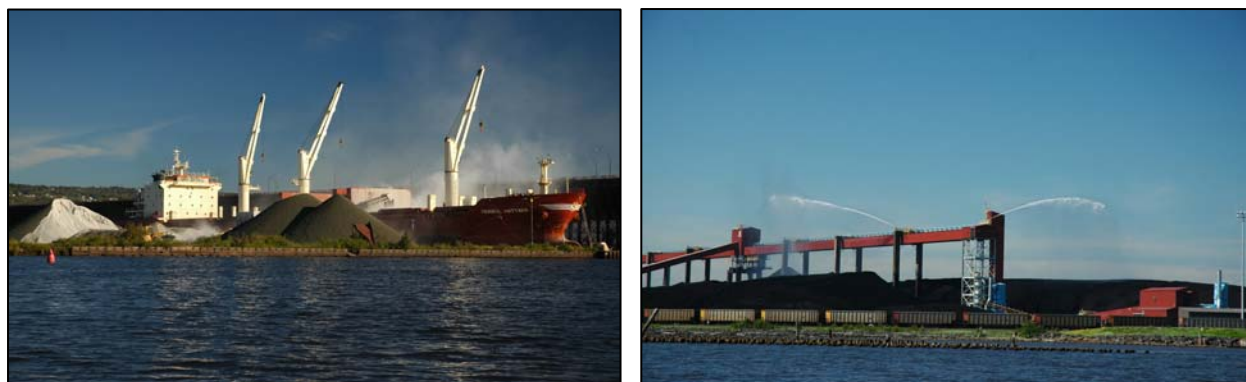


Figure 4-9. Western coal is brought by train to Superior, Wisconsin, and shipped to electric generating facilities. In 2008, the port shipped 20.8 million tons of coal, mostly to Detroit. Photo credit: Frank Koshere, WDNR.

Monitoring and Reporting

- In 2007, the Ontario Ministry of the Environment carried out an urban stream pesticide monitoring project to determine the quantities of common pesticides entering urban streams. Samples were taken twice a month during the summer in 2007 by the Regional Pesticides Specialists. McVicar's Creek and the McIntyre River were monitored in Thunder Bay. Final results will be available in 2008.
- The National Park Service (NPS) - Great Lakes Inventory and Monitoring Network sampled bald eagle nestlings in 2006 and 2007 along the length of the St. Croix and Namekagon Rivers, a portion of the Mississippi River in downtown Minneapolis/St Paul, and along the south shore of Lake Superior. PCBs and DDT continue to decline from highs in the 1970s, though concentrations are higher in nestlings sampled on Lake Superior and in the Greater Twin Cities area. NPS found active DDT in three of 10 nestlings on Lake Superior but only one of 26 nestlings from inland areas. PBDEs were found in all nestlings sampled, and data suggest a near doubling of the concentrations over the last five years. Mercury was highest in nestlings along the upper portions of the St. Croix and Namekagon Rivers where extensive areas of wetlands likely contribute to the production and availability of mercury.
- Red Cliff is taking the lead in the planning and development process for analysis of a large barrel dump site off the north shore coast of Minnesota. They are working with MPCA, US EPA, the Corps of Engineers and others to determine next steps. They are developing a Strategic Project Implementation Plan and hiring a contractor to help with the analysis and planning.
- GLIFWC completed studies of 37 PBT contaminants (including seven of the nine zero discharge pollutants) in Lake Superior cisco (formerly lake herring). Results from the studies were presented at various forums including meetings of SETAC and the *Making a Great Lake Superior 2007* conference.

- Red Cliff continued a Surface Water Quality Monitoring Program that tests 21 different locations on the reservation for 22 different parameters including mercury, dioxin (2,3,7,8-TCDD), PCBs, toxaphene, and chlordane. Keweenaw Bay, Grand Portage, Fond du Lac, and Bad River currently have in place or are developing similar surface water quality monitoring programs.
- Bad River is monitoring and anticipates close out of another old Underground Storage Tank in 2008.
- Grand Portage collected fish in 2007 for contaminant analysis (i.e., mercury, PCBs, dioxins, etc.) and will be collecting fish again in 2008.
- Fond du Lac plans to collect fish for mercury analysis in the summer of 2008.
- The MPCA purchased a solid sample analyzer for a Lumex portable mercury vapor analyzer. The equipment was used to analyze the mercury content of 40 participants of the *Making A Great Lake Superior 2007* conference in 2007 as part of an outreach project. Additional work is planned to compare the Lumex results to standard cold vapor atomic absorption results. The MPCA and WLSSD also made arrangements for a Lumex training refresher course for users in the Duluth-Superior area in 2006.

Sediment and Soil Remediation

- At the Torch Lake AOC in Michigan, the fish tumor Beneficial Use Impairment (BUI) was delisted from this AOC, leaving the fish advisories and restoration of benthos as the remaining BUIs.



Figure 4-10. The Torch Lake Area of Concern Mason site before and after remediation. Photo credit: Brenda Jones, US EPA.

- In 2007, at the Torch Lake site, US EPA performed an emergency removal of arsenic- and lead-contaminated soils and sediments. The Superfund program performed an area assessment afterward and found that further remedial investigation may be warranted.
- MDEQ, Torch Lake Public Advisory Committee, and US EPA are working together to determine if there is a source of PCBs in the lake that is driving the fish consumption advisory. In August 2007, MDEQ and US EPA, using the *R/V Mudpuppy*, collected sediment samples to locate any potential sources of PCBs in the lake. Results indicate there may be a source of low-level PCBs, but the concentrations were not high enough to

warrant remedial action. MDEQ, Torch Lake PAC, and US EPA are awaiting the results of the 2007 Michigan Department of Natural Resources fish sampling to determine if the fish consumption advisory for PCBs is still appropriate.

- Copper mining wastes (“stamp sands”) deposited in Michigan’s Keweenaw Peninsula watersheds over 100 years ago result in elevated aqueous copper concentrations, poor aquatic habitat, and impacted aquatic macroinvertebrate populations. Two stamp sand deposits were isolated from the streams by stabilizing the stream banks and capping and revegetating the upland areas; 2.5 acres were stabilized in the Kearsarge Creek watershed in 1998, and 19 acres were stabilized in the Scales Creek watershed in 2005. These remedial actions resulted in major improvements to Kearsarge Creek; instream copper concentrations fell by a factor of 10, and the macroinvertebrate population tripled with sensitive species such as mayflies, caddisflies, and stoneflies returning. Conditions in Scales Creek have also improved, instream copper concentrations decreased slightly, macroinvertebrates increased by 40 percent, and sensitive species doubled.
- St. Marys River – Algoma Steel Inc. (ASI) completed an assessment of PAH-contaminated sediment in its boat slip during 2005, and the dredging of 2630 cubic metres was undertaken in 2006. Sediments were disposed in an ASI landfill waste management facility.
- St. Marys River – Assessments of sediment contamination at the Bellevue Marine Park location were undertaken in 2006, and results are being evaluated to determine the cause of site-specific toxicity and the need for sediment management.
- Peninsula Harbour – Results of assessments of mercury and PCB bioaccumulation and ecological risk have indicated the need for sediment management. Remedial options are currently being assessed in consultation with local stakeholders. A preferred option will be selected in 2008.
- Thunder Bay (North Harbour) – Results of assessments of mercury and PCB bioaccumulation and ecological risk have indicated the need for sediment management. Remedial options are currently being assessed in consultation with local stakeholders. A preferred option will be selected in 2008.
- Wisconsin helped fund and manage a sediment monitoring and evaluation plan to collect sediment chemistry and toxicity data within Wisconsin waters of the St. Louis AOC. The results of the sediment assessment will be reported in 2008.
- WDNR has finished the Hog Island cleanup within the St. Louis River (SLR) AOC and is now working with Douglas County officials in revising and beginning implementation of the Hog Island Restoration Master Plan.
- As part of the federal Superfund process, Northern States Power of Wisconsin (NSPW) has completed a remedial investigation of the Ashland site, as well as an ecological risk assessment of the impacted sediment. Cleanup goals for the sediments were based on this assessment and earlier sediment investigation work. NSPW has submitted a Feasibility Study (FS) assessing cleanup options for the entire site and contaminated sediments. WDNR and US EPA are reviewing the FS and will be commenting back to NSPW shortly. NSPW will then resubmit the FS with changes reflecting the agencies’ comments. The Bad River and Red Cliff Bands have also been involved in the Ashland/NSP Coal Tar Site (Superfund) Remedial Investigation, as well the natural resources damage assessment.

- WDNR is awaiting analysis results from sampling of suspected contamination on the Superior Water, Power, and Light site.
- The owners of Koppers' plant, a wood processing facility near Superior, have submitted a remedial design study of onsite contamination to the WDNR. The owners have also begun a field investigation of off-site contamination. Contaminants of concern are PAHs, PCP, and dioxin.
- At the St. Louis River/Interlake/Duluth Tar Site in the St. Louis River AOC in 2006, a 2,000-foot long sheet pile wall was placed around the eastern portion of Stryker Bay, and a cap of sand sandwiching a geo-textile mat was placed within the enclosed area. A rock dike with a clay liner was constructed to cut off Slip 6 from the river. In 2007, a water filtration plant was constructed to treat water from the Contained Aquatic Disposal (CAD) facility. The CAD received contaminated sediments from Stryker Bay and other areas where dredged materials contained PAH levels over 13.7 ppb. Activities slated for 2008 include dredging a small segment of the St. Louis River, removing the sheet pile wall, and capping the remaining area. Restoration activities scheduled for 2009 will focus on dredging around Tallas Island.
- The MPCA will enter into a Memorandum of Agreement with the U.S. Army Corps of Engineers, creating a mechanism for sediment assessment and habitat restoration funding and technical assistance for the Minnesota portion of the lower St. Louis River in 2008.
- The MPCA is partnering with University of Minnesota-Duluth Natural Resource Research Institute and has applied Great Lakes Environmental Indicator (GLEI) data to the St. Louis River AOC to establish reference sites for six near-shore ecotypes identified in the SLR Habitat Plan.
- The MPCA and partners from the Harbor Technical Advisory Committee (HTAC) developed the Erie Pier Management Plan converting the harbor's designated Confined Disposal Facility into a dredge material recycle and recovery area. HTAC is working to market materials to regional stakeholders.
- The MPCA oversaw cleanup of a Silver Bay, Minnesota, dump once used by Reserve Mining Co. to discard 12,500 drums filled with grease, solvents, heavy metals, and other hazardous waste. The three-year cleanup ended in 2007 and cost nearly \$13 million. Remaining work includes removal of 3,500 tires weighing about a ton each, monitoring groundwater near the old dump site, and cleaning up a pile of coal ash near Lake Superior.
- Remediation work on 16 of the 18 contaminated sites at the U.S. Steel (USS) Superfund site has been completed at a cost of more than \$12 million.



Figure 4-11. Oily debris from the Reserve Mining barrel dump site in Silver Bay, Minnesota. Photo credit: Susan Johnson, MPCA.

The remaining two, with contaminated sediments in waters adjacent to the Wire Mill Pond and the coke-settling basin, are currently undergoing remedial action. USS has also conducted additional land and creek investigations. The MPCA and US EPA staff will carry forward the 2003 report requirements and subsequent remediation work to the 2008 five-year review process this spring.

- In 2006, KBIC completed a cleanup of a tribal property that removed and properly disposed of twenty-six 55-gallon drums that included hazardous waste, and non-hazardous waste.
- KBIC's Sand Point stamp sand brownfields site soil cap/cleanup project was completed in 2006. Capping and revegetating the site will reduce heavy metal sediment loading to Keweenaw Bay by an estimated 340 tons per year.

Solid Waste Management

- Red Cliff Tribal Council formally banned the use of burn barrels on the Red Cliff Reservation in 2007. The Band also drafted a Solid Waste Management Plan, with a goal of final approval in 2008.
- Bad River completed a Solid Waste Management Plan in 2007 and is awaiting final approval.
- Illinois-Indiana Sea Grant (IISG) and US EPA GLNPO collaborated on a project to help communities initiate unwanted-medicine collection programs. The two agencies developed *Disposal of Unwanted Medicine: A Resource for Action in Your Community* in an effort to address the emerging concern that medications are ending up in lakes, rivers, and streams (www.iisgcp.org/unwantedmeds). A resource kit was also created for communities to start take-back programs to collect unwanted medicines. Over 160 resource kits have been distributed, and IISG has held workshops for over 100 local officials. As a result, a number of communities or counties in the Great Lakes region have begun collection programs.
- Over the past two years, US EPA developed a web-based burn barrel toolkit entitled *Learn Not to Burn*, which provides resources for local officials to reduce trash burning in their communities. The toolkit includes individual fact sheets for each state and case studies of efforts to reduce household garbage burning in various communities. The toolkit is available free of charge online, or communities may request CD toolkits via the *Learn Not to Burn* web site at <http://www.iisgcp.org/learnnot2burn>.

Stormwater

- KBIC is working with the local Resource Conservation and Development office to complete a road crossing and culvert inventory for most or all of nine watersheds on and around the L'Anse Reservation, to identify areas of significant sediment loading and prioritize crossings for mitigation.
- KBIC staff are in the process of obtaining federal inspector credentials for conducting Construction Storm Water Discharge Permit compliance inspections on the reservation.
- The Grand Portage Band received an EQIP grant (USDA Natural Resource Conservation Service Environmental Quality Incentive Program) and installed rain gardens and

conducted stream channel restoration near the Lodge and Casino in an effort to reduce non-point source pollution to Lake Superior.

- Red Cliff is applying for Section 319 base funding to develop a non-point source pollution management plan.
- MDEQ provided funding to implement several Best Management Practices (BMPs) in the Iron River watershed. BMPs included livestock exclusion fencing, alternate watering sources, and livestock crossings. An estimated 270 tons of sediment, 250 tons of phosphorous, and 500 tons of nitrogen were reduced through use of the BMPs.
- The City of Superior is working on their Erosion and Post Construction ordinance. In support of this ordinance, they have delineated storm drainage patterns and stream sheds. They maintain a web site for Superior streams, found at: <http://www.ci.superior.wi.us/index.asp?nid=117>
- The City of Superior approved its “Stormwater Utility” ordinance. A variable fee will be assessed starting in February 2008 based on the area of imperviousness.

- The City of Superior has a stormwater flood control program aimed at residents who have experienced basement backups. The program provides money for televising laterals (up to \$150) and installing sump pumps and/or back flow presenters (100%). Participants have to pay for cleaning and repair of laterals if indicated.



Figure 4-12. In Superior, Wisconsin, a *Neighbors Helping Neighbors to Become Stormwater Stewards* project focused on training community leaders to promote environmental stewardship in their local neighborhood. Photo credit: Frank Koshere, WDNR.

- The Wisconsin Education board provided a grant to the City of Superior for a *Neighbors Helping Neighbors to Become Stormwater Stewards*. The project focused on training community leaders in the Billings park area to promote environmental stewardship in their local neighborhood.
- Superior hosted a very popular workshop on snow and ice. The workshops helped to minimize the use of salt and deicing chemicals. This was sponsored by the MPCA for Twin Ports residents.

Wastewater Infrastructure

- The City of Marquette is upgrading their wastewater treatment facility with activated sludge and new secondary clarifiers.

- Bad River completed the second phase of a long-term, five-phase project, with the ultimate goal of bringing all failing septic systems up to code. The Tribe established a Private On-site Wastewater Treatment Systems (POWTS) Inspector position to assist Tribal members with POWTS and to provide education/outreach on septic systems.
- Grand Portage added a new sewer line to its West Village housing development and a new line for the central village sewer that replaces several septic systems.
- KBIC is nearing completion of construction of sewer and water line extensions to serve lake front properties along the east shore of Keweenaw Bay.
- KBIC, in conjunction the Village of Baraga, completed repair of approximately 9,000 linear feet of wastewater service lines and upgraded associated existing sewage lagoons.
- Red Cliff removed an obsolete wet well to prevent the potential risk of discharging sewage to a Lake Superior tributary.

4.2.2 New Regulations and Policies Aligned with LaMP Goals

In addition to the activities described above, some government regulations and policies have taken place since the LaMP 2006 update that target releases of the nine chemicals slated for zero discharge or are expected to provide co-benefits for those nine chemicals. Those that are most closely aligned with contaminant sources in the Lake Superior basin include the following:

Air Quality

- Minnesota passed a law requiring 90 percent reduction of mercury emissions from the three largest coal-fired power plants in the state. The bill also requires installation of continuous emission monitoring and allows companies to offset reductions at the three largest plants by reducing mercury emissions in other plants.
- In 2006, Michigan Governor Granholm directed the MDEQ to pursue a rule under Michigan's *Clean Air Act* to reduce mercury emissions from electric utilities by 90 percent by 2015. A stakeholder workgroup is currently developing rules to comply with the Governor's directive.
- In 2007, the MDEQ was granted \$100,000 to perform an innovative wood stove change-out and outreach program. MDEQ will create a unique partnership with HPBA and Michigan United Conservation Clubs (MUCC). This partnership will create a campaign to educate Michigan citizens about the benefits of upgrading to cleaner burning technologies for hearth appliances, and an incentive program to achieve a goal of replacing 500 uncertified wood-burning stoves. The MDEQ's role will be to administer the grant, monitor progress toward meeting the goal, and evaluate the outcomes. The MUCC's role will be to create and administer the educational campaign and administer the incentive program. The HPBA will supply the incentives (with assistance from grant funds) and document change-outs.
- The use of Outdoor Wood-fired Boilers (OWBs) is increasing, with about 500,000 expected to be in place nationwide by 2010, primarily in the Northeast and Midwest, including the Great Lakes area. Although US EPA is not adopting regulations to address OWBs, it has taken the following steps: (1) completed development of a test method specific to OWBs; and (2) entered into an agreement with major OWB manufacturers, based on a previous voluntary incentive program. As a result of this agreement,

beginning in April 2007, wood boiler manufacturers are offering for sale at least one model of wood boiler that will emit 70 percent less emissions, with further reductions in subsequent years. In addition, a model rule has been developed for states and local agencies that will include emission limits, zoning, stack height, operation and maintenance, labels, and notices to buyers.

- The Ontario government implemented the Industry Emission Reduction Plan, which establishes new emissions caps for industrial pollution sources in Ontario starting in 2006; the caps become more strict in 2007, 2010, and 2015.
- Under *Regulation 419/05*, the Air Pollution Regulation – Local Air Quality, in 2007, Ontario reviewed and updated the limits for 15 substances based on improved scientific information, updated research on associated health risks and new air dispersion models to provide greater protection of public health and the environment. The standards for these substances will be used primarily to assess and manage local impacts from industries on surrounding neighborhoods and communities. The complete regulation and emissions standards are available in schedules 2, 3, and 4 on this web site:
http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_050419_e.htm.
- On August 24, 2007, Ontario implemented *Regulation 496/07*, which requires the cessation of coal use at all four currently operating coal-fired generating stations (Atikokan, Lambton, Nanticoke, and Thunder Bay) by December 31, 2014.
- Ontario anticipates finalizing its mercury emission reduction plan for coal-fired power plants once the Ontario Power Authority's Integrated Power System Plan is reviewed by the Ontario Energy Board.
- The Ontario Ministry of the Environment is in the process of amending the Certificates of Approval for electric arc furnaces to include the dioxin/furan CWS limits, which will come into effect on December 31, 2006 (phase 1), and December 31, 2010 (phase 2).
- Ontario continues to implement the Canada-wide Standards (CWS) for mercury and dioxins/furans from municipal waste, sewage sludge, hazardous waste, and medical waste incinerators.
- The *Canada-wide Standard for Mercury Emissions from Coal-Fired Electric Power Generation Plants* commits the provinces to reduce mercury emissions from coal-fired power plants by 60 percent nationally by 2010.
- A partnership of Environment Canada and the Hearth, Patio and Barbeque Association (HPBA) has conducted a study to measure emissions from conventional woodstoves and verify historical emission factors. The study results are published in the *16th Annual International Emission Inventory Conference* proceedings, available at
<http://www.epa.gov/ttn/chief/conference/ei16/session5/victor.pdf>.

Energy

- Legislation to implement Minnesota Governor Pawlenty's *Next Generation Energy Initiative* was passed in 2007.
 - *25x25 Renewable Electricity Requirements* established the Nation's strongest renewable energy standard, which requires energy companies to provide 25 percent of power from renewable sources by 2025.
 - *Next Generation BioEnergy and BioFuels* appropriates over \$35 million for energy projects and research including bioenergy, biomass electricity, biofuels,

plug-in hybrid technologies, renewable hydrogen and solar technology projects; energy research, including funding for the University of Minnesota Initiative for Renewable Energy and the Environment; and funding to double the number of E85 stations in Minnesota from the nation-leading 300 stations to 600 stations.

- *Next Generation Energy Act of 2007* effectively doubles the amount of energy saved by Minnesota's utilities and sets a goal of 1,000 Energy Star Buildings in Minnesota by 2010 and provides adequate funding to achieve the goal. It also expands and strengthens Minnesota's commitment to the development of locally-owned renewable energy projects. It also propels Minnesota along with California in leading the way towards reducing greenhouse gas (GHG) emissions. The bill establishes statewide GHG reduction goals of 15 percent by 2015, 30 percent by 2025, and 80 percent by 2050. The bill also endorses a Minnesota Climate Change Advisory Group (www.mnclimatechange.us).

Co-Benefits: Greenhouse Gas and Mercury Reductions

Reductions in greenhouse gases may have co-benefits with reductions in mercury emissions. Energy conservation is an especially good example of an activity that has co-benefits. Some greenhouse gas control technologies may shift mercury from one pathway to another, for example, from a release to air to a release to a solid waste byproduct. Such a shift may require reconsideration of waste disposal practices.

- Using a grant from the MPCA, a collaboration including the Builders Association of the Twin Cities, the Minnesota chapter of the National Association of the Remodeling Industry, and the Minneapolis-based Green Institute created a Minnesota GreenStar certification program. The program developed a new set of standards aimed at increasing durability, energy efficiency, and indoor air quality. Training for builders and remodelers is mandatory, and projects will require inspection and performance testing at various stages by third-party raters, including the Center for Energy and the Environment and the Neighborhood Energy Connection (www.mngreenstar.org).
- Ontario is extending the retail sales tax credit for installing wind, micro hydro-electric, and geothermal energy systems installed in residential premises up to January 1, 2010.

Great Lakes

- In February, the MDEQ released a comprehensive strategy to eliminate the use and release of mercury to Michigan's environment. The MDEQ's Mercury Strategy Staff Report contains specific recommendations and a comprehensive approach to controlling mercury, including environmental monitoring, inventory development, collaborations and partnerships, education and outreach, and regulatory controls. It also provides an overview of the mercury problem, identifies current sources that contribute to mercury releases, and identifies various methods for reducing and eliminating the sources. It outlines Michigan's rules, regulations, policies, and monitoring activities for mercury, and chronicles various actions undertaken thus far to prevent the use and release of mercury.

- Under a grant from US EPA, EMA Research & Information Center, subcontractor to the Tellus Institute, developed a spreadsheet tool to determine and compare the costs of phasing out PCB transformers against the costs of continued use. The tool was developed with the input of industry representatives and was based on actual case study information. The software was demonstrated to the Great Lakes Binational Toxics Strategy (BTS) PCB Workgroup in 2006. Some of the major cost drivers and considerations included the transformer age, size, type, and rating; the fluid volume and PCB concentration; the location and accessibility of the equipment; spill containment and fire prevention; equipment reliability and importance; and regulatory compliance. The software specifically enables a firm to conduct an itemized financial assessment for the scenarios of keeping, removing, and retrofilling a PCB transformer, including such factors as net present value and payback, depreciation, taxes, inflation, and discounting. US EPA is currently evaluating the spreadsheet tool and will work with other industry representatives to conduct additional trial case studies on the use of the tool.
- A study of PCB emissions from in-service PCB transformers conducted by Dr. William J. Mills of the University of Illinois was submitted to US EPA. Dr. Mills collected samples of ambient air around operating PCB Askarel transformers in January and October 2004. The study showed that PCB levels in rooms with transformers were at least 1 order of magnitude higher than outside background PCB concentrations collected on-site, and higher still than a background PCB concentration collected off-site. The draft report was discussed with the BTS PCB Workgroup in 2006. The workgroup concluded that additional information specific to any potential source of PCBs at the facility would be needed to fully understand the relative contribution loading of PCB transformers. The other potential sources could include past spills, paint, caulk, or other PCB-containing equipment.
- A risk-based decision-making framework for contaminated sediments was completed under the 2002-2007 *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* (COA). The Ontario Ministry of the Environment is integrating the document with existing guidance to produce “*Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An Integrated Approach.*” Pending final internal review, the guidance will be applied throughout the province.
- In 2007, a workgroup of state, tribal, and city staff developed a basin-wide Great Lakes mercury product stewardship strategy to fulfill the Great Lakes Regional Collaboration Strategy recommendation to phase down mercury in products and waste. The Draft *Mercury in Products Phase-Down Strategy* is posted at <http://www.glrc.us/initiatives/toxics/draftphasedownstrategy.html>.

Products

- In Michigan, three acts were passed in 2006 to restrict sales of certain mercury-bearing products.
 - *Public Act 492 of 2006* banned the sale of thermostats that contain mercury or a mercury compound beginning January 1, 2009. It does not apply if the thermostat is a replacement for an existing thermostat containing mercury or a mercury compound that is a component of an “appliance.” The term “appliance” is

precisely defined in *Public Act 494*. Thermostats that regulate home heating and cooling do not meet the definition of “appliances.”

- *Public Act 493 of 2006* prohibits the sale of mercury-added blood pressure devices by January 1, 2008, and their “use” by January 1, 2009, with two exceptions: in home use and calibration of mercury-free devices in health care facilities, if deemed warranted.
- *Public Act 494 of 2006* bans the sale of esophageal dilators, bougie tubes, and gastrointestinal tubes that contain mercury or mercury compounds beginning January 1, 2009.
- Minnesota passed two new laws regarding mercury in products. Both expanded existing mercury legislation. The first in May 2007 phased out the sale of more mercury-containing products (including switches, thermostats, medical devices, and sensors), required recycling of compact fluorescent lamps, set a goal to remove mercury from all pre-K through 12 schools within two and a half years, and strengthened public outreach and collection programs for products still in use. The other bans the sale of cosmetics which are manufactured using mercury.
- The National Vehicle Mercury Switch Recovery Program (NVMSRP) was established by an August 2006 agreement among vehicle manufacturers, steelmakers, vehicle dismantlers, auto shredders, brokers, the environmental community, state representatives, and US EPA. Under this program, vehicle manufacturers, auto dismantlers, and steelmakers promote a voluntary program that facilitates and provides incentives for removal of mercury switches from automobiles at the end of life. NVMSRP met its first-year goals of enlisting all U.S. states to take part in the program, and of developing a way to measure progress toward the goal of collecting at least 80 percent of available mercury switches in future years.
- In 2006, thermostat manufacturers increased collections through the Thermostat Recycling Corporation (TRC), which seeks to improve recovery of mercury-containing thermostats for recycling. The TRC enables wholesalers and contractors across the country to collect and ship mercury thermostats without charge to an industry facility for disassembly and recycling. In 2006, the TRC recovered nearly 113,600 thermostats and thereby removed 1,080 lbs of mercury from the solid waste stream. These figures represent a 29 percent increase in thermostat collections and a 32 percent increase in recovered mercury from 2005. The number of mercury thermostats coming out of service has been estimated at more than 2 million annually. Mercury thermostats that are not managed by the TRC or by HHW programs are either discarded in the trash or as part of construction and demolition waste.
- The American Dental Association has added the use of dental amalgam separators to the list of *Best Management Practices for Amalgam Waste* that it recommends dentists follow.
- The Ontario Ministry of the Environment is moving to ban the cosmetic use of pesticides. New use restrictions are being planned as part of an overall toxic substance reduction strategy. The government has committed to introduce legislation in the spring of 2008.

Pesticide Use in the Great Lakes States

The use of and exposure to lawn chemicals and herbicides and pesticides have been linked to human, aquatic, and ecosystem health effects. Pesticides run-off is also contributing to the Gulf of Mexico dead zone and to deleterious effects in aquatic life and the ecosystem. In alignment with Great Lakes Regional Collaboration recommendations on the reduction of pesticides to the Great Lakes, US EPA GLNPO issued a grant to a non-profit organization, "Safer Pest Control Project", to conduct a workshop entitled "Natural Lawn Care." The grant was matched by the Boeing Corporation and helped support a two-day workshop in Chicago in February 2008 to help cities, municipalities, park and school districts, churches, and turf care professionals learn natural and organic lawn care methods and techniques. More information can be found at www.spcpweb.org/yards.

Solid and Hazardous Waste

- On December 11, 2006, the Minister of the Environment filed Ontario Regulation 542/06 under the *Waste Diversion Act* (WDA). The regulation identifies wastes that fall within the municipal hazardous or special wastes class (MHSW). On February 19th, the Minister of the Environment approved a MHSW program submitted by Waste Diversion Ontario (WDO). The program requires the producers of household hazardous and special wastes to develop and fund a diversion program for specific materials. The regulation focuses on the following key areas: recycling, alternative fuels, and emerging waste technologies. Following approval, the plan is scheduled to be implemented in phases beginning July 1, 2008.
 - WDO will work with brand owners to look at financial or other incentives to reuse and recycle these materials, to increase the amount of materials collected, to promote best practices and encourage innovative diversion techniques, and to develop an education program.
 - Phase one materials will be paints, solvents, oil filters, pressurized containers, fertilizers, pesticides, antifreeze, and single-use dry cell batteries.
 - WDO will be submitting a plan for Phase two materials July 1, 2009. Phase two materials include: fluorescent lights, pharmaceuticals, aerosol containers, fire extinguishers, syringes rechargeable batteries, thermostats, thermometers, or other measuring devices containing mercury. More information may be obtained at <http://www.wdo.ca/files/domain4116/Revised%20Final%20MHSW%20Plan%20Nov%2026%2007.pdf>.
- The MDEQ released a stakeholder-driven update to the Michigan Solid Waste Policy in 2007. The Policy provides a framework to guide Michigan citizens, businesses, government agencies, institutions, universities, and political leaders in making smart choices for managing Michigan's solid wastes by viewing it as a resource in a global economy. The policy uses the three principles of sustainability: economic vitality, ecological integrity, and improved quality of life to guide solid waste management decisions.

Water Quality

- Minnesota’s statewide mercury Total Maximum Daily Load (TMDL) was approved by US EPA in 2007. This TMDL seeks a 93 percent reduction in mercury emissions from the state using mercury levels in fish from northeastern Minnesota as an endpoint. The process has moved into the second phase, in which a mercury TMDL stakeholder group is developing an implementation plan (<http://www.mn-ei.org/policy/hgtmdlindex.html>).
- Four members of a partnership of northeastern Minnesota businesses, WLSSD, and environmentalists have joined the Minnesota statewide stakeholder process for implementing the statewide mercury TMDL. Once this group makes its recommendations, the information gathered from the process will be taken back to the St. Louis River TMDL Partnership.
- In Ontario, the *Clean Water Act* received Royal Assent on October 19, 2006, and addresses the recommendations from the Walkerton Inquiry which pertain to the protection of drinking water sources. Justice O’Connor’s report recommends that:

“Drinking water sources should be protected by developing watershed-based source protection plans. Source protection plans should be required for all watersheds in Ontario” (D.R. O’Connor 2002). The report also recommends that “The Ministry of the Environment should ensure that draft source protection plans are prepared through an inclusive process of local consultation. Where appropriate, this process should be managed by Conservation Authorities” (D.R. O’Connor 2002).
- The province passed the *Clean Water Act* in October 2006. The Act will better protect the quantity and quality of water in aquifers, rivers, and lakes, including the Great Lakes by:
 - a. Requiring communities to look at the existing and potential threats to their water and set out and implement the actions necessary to reduce or eliminate significant threats.
 - b. Requiring communities to take action to prevent threats from becoming significant.
 - c. Requiring public participation on every local source protection plan. This means everyone in the community gets a chance to contribute to the planning process.
 - d. Requiring that all plans and actions are based on sound science.
- Source Protection Plans are being implemented on Lake Superior by the Lakehead Region Conservation Authority and the Sault Ste. Marie Region Conservation Authority. More information may be obtained on the Conservation Ontario web site: http://conservation-ontario.on.ca/source_protection/CWAFundEarlyActions.htm.



Figure 4-13. Lake Superior water – frozen and unfrozen. Photo credit: Chris Zadak, MPCA.

4.3 Challenges

4.3.1 Overall Challenges

Most of the challenges summarized in the LaMP 2006 update remain today. These include:

1. Chemical inventories must be up-to-date and as accurate as possible. The PCB inventory has been a challenge, as there is no comprehensive and up-to-date inventory.
2. Outreach and coordination internally and externally are essential and must be strengthened.
3. More easily achieved reductions have been accomplished, and the remaining sources will be more difficult to reduce.
4. Out-of-basin sources continue to be a major source of deposition to the Lake Superior watershed.

The *Critical Chemical Reduction Milestones* report (LSBP 2006) provides additional detail on these challenges. The Milestones report also warns of the potential for critical pollutant increases due to projected increases in energy demand and proposed new emission sources. New developments since the release of the Milestones report include three new mines that have received permits to discharge in the Lake Superior basin and other proposed mines and a coal gasification plant that are in the planning stages. All three permitted mines are likely to begin operations before the 2010 mercury reduction milestone.

- The Kennecott Eagle Project in Michigan is expected to yield 112 million to 135 million kg of nickel and about 90 million kg of copper. Mercury emissions are estimated to be quite small at <0.1 kg/yr.
- The Minnesota Steel project in Minnesota would both mine taconite and produce steel slabs. An estimated 35 kg/year of mercury would be emitted from this facility.
- Mesabi Nugget, also in Minnesota, is a new kind of taconite processing plant with an estimated mercury emission of 35 kg/yr.

Also, US Steel recently announced their intent to expand the Keewatin taconite mine in Minnesota. If the project is completed, about 22 kg/year of mercury would be released from the additional ore being mined.

Burning Garbage

Although no large open burning surveys were done in the Lake Superior basin in 2006 or 2007, anecdotal evidence points to the continuing practice of burning garbage. In the 2006-2007 period, regional newspapers reported several wildfires that were started by burn barrels, a burning dump truck load that had to be dumped on the road and hosed down by firefighters, and an accidental landfill fire. One of the wildfires killed the elderly man who started the fire.



Photo credit: US EPA

These new and expanded emission sources, particularly of mercury, present the most significant challenge to Binational Program agencies as the 2010 reduction milestone goals rapidly approach. In response to a Task Force request, the Chemical Committee prepared a list of broad potential actions that could be taken by Binational Program agencies to help meet the 2010 reduction milestones given the challenges posed by these new emission sources. The agencies responded by committing to various specific actions underneath those recommendations. Addendum 4C describes these specific actions in detail.

4.3.2 Substances of Emerging Concern

The Problem

The phrase “substances of emerging concern” has come to define the universe of newly detectable chemical substances being discovered in air, water, sediment, and wildlife. Improvements in instrumentation and analytical methods enable scientists to detect more substances at lower concentrations than was possible a short time ago. This improved detection ability brings with it an emerging concern over the risk these substances may pose to human and ecosystem health and a formidable challenge for environmental scientists, managers, and policy makers. The sheer number of potential substances for investigation combined with the resources required to investigate and manage a single substance pose a significant research and management challenge.

For the purposes of management in the Lake Superior basin, substances of emerging concern are those substances whose presence in the environment may pose a risk to human and/or ecosystem health. While this definition could include thousands of substances, the focus of the management strategy will be limited to those substances that have been identified, categorized, or prioritized by appropriate technical, research, or management authorities. Table 4-3 lists some examples of substances of emerging concern.



Figure 4-14. Shovel Point trail, MN. Photo credit: Carri Lohse-Hanson, MPCA.

Table 4-3. Examples of common classes of substances of emerging concern, specific chemicals of interest in those groups, and their common uses.

CHEMICAL GROUP	EXAMPLES OF CHEMICAL USES
<u>Flame Retardants</u> <ul style="list-style-type: none"> • Polybrominated diphenyl ethers (PBDEs) • Polybrominated biphenyls (PBBs) • Tetrabromobisphenol A (TBBPA) 	Retard flammability of plastics, foams, polymers, wiring insulation
<u>Fluorinated Surfactants</u> <ul style="list-style-type: none"> • Perfluorooctane sulfonate (PFOS) • Perfluorooctanoic acid (PFOA) 	Fire fighting foams; water, oil, soil, and grease repellents on surfaces such as carpets, fabrics, and upholstery; surfactants in chrome plating operations
<u>Personal Care Products</u> <ul style="list-style-type: none"> • Triclosan • Benzalkonium chloride (BAC) • Synthetic musk fragrances 	Anti-microbial soaps, perfumes, disinfectants, shampoos, etc.
<u>Pharmaceuticals</u> <ul style="list-style-type: none"> • Steroids • Hormones – estrogens and androgens • Caffeine • Cotinine 	Over the counter, prescription, veterinary drugs
<u>Detergents</u> <ul style="list-style-type: none"> • Alkylphenol ethoxylates (APEs) 	Industrial and institutional cleaning, metal finishing, textiles
<u>Plasticizers</u> <ul style="list-style-type: none"> • Phthalates 	Added to plastic formulations to change rigidity
<u>Current-use Pesticides</u> <ul style="list-style-type: none"> • N,N-diethyltoluamide (DEET) • Dacthal • Chlorothalonil • Pyrethroid pesticides 	Insect repellants, fungicides, insecticides, herbicides
<u>Short Chain Chlorinated Paraffins (SCCP)</u>	Mainly used in extreme pressure lubricants in the metal processing industry

Source: LSBP 2006.

Is There Evidence That Substances of Emerging Concern Are Present in the Lake Superior Basin?

Emerging contaminants have been detected in the Lake Superior ecosystem. Most studies to date have focused on brominated flame retardants (PBDEs and polybrominated biphenyls [PBBs]) as well as perfluorinated chemicals (PFOS and perfluorooctanoic acid [PFOA]). The following is an overview of some of these studies.

PBDEs have been detected in air at the Lake Superior Integrated Atmospheric Deposition Network (IADN) station at Eagle Harbor, Michigan (Strandberg et al. 2001). Concentrations of PBDEs were similar in air above all the Great Lakes and showed a strong urban signal from Chicago. Similar spatial results have also been found for PCBs.

Two classes of brominated flame retardants (total PBDEs and total PBBs) were measured in composites of six-year-old lake trout captured in 1997 from all the Great Lakes except Lake Michigan (Lake Michigan samples were not measured) (Luross et al. 2002). Lake Superior lake trout had the second highest PBDE concentrations (mean of 56 ppb) and the lowest PBB concentrations (mean of 0.25 ppb).

Archived lake trout tissue collected between 1980 and 2000 was analyzed for PBDEs and one PBB (#153) (Zhu and Hites 2004). Concentrations of PBB-153, a component of a flame retardant banned in the 1970s, did not show a significant decreasing trend as many other banned chemicals have (i.e., PCBs, DDT). PBDEs increased exponentially with a doubling time of every 3 to 4 years (Figure 4-1a). Similar results were also found in lake trout and/or walleye from the other Great Lakes.

Total PBDEs were detected at a mean concentration of 7.9 ppb in bald eagle nestling blood plasma samples collected from the Wisconsin shores of Lake Superior in 2000-2001 (Dykstra et al. 2005). This compared to a mean total PCB concentration of 51.5 ppb and a mean DDE concentration of 13.4 ppb also in samples from 2000-2001 (Dykstra et al. 2005).

Sediment cores from six off-shore locations in Lake Superior were analyzed for ten PBDE congeners by Song et al. 2004 (Figure 4-1b). In general, and in contrast to concentrations of PCBs in the same samples, PBDE concentrations were increasing significantly in recent years. The authors estimated an annual PBDE loading rate for Lake Superior at 80-160 kg/year.

Perfluorinated chemicals have been reported for surface waters and in lake trout from Lake Superior (Furdui et al. 2006a; Furdui et al. 2006b). Mean PFOS and PFOA concentrations of less than 1 ng/L were lowest in Lake Superior compared to Lakes Ontario, Erie, and Huron (Furdui et al. 2006a). In lake trout, the mean PFOS concentration was 5 ng/g and again was lowest for lake trout from the five Great Lakes. Similarly, total perfluoroalkyl contaminants (sum of perfluorosulfonates and perfluorocarboxylic acids) were lowest in Lake Superior lake trout (mean 13 ng/g) (Furdui et al. 2006b).

What Does the Management Strategy for Substances of Emerging Concern in the Lake Superior Basin Provide?

The Lake Superior LaMP has identified the importance of substances of emerging concern within the context of “restoring and protecting the Lake Superior Basin.” The main goal of the strategy for emerging substances is to prevent the future designation of additional critical pollutants. The issue presents a vast challenge for which a management strategy will help to clarify and facilitate the inclusion of substances of emerging concern in the LaMP process. It provides a means to develop monitoring priorities for these substances in an organized and systematic way, encourages pollution prevention activities, funding, and reporting of those activities in the LaMP updates. For example, collections of unused pharmaceuticals or electronics by groups with US EPA support have been previously reported in the LaMP, even though they did not target any of the current critical or prevention pollutants. Finally, a management strategy for substances of emerging concern will help emphasize pollution

prevention as the preferred management approach for both critical pollutants and substances of emerging concern in the Lake Superior basin.

Management Strategy for Substances of Emerging Concern in the Lake Superior Basin

Overview

The Chemical Committee of the Lake Superior Workgroup has developed a three-part management strategy for substances of emerging concern in the Lake Superior basin: 1) Pollution prevention will be the focus and guiding principle for the management effort, 2) Substances of emerging concern will be added to the critical and prevention pollutant management categories, after appropriate public and technical consultation, using the decision path set out by the Revised Management Goal Flow Chart (Figure 4-15), and 3) Substances of emerging concern will become a new reporting section in the biennial LaMP updates.

Three-Part Strategy

1. Focus on pollution prevention projects in order to:
 - Look for co-benefits in current reduction programs. Substances of emerging concern may be produced through processes that generate some of the current critical or prevention pollutants.
 - Identify pollution prevention opportunities with stakeholders in the basin or in collaboration with the BTS or other programs that focus on preventing or reducing release of a specific substance, a class of substances, specific uses, sectors, modes of action, or endpoints.
 - Use pollution prevention as the preferred management approach for all chemicals of concern including critical pollutants and substances of emerging concern. There will be no discrete list of substances for pollution prevention activities.

2. Use the Revised Management Goal Flow Chart (Figure 4-15) to:
 - Identify the five LSBP management categories and the process for assigning substances to each of them (Tables 4-4, 4-5, and 4-6).
 - Identify a discrete list of substances for which monitoring or use data is lacking.
 - Recognize pollutants that are of special concern due to concentrations which exceed yardsticks (the current critical pollutants).
 - Identify, in conjunction with stakeholder input, additional critical pollutants.

3. Report on substances of emerging concern:
 - Adding a new section to the critical pollutants chapter of the LaMP to report on substances of emerging concern will:
 - Highlight monitoring needs and the state of science in the Lake Superior basin;
 - Provide a record of relevant pollution prevention activities;

- Create awareness about outreach activities for these substances;
- Provide a forum for tracking reductions;
- Promote investigation of alternatives to these substances; and
- Identify sources of substances of emerging concern in the Lake Superior watershed.

Conclusion

In the LaMP 2000 report, the Chemical Committee identified reduction strategies to address each of the Zero Discharge critical pollutants. These were updated in the Milestones Report (LSBP 2006). The Committee also devoted a section of the Milestones Report to introducing the issue of substances of emerging concern as an important management consideration for the Lake Superior LaMP. The LaMP has a responsibility to evaluate chemical substances that may pose a risk to the human and ecological health of the Lake Superior basin. Creating a management strategy for these substances will help to prevent the potential designation of new critical pollutants. Creating a section for regular reporting in this area will enable tracking of substance release and reduction inventories. It will also help to promote the development and use of sustainable chemical management practices. As more information about the risks from substances of emerging concern becomes available, tolerable background levels will be established. These will be used to develop “yardsticks” for management in the Lake Superior LaMP. The LaMP will then be in a good position to refine specific strategies that may be needed to prevent or reduce concentrations of substances of emerging concern from reaching critical levels.

Table 4-4. Existing critical pollutants for Lake Superior.

MANAGEMENT CATEGORY	CRITICAL POLLUTANTS	
1. Zero Discharge*	Chlordane DDT and metabolites Dieldrin/aldrin Hexachlorobenzene PCBs	2,3,7,8 –TCDD dioxin Toxaphene Mercury Octachlorostyrene (OCS)
2. Lakewide Remediation	PAHs (anthracene, benz(a)anthracene, benzo(b)fluoranthene, clinitropyrene, benzo(a)pyrene, perylene, benzo(g,h,i)perylene, phenanthrene)	Alpha-BHC Cadmium Heptachlor/heptachlor epoxide TCDD(TEQ) ^a dioxins and furans
3. Local Remediation	Aluminum Arsenic Chromium Copper Iron	Lead Manganese Nickel Zinc

^aTEQ = Toxicity Equivalent

Table 4-5. Existing prevention pollutants for Lake Superior.

MANAGEMENT CATEGORY	PREVENTION POLLUTANTS	
4. Monitor	1,4-dichlorobenzene 1,2,3,4-tetrachlorobenzene Mirex/photo-mirex	Pentachlorobenzene Pentachlorophenol BHC, gamma congener
5. Investigate	1,2,4,5-tetrachlorobenzene 3,3-dichlorobenzidine 2-chloroaniline Tributyl tin	BHC, beta and delta congeners Hexachlorobutadiene

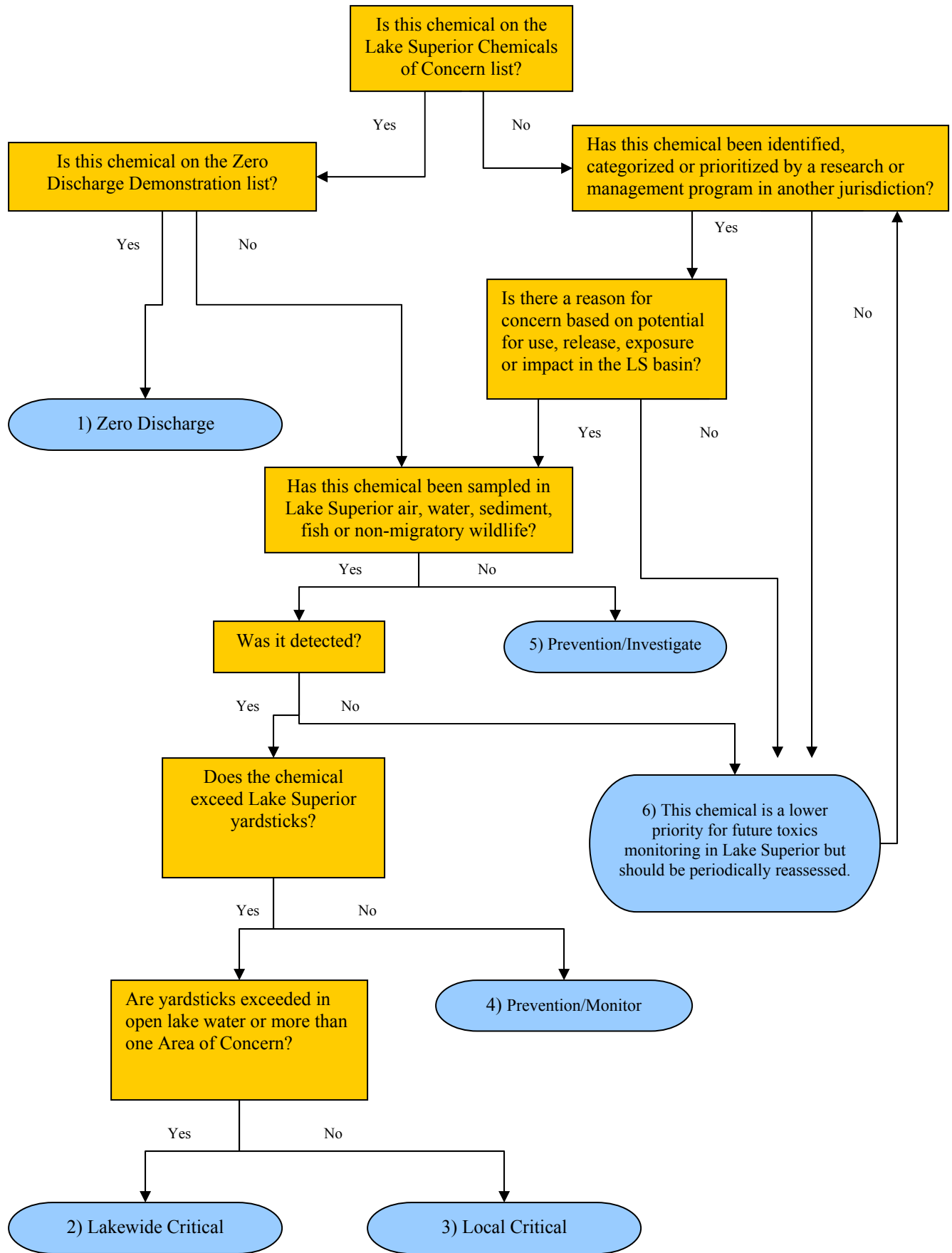
Table 4-6. Explanation of management categories.

MANAGEMENT CATEGORY	DESCRIPTION
Critical Pollutants	Levels of persistent, bioaccumulative toxic chemicals should not impair beneficial uses of the natural resources of the Lake Superior basin. Levels of critical pollutants which are persistent, bioaccumulative and toxic should ultimately be virtually eliminated in the air, water and sediment in the Lake Superior basin.†
1. Zero Discharge*	As a management approach, virtual elimination from the environment requires that zero discharge or emission is applied to the use, generation, and release of persistent, bioaccumulative and toxic substances originating from human activities. The effect of these chemicals is found both locally and lakewide. Sources may be local or outside of the basin.
2. Lakewide Remediation	These pollutants have less potential to bioaccumulate than those in the zero discharge category. Some of the lakewide remediation pollutants are responsible for nearshore problems in multiple locations, and some exceed criteria in open lake waters. The management approach for these pollutants is to coordinate lakewide reductions in loadings.
3. Local Remediation	Local remediation pollutants consist of metals that impact AOCs or other nearshore areas. These are mainly metals which have both natural sources and sources due to human activity. The management approach is concurrent localized reduction in loads and remediation of hot spots.
Prevention Pollutants	Prevention pollutants have properties that give them potential to impair the lake, but they have been found below harmful levels or have not been monitored in Lake Superior. The intention is to manage the prevention pollutants to avoid impairments in the future.
4. Monitor	Although these pollutants have not been found at harmful levels in the Lake Superior ecosystem, the ecosystem should be monitored to confirm the continued absence at levels of concern for these pollutants.
5. Investigate	Substances in this category have been identified as being of concern by Lake Superior programs such as GLI or COA. Because these pollutants were not sampled in previous surveys, they should be sampled for in the future.

* This category was previously referred to as Virtual Elimination in the LaMP Stage 2 report.

† Lake Superior Binational Program. 1998. Ecosystem principles and objectives, indicators and targets for Lake Superior (revision date). Lake Superior Work Group of the Lake Superior Binational Program, Thunder Bay, Ontario. 110 p.

Figure 4-15. Revised management goal flow chart for Lake Superior critical chemicals (Replaces Figure B-1 in the LaMP Stage 2, 1999).



Explanation of Decision Points for Figure 4-15:

Is this chemical on the Lake Superior Chemicals of Concern list?

The Lake Superior Chemicals of Concern list is a list of chemicals derived by combining the U.S. Great Lakes Water Quality Initiative (GLI) bioaccumulative chemicals of concern (BCCs - as originally discussed in the Lake Superior LaMP Stage 2, Appendix B) and the list of Tier I and Tier II substances that form the baseline commitment under COA. The Lake Superior Chemicals of Concern are listed in Tables 4-4 and 4-5.

Is this chemical on the Zero Discharge Demonstration list?

The goal of the ZDDP is to achieve zero discharge and zero emission of certain designated persistent bioaccumulative toxic substances in the Lake Superior basin. In 1999, the Lake Superior Binational Program mapped out a two-decade reduction plan for the “Nasty Nine” pollutants. The plan identified targets for staged reductions of these pollutants, with 1990 as the baseline year and 2020 as the year where virtual elimination will be achieved.

Has this chemical been identified, categorized or prioritized by a research or management program in another jurisdiction?

Examples of a research or management program in which chemicals may be identified, categorized, or prioritized include: Annex 1 Supplement of the Great Lakes Water Quality Agreement, Environment Canada’s CEPA Schedule 1 or Chemical Management Plan, BTS, US EPA Toxic Substances Control Act (TSCA), US EPA High Production Volume (HPV) program, or otherwise identified by an International Joint Commission, Commission for Environmental Cooperation, Health Canada, or US EPA program, COA, BTS, European list, or other respected international list.

Is there a reason for concern based on potential for use, release, exposure or impact in the LS basin?

Consider whether there is potential for Lake Superior basin effects based on current or historic use, release, or exposure data in the basin. Consider whether there is evidence of significant impact in another geographic location with the same sources and use patterns as the Lake Superior basin, or that effects would be significant by the time it was able to be measured through monitoring in the basin.

Has this chemical been sampled in Lake Superior air, water, sediment, fish or non-migratory wildlife?

Consider whether the substance has been the subject of a thorough and scientific sampling campaign by a qualified body or individual.

Does the chemical exceed Lake Superior yardsticks?

To identify substances which are “likely to impair” the ecosystem, the most stringent water, sediment, and biota criteria, standards, or guidelines (not including those for drinking water) of the jurisdictions in the basin will be used as the standard for concentrations of concern in Lake Superior. They are described as yardsticks so as not to imply any action but to strictly define critical pollutants. Substances for which no yardsticks exist will need to be re-evaluated should yardsticks be developed by Lake Superior agencies, but for all substances this is a dynamic process, where new information will cause a substance to be moved to a new category.

Are yardsticks exceeded in open lake water or more than one Area of Concern?

“A beneficial use is considered impaired on a lake-wide basis only if it is found in a minimum of two AOCs or one open-lake site.”¹

4.4 NEXT STEPS

In addition to chemical reduction projects that LaMP Chemical Committee members will track and coordinate in their own jurisdictions, the Committee will concentrate on a variety of projects through 2010. A description of the activities that Lake Superior partners will be undertaking to reduce and inventory the nine designated zero discharge and zero emission chemicals is included in Addendum 4B.

At this point, the following projects are anticipated for the Chemical Committee:

- Implement the activities described in Addendum 4B;
- Participate in the realtor/landowner outreach project with an emphasis on preventing releases of toxic chemicals by rural landowners;
- Prepare a LaMP update in 2010; and
- Estimate inventory releases in 2010 in order to monitor progress under the Stage 2 LaMP reduction milestones.

4.5 REFERENCES

Dove, Alice, Environment Canada. Personal communication, 2005 data. Great Lakes Surveillance Program, Water Quality Monitoring & Surveillance, Ontario, Environment Canada.

Dykstra C.R., M.W. Meyer, P.W. Rasmussen, and D.K. Warnke. 2005. Contaminant Concentrations and Reproductive Rate of Lake Superior Bald Eagles, 1989–2001. *Journal of Great Lakes Research*. 31:227-235.

Furdui, V.I., Crozier, P.W., Reiner, E.J., Mabury, S.A. 2006a. Optimized trace level analysis of perfluorinated acids in the Great Lakes watershed. *Environ. Sci. Technol.*, submitted.

Furdui, V.I., Stock, N., Whittle, D.M., Crozier, P.W., Reiner, E.J., Muir, D.C.G., Mabury, S.A. 2006b. Perfluoroalkyl contaminants in lake trout from the Great Lakes. Presented at the 41st Central Canadian Symposium on Water Quality Research, February 13 & 14, 2006, in Burlington, Ontario, Canada.

¹ Source: Lake Superior Stage 1 LaMP, Section 2.1, page 17.

Jantunen, L.M. and T.F. Bidleman. Henry's law constants of toxaphene congeners and estimates of gas exchange in Lake Superior. International Association of Great Lakes Research, May 2006, Windsor, ON, CA.

Lake Superior Binational Program (LSBP). 2006. Lake Superior Lakewide Management Plan: 1990-2005 Critical Chemical Reduction Milestones. Prepared by the Superior Work Group – Chemical Committee. 209 pages. Toronto and Chicago.

LaMP Stage 1. 1995. Current Status of Critical Pollutants: Stage 1 Problem Identification. Prepared by the Superior Work Group – Chemical Committee. 99 pages. Thunder Bay and Chicago.

LaMP Stage 2. 1999. Protecting Lake Superior – Lakewide Management Plan: Stage 2 – Load Reduction Targets for Critical Pollutants. Prepared by the Superior Work Group – Chemical Committee. 162 pages. Thunder Bay and Chicago.

Luross, J.M., M. Alae, D.B. Sergeant, C.M. Cannon, D.M. Whittle, K.R. Solomon, and D.C.G. Muir. 2002. Spatial distribution of polybrominated diphenyl ethers and polybrominated biphenyls in lake trout from the Laurentian Great Lakes. *Chemosphere*. 46:665-672.

Muir, D. 2007. Aquatic Ecosystem Division, Environment Canada. Personal communication.

Song, W., J.C. Ford, A. Li, W.J. Mills, D. Buckley, and K.J. Rockne. 2004. Polybrominated Diphenyl Ethers in the Sediments of the Great Lakes. 1. Lake Superior. *Environmental Science and Technology*. 38:3286-3293.

Strandberg, B., N. G. Dodder, I. Basu and R.A. Hites. 2001. Concentrations and Spatial Variations of Polybrominated Diphenyl Ethers and Other Organohalogen Compounds in Great Lakes Air. *Environmental Science and Technology*. 35:1078-1083.

Zhu, L.Y. and R.A. Hites. 2004. Temporal Trends and Spatial Distributions of Brominated Flame Retardants in Archived Fishes from the Great Lakes. *Environmental Science and Technology*. 38:2779-2784.

ADDENDUM 4A: CHAPTER 4 ACRONYMS

AGGEP	Anishinabek of the Gitchi Gami Environmental Programs
AOC	Area of Concern
APEs	alkylphenol ethoxylates
AREA	Arrowhead Regional Emissions Abatement
BAC	benzalkonium chloride
BCCs	bioaccumulative chemicals of concern
BHC	benzene hexachloride
BMPs	Best Management Practices
BTS	Great Lakes Binational Toxics Strategy
BUI	Beneficial Use Impairment
CAD	Contained Aquatic Disposal
CEC	Commission for Environmental Cooperation
CEPA	Canadian Environmental Protection Act
CFLs	compact fluorescent lamps
COA	Canada-Ontario Agreement Respecting the Great Lakes System
CWS	Canada-wide Standards
DDT	dichlorodiphenyltrichloroethane
DEET	N,N-diethyltoluamide
DW	dry weight
EC	Environment Canada
e-waste	electronic waste
FCM	Federation of Canadian Municipalities
FS	Feasibility Study
FWFN	Fort William First Nation
GHG	greenhouse gas
GLEI	Great Lakes Environmental Indicator
GLI	Great Lakes Water Quality Initiative
GLIFWC	Great Lakes Indian Fish and Wildlife Commission
GLNPO	Great Lakes National Program Office
GLWQA	Great Lakes Water Quality Agreement
HC	Health Canada
HCB	hexachlorobenzene
HPBA	Hearth, Patio, and Barbeque Association
HPV	High Production Volume
HTAC	Harbor Technical Advisory Committee

IADN	Integrated Atmospheric Deposition Network
IISG	Illinois-Indiana Sea Grant
IJC	International Joint Commission
KBIC	Keweenaw Bay Indian Community
LaMP	Lakewide Management Plan
LEAF	Learning, Experience and Activities in Forestry
LEED	Leadership in Energy and Environmental Design
LSBP	Lake Superior Binational Program
MACT	Maximum Achievable Control Technology
MDEQ	Michigan Department of Environmental Quality
MHSW	municipal hazardous or special wastes class
MI	Michigan
MN	Minnesota
MOE	Ontario Ministry of Environment
MP	Minnesota Power
MPCA	Minnesota Pollution Control Agency
MPI	Marathon Pulp Inc.
MUCC	Michigan United Conservation Clubs
MW	megawatt
NOx	nitrogen oxides
NPS	National Park Service
NSPW	Northern States Power of Wisconsin
NVMSRP	National Vehicle Mercury Switch Recovery Program
NWRPC	Northwest Regional Planning Commission
OCS	octachlorostyrene
ON	Ontario
OWBs	Outdoor Wood-fired Boilers
PAH	polycyclic aromatic hydrocarbon
PBBs	polybrominated biphenyls
PBDE	polybrominated diphenyl ether
PBT	Persistent Bioaccumulative Toxic chemical
PCBs	polychlorinated biphenyls
PCP	pentachlorophenol

PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonate
POWTS	Private On-site Wastewater Treatment Systems
PPCPs	pharmaceuticals and personal care products
PWQOs	Provincial Water Quality Objectives
SCCP	short chain chlorinated paraffins
SETAC	Society of Environmental Toxicology and Chemistry
SOLEC	State of the Lakes Ecosystem Conference
TBBPA	tetrabromobisphenol A
TCDD	tetrachlorodibenzodioxin
TEQ	toxicity equivalent

TMDL	Total Maximum Daily Load
TRC	Thermostat Recycling Corporation
TSCA	Toxic Substances Control Act
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
USS	U.S. Steel
WDNR	Wisconsin Department of Natural Resources
WDO	Waste Diversion Ontario
WI	Wisconsin
ZDDP	Zero Discharge Demonstration Program

ADDENDUM 4B: LAKE SUPERIOR ZERO DISCHARGE DEMONSTRATION PROGRAM AND CRITICAL CHEMICAL REDUCTION MILESTONES



Contents

What is the Lake Superior Zero Discharge Demonstration Program? ... 1

Fate of The Nine Pollutants in the Lake Superior Ecosystem 2

Zero Discharge At Work: Tracking the Release of The Nine Pollutants..... 3

2005 Reduction Milestone for Mercury 5

2005 Reduction Milestones for Dioxin, Hexachlorobenzene and Octachlorostyrene 6

2005 Reduction Milestones for PCBs 7

2005 Reduction Milestones for Pesticides: Dieldrin, Chlordane, DDT and Toxaphene 7

The Future of the Lake Superior Zero Discharge Demonstration Program..... 8

Photo: Matt Hudson, Great Lakes Indian Fish and Wildlife Commission.



What is the Lake Superior Zero Discharge Demonstration Program?

The goal of the Zero Discharge Demonstration Program (ZDDP) is to achieve zero release of certain designated persistent bioaccumulative toxic substances in the Lake Superior basin. In 1990, the International Joint Commission challenged the governments of Canada and the United States to develop a program to virtually eliminate a group of “The Nine” persistent, bioaccumulative and toxic pollutants. The governments responded to this challenge by creating the Lake Superior “Binational Program to Restore and Protect the Lake Superior Basin.” This program guides the Zero Discharge Demonstration Program (ZDDP) targeted at The Nine pollutants. The Lake Superior Binational Program is administered by federal, provincial, state and tribal agencies through the Superior Work Group and Task Force with the assistance of a public involvement and outreach group known as the Lake Superior Binational Forum. The Lake Superior Lakewide Management Plan (LaMP) was developed by the Lake Superior Binational Program as a man-

agement strategy for Lake Superior and currently guides the implementation of the ZDDP.

The Nine pollutants are mercury, PCBs, dioxin, hexachlorobenzene, octachlorostyrene and 4 pesticides - dieldrin, chlordane, DDT and toxaphene. The ZDDP targets only Lake Superior basin sources of The Nine. While out-of-basin sources may contribute significantly to the presence of these substances in the lake, these are beyond the ability of the Lake Superior Binational Program to directly influence. These out of basin sources make it difficult to be sure of the effect of local toxic reductions on environmental concentrations in Lake Superior. Despite this, the ZDDP is an important step in taking local action to “clean up our own backyard” with respect to The Nine and other pollutants of concern. As its name implies, the ZDDP is also a model that demonstrates the progress and benefits of multi-sector cooperation to address a global problem.

LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

In 1999, the Lake Superior Binational Program mapped out a two-decade release reduction plan for The Nine pollutants. The plan identified targets for staged reductions of these pollutants, with 1990 as the baseline year

and 2020 as the year where virtual elimination will be achieved. Table 1 shows the reduction schedules and targets set out in the release reduction plan.

Table 1 - Summary of Release Reduction Targets for Lake Superior ZDDP

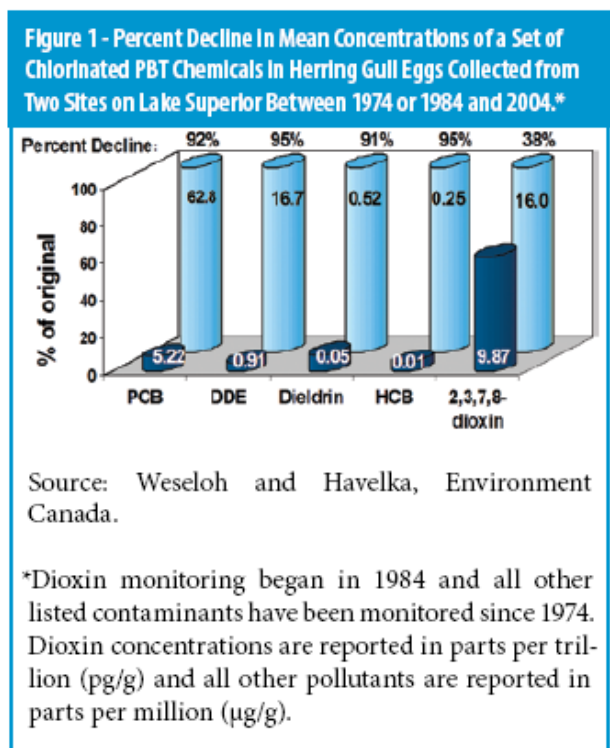
Summary of Release Reduction Targets for Lake Superior ZDDP					
Pollutant	2000	2005	2010	2015	2020
Mercury	60%		80%		100%
PCBs	33%	60%	95%		100%
Pesticides ²	100%				
Dioxin ¹ , HCB, OCS		80%		90%	100%

¹ The Binational Program lists 2,3,7,8-TCDD (dioxin) for the Zero Discharge Demonstration Program. By convention, dioxin is measured and reported as toxic equivalents (TEQ).

² The 4 pesticides included in the ZDDP are Dieldrin, Chlordane, DDT and Toxaphene.

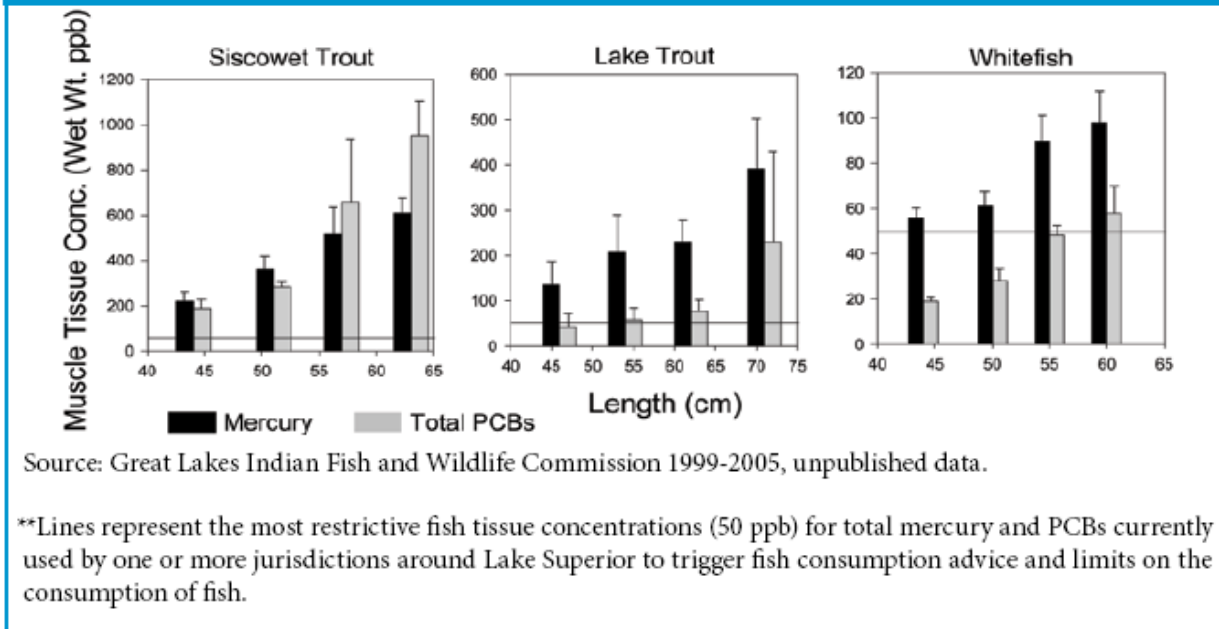
Fate of The Nine Pollutants in the Lake Superior Ecosystem

In general, the presence of The Nine pollutants has declined in the Lake Superior ecosystem over the past 30 years. Figure 1 shows an example of this decline, using concentrations of several chlorinated substances found in Lake Superior herring gull eggs over the time period that the Canadian Wildlife Service has been measuring them regularly. However, the rate of environmental decline of these pollutants has slowed in recent years. In addition, The Nine continue to impair lake use locally and lake-wide in the form of fish consumption advisories and loss of fish and wildlife habitat, among others. For example, PCBs, mercury, dioxin and some pesticides remain above levels that limit consumption of fish from Lake Superior. Figure 2 shows total mercury and total PCB concentrations in fillet tissue compared to fish length for some species of Lake Superior fish.



LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

Figure 2 - Total Mercury and Total PCB Concentrations In Fillet Tissue of Lake Superior Siscowet Trout (*Salvelinus namaycush siscowet*), Lake Trout (*Salvelinus namaycush namaycush*), and Whitefish (*Coregonus dupeaformis*).**



ZERO DISCHARGE AT WORK

Tracking the Release of The Nine Pollutants

In the Lake Superior basin, the year 2005 marked the midpoint between the ZDDP baseline year of 1990 and the 2020 goal for virtual elimination of The Nine pollutants. The 2005 Chemical Reduction Milestones Report details the release reduction successes achieved since 1990 and identifies the challenges that lie ahead for reaching the next reduction target in 2010. The successes are the result of collaboration and commitment by the wide range of stakeholders including business and industry, non-governmental organizations, and municipal, state, tribal, First Nation, provincial and federal agencies actively engaged in the Lake Superior Binational Program. The importance of the involvement of the citizens of the Lake Superior basin cannot be overstated.



A seed disinfectant containing mercury. Credit Minnesota Department of Agriculture

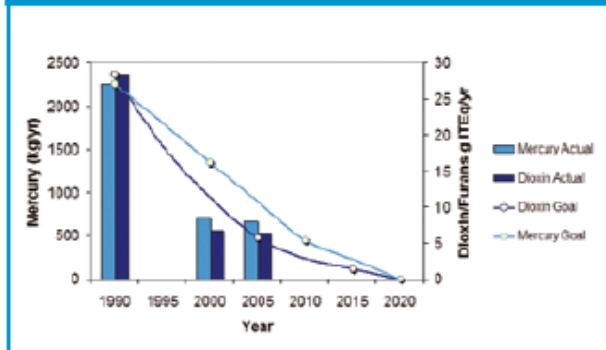
LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

In 2005, emission inventories for The Nine pollutants were updated for both the United States and Canadian portions of the Lake Superior basin. These inventories allow the Lake Superior Binational Program to calculate the change in release of The Nine pollutants since 1990. Figure 3 shows actual release along with the release reduction targets for mercury and dioxin in the Lake Superior basin over the timeframe of the program.

Notable achievements include:

- 71% reduction in mercury releases basin-wide;
- 76-79% reduction in dioxin releases basin-wide;
- Significant reductions of PCB materials basin-wide;
- The ongoing collection and safe disposal of waste pesticides around the basin, with more than 12,700 kg (28,000 pounds) collected between 1992 and 2004 in Minnesota and Wisconsin alone.

Figure 3 - Actual release and release reduction targets for mercury and dioxin in Lake Superior Basin from 1990 to 2020



Top 12 Ways You Can Protect Lake Superior Everyday

- Create an energy efficient home.
- Install water saving devices.
- Never burn garbage.
- Try to reduce, reuse, recycle and repair.
- Take household hazardous materials to hazardous waste collections.
- Never pour oil or other used liquids into a storm drain.
- Put your lawn on a chemical-free diet.
- Inspect your boat and trailer and remove any plants and animals before leaving a boat access.
- Landscape with plants that are native to the region.
- Plant trees to capture carbon dioxide and prevent erosion.
- Use a rain barrel for gardening and washing the car.
- And most importantly, love Lake Superior!



A Lake Superior tributary. Credit: Ron Leonetti.

LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

ZERO DISCHARGE POLLUTANTS

2005 Reduction Milestone for Mercury

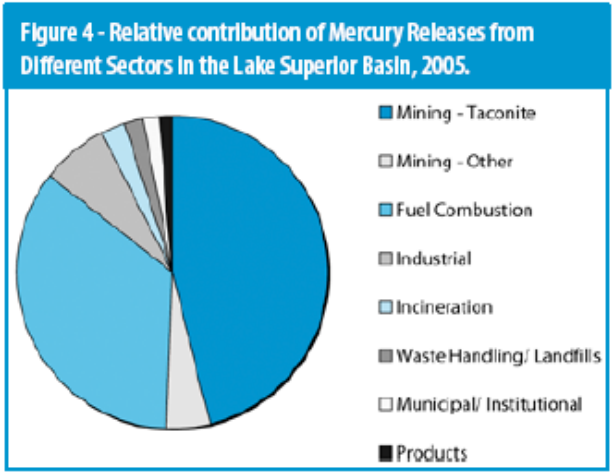
In a year 2000 report it was estimated that mercury discharges and emissions declined 69% in the Lake Superior basin between 1990 and 2000. By 2005, the total reduction since 1990 had increased to 71%. The greatest reduction as a result of the ZDDP was a 96% reduction in the release of mercury from products. The largest overall reductions have been due to the closures of the White Pine copper smelter in Michigan and the Algoma sintering plant in Wawa, Ontario, which were not related to the ZDDP.

In order to meet the next mercury reduction milestone of 80% by 2010, 2005 loads must be reduced by an additional 200-207 kg/yr. While emissions continued to decline between 2000 and 2005, the rate of decline appears to have slowed (see Figure 3). The largest remaining sectors for mercury emissions are mining and fuel combustion, which together account for greater than 85% of the mercury emissions within the basin. Figure 4 shows the main sources of mercury in 2005. Currently, taconite mines in the Minnesota portion of the basin are the largest single sector for mercury emissions.



Above: Jamie Harvey uses a Lumex unit to test for mercury at an industrial site. Credit: D. Hansen, Minnesota Pollution Control Agency.

Below: Stream fishing in the fall. Mercury levels in certain fish caught in the Lake Superior basin remain high enough to cause fish consumption restrictions. Credit: Michigan Travel Bureau.



LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

ZERO DISCHARGE POLLUTANTS

2005 Reduction Milestones for Dioxin, Hexachlorobenzene and Octachlorostyrene

Dioxin

Release of dioxin is estimated to have declined 75-78% between the ZDDP baseline year of 1990 and year 2000. However, the bulk of these reductions were due to the closure of the Algoma sintering plant, an event which was not related to the ZDDP. Little change, if any, has occurred in dioxin releases since 2000, with current estimates of total release reduction since 1990 at 76-79%. Currently residential open burning of garbage is the largest source of dioxin on both sides of the border. Fuel combustion is the second largest source of in-basin dioxin. Projected trends for dioxin emission from 2005-2010 are unknown due to changing control technology at coal-fired utilities and demand for electricity. Figure 5 shows the contribution of various sectors to dioxin release.

In order to meet the 90% reduction goal by 2015, an additional 4.32 to 4.46 g I-TEQ/yr of dioxin must be reduced from the 2005 load; this can be seen in Figure 3 above. Open burning is a completely preventable source of dioxin, and if all other sources remain unchanged, elimination of open burning by 2015 would achieve the 90% reduction goal.

Hexachlorobenzene

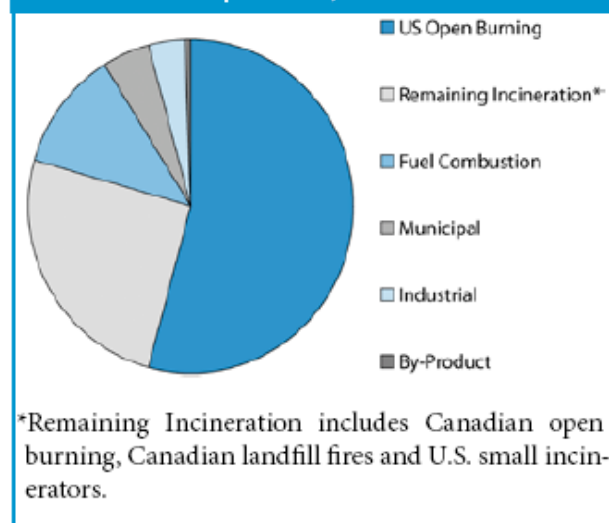
Completion of the hexachlorobenzene (HCB) inventory has been challenging. Utility poles and in-use railway ties treated with PCP, were the largest identified HCB sources on the Canadian side, this was followed by residential wood combustion. On the US side, the largest sources were open burning of trash, followed by motor vehicles. Since 1990, the pulp and paper industry has been responsible for significant reductions in release of HCB (about 32% of the total) because of their conversion of the bleaching process to chlorine dioxide in place of elemental chlorine.

Billboard near Floodwood, MN discourages people from burning garbage, the largest source of dioxin in the Lake Superior basin. Credit: Mary McReynolds, St. Louis County Solid Waste Department.

Octachlorostyrene

Environmental monitoring data in the Great Lakes have shown a decline in levels of octachlorostyrene (OCS) and no large source of OCS is believed to exist within the Lake Superior basin. However, since OCS may form under similar conditions as dioxin and HCB, LSBP may get better information about the release of OCS in the basin by improving the basin inventories for dioxin and HCB.

Figure 5 - Contribution of Dioxin Releases from Different Sectors in the Lake Superior Basin, 2005.



LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

ZERO DISCHARGE POLLUTANTS

2005 Reduction Milestones for PCBs

Tracking PCB reductions over time has not been possible because data on in-use PCBs in the Lake Superior basin are not available or difficult to access. As an alternative, the LSBP has proposed to track PCB disposal and storage via the Ontario database for PCB storage, the Environment Canada database for PCB disposal and the Minnesota hazardous waste database for PCB disposal. To date the resources have not been available to assess the Wisconsin and Michigan PCB disposal records from facilities in the Lakes Superior Basin in the same way. Storage, disposal, and/or destruction of PCB capacitors, transformers and oil will be analyzed every 5 years for trends and cumulative progress.



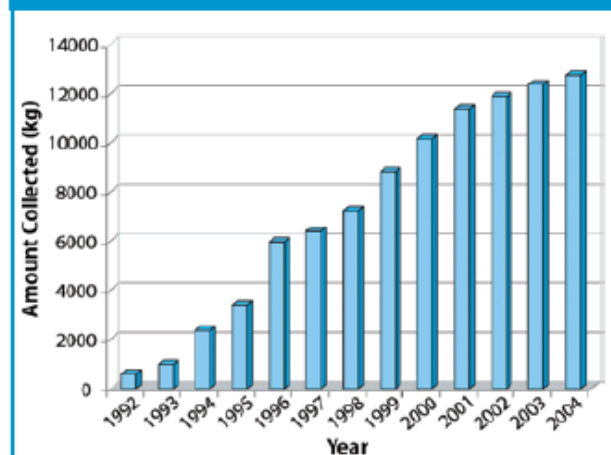
A PCB transformer. Photo Credit: Scott Bohling, Minnesota Pollution Control Agency.

ZERO DISCHARGE POLLUTANTS

2005 Reduction Milestones for Pesticides: Dieldrin, Chlordane, DDT and Toxaphene

Although the Lake Superior basin is mostly non-agricultural, a significant amount of banned pesticides have been collected in or near the basin since 1992. Although the initial reduction goal was to collect all remaining stores of these pesticides by 2000, it is obvious that these pesticides are still present in the basin and that collections need to continue, even in non-agricultural areas. Figure 6 shows the amounts of pesticides of interest (i.e. those targeted by the ZDDP and those that may be contaminated by dioxin) that have been collected in Minnesota and Wisconsin counties in the Lake Superior basin.

Figure 6 - Cumulative Amount of Pesticides Collected in Minnesota and Wisconsin Counties in the Lake Superior Basin, 1992-2004 (kg).



LAKE SUPERIOR LaMP ZERO DISCHARGE DEMONSTRATION PROGRAM

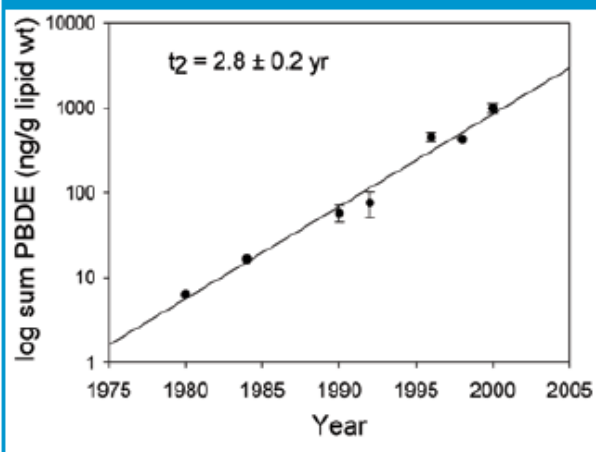
The Future of the Lake Superior Zero Discharge Demonstration Program

Identified challenges include improving our ability to accurately quantify inventories of The Nine pollutants, such as PCBs, and banned pesticides. Chapter 5 of the full report presents a range of comprehensive strategies to encourage progress towards ZDDP targets. Current trends, particularly increasing mining operations and energy use within the basin, provide a challenge for all partners in the Lake Superior Binational Program to meet the next set of reduction targets.

Recent discoveries of chemicals of emerging concern in the Lake Superior ecosystem also pose a new challenge for the ZDDP. Chemicals of emerging concern include many substances that have common, everyday uses and are being detected in water, fish, and sediments. The potential ecosystem impacts of these chemicals are largely unknown. Polybrominated diphenyl ethers (PBDEs) are one example group of chemicals of emerging concern that has been increasing in Lake Superior lake trout (Figure 5). PBDEs are commonly used as flame retardants in products such as furniture and computers. Other groups of chemicals of emerging concern include pharmaceuticals, personal care products and household pesticides. As a first step in addressing these chemicals, a watch-list has been proposed for those that have been detected in Lake Superior and are under evaluation for potential persistent, bioaccumulative and/or toxic effects. As more becomes known, management strategies will be developed by the Lake Superior Binational Program. In the meantime, the Binational Program will encourage monitoring and pollution prevention of these chemicals.

Although significant pollutant reductions have been made over the past 15 years, predicted future increases in industrial activity, energy demand and increased human population may result in corresponding increases in the release of toxic pollutants in the basin. Since pollution prevention is more cost-effective than degradation followed by restoration, it is preferable to limit the release of toxic pollutants to Lake Superior. Recognizing the evolving nature of the interactions between persistent toxic chemicals and the ecosystem, the Lake Superior Binational Program remains committed to achieving the goals of the ZDDP as part of the larger goal to restore and maintain the health of the Lake Superior basin ecosystem.

Figure 7: Concentrations of Polybrominated Diphenyl Ethers (PBDEs) in Whole Lake Trout from Lake Superior, 1980-2000.
Source: Zhu and Hites 2004.



For More Information:

For more information about the Zero Discharge Demonstration Program, please view the Lake Superior Binational Program website at www.binational.net. As the Program has many partners, additional reports and documents relevant to the Program may be found on Partner Agency Sites. Links to those sites can also be found on binational.net or contact:

In Canada: Pamela Finlayson
Environment Canada
Phone: (416) 739-5996
pamela.finlayson@ec.gc.ca

In the U.S.: E. Marie Wines
U.S. Environmental Protection Agency
Phone: (312) 886-6034
wines.e-marie@epa.gov

**ADDENDUM 4C: CHEMICAL REDUCTION AND INVENTORY ACTIVITIES FOR
2010 LAKE SUPERIOR MILESTONE**

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/T¹	2005 Load of Primary Chemical²	2005 % of Primary Chemical³
Overall Reductions							
1	All	Mercury		Develop policy or regulation that caps mercury emissions so that new or expanded sources would be allowed only if overall emissions did not increase.	R	653	100%
	MI	The Michigan Department of Environmental Quality (MDEQ) has released a comprehensive strategy to eliminate the use and release of mercury to Michigan's environment. The MDEQ's Mercury Strategy Staff Report contains specific recommendations and a comprehensive approach to controlling mercury, including environmental monitoring, inventory development, collaborations and partnerships, information and outreach, and regulatory controls. It also provides an overview of the mercury problem, identifies current sources that contribute to mercury releases, and identifies various methods for reducing and eliminating the sources. It also outlines Michigan's rules, regulations, policies, and monitoring activities for mercury, and chronicles various actions undertaken thus far to prevent the use and release of mercury.					
	MN	The Minnesota statewide mercury Total Maximum Daily Load (TMDL) is the best program for attempting to implement this action. The TMDL calls for a 93% reduction of mercury emissions from all Minnesota sources. The Minnesota LaMP program will seek opportunities for information sharing and input into the TMDL implementation process. The implementation phase is currently being scoped out by a stakeholder group: www.mn-ei.org/policy/hgtmdlindex.html .					
	WI	The Wisconsin Department of Natural Resources (WDNR) is proposing revisions to the state's air mercury rule in response to three separate but related actions. They include promulgation of the federal Clean Air Mercury Rule (CAMR) in May 2005, a directive from Governor Doyle in August 2006 to further reduce mercury emissions, and a January 2007 Citizens' Petition requesting revision to Chapter NR 446 (state mercury rule).					
	ON	Ontario continues to follow the <i>Canada Wide Standard for Mercury Emissions from Coal Fired Generating Stations</i> , which commits the province to reducing mercury emissions from coal-fired generating stations by 60% nationally by 2010. On August 27, 2007, Ontario implemented <i>Regulation 496/07</i> that requires cessation of coal use at the remaining four coal-fired plants, including Thunder Bay, by 2014.					
2	All	Pesticides		Encourage, support, assist, and provide funding for collections.	R	unknown	100%
	EC	EC has funded Household Hazardous Waste collections in the Lake Superior basin. These collections have yielded a quantity of pesticides. EC will continue to work with its partners and pursue funding opportunities in the future.					
	US EPA	The U.S. Environmental Protection Agency (US EPA) will consult with states on pesticides collections; will continue to provide outreach/education on both legacy and current use pesticides. Will continue to support workshops and trainings to educate public, municipalities, schools, and park districts on reducing use of and alternatives to pesticides.					
	MI	The MDEQ will consult with the MI Department of Agriculture on pesticide collections.					

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/I ¹	2005 Load of Primary Chemical ²	2005 % of Primary Chemical ³
	MN	The Minnesota Pollution Control Agency (MPCA) will consult with Minnesota Department of Agriculture, counties, and Western Lake Superior Sanitary District (WLSSD) on how they are doing under the new waste pesticide funding regime.					
	WI	Support mercury/toxics/pesticides/e-waste/clean sweeps. Support efforts that make hazardous waste collections more affordable in rural areas such as Northwest Wisconsin Regional Planning Commission's mobile clean sweep program for households, farmers, and small businesses.					
	ON	Ontario has provided financial support for EcoSuperior to undertake a collection and education program in Canadian Lake Superior basin communities. Some communities have gone on to carry out subsequent collections, at their own expense. Ontario will introduce draft legislation to ban the cosmetic use of pesticides in urban areas in the spring of 2008.					
3	All	PCBs		Encourage, support, assist, and provide incentives for phase-out.	R		100%
	EC	EC has proposed revisions to the existing <i>Chlorobiphenyl Regulations</i> and the <i>Storage of PCB Material Regulations of the Canadian Environmental Protection Act 1999</i> (CEPA 1999) that would set specific dates for the complete destruction of all PCBs in service and in storage.					
	US EPA	US EPA encourages, supports, assists, and provides incentives for PCB phase-out where possible. Will work with MN, WI, and MI as well as the BTS program, to explore state PCB utility reductions.					
	MI	MDEQ encourages, supports, assists, and provides incentives for PCB phase-out where possible.					
	MN	The LaMP program will work with Toxic Substances Control Act (TSCA) staff to follow-up on progress on Minnesota Power's 1994 phase-down plan. We are especially interested in an update on PCB equipment at the Arrowhead Terminal.					
	WI	Through the Green Tier program, WDNR collaborates with businesses to ensure proper management and phase-out of PCBs by providing technical assistance with PCB management and phase-out.					
4	All	All		Work with other programs to improve LaMP inventory	I		100%
	EC	EC will continue to work with our partners to improve the LaMP inventory.					
	US EPA	Will work through the LaMP chemical committee to provide support on updated emission factors as needed.					
	MI	MDEQ works with other programs and agencies to improve the LaMP inventory.					
	MN	This action is already incorporated in the LaMP coordinator's workplan. Work will include seeking updated emission factors and throughputs as well as compiling hazardous waste and pesticide collection data.					
	WI	This action is already incorporated in the LaMP coordinator's workplan. Work will include seeking updated emission factors and throughputs as well as compiling hazardous waste and pesticide data.					
5	All	Dioxin	Mercury	Encourage, support, assist, and provide funding for open burning abatement programs.	R	4.2	65%
	EC	EC will continue to support public education on open burning education and work with its partners to support open burning abatement programs.					
	US EPA	US EPA will continue to support open burning abatement actions, programs, and projects, in coordination with the BTS and Sea Grant outreach. Such support may include staff, technical, and financial resources.					

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/T ¹	2005 Load of Primary Chemical ²	2005 % of Primary Chemical ³
	MI	In Michigan, the practice of open burning may be regulated at both the state and local level. At the state level, open burning is regulated under Parts 55, 115, and 515 of the <i>Natural Resources and Environmental Protection Act, Public Act 451 of 1994</i> , as amended, and associated administrative rules. There are two state agencies responsible for administering these open burning regulations: MDEQ and Michigan Department of Natural Resources; however, these regulations may be enforced by local units of government. The MDEQ has also developed a document for local officials which is a "Model Open and Outdoor Burning Ordinance." This publication is designed to help local officials craft their own burning ordinance. The ordinance provides options to be more restrictive than the state regulations if they choose. Another outreach tool MDEQ has developed is a burn barrel display. MDEQ has also developed instructions for making a display.					
	MN	The MPCA will use a federal grant extension to carry out an outreach project that involves radio spots, magazine advertising, and written materials. The open burning abatement message is also included in the landowner-realtor outreach project that the MPCA is seeking funding to implement.					
	WI	Support programs for burn barrel reduction, one of the most preventable sources of dioxin and other PBT release to the atmosphere. WDNR will look to expand its education partner base through the involvement of WDNR's forestry concern over burn barrels as a cause of forest fires. WDNR will continue to investigate burn barrel outreach projects through partners such as the Waste Management Program. The WDNR will also encourage adoption of burn barrel ordinances by local units of government.					
	U.S. Tribes	Lake Superior Tribes will continue to conduct open burning outreach, education, and abatement programs, along with continuing household hazardous waste and other collections to provide alternatives to open burning of garbage.					
6	All	Dioxin		Work on common backyard burning inventory method.	I	4.2	65%
	EC	EC will continue to support and work with its partners to improve the backyard burning inventory, including working toward a common method.					
	US EPA	US EPA will work with MPCA and EC staff to clarify the original methods and work toward a common method.					
	MI	Assist LaMP partners is finding a common method.					
	MN	Per Minnesota's commitment to Action 4, the LaMP coordinator will work with MPCA, US EPA, and EC staff to clarify the original methods and work toward a common method.					
	WI	Wisconsin will continue to work with the Binational Program toward a common method.					
7	All	Mercury	Dioxin	Encourage, support, assist, and provide funding for energy conservation programs.	R	229	35%
	EC	EC will ensure that existing federal programs (such as Natural Resource Canada's ecoENERGY Efficiency Initiative and the ecoENERGY Retrofit program) are promoted through existing communications channels. Environment Canada will also work with its partners to support other energy conservation programs.					
	US EPA	US EPA Region 5 recently released a climate change framework that calls for energy conservation, reduction, and outreach on alternatives. US EPA will work with states, businesses, and municipalities to help reduce energy usage to mitigate the effects of climate change. US EPA has recently provided support to MPCA and the Will Steger Foundation to pursue climate change mitigation/greenhouse gas reductions and will partner with them to implement on-the-ground actions.					

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/T ¹	2005 Load of Primary Chemical ²	2005 % of Primary Chemical ³
	MI			The MDEQ has partnered with the Department of Labor and Economic Growth Energy Office, Michigan Public Services Commission and Department of Transportation to identify various energy efficiency and energy conservation programs and resources available to the public, private business, and municipal government.			
	MN			Minnesota recently passed laws that set goals for renewable energy and energy conservation as part of the state's contribution towards reducing the impact of climate change. It is likely that mercury reduction co-benefits will result. The LaMP program will seek opportunities to pilot projects in the Lake Superior watershed. In addition, Minnesota's Governor Tim Pawlenty is the 2008 chair of the National Governors Association and plans to focus the organization on clean energy.			
	WI			In November 2007, Governor Jim Doyle signed the historic Midwest Governors Association Energy Security and Climate Stewardship Platform and the Midwestern Greenhouse Gas Accord to work on a regional strategy to achieve energy security and reduce greenhouse gas emissions. Governor Doyle and Governor Pawlenty [Minnesota] met in early January to discuss the next steps that Minnesota and Wisconsin will take to make the Midwest a renewable energy leader. Governor Doyle has proposed a Governor's Office of Energy Independence and proposed \$40 million in his budget for renewable energy like solar, wind, hydrogen, biodiesel, and ethanol.			
	U.S. Tribes			Lake Superior Tribes will continue to actively pursue alternative energy sources and seek to maximize energy efficiency.			
	ON			Ontario, through the Ontario Power Authority, will continue the Every Kilowatt Counts initiative. Consumer incentives are available for purchasing energy efficient appliances, cycling down air conditioners during periods of high demand, and free pick up and disposal of old refrigerators. Commercial and industrial users are eligible for the Electricity Retrofit Incentive Program and the Load Management Program.			
8	All	Mercury		Encourage, support, assist, and provide funding for collections and product alternatives.	R	45.3	7%
	EC			EC will continue to work with its partners to support Household Hazardous Waste collections.			
	US EPA			US EPA is provided financial support to cities, non-profit groups, and other entities for continued hazardous and e-waste collections as well as unwanted medicine collections.			
	MI			See Michigan's Solid Waste Policy, action #13			
	MN			While messages about mercury products are included in the realtor/landowner outreach project that the MPCA is seeking funding to implement, the agency will not actively seek projects specifically for the basin since products are a relatively small portion of the inventory, and infrastructure and outreach in the basin are already well established.			
	WI			Adopt the Great Lakes Regional Collaboration's <i>Mercury in Products Phase Down Strategy</i> as Wisconsin's guideline for reducing mercury in products. Continue to work with the City of Superior mercury reduction initiatives. Continue to support and seek ways to expand mercury initiatives to other communities in the basin.			
Fuel Combustion							
9	MI	Mercury		Support Wisconsin Energy's Presque Isle mercury control technology.	R	45.7	7%
				Michigan supports reduction of mercury emissions from coal-fired powered plants.			

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/I ¹	2005 Load of Primary Chemical ²	2005 % of Primary Chemical ³
10	ON	Mercury		Support efforts to explore viability of a low mercury emissions process at the Thunder Bay Generating Station; encourage public education and informed discussion.	R	37	6%
11	MN	Mercury		Support Minnesota Power's Taconite Harbor mercury control technology.	R	31.9	5%
		The MPCA will approach Minnesota Power and MDEQ to participate in an informal group to examine mercury cycling at the two facilities in the Lake Superior basin that have mercury control technology or are installing it (i.e., the Presque Isle coal-fired power plant in Marquette and Minnesota Power's Taconite Harbor facility).					
Trash Burning							
12	MN	Dioxin	Mercury	Encourage, support, assist, and provide funding to improve solid waste infrastructure in rural areas.	R	1.76	27%
		Solid waste infrastructure in the northeastern Minnesota is already fairly well established, but the MPCA will seek opportunities for improvement through the Northeast Waste Advisory Council (NEWAC) and the Solid Waste Officers of the Northeast Region (SWONERS).					
13	MI	Dioxin	Mercury	Encourage, support, assist, and provide funding for solid waste infrastructure in rural areas.	R	1.59	25%
		The MDEQ released a stakeholder-driven update to the Michigan Solid Waste Policy in 2007. The Policy provides a framework to guide Michigan citizens, businesses, government agencies, institutions, universities, and political leaders in making smart choices for managing Michigan's solid wastes by viewing it as a resource in a global economy. The Policy uses the three principles of sustainability: economic vitality, ecological integrity, and improved quality of life to guide solid waste management decisions.					
14	WI	Dioxin	Mercury	Encourage, support, assist, and provide funding to improve solid waste infrastructure in rural areas.	R	0.59	9%
15	All U.S.	Dioxin	Mercury	Work with US EPA to improve estimate of emissions from landfill fires.	I	unknown	unknown
	US EPA	US EPA will continue to work with experts on landfill emission factors and throughput measurements. We will continue to seek information on wildfire emissions. We will support states' efforts in this endeavor.					
	MI	MDEQ will work with partners to estimate emissions from landfill fires where appropriate.					
	MN	Per Minnesota's commitment to Action 4, the MPCA will work with experts on landfill emission factors and throughput measurements. We will also seek additional information on wildfire emissions.					
	WI	WDNR will cooperate with MPCA and US EPA experts on landfill emission factors and throughput measurements.					
16	ON	Dioxin	Mercury	Encourage, support, assist, and provide funding for solid waste infrastructure in rural areas	R	0.21	3%

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/T ¹	2005 Load of Primary Chemical ²	2005 % of Primary Chemical ³
		Ontario continues to improve collection of Municipal Household and Special Wastes (MHSW). A plan has been developed by Waste Diversion Ontario and submitted to the Minister of the Environment that would improve access to hazardous waste collection. Under this program the costs of recovering and disposing of MHSW will be borne by industry. Wastes such as paints, solvents, oil filters and containers, single-use batteries, antifreeze, pressurized containers, fertilizers, and pesticides will be included in the program. Early objectives will be to increase the number of collection events and to expand collections to areas without existing service.					
17	ON	Dioxin	Mercury	Work with landfill owners and operators to decrease landfill fires.	R	0.05	1%
Mining							
18	MN	Mercury		Incorporate reductions in mercury from taconite into statewide mercury TMDL that are also part of the LaMP inventory.	R	303	46%
		Given the size of this source in the mercury inventory, the Minnesota LaMP program will seek opportunities for LaMP reductions through other agency programs. The best fit will be the mercury TMDL as mentioned in Item 1. The 93% statewide TMDL reduction cannot be met without reductions from the mining sector.					
19	US EPA	Mercury		Evaluate mercury as part of taconite residual risk	I	303	46%
		US EPA will continue to pursue this through the BTS.					
20	MI & WI	Mercury		Develop estimate of mercury that would be released from proposed mine projects	I	unknown	unknown
	MI	MDEQ will work with other programs and agencies to estimate mercury releases from proposed mine projects.					
	WI	Currently no mining is proposed in Wisconsin; however, there is speculation of mining interests. In the event of a mining proposal, the state will promote the reformation of the State Mining Team.					
Pesticide Inventory							
21	MI	Pesticides		Analyze waste pesticide collections to make consistent with rest of U.S. inventory	I	unknown	unknown
		MDEQ will work with the Michigan Department of Agriculture to analyze waste pesticides collected and will use consistent reporting where possible.					
PCB Inventory							
22	ON	PCBs		Develop cumulative tracking of inventory from 1990	I	unknown	100% of Canadian PCBs
23	EC	PCBs		Assist Ontario with cumulative tracking	I	unknown	100% of Canadian PCBs

ID	Jurisdiction	Chemical (primary)	Chemical (secondary)	Action	R/I¹	2005 Load of Primary Chemical²	2005 % of Primary Chemical³
24	MN	PCBs		Develop cumulative tracking of inventory from 1990	I	unknown	unknown
		Because of state TSCA delegation, the MPCA has direct access to records, but computerized records only go back to 1998. LaMP staff will work with the hazardous waste database staff to see if a student worker can compile 1990 to 1997 PCB records. The agency will work with Ontario, EC, and US EPA to keep methods as consistent as possible.					
25	WI	PCBs		Report to extent possible on PCBs disposed since 1990	I	unknown	unknown
26	MI	PCBs		Report to extent possible on PCBs disposed since 1990	I	unknown	unknown
				Report to extent possible on PCBs disposed since 1990			
27	US EPA	PCBs		Assist WI and MI with cumulative tracking	I	unknown	100% of U.S. PCBs
				US EPA will continue to support WI and MI with cumulative tracking of PCB disposal to the extent possible.			

¹ R = Reduction or I = Inventory.

² The estimated load from the 2005 milestones inventory that can be associated with the action is reported as kg/yr except for dioxin, which is g I-TEQ/yr.

³ The fraction of the 2005 milestones inventory estimated load that can be associated with the action is reported as percent. For example, in Action 9, 45.7 kg/yr is associated with the Presque Isle coal-fired power plant, and this is 7% of the 2005 milestone inventory. Some actions can be associated with 100% of the inventory.