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GREAT LAKES BINATIONAL TOXICS STRATEGY

2005 Progress Report

December 16, 2005
Draft – Do Not Cite or Quote

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ACRONYMS

ADA	American Dental Association
AHA	American Hospital Association
ALMR	Association of Lighting and Mercury Recyclers
AMRC	Association of Municipal Recycling Coordinators
AOC	Area of Concern
ASTM	American Society for Testing and Materials
B(a)P	Benzo(a)pyrene
BEC	Binational Executive Committee
BETR	Berkeley-Trent Model
BFRs	Brominated Flame Retardants
BMPs	Best Management Practices
CAA	Clean Air Act
CAMR	Clean Air Mercury Rule
CCME	Canadian Council of Ministers of the Environment
CDD	Chlorinated dibenzo-p-dioxin
CDF	Chlorinated dibenzo-p-furan
CEPA	Canadian Environmental Protection Act
CGLI	Council of Great Lakes Industries
COA	Canada-Ontario Agreement
COC	Contaminant of Concern
CWS	Canada-Wide Standards
DNAPL	Dense Non-Aqueous Phase Liquid
DNR	Department of Natural Resources
EC	Environment Canada
GLBTS	Great Lakes Binational Toxics Strategy
GLNPO	Great Lakes National Program Office
GLWQA	Great Lakes Water Quality Agreement
GRAHM	Global and Regional Atmospheric Heavy Metals Model
HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
Hg	Mercury
HVAC	Heating, Ventilation, and Air-Conditioning
HWC	Hazardous Waste Combustors
H2E	Hospitals for a Healthy Environment
IADN	Integrated Atmospheric Deposition Network
IDEM	Indiana Department of Environmental Management
IJC	International Joint Commission
ISO	International Standards Organization
LaMPs	Lakewide Management Plans
LDR	Land Disposal Restrictions
MACT	Maximum Available Control Technology
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources

ACRONYMS

METALLICUS	Mercury Experiment to Assess Atmospheric Loading in Canada and the U.S.
MOE	Ministry of the Environment (Ontario)
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
MWC	Municipal Waste Combustors
MWI	Medical Waste Incinerators
NAPS	National Air Pollution Surveillance Network
NDAMN	National Dioxin Air Monitoring Network
NADP	National Atmospheric Deposition Program
NEI	National Emissions Inventory
NEMA	National Electrical Manufacturers Association
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPRI	National Pollutant Release Inventory (Canada)
NRDA	Natural Resource Damage Assessment
OCS	Octachlorostyrene
ODA	Ontario Dental Association
OME	Ontario Ministry of the Environment
OSPPERA	Ohio Spill Planning, Prevention, and Emergency Response Association
OTS	Ontario Tire Stewardship
OU	Operable Unit
P2	Pollution Prevention
PAH	Polycyclic Aromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzo-Para-Dioxins
PCDF	Polychlorinated Dibenzofurans
PCP	Pentachlorophenol
PM	Particulate Matter
POPs	Persistent Organic Pollutants
POTW	Publicly Owned Treatment Works
RAPs	Remedial Action Plans
RCRA	Resource Conservation and Recovery Act
SAB	Science Advisory Board
SOLEC	State of the Lakes Ecosystem Conference
SOP	Strategic Options Process
SWARU	Solid Waste Area Reduction Unit
SVOC	Semi-Volatile Organic Compound
TEQ	Toxic Equivalent
TGM	Total Gaseous Mercury
TSMP	Toxic Substances Management Policy
TRC	Thermostat Recycling Corporation
TSCA	Toxic Substances Control Act

TRI	Toxics Release Inventory (U.S.)
UNEP	United Nations Environment Programme
US EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USWAG	Utility Solid Waste Management Group
VOC	Volatile Organic Compound
WDNR	Wisconsin Department of Natural Resources
WDO	Waste Diversion Ontario
WG	Workgroup
WLSSD	Western Lake Superior Sanitary District

INTRODUCTION/EXECUTIVE SUMMARY

[An Introduction will be included in the final report.]

1.0 MERCURY

Canadian Workgroup co-chair: Robert Krauel
U.S. Workgroup co-chair: Alexis Cain

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, a 50 percent reduction nationally in the deliberate use of mercury and a 50 percent reduction in the release of mercury from sources resulting from human activity.

Canadian Challenge: Seek by 2000, a 90 percent reduction in the release of mercury, or where warranted the use of mercury, from polluting sources resulting from human activity in the Great Lakes Basin.

Both Canada and the U.S. have achieved reductions of mercury from sources resulting from human activity, and continue to pursue their challenge goals outlined in the Strategy. A description of the progress made by each country is provided below. The GLBTS Mercury Workgroup is active; numerous mercury reduction activities are occurring in Canada to meet the goal of reducing releases of mercury in the Great Lakes Basin, and in the U.S. to meet the goal of reducing the deliberate use of mercury and releases of mercury nationwide.

Ontario: Progress Toward the GLBTS Challenge

In Ontario, releases of mercury have been reduced by approximately 84 percent between the 1988 baseline and 2002. Figure 1-1 illustrates the progress made toward the Canadian 90 percent reduction target.[1] This figure shows that releases in Ontario have been cut by more than 11,900 kg since 1988, based on Environment Canada's 2003 mercury inventory. Figure 1-2 illustrates the 2003 sources of mercury releases in Ontario. This figure shows that the primary sources of releases are electric power generation, iron and steel, municipal (primarily land application of biosolids), cement and lime, and incineration.

[1] This target is considered as an interim reduction target and, in consultation with stakeholders in the Great Lakes Basin, will be revised if warranted, following completion of the 1997 COA review of mercury use, generation, and release from Ontario sources.

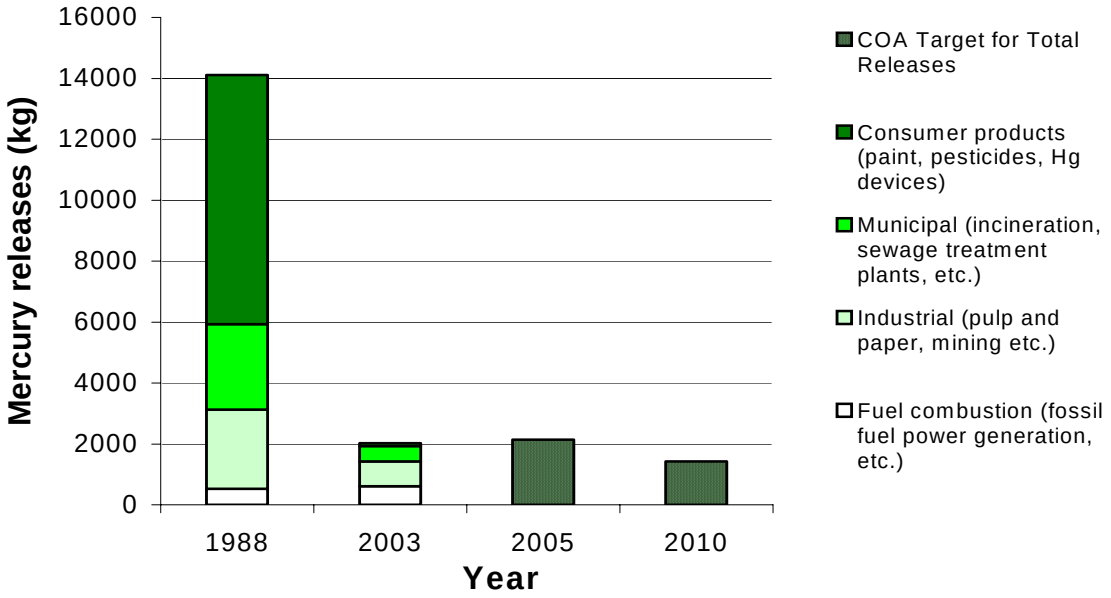


Figure 1-1. Reductions in Mercury Releases in Ontario from 1988 to 2003, by Sector. Source: Environment Canada, Ontario Region (2005)

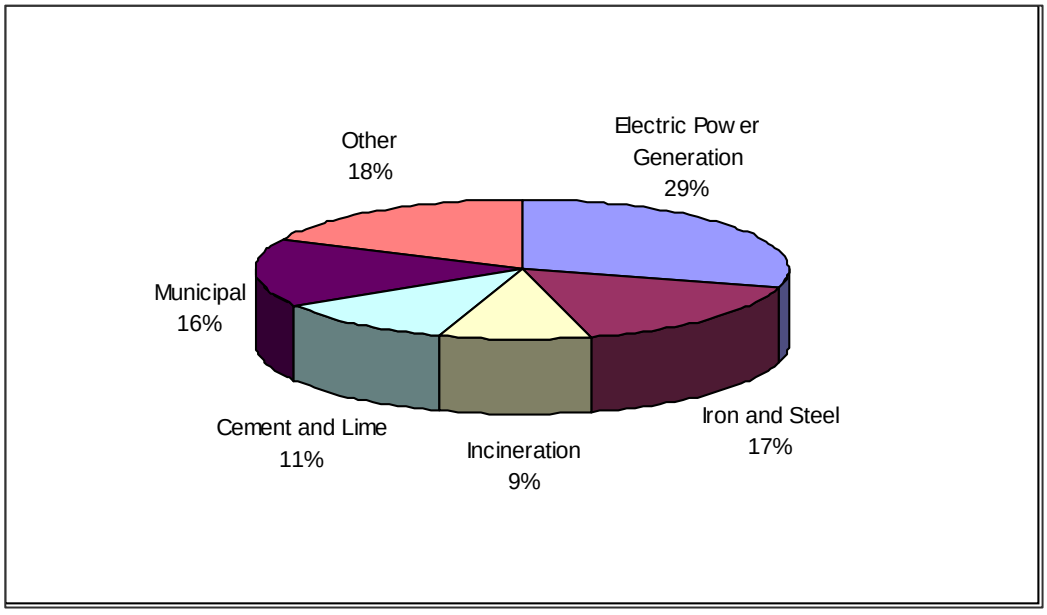


Figure 1-2. Sources of Mercury Releases in Ontario (2003). Source: Environment Canada, Ontario Region (2005)

United States: Progress Toward the GLBTS Challenge

Because of the potential for mercury releases to air to be transported to the Great Lakes, the Mercury Workgroup has focused on nationwide atmospheric mercury emissions in the U.S. The U.S. release challenge applies to the aggregate of air releases nationwide and of releases to water within the Great Lakes Basin.[2]

According to the most recent estimates from the National Emissions Inventory (NEI), U.S. mercury emissions decreased approximately 45 percent between 1990 and 1999 (see Figure 1-3).[3] These reductions have been driven by the implementation of Maximum Achievable Control Technology (MACT) standards enacted under the Clean Air Act (CAA), especially for incinerators. Additional reductions have occurred since 1999, particularly in emissions from gold mines, medical waste incinerators, and chlor-alkali plants. The NEI for 2002 will be complete in late 2005, and will likely show achievement of roughly 50 percent reductions in total mercury emissions since 1990.

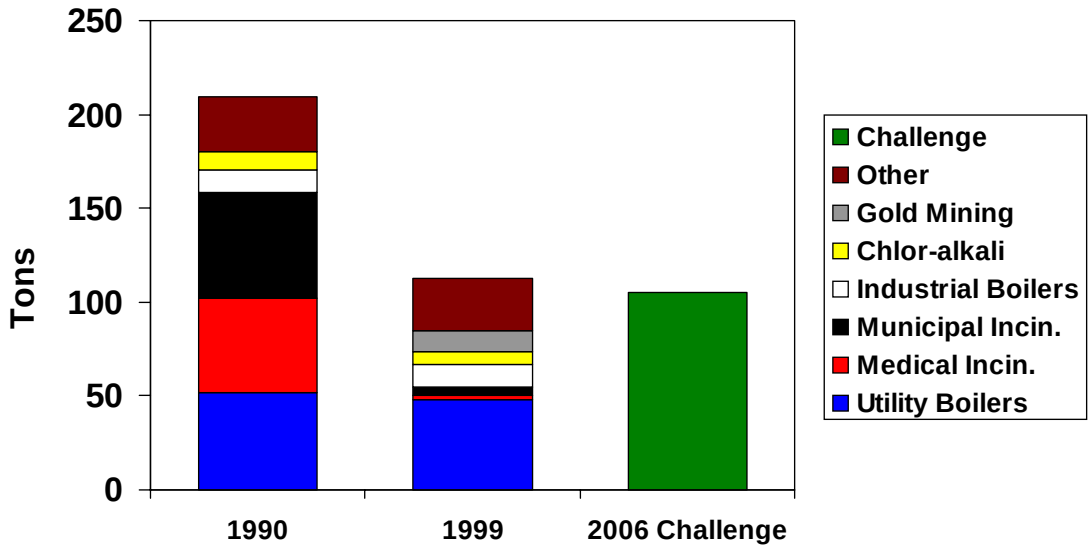


Figure 1-3. U.S. Mercury Emissions: 2006 Challenge, 1990 Baseline. Source: US EPA, Office of Air Quality Planning and Standards, National Emissions Inventory

Although it is clear that mercury use has decreased since 1995, the trend is difficult to quantify because the U.S. Geological Survey (USGS) stopped reporting estimated U.S. mercury consumption after 1997. However, on the basis of data reported by the chlor-alkali, lamp, and dental industries, it appears that total mercury use declined more than 50

[2] This target is considered as an interim reduction target and, in consultation with stakeholders, will be revised if warranted, following completion of the Mercury Study Report to Congress.

[3] Note that there is uncertainty associated with all emissions inventories. For more discussion, see Murray and Holmes (2004).

percent between 1995 and 2003, assuming that mercury use by other sectors has remained constant since 1997 (see Figure 1-4). The chlor-alkali industry accounted for an estimated 35 percent of mercury use in 1995, and its total mercury use decreased 76 percent between 1995 and 2003 (including the impact of plant closures), and a total of 92 percent between 1995 and 2004. The fluorescent lamp industry has reported that mercury use in 2003 was six tons, compared with 32 tons estimated by the USGS for 1997 (see Table 1-1). These reductions are the result of reductions in the mercury content of lamps sold in the U.S., as well as an increase in lamp imports and a decline in U.S. fluorescent lamp production. Lamp manufacturers use mercury both in lamps themselves and in the production process.

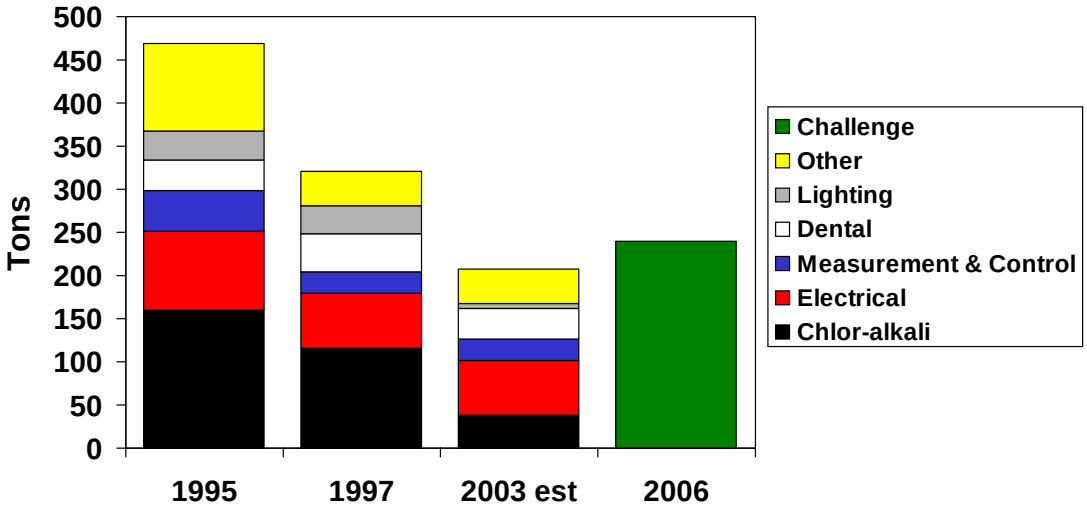


Figure 1-4. U.S. Mercury Use: 2006 Challenge, 1995 Baseline. Source: USGS, *Minerals Yearbook, 1995, 1997*; Chlorine Institute Annual Report to EPA, 2004; National Electrical Manufacturer's Association, direct communication, 2004

It is likely that mercury use has declined even more than portrayed in Figure 1-4, because mercury use in other categories has also decreased. For instance, evidence suggests that use of mercury in measurement and control devices and switches and relays has decreased. These reductions cannot be quantified and are not visible in Figure 1-4.

Table 1-1. U.S. Mercury Use (tons).

Industry/Product Category	1995*	1997*	2003*
Chlor-alkali Production**	160	116	38
Wiring Devices and Switches	92	63	63
Measurement and Control Devices	47	26	26
Dental***	35	44	35
Lighting****	33	32	6
Other	102	40	40
Total	469	321	208

*Source for 1995 and 1997 (except chlor-alkali data): U.S. Geological Survey, *Minerals Yearbook*, 1995 and 1997 – converted to short tons. For 2003, assume that use has not changed, except in chlor-alkali, lighting, and dental categories.

**Chlorine Institute, *Seventh Annual Report to EPA*, July 22, 2004. Mercury "used" rather than mercury "purchased." Under this definition of "use," mercury purchased and placed in inventory or added to cells to increase working stock of mercury does not count as "use."

***Source of 2003 estimate: Vandeven J, McGinnis S, An Assessment of Mercury in the Form of Amalgam in Dental Wastewater in the United States. Water Air and Soil Pollution (Accepted for publication).

**** Source of 2003 estimate: E-mail from Ric Erdheim, National Electrical Manufacturers Association, May 27, 2004.

Workgroup Activities

Workgroup Meetings

On November 30, 2004, the Mercury Workgroup meeting focused on reducing mercury in auto switches, and on potential state regulation of mercury emissions from electric utility boilers. In addition, the workgroup addressed mercury use by the chlor-alkali industry, management of mercury-containing thermostats, implementation of the North American Mercury Action Plan, coal-blending for mercury emissions reduction, mercury use reduction, and mercury emissions inventories.

At its May 17, 2005 meeting, the Mercury Workgroup focused on gaining a better understanding of mercury in the environment, with presentations on mercury transport, mercury effects on wildlife, the Mercury Experiment to Assess Atmospheric Loading in Canada and the U.S. (METALLICUS), mercury trends in Canadian wildlife, and sport fish consumption advisories in Ontario. The workgroup also heard presentations on the Canada-wide Standards (CWS) for mercury emissions from coal-fired power plants, the costs and benefits of the Clean Air Mercury Rule (CAMR) in the U.S., and on mercury use by the chlor-alkali industry. The workgroup also discussed the draft Management Assessment for Mercury.

U.S. Reduction Activities

Management Assessment for Mercury Drafted

The workgroup co-chairs completed a draft Management Assessment for Mercury and accepted comments from workgroup members. The draft Management Assessment for Mercury concludes that mercury should remain in Level 1 status with periodic reassessment by the GLBTS. It also finds that the Mercury Workgroup should: 1) disseminate information about removal of mercury devices in auto scrap, appliances, and industrial equipment, and on assisting state, provincial, and local governments identify cost-effective reduction approaches for mercury releases from dental offices, and 2) participate in national and international mercury reduction programs.

NEMA Improves Success of Thermostat and Lamp Recycling

In 2004-2005, member companies of the National Electrical Manufacturer Association (NEMA) continued progress in reducing the contribution of electrical products to mercury in the environment. Two areas of progress are mercury-containing thermostats and fluorescent lamps, both of which can be recycled nationwide through industry-sponsored programs.

Thermostat manufacturers use mercury to achieve more precise temperature control and to ensure ease of use and retrofitability. In response to environmental concerns, the industry funds the Thermostat Recycling Corporation (TRC) to limit disposal of mercury-containing thermostats in solid waste landfills. 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 2004, the TRC recovered more than 80,000 thermostats and thereby removed 730 pounds of mercury from the solid waste stream. This constituted increases of 23 percent and 17 percent, respectively, over 2003. Figures for the first half of 2005 indicate similar growth for 2005.

Meanwhile, households and businesses seeking to dispose of mercury-containing fluorescent lamps can go to www.lamprecycle.org for assistance. This website is funded by the lamp industry and is maintained by NEMA and the Association of Lighting and Mercury Recyclers (ALMR). It functions as a guide to a comprehensive service network throughout North America that provides assistance with collection, processing, recycling and recovery of spent mercury lamps and lighting accessories. In 2004, households and business owners recycled 156 million lamps through the ALMR network. Meanwhile, the ALMR and NEMA are collaborating with the US EPA on outreach activities aimed at spreading awareness of lamp recycling facilities and increasing the rate of collection.

US EPA Regulates Mercury Air Emissions

US EPA finalized a rule controlling mercury emissions from coal-fired electric utilities. The CAMR requires states to submit plans that will, in aggregate, reduce mercury emissions by 21 percent by 2010 and 69 percent by 2018. States may choose to participate in a national emissions trading program or to reduce emissions deeper than federal requirements.

Hospitals for a Healthy Environment Program Enlists New Partners

The Hospitals for a Healthy Environment (H2E), a joint project of the American Hospital Association, Health Care Without Harm, the American Nurses Association, and the US EPA, is a voluntary program with 1,078 partners representing 5,169 facilities: 1,188 hospitals, 2,620 clinics, 497 nursing homes and 864 other types of facilities. These partners are health care facilities that have pledged to eliminate mercury and reduce waste, consistent with the overall goals of H2E. This program is continuing to grow and has enlisted 165 new partners in the last year.

Chlorine Industry Continues Voluntary Mercury Reduction Commitment

The Chlorine Institute released its *Eighth Annual Report to EPA*, showing an 88 percent capacity-adjusted reduction in mercury consumption by the U.S. chlor-alkali industry between 1995 and 2004, exceeding this sector's commitment to reduce mercury use by 50 percent by 2005. Including shutdowns of mercury cell factories, mercury use has decreased by 92 percent. The report also describes the industry's efforts to meet its commitments to enhance cell room air monitoring and to fully account for mercury inventory. The industry could not account for 30 tons of mercury in 2003; this amount was reduced to seven tons in 2004.

National Estimates of Mercury Releases from Products

US EPA Region 5, in conjunction with the Wisconsin Department of Natural Resources (WDNR), Dane County, Wisconsin, and Barr Engineering, has developed estimates of nationwide mercury releases from products. These estimates are derived from a mercury product flow model that combines data on the amount of mercury in products produced or sold with distribution factors that indicate what happens to mercury though the product life-cycle. This technique yields estimates of the distribution of mercury-containing products, including what percentage are landfilled, versus incinerated or melted in a steelmaking furnace. These estimates can then be combined with release factors to calculate the amount of mercury released to air, water, and land. This approach results in an improved estimate of mercury releases and also can be used to predict the impacts of options that would decrease mercury use or improve management of mercury-containing wastes.

Canadian Reduction Activities

Municipal Actions to Reduce Mercury

In February, 2005, the Association of Municipal Recycling Coordinators (AMRC) hosted a workshop on actions that municipalities can take to reduce mercury. Approximately 135 participants representing municipalities from across Ontario attended the session. The workshop built upon experience in both Canada (e.g., Region of Niagara, EcoSuperior) and the U.S. (e.g., Delta Institute).

Following the workshop, a Canada-Ontario guidance document was prepared on how to develop and implement municipal actions to reduce mercury. This guide has been distributed to municipalities in Ontario.

Ontario Dentists Reduce Mercury Releases

Ontario Regulation 196/03 required all dental clinics that place, repair or remove amalgam to install a dental amalgam device that meets or exceeds the ISO standard for dental amalgam separators. The Royal College of Dental Surgeons of Ontario, the regulatory body for the dental profession, has indicated that approximately 99 percent of dentists appear to be in compliance. Ontario is compiling data on mercury concentrations in biosolids from various municipalities in Ontario as a performance indicator of mercury reductions in this sector.

A *Best Management Practices (BMP) Guide for the Dental Community*, produced by EC, the Ontario Ministry of the Environment (MOE), the Ontario Dental Association (ODA) and other dental stakeholders was distributed to over 8,000 dentists in Ontario by the ODA.

Auto "Switch Out" Program Participation Increases

The "Switch Out" program was launched in 2001 to recover mercury switches from end-of-life vehicles. The Clean Air Foundation manages the program and works with automobile recyclers from across Canada. As of July 1, 2005, over 450 automobile recyclers were participating in the program and close to 80,000 switches had been collected.

Promoting Reductions in the Healthcare Sector

In February 2005, the Ontario Hospital Association (OHA) hosted a *"Greening Health Care"* workshop in Toronto. This was the latest in a series of successful workshops promoting mercury reductions and pollution prevention. The workshops were organized by the OHA and other organizations over the past several years.

In September 2003, EC and Natural Resources Canada hosted a *"Greening Health Care"* workshop that was facilitated by the Canadian Centre for Pollution Prevention: "*Green*

Health Care: Purchasing Choices that Will Help Reduce Your Energy Costs & Environmental Impact". As a follow up to that workshop, information pamphlets concerning two case studies were prepared and distributed to stakeholders in this sector:

- "Replacing Histological Reagents Containing Mercury in Hospital Laboratories" and
- "Replacing Cleaners Containing Nonylphenol (NP) and Its Ethoxylates (NPEs) in Health Care Facilities".

Canada-Wide Standard for Lamps is Achieved

In October 2004, the Electro-Federation Canada reported that the average mercury content of all mercury-containing lamps sold in 2003 was 11.4 mg per lamp. This represents a 73.5 percent reduction from the 1990 CWS baseline and exceeds the CWS target of 70 percent reduction by 2005. The CWS also requires an 80 percent reduction by 2010.

Canada-Wide Standard for Coal Fired Electric Power Generation Plants

In June 2005, the Canadian Council of Ministers of the Environment (CCME) accepted in principle a draft CWS that would significantly reduce mercury emissions from the coal-fired electric power generation sector. Final endorsement of the CWS by ministers is expected prior to the end of 2005.

This CWS consists of two sets of targets:

- Provincial caps on mercury emissions from existing coal-fired electric power generation plants, with the 2010 provincial caps representing a 65 percent national capture of mercury from coal burned, or 70 percent including recognition for early action. The Ontario 2010 cap reported as kilograms per year (kg/yr) is zero.
- Capture rates or emission limits for new plants, based on best available control technology, are effective immediately. Capture rates and emission rates are based on coal type. A 75 percent capture rate has been established for sub-bituminous coal and lignite, and an 85 percent capture rate has been established for bituminous coal and blends.

Based on reports on progress, the CWS may be reviewed by 2012 to explore the capture of 80 percent or more of mercury from coal burned for 2018 and beyond.

Next Steps

The Mercury Workgroup will complete the Management Assessment for Mercury, and continue to focus on sharing information about cost-effective reduction opportunities, tracking progress toward meeting reduction goals, and publicizing voluntary achievements in mercury reduction. The workgroup will provide a forum for discussion of cost-effective approaches for removing mercury from metal scrap and reducing mercury releases from dental offices. In addition, the workgroup will begin to focus more on exploring ways to impact global releases of mercury.

In addition, the workgroup will continue to try to improve quantification of mercury emissions sources, including global emissions sources. The December 6, 2005, workgroup meeting will focus on quantifying sources, including atmospheric emissions in China, emissions from global mining and smelting of metals, and U.S. emissions caused by use and disposal of mercury-containing products.

References

Murray, M.; Holmes, S.A. (2004) Assessment of mercury emissions inventories for the Great Lakes states. *Environ. Res.* 95:282-297.

2.0 POLYCHLORINATED BIPHENYLS (PCBs)

Canadian Workgroup co-chair: Ken De
U.S. Workgroup co-chair: Tony Martig

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, a 90 percent reduction nationally of high-level PCBs (>500 ppm) used in electrical equipment. Ensure that all PCBs retired from use are properly managed and disposed of to prevent accidental releases within or to the Great Lakes Basin.

Canadian Challenge: Seek by 2000, a 90 percent reduction of high-level PCBs (>1 percent PCB) that were once, or are currently, in service and accelerate destruction of stored high-level PCB wastes which have the potential to enter the Great Lakes Basin, consistent with the 1994 COA.

According to the most recent data available, the U.S. and Canada have both made progress toward reaching the PCB challenge goals outlined in the GLBTS. However, as described below, some data gaps exist regarding the amount of PCBs in remaining equipment and storage. Information continues to be gathered and assessed by US EPA and EC to determine whether the U.S. and Canadian PCB challenge goals have been met in entirety. While the U.S. has made progress in reducing the amount of equipment in service containing >500 ppm PCBs, they are lacking sufficient data to determine with accuracy the status of progress toward the goal. As described below, it appears that Canada is likely to achieve a 90 percent reduction of high-level PCBs in storage (thus meeting the non-quantitative challenge goal of accelerated destruction), but unlikely to meet the 90 percent reduction goal for PCBs that are still in service.

The GLBTS PCB Workgroup is active and continues to pursue reduction opportunities and outreach activities. Potential amendments of PCB regulations mandating phase out dates are being pursued and assessed by EC. The U.S. is evaluating opportunities to comply with the Stockholm Convention, which includes goals to phase out PCBs.

Ontario: Progress Toward the GLBTS Challenge

According to Environment Canada's latest PCB Inventory reports, as of December 2004, about 89 percent of previously stored high-level PCB wastes had been destroyed (compared to 1993), and the number of PCB storage sites had been reduced to 420 from 1,529 in 1993 (see Table 2-1 and Figure 2-1). However, as described below, some data gaps exist regarding PCBs in remaining equipment that is still in service. In Canada, as of December 2004, there were still approximately 3,086 tonnes (in net tonnes) (6.8 million pounds) of high-level PCBs in use/service which need to be targeted for phase out. This is a reduction of approximately 36 percent compared to the 1993 inventory and a reduction of approximately 63 percent since 1989 (see Figure 2-2).

Table 2-1. PCB Storage Sites Remaining in Ontario

	Dec. 1994	April 2003	April 2004	Dec. 2004
Federal Sites	109	25	26	21
Non-federal Sites	1429	530	407	399
Total Sites Remaining	1538	555	433	420

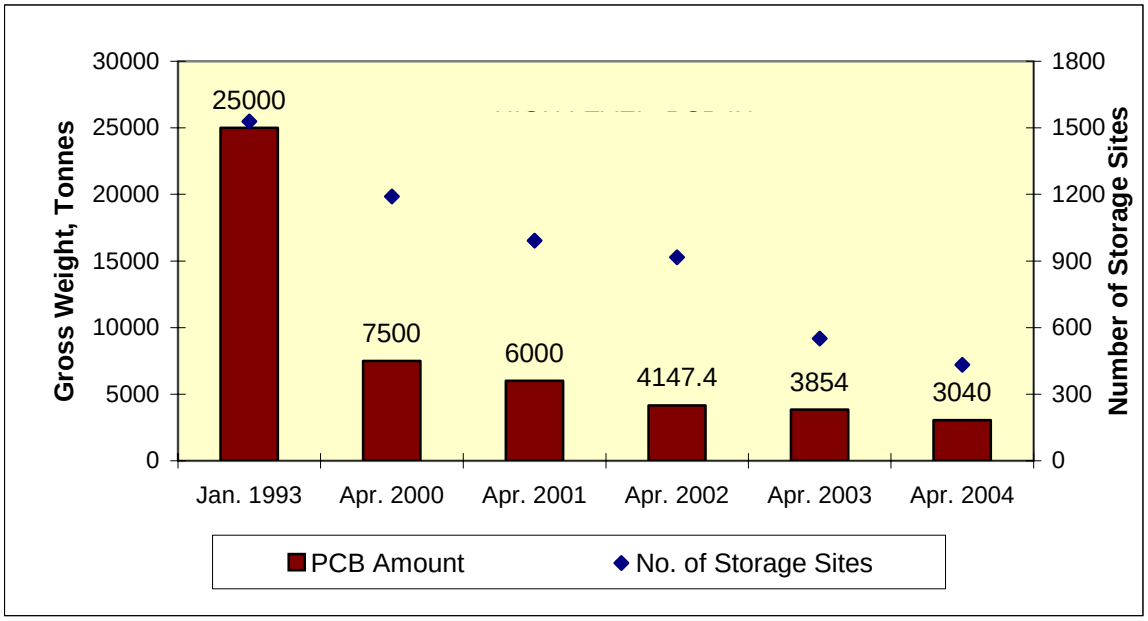


Figure 2-1. High-Level PCBs (Gross Tonnes) in Storage in Ontario. Source: Environment Canada

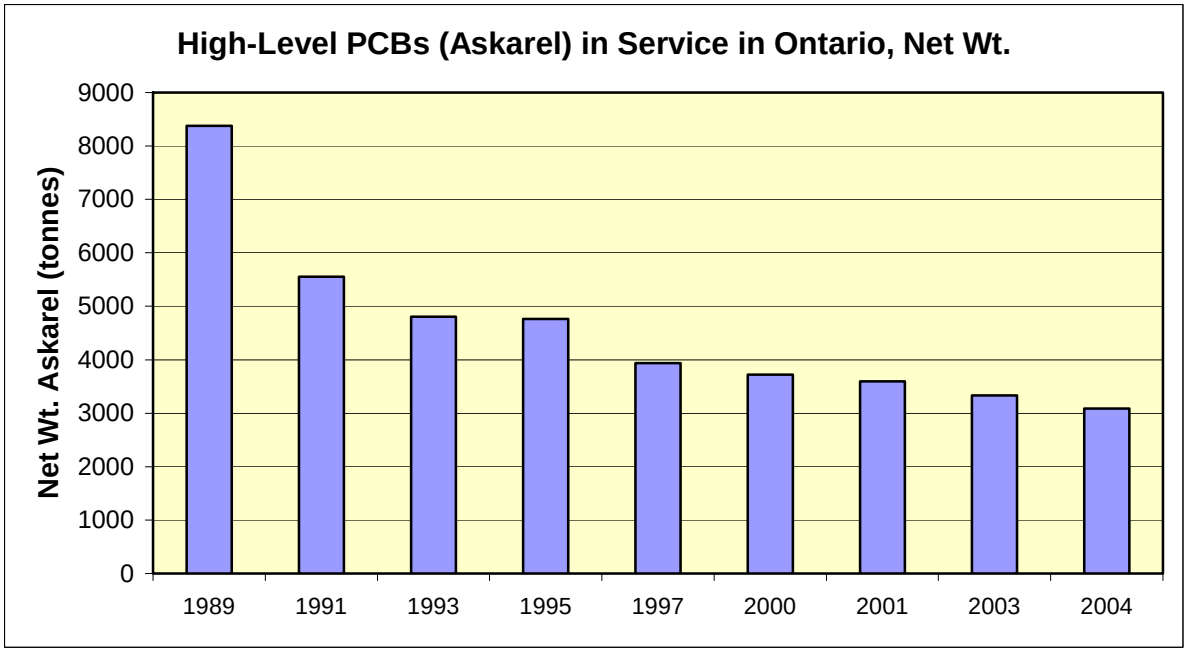


Figure 2-2. Trends in High-Level (Askarel) PCBs (Net Tonnes) in Service in Ontario. Source: Environment Canada

The figures reported for EC are based on historical data recorded in EC's database and should be accurate with a possible time lag, based on the timing and updating of the received data in the database. Environment Canada continues to update its inventory information annually and will be able to accurately state the percentage reductions achieved by 2006.

The lack of progress in reducing in-service PCB equipment is due to economic issues facing PCB equipment owners. The average cost to replace and destroy an Askarel transformer is estimated to be $62,000 (CAD) (Headwater Environmental Services Corp., 2005. "Economic Analysis of Proposed Revisions to the Chlorobiphenyl and PCB Storage Regulations"), and a large transformer can cost $250,000 (CAD) or more. For most small- to medium-sized industries, this is a staggering cost, especially when the owner considers that the existing transformer is functioning well. For larger businesses with many transformers or several very large transformers, the cost must be spread over many years.

Awareness of the need to reduce PCB amounts continues to increase due to PCB outreach, the PCB Phase-Out Awards Program (in Canada), sector mail-out of information, and voluntary commitment letters. Newer facilities and options are now available in Ontario for PCB decontamination and destruction, in addition to the Alberta Swan Hills incinerator.

United States: Progress Toward the GLBTS Challenge

An estimated 113,000 PCB transformers and 1,330,000 large PCB capacitors remained in use at the end of 2003. According to annual reports submitted to US EPA by PCB disposers, about 110,000 PCB transformers and 166,000 large PCB capacitors were disposed of between the 1994 baseline and the end of 2003. The estimates for the amount of equipment remaining in use in 2003 were obtained by abstracting the annual disposal data from the 1994 estimated baseline. However, the US EPA expects the amount of PCB equipment remaining in use to be much less since the disposal of every PCB transformer or capacitor may not be accounted for in the annual reports. Supporting this expectation is that, in 2000, 20,000 PCB transformers were registered with US EPA. US EPA currently is compiling PCB disposal information for 2004 and updating the PCB transformer registrations. Upon completion of the registration update, US EPA will re-evaluate the data gaps in the inventory.

Workgroup Activities

Workgroup Meetings

The PCB Workgroup met on March 23, 2005, and on May 17, 2005. Both meetings primarily focused on the continued development of the draft Management Assessment for PCBs.

During the meeting on March 23, in Windsor, the workgroup discussed the revised draft of the Management Assessment for PCBs (March 15, 2005 draft) that had been updated during the month of February, with a focus on revising the summary of the report to be presented to the Integration Workgroup. Key issues discussed included data quality, interpretation and characterization of the data, which data to include, who should participate in the data review (e.g., more input may be needed from EC/US EPA environmental media experts), how to handle the issue of coplanar PCBs (e.g., defer to the Dioxin Workgroup), and whether the original challenge goals are appropriate given more recent information on sources.

Workgroup discussions at the March 23 meeting concluded with the following recommendations for management outcomes:

- Continuing progress toward the current challenge goals;
- Continuing existing programs (e.g., U.S. national PCB program, Canadian regulations);
- Supporting and helping to coordinate information gathering efforts to prioritize the remaining PCB sources and determine trends; and
- Possibly setting new challenge goals.

The proposed final management outcome for PCBs at the conclusion of the March 23 meeting was active Level 1 status with a priority on collecting information on PCB sources.

During the May 17 meeting, in Toronto, the workgroup reviewed the revised draft Management Assessment for PCBs that was updated in April, based on outcomes of the March meeting and written comments from workgroup participants received during the month of April. There was a discussion and exchange of information and ideas regarding the management assessment. It was noted that attendance at this workgroup meeting was the highest ever; 21 people participated. Highlights of the workgroup discussion included the following:

- Dr. Sunling Gong of the Meteorological Service of Canada presented a model of the deposition of PCBs from various media and how to determine the contribution of PCBs from regional, provincial, and global sources.
- The Canadian Wildlife Service and Ontario Ministry of the Environment presented monitoring results.
- Regarding the draft Management Assessment for PCBs:
    - It is uncertain whether the challenge goals have been met in entirety. Canada has achieved the goal for accelerated destruction of high-level PCBs in storage. The U. S. is reviewing the data to determine reduction progress.
    - There is sufficient environmental data for the assessment.
    - Presentation of the data (e.g., plotting the data on a logarithmic scale rather than a linear scale) was discussed.
    - There is a need to revisit criteria and threshold limits.
    - There is an overall declining trend, but the workgroup will review the data more closely.
    - The relative contribution of sources needs to be determined, which may be accomplished with techniques such as Dr. Gong's model.
    - Opportunities for further GLBTS work include removing PCBs from service.
    - The PCB Workgroup will consider working with the Dioxin Workgroup concerning coplanar PCBs.
    - The management outcome for PCBs is that work remains to be done.
- Sediment contamination is a region-wide concern.
- Further work includes continuing collaboration with international groups.
- New initiatives may be necessary, such as ISO audits that include decommissioning PCB equipment.

The proposed final management outcomes for PCBs at the conclusion of the May 17 meeting were:

- Continue active Level 1 status
- Continue existing programs
- Coordinate information gathering and assessment to prioritize sources and determine trends

The PCB Workgroup co-chairs extended the opportunity to comment on the draft Management Assessment for PCBs until August 19, 2005, with plans to finalize the draft report prior to the December workgroup meeting.

Reduction Activities

U.S. PCB Phasedown Program

In an effort to clarify information on US EPA's PCB Transformer Registration Database, the US EPA contacted up to 2,400 entities that registered PCB transformers with the US EPA. During that effort, many entities indicated that they had already removed their PCB transformers since registering them in 2000. US EPA is currently compiling the clarification information, which should be available in early 2006, and will then update the database.

In addition, US EPA has begun to develop a nationwide effort to seek the voluntary phase out of PCB electrical equipment. The finalization and actual implementation of a national US EPA program is expected in early 2006, dependant upon programmatic resources.

Stakeholders PCB Phaseout Efforts

Commencing in 1999, PCB reduction commitment letters were mailed to priority industry sectors including school boards and other sensitive sites (food, beverage, hospitals, care facilities, and water treatment industries). These were followed-up in 2003 and 2004 [*Ken, could you explain a little further how you followed up?*]. Additional letters have been sent out for inventory updates during August-November, 2005, with a good response so far. In total, over 1000 letters have been sent to date, and over 400 completed commitment forms have been sent back to Environment Canada. The return letters are also extremely useful in updating the federal PCB inventory information. A number of companies in the iron and steel, utilities, pulp and paper, and metals and mining sectors, as well as some sensitive areas, have voluntarily undertaken initiatives to eliminate (particularly) high-level PCBs in use and/or storage. Additional companies are being identified as "PCB Free," and these will be used to update the inventory of "PCB Free" companies during the 2005-2006 fiscal year.

PCB Phase-out Awards Program (Canada)

The Canadian workgroup has developed a plan of outreach and recognition to try to increase awareness and the rate of PCB phase-out. The main elements of the plan are to:

- Present award of a plaque to each eligible company that becomes PCB-free or reaches a major PCB target (90 percent reduction and above).
- Take a photograph of the award presentation and develop a case study (success story).
- Post the photograph and case study or success story on the website and make copies available for distribution.
- List the names of award winners in GLBTS, International Joint Commission (IJC), government and trade association publications. An event report has been

published on the May 2005 PCB Award Ceremony under the title: "Ontario companies recognized for PCB phase-out" page 8, Canadian HazMat Magazine, June/July 2005, which is accessible at www.hazmatmag.com.

- Make presentations at trade association meetings and conferences.

In September 2003, at the GLBTS Integration Workgroup meeting in Toronto, the first four award plaques were presented to Stelco Steel (Stelpipe Division), Hydro One, Slater Steel and Enersource Hydro Mississauga. At the May 2004 Stakeholders Meeting in Toronto, two awards were presented to the City of Thunder Bay and to Canadian Niagara Power. Table 2-2 describes the PCB phase-out history of these companies. In May 2005, two awards were presented at the GLBTS Stakeholder Forum meeting in Toronto. The awards were presented to General Motors - St. Catharines Powertrain Plant and Ontario Power Generation – Nanticoke Generating Station for their achievements in PCB elimination.

Canadian Case Studies

Case studies for all of the award recipients listed in Table 2-2 have been completed and printed in hardcopy. Copies may be requested from Ken De, the Canadian PCB Workgroup co-chair, by e-mail at ken.de@ec.gc.ca or by phone at (416) 739-5870. The case studies will also be posted on the GLBTS PCB website when the revisions to the website are completed. The goal of the case studies is to promote the removal of PCBs by companies that have not yet done so by providing examples of beneficial factors considered when companies decided to remove their PCBs.

Canadian GLBTS PCB Newsletter

The second edition of the Environment Canada GLBTS PCB Newsletter has been published and is available from Ken De, Environment Canada (see above for contact information). The Newsletter will be used to promote the PCB elimination and award programs. The purpose of the Newsletter is to summarize information about the GLBTS, PCBs as an environmental hazard, the PCB Phase-Out Awards Program and other issues in an eye-catching, simplified format. The main target audience is PCB-owning industries, in particular industrial environmental managers.

Table 2-2. Canadian Companies Receiving PCB Phase-out Awards

Company	Initial High-Level PCB Inventory	Phase-out History	% Reduction of High-Level PCBs
Hydro One	1983 - 40 large askarel transformers and 30,000 PCB capacitors (large)	All removed and destroyed by 1999	**100%**
Enersource Hydro Mississauga	19,500 kg askarel Oil in transformers 14,000 kg askarel transformer solids 67,000 kg PCB capacitors and ballasts (high-level)	Removed from service by 1990. Sent for destruction in 2000.	**100%**
Stelco, Stelpipe	5 large askarel transformers 65 lighting and control (small) transformers	All removed and destroyed by 1998	**100%**
Slater Steel	Empty transformers, askarel liquid (transformer oil), PCB contaminated mineral oil, capacitors, debris, metal debris	Sent for destruction in 1998	**100%**
City of Thunder Bay	44 drums containing over 25 tonnes of high-level PCB wastes	Removed from service between 1994 and 1998. Sent for destruction in 2001.	**100%**
Canadian Niagara Power	2 large Askarel transformers, 95 capacitors	Removed from service between 1993 and 2003. All sent for destruction by 2003.	**100%**
General Motors – St. Catharines	8 askarel transformers 221 power-factor capacitors	Removal and destruction program commenced in 1996 and completed in 2000.	**100%**
Ontario Power Generation – Nanticoke	9 large with gross weight 43 tonnes each 61 medium size with average gross weight 4.6 tonnes 56 small with average gross weight 0.25 tonnes	Removal and destruction program commenced in 1998 and completed in 2004.	**100%**

Canadian Regulatory Activities

Environment Canada's PCB regulations are being amended and targeted for *Canada Gazette* publication in 2006. These regulations are:

1) The Chlorobiphenyl Regulations (1977)
2) The Storage of PCB Material Regulations (1992)
3) Export of PCB Regulations (1996)
4) Federal PCB Destruction Regulations (1989).

The most significant revisions to the regulations will be the imposition of strict phase-out dates for certain categories of PCBs. The most important phase-out targets will be:

- Phase-out of all in-service high-level PCBs (>500 ppm PCB) by 2009 (except for pole-top transformers and equipment at electrical generation, transmission and distribution facilities).
- Phase-out of all PCB storage sites by 2009.
- Phase-out of all "pad-mounted" (anything that is not pole-mounted) equipment with 50-500 ppm PCB by 2014.
- Phase-out of all pole-mounted transformers and all equipment at electrical generation, transmission and distribution facilities by 2025.
- Re-use of transformer oils with 2-50 ppm PCB not allowed (this equipment will not have to be destroyed by any specific date, but once it comes out of service, the oil must be decontaminated to below 2 ppm PCB).

Revisions to the Federal PCB destruction regulations will see the strengthening of emissions release provisions to bring the federal regulations in line with existing provincial requirements. More information and updates can be found on the Environment Canada website at http://www.ec.gc.ca/pcb/.

Outreach/Sharing Information

An outline for the PCB phase-out guidance document was developed and distributed at the June 17, 2004, PCB Workgroup meeting for comments. The outline will be used to prepare a first draft of a guidance document, which is intended to provide information on identifying and disposing of PCBs that can be used by industry, for industry, to encourage and assist facilities in phasing out their PCBs.

Source Profiles and Emissions Quantitation of PCB to Ambient Air from Transformers

Samples of ambient air around operating PCB Askarel transformers were collected in January and October 2004. The samples were collected as part of the US EPA Great Lakes National Program Office (GLNPO)-funded project to study emissions of PCBs from in-service PCB transformers. The study, *Source Profiles and Emissions Quantitation of PCB to Ambient Air from Transformers*, is being conducted by Dr. William J. Mills of the University of Illinois. US EPA is awaiting the final report.

Accelerating Phase-out of PCB Transformers: The Business Case

The US EPA GLNPO funded a project in 2003 to study the costs associated with the continued use and disposal of PCB transformers. Under this project, case studies on cost estimates of PCB transformer management and disposal were to be developed and incorporated into a spreadsheet tool that was intended to assist other PCB transformer owners in estimating their costs/savings for the phase-out of their PCBs. However, due to unanticipated personnel limitations within the expertise of the grantee's firm, they were

unable to complete the project. Efforts are being pursued to determine if others within the firm can complete the project.

Canadian PCB Strategy Document

A draft strategy document is being prepared with the purpose of examining the activities of Environment Canada and overall GLBTS management objectives, proposing new or revised initiatives that may be more effective in promoting PCB phase-out and ultimately in reducing PCB levels in the Great Lakes. Once this report is finalized, a new PCB Workplan will be developed for implementation in 2006.

Next Steps

The workgroup and agencies plan to continue their core activities noted above and the following:

PCB Reduction Commitments

The workgroup will continue seeking commitments to reduce PCBs through PCB reduction commitment letters and other PCB phase-out efforts, and to publicize voluntary achievements in PCB reduction.

PCB Reassessment

The PCB Workgroup will complete the Management Assessment for PCBs and finalize the management outcomes. Because the workgroup has determined that several data issues exist (e.g., data quality and comparability issues) regarding PCB sources, levels and trends in the environment, future workgroup activities will include further evaluation of the available data before final conclusions are made.

At this time, the workgroup recommends that PCBs should continue in active Level 1 status, with an initial priority of collecting and assessing a more complete set of data on PCB sources and environmental levels. The primary goals of this exercise will be to: 1) prioritize the remaining PCB sources (better defining relative source contributions); 2) elucidate PCB trends and impacts on the environment; and 3) assess the ability of the GLBTS to effect further reductions.

Work targeting PCB-containing equipment in service should continue (such as outreach to industry), due to the potential for the equipment to be a source of future releases, and should be coordinated with other efforts. Work targeting other areas, such as coplanar/dioxin-like PCBs, will likely be most efficiently and effectively addressed through referral or coordination with participation in other forums, such as the Dioxin Workgroup.

PCB Facility Audit

EC would like to conduct a trial facility PCB audit and prepare a case study with the results. A document titled "*Scope of Work for a PCB Audit Programme*" for small- and medium-sized industries has been prepared. The project will use the services of a contractor with electrical skills, experience with PCBs, and experience in evaluation of the electrical systems in buildings. The facility will be inspected for the presence of PCB. An assessment will then be completed of the costs to replace the equipment and destroy the PCBs, along with the benefits of replacing the equipment (improved efficiency, reduced liability and insurance). A candidate facility is being sought at this time.

Information Resources (Canada and United States)

The website for the PCB Workgroup has not been updated recently. Continued effort will be made in 2006 to redesign the website and add all relevant information.

3.0 DIOXINS/FURANS

Canadian Workgroup co-chair: Anita Wong
U.S. Workgroup co-chair: Erin Newman

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, a 75 percent reduction in total releases of dioxins and furans (2,3,7,8-TCDD toxicity equivalents) from sources resulting from human activity. This challenge will apply to the aggregate of releases to the air nationwide and of releases to the water within the Great Lakes Basin.

Canadian Challenge: Seek by 2000, a 90 percent reduction in releases of dioxins and furans from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 COA.

According to the most recent dioxin release data available, the U.S. and Canada have both made significant progress toward reaching the dioxin/furan reduction goals outlined in the GLBTS.

Ontario: Progress Toward the GLBTS Challenge

Canada has made significant progress toward meeting the goal of a 90 percent reduction in releases of dioxins and furans, achieving an 87 percent reduction (227 grams) of total releases within the Great Lakes Basin, relative to the 1988 Canadian baseline. This reduction is based on the 2004 release inventory update for Ontario sources[4], which estimates a total annual dioxin/furan release of 35 grams. Much of the reductions achieved are attributable to the pulp and paper sector after federal regulations were impending or imposed, closure of hospital waste incinerators by the Ontario government (in anticipation of Ontario Regulation 323/02), and closure of an iron sinter plant and a municipal waste incinerator. Figure 3-1 illustrates reductions in the top Canadian (Ontario) dioxin/furan emission sources for 1997 and 2001. The figure also includes a forecast for 2005.

The renewed Canada-Ontario Agreement (COA) with Respect to the Great Lakes Basin Ecosystem commits to a 90 percent reduction in the release of dioxins/furans by the year 2005, from a baseline of 1988. Based on current initiatives underway or proposed for dioxins/furans, such as CWS for waste incineration, iron sinter and electric arc furnaces, it is expected that Canada will continue to work toward this commitment within the Great Lakes Basin.

[4] Point sources are mostly based on 2003 NPRI data. Availability of final NPRI data is normally two years after the reporting year.

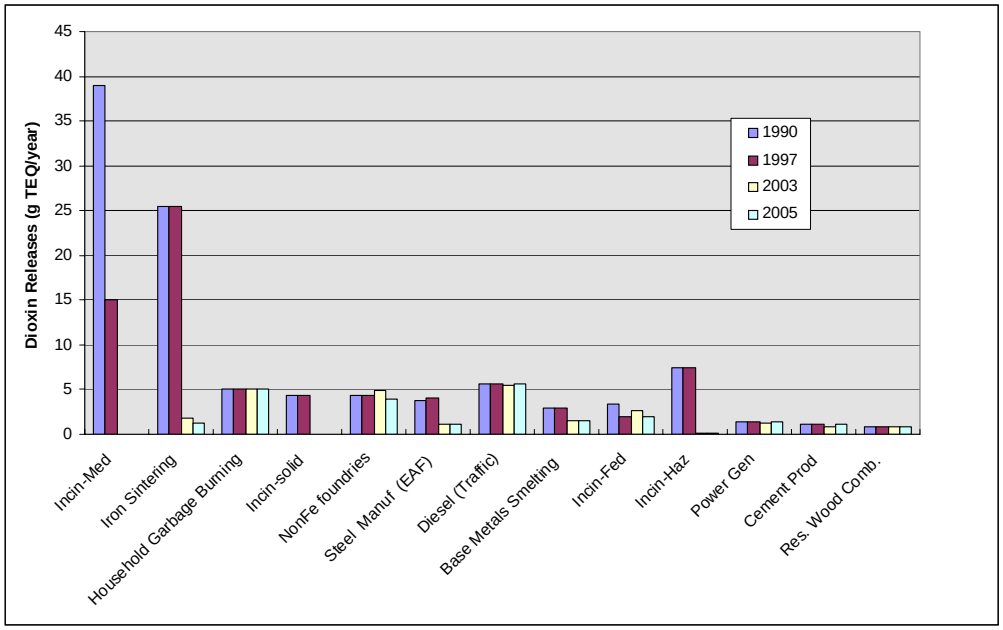


Figure 3-1. Top Canadian (Ontario Region) Dioxin/Furan Emission Sources. Source: Environment Canada, Ontario Region[5]

United States: Progress Toward the GLBTS Challenge

Significant reductions have been achieved in the U.S., primarily from the use of MACT standards enacted under the CAA. For example, MACT standards are expected to achieve thousands of grams of reductions from large and medium size municipal waste incinerators; upon full implementation, the standards are estimated to reduce releases from this source category to approximately 12 grams TEQ. Other source categories with significant reductions resulting from the enactment of MACT standards include Medical Waste Incinerators (MWIs), hazardous waste-burning cement kilns, and secondary copper smelting. These reductions result from a combination of change in processes and equipment to comply with standards, pre-existing actions in the design and retrofitting of facilities, and facility closures.

The U.S. also is investigating numerous dioxin sources that have not yet been added to the inventory. While the U.S. challenge goal for dioxin was met under the GLBTS, according to the current inventory, US EPA is concerned about sources not yet quantified. Many of these sources are difficult to inventory, such as forest fires and other uncontrolled combustion sources. Acquiring data to characterize these sources remains a priority and long-term goal of the US EPA.

[5] For air releases, numbers for the baseline year of 1988 are the same as for 1990. Pulp and paper releases are not shown, as this source contributed 146 grams in the base year and would have masked all other sectors on the graph.

US EPA is currently working on a 2000 Dioxin Inventory, the most comprehensive dioxin inventory to date. This inventory indicates that major reductions have been achieved as the MACT program has been fully implemented. Once the Dioxin Reassessment is final, the U.S. will be able to formally confirm achievement of the GLBTS challenge goal. This inventory will be used by the workgroup to investigate sources directly within the Great Lakes Basin.

Figure 3-2 illustrates the top U.S. inventoried dioxin emission sources from 1995. The figure also includes projected estimates for 2002/04.

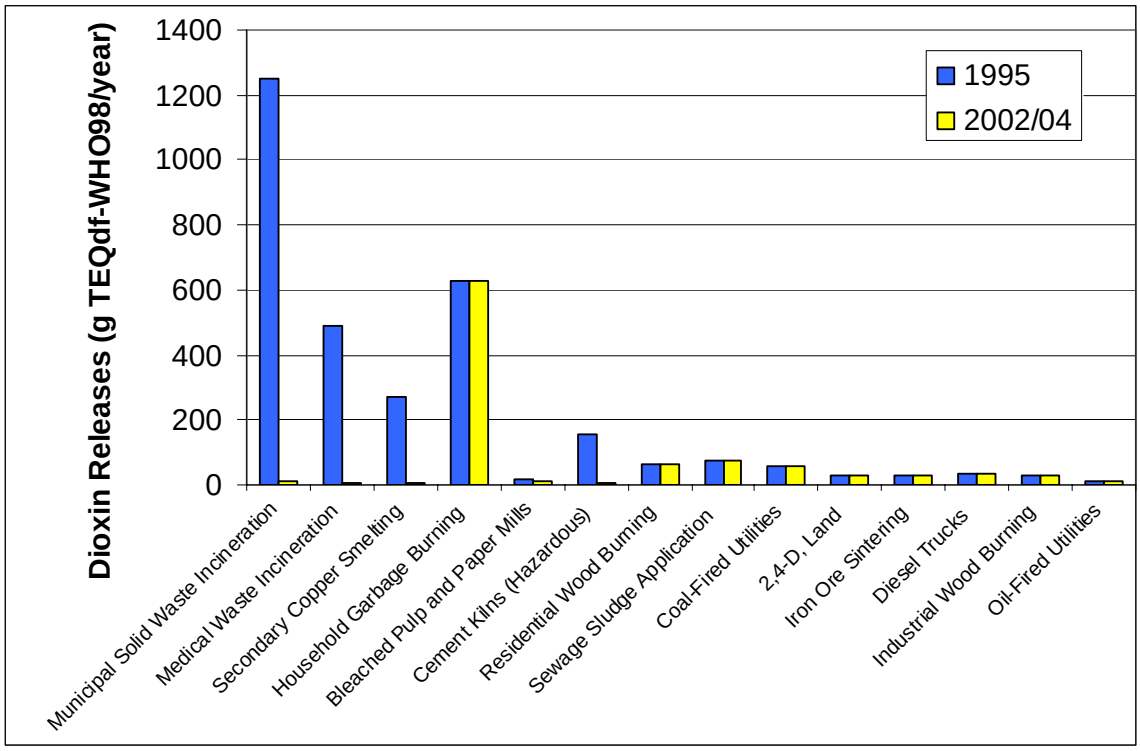


Figure 3-2. Top U.S. Inventoried Dioxin Emissions with Projected Estimates for 2002/04. Source: US EPA [from 2004 Progress Report]

Workgroup Activities

Workgroup Meetings

In the past year, the Dioxin/Furan Workgroup has made the following progress in the 4-step process:

- The workgroup continues to follow the Dioxin/Furan Workplan formally adopted in December of 2003.

- The workgroup held a call on February 15, 2005, to address comments on four issue papers on uncontrolled combustion sources: agricultural burning, wildfires and prescribed burning, tire fires, and structural fires.
- The workgroup has developed a Management Assessment for Dioxins and Furans using the *General Framework to Assess Management of GLBTS Level 1 Substances*.
- The draft Management Assessment for Dioxins and Furans was presented to the Integration Workgroup on March 23, 2005.
- The workgroup held a call on May 3, 2005, to discuss the status of the Management Assessment report.
- The workgroup finalized the four issue papers on uncontrolled combustion sources.
- The workgroup met on May 17, 2005, at the GLBTS Stakeholder Forum in Toronto, Ontario. The workgroup discussed updates on burn barrel reduction efforts, finalized the uncontrolled combustion issue papers, and reviewed the latest version of the Management Assessment for Dioxins and Furans.
- The workgroup held a call on August 4, 2005, to address outstanding comments on the Management Assessment report.
- The Burn Barrel Subgroup met by teleconference five times in 2005: on January 18, March 8, May 10, September 13 and November 8. Topics related to reducing the practice of open burning were discussed, including: input to workshops; burning of waste pesticide containers; community health agencies and cancer control plans; discussion of the North East States Joint Resolution Promoting Interstate Cooperation to Reduce Air Pollution from Open Burning of Solid Waste; and sharing of activities by the various agencies represented on the subgroup.

Reduction Activities

Burn Barrels and Household Garbage Burning

Burn barrels and other household garbage burning methods remain a high reduction priority for the workgroup. Household garbage burning is estimated to emerge as the largest source of dioxin emissions after air emissions standards for industrial sources are in place. The practice of household garbage burning typically is carried out in old barrels, open pits, woodstoves, or outdoor boilers. The Burn Barrel Subgroup, led by Bruce Gillies of EC, is addressing this issue. The subgroup maintains a website for information sharing at www.openburning.org.

The following workshops on options for reducing burning were offered to local officials in the Lake Superior region:

- *Open Garbage Burning: Preventable Pollution - A Workshop for Local Officials*, March 4, 2005, Duluth, Minnesota. The workshop was hosted by Western Lake Superior Sanitary District (WLSSD) and sponsored by the US EPA GLNPO. The workshop was well-attended, with approximately 100 participants.

- *Landfill Sites in Northwestern Ontario: Issues and Opportunities*, March 2, 2005, Thunder Bay, Ontario. The workshop was hosted by EcoSuperior Environmental Programs and Ontario First Nations Technical Services Corp., and sponsored by Environment Canada.

More information about these workshops, including presentations and other materials is available at www.c2p2online.com/main.php3?session=&section=144&doc_id=293.

An updated guide "*Clearing the Air: Tools for Reducing Residential Garbage Burning*" was compiled in 2005 by the WLSSD in partnership with the Minnesota Office of Environmental Assistance, funded through a grant from the US EPA GLNPO. This 44-page toolkit includes information and resources to help local officials, community educators and concerned citizens stop the hazardous practice of garbage burning in their communities. Chapters focus on public education, waste disposal infrastructure and establishing and enforcing burning restrictions.

Twenty-two U.S. burn barrel case studies were compiled by Battelle for the US EPA. These efforts include alternatives to burning in seven counties, six Tribes, four States, three cities, and two solid waste districts across the U.S. In many cases, community demographics are provided, such as population and per capita income, to help state, local, and Tribal officials determine whether an approach that worked for one community might work in their own community.

US EPA continues to maintain a website of burn barrel information at www.epa.gov/msw/backyard .

Great Lakes States (including Illinois, Indiana, Minnesota, New York, Michigan, and Wisconsin) are continuing activities, consistent with the Burn Barrel Subgroup's Household Garbage Burning Reduction Strategy, to educate and influence behavior change, supported by infrastructure and local by-laws.

Inventory Improvements

US EPA maintains and annually updates the Toxics Release Inventory (TRI), a publicly available database that contains information on toxic chemical releases and other waste management activities. Due to the high toxicity of dioxins and furans to humans, US EPA added these as chemicals that facilities are required to report to the 2000 TRI. According to TRI, 129,571grams of total releases of dioxin and dioxin-like compounds were reported for 2003 in the U.S. More information is available on the TRI website at www.epa.gov/tri.

In addition to TRI, the eight Great Lakes States and the Province of Ontario maintain a regional emissions inventory for hazardous air pollutants, including dioxins and furans. US EPA also continues to update the National Dioxin Emissions Inventory, which indicates that over 90 percent of all dioxin releases in the U.S. are from air sources. US EPA is separately tracking emission reductions from the MACT program requirements for MWCs and MWIs.

Polychlorinated dibenzo-para-**dioxins** (PCDD) and polychlorinated dibenzo**furans** (PCDF), as a group, have been included in the list of substances required to be reported under Environment Canada's National Pollutant Release Inventory (NPRI), beginning with the reporting year 2000. The reported information is made available to the public on an annual basis through the EC website at www.ec.gc.ca/pdb/npri. EC will use the NPRI data to update the point source information in the Ontario Dioxin/Furan Release Inventory. In 2003, 12.4 grams and 89.2 grams of total releases of dioxin and furans releases were reported in Ontario and Canada, respectively.

Since the initiation of the Canadian Voluntary Stack Testing Program in the spring of 2000, EC has conducted stack tests for dioxins and furans and many other substances of concern at nine volunteer facilities in Ontario. Between 2000 and 2002, a nickel-base metal smelter, two medical waste incinerators, a steel foundry, a Kraft boiler, and a crematorium were tested. In 2003, an additional Kraft boiler located in Marathon and two animal carcass incinerators (Ecowaste and Burneasy) were tested. In 2004, the Newmount Gold Mill in Marathon, Ontario, was tested with mercury as the principal pollutant of concern; however, dioxins and furans were tested in the carbon kiln exhaust. Results are expected in 2005. The information gathered through this program will help improve release inventories for dioxins/furans as well as other GLBTS substances.

Ambient Air Monitoring

US EPA conducts air monitoring for dioxin under the National Dioxin Air Monitoring Network (NDAMN), in order to track fluctuations in atmospheric deposition levels. NDAMN was initiated in year 1998. Results for years 1998 through 2001 are currently available (see Figure 3-3). No clear trends over time are apparent from the NDAMN data.

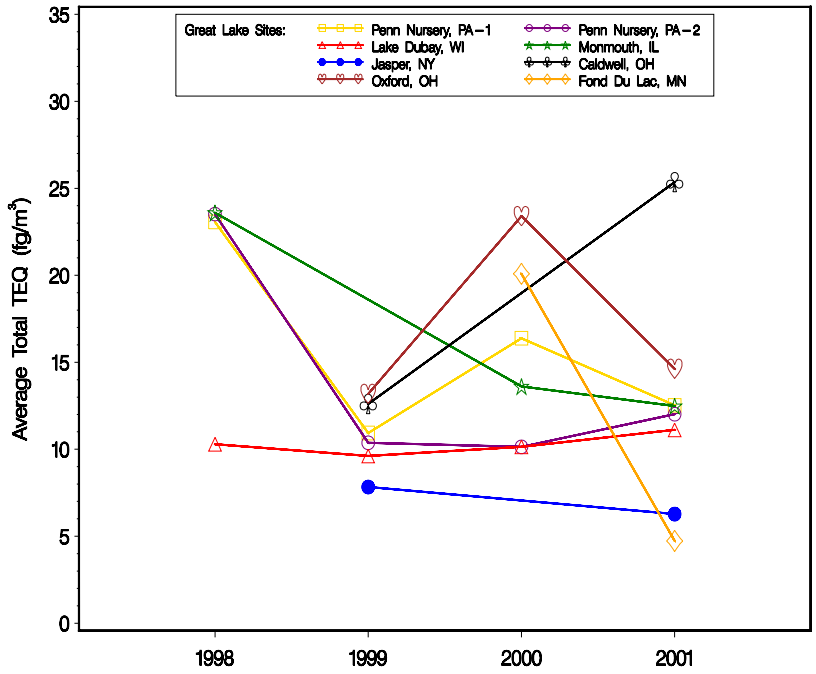


Figure 3-3. NDAMN Average Total TEQ Concentrations, including Dioxin, Furans, and Dioxin-like PCBs, for Sites in the Great Lakes Region, 1998-2001. Source: US EPA

Ambient air monitoring of GLBTS substances has been conducted in Canada since 1996 through the National Air Pollution Surveillance Network (NAPS) (see Figure 3-4). Dioxins and furans have been monitored at 12 stations in Ontario, comprised of eight urban and four rural sites. Results show elevated levels at urban sites compared to rural sites but a decreasing trend in concentrations overall. All concentrations remain below the Ontario MOE ambient air quality criterion of 5 picograms per cubic metre (TEQ), 24 hour average.

From 1999 to 2003, the highest TEQ (765 femtograms per cubic metre) was recorded in Hamilton at the Confederation site (see Figure 3-5). The station was near the Solid Waste Area Reduction Unit (SWARU) municipal waste incinerator which was shut down in December 2002. In August 2003, PCDD/PCDF sampling began at an Integrated Atmospheric Deposition Network (IADN) site located at Burnt Island. In addition, measurement of coplanar PCBs began in 2005.

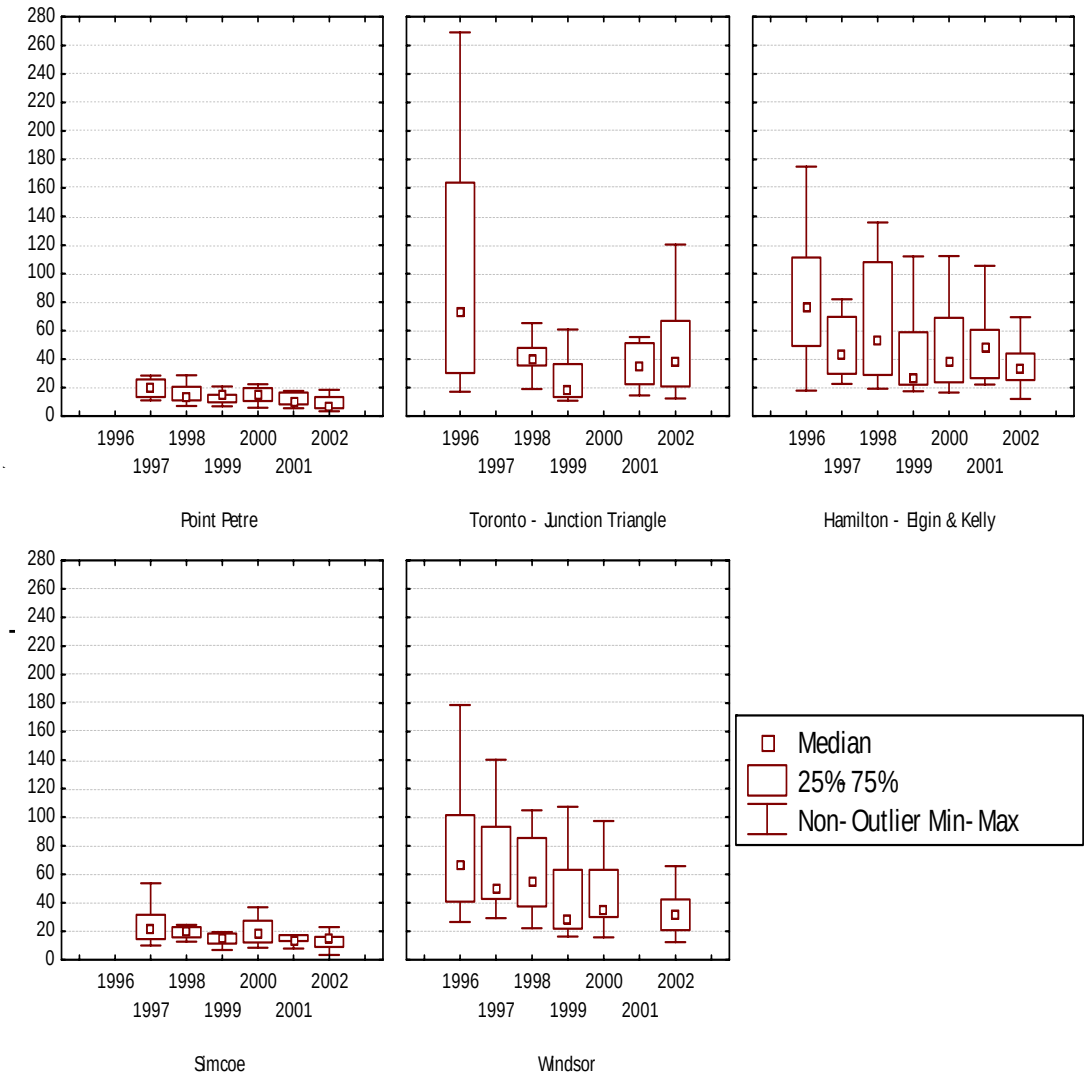


Figure 3-4. Trends in Median Annual TEQ Concentrations in Ambient Air at Ontario Sites, 1996-2002. Source: Environment Canada

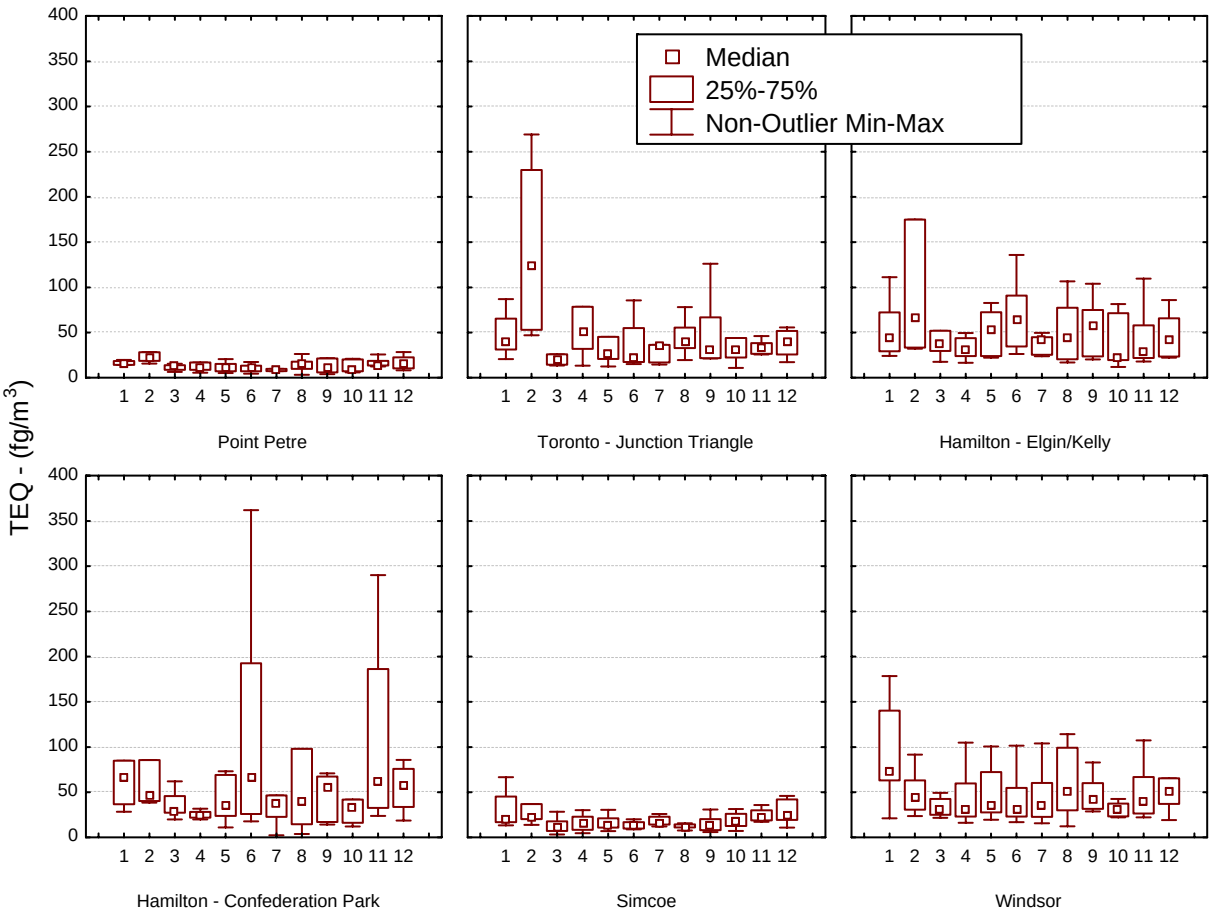


Figure 3-5. Seasonal Variations in 2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxic Equivalent (TEQ) Concentrations (fg/m^3) at Selected Sites, (1996-2003). Source: Environment Canada

With the exception of the Hamilton-Confederation Park site, which was highly influenced by the SWARU incinerator, there appears to be elevated levels of dioxins and furans during the winter months.

US EPA and EC have shared information on the ambient air monitoring protocols for dioxins and furans applied in NDAMN and NAPS, respectively (see Table 3-1). The NDAMN sites are located in rural and remote areas while the NAPS sites are located in urban (Toronto, Hamilton, Windsor) and rural areas. The annual values from the two networks are considered comparable.

Table 3-1. Comparison of NDAMN and NAPS Ambient Air Monitoring Protocols.

	Species	Sampling Method	Analytical Method	Detection Level	Sampling Frequency
Canada NAPS	2,3,7,8-substituted isomers	Hi-vol sampler @ 900 m^3/24 hr Filter/PUF[1]	HRGC-HRMS[2]	1-20 fg/m^3	Collected over 24 hr once every 12-24 days
United States NDAMN	2,3,7,8-substituted isomers & coplanar PCB	PSL sampler @300 m^3/24 hr Filter/PUF[1]	HRGC-HRMS[2]	Target 0.1 fg/m^3	4 sampling periods/year, each period: 24 hrs/d, 5 d/wk over 28 days

[1]PUF – Polyurethane foam
[2]High Resolution Gas Chromatography and High Resolution Mass Spectrometry

Joint Priorities with Other GLBTS Workgroups

The Dioxin Workgroup has been coordinating efforts with the HCB/B(a)P Workgroup on issues that concern both chemical workgroups. The two workgroups held a joint meeting in November 30, 2004 to share information on common issues of concern including wood preservatives, iron and steel, uncontrolled combustion sources and inventory gaps. The two workgroups will continue to update members with new information and identify opportunities for joint work on common sources.

The Dioxin and PCB Workgroups will continue discussions on addressing dioxin-like PCBs.

Next Steps

A new workplan was finalized in December 2003 to set directions for the workgroup until 2005. This workplan includes: continued reporting of national/regional programs, characterizing new sources of concern, outreach efforts on new sources, continued implementation of the Burn Barrel Strategy by the Burn Barrel Subgroup, exploring pathway intervention, pursuing potential joint work with the B(a)P/HCB and PCB Workgroups, and tracking environmental monitoring information. Throughout the two years, the workgroup has initiated most of these activities by examining new sources (uncontrolled combustion), holding joint meetings with the HCB/B(a)P and PCB Workgroups to share information on issues of common interests, and comparing Canadian and U.S. ambient air monitoring methods. The workgroup continues its efforts to engage health and agriculture/food representatives to discuss pathway intervention opportunities.

Based on the Management Assessment for Dioxins, the workgroup is expected to continue its activities to reduce dioxin/furan releases after 2005. When the report is finalized, the workgroup will review the management outcomes and establish a new plan to address outstanding issues for addressing dioxin/furan releases. The workgroup structure and level of efforts will also be examined to ensure an effective mechanism is in place.

4.0 HEXACHLOROBENZENE/BENZO(a)PYRENE (HCB/B(a)P)

Canadian Workgroup co-chair: Tom Tseng
U.S. Workgroup co-chair: Steve Rosenthal

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, reductions in releases, that are within, or have the potential to enter the Great Lakes Basin, of HCB and B(a)P from sources resulting from human activity.

Canadian Challenge: Seek by 2000, a 90 per cent reduction in releases of HCB and B(a)P from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 COA.

Ontario: Progress Toward the GLBTS Challenge

From a 1988 baseline, Canada has reduced HCB emissions to the Great Lakes Basin by approximately 68 percent. Figure 4-1 shows the release estimates and progress achieved towards meeting the 90 percent reduction target.[6] Over 80 percent of the reductions achieved to date are due to lower residual HCB levels in pesticides, with other significant reductions coming from the implementation of CWS for waste incinerators, and from process changes within Ontario's chlorinated chemical manufacturing sector. Canada's 2003 HCB releases in the basin are estimated at 37 lbs. Non-point sources include: pesticide application, open burning, and the use of products containing trace HCB levels, which account for about 75 percent of the HCB releases. Significant remaining point sources include steel, cement, and ferrous/nonferrous metal production facilities.

From a 1988 baseline, Canada has reduced B(a)P emissions to the Great Lakes Basin by approximately 45 percent. Figure 4-2 shows the release estimates and progress achieved towards meeting the 90 percent reduction target.[7] Over 70 percent of the B(a)P reductions achieved to date have occurred from reduced emissions from cokemaking operations, with other significant reductions attributed to the petroleum refining sector and to the implementation of codes of practice within the wood preservation sector. Canada's 2003 B(a)P releases in the basin from anthropogenic sources are estimated at 29,000 lbs. This does not include 9,020 lbs/yr of B(a)P released from forest fires (wildfires).[8] Non-point sources include: residential wood combustion, use of creosote-

[6] Based on "Hexachlorobenzene Sources, Regulations and Programs for the Ontario Great Lakes Basin 1988, 1998 and 2000 Draft Report (No. 1), July 13, 2000" prepared for Environment Canada by Benazon Environmental Inc., with releases updated by Environment Canada, Ontario Region, based on NPRI facility release data, on recent sector release assessments, and on pesticide application release information received from Health Canada's Pest Management Regulatory Agency on August 29, 2005.

[7] Based on "B(a)P/PAH Emissions Inventory for the Province of Ontario 1988, 1998 and 2000 Draft Report (No. 1), May 16, 2000" prepared for Environment Canada by Benazon Environmental Inc., with releases updated by Environment Canada, Ontario Region, based on NPRI facility release data and on recent sector release assessments.

[8] Toxic Emissions from Wildfires and Prescribed Burning, Issue Paper March 31, 2004, prepared for

treated wood products, motor vehicle emissions and open burning (prescribed and household waste burning), which account for about 80 percent of the B(a)P releases. The major point source is coke oven emissions.

United States: Progress Toward the GLBTS Challenge

From a 1990 baseline, the U.S. has reduced releases of HCB from approximately 8,519 lbs in 1990 to 2,911 lbs in 1999. Figure 4-3 shows national HCB release estimates and progress achieved since 1990.[9] This reduction is mainly attributed to lower residual HCB levels in pesticides, along with reduced HCB emissions from chlorinated solvent production and pesticide manufacture. These three categories combined account for roughly 5,000 lbs per year of HCB reductions.

Differences in the 1990 and the 1999 emission inventories and source categories complicate the determination of the exact emission reductions that have occurred. The inventories represent the best emission estimates that are available and provide a useful snapshot of HCB emissions from several source categories in 1990 and 1999. However, due to inconsistencies in the sources included in the two inventories, they cannot be used to establish a specific reduction in HCB emissions since 1990.

Figure 4-4 shows B(a)P release estimates and reduction progress within the U.S. Great Lakes Basin from 1996 to 2001.[10] B(a)P emissions from the eight Great Lake states have been reduced by approximately 77 percent during that time, with annual emissions in 2001 estimated at 43,700 lbs. Since the 2001 inventory was prepared, B(a)P emissions from the petroleum refinery sector have been essentially eliminated, and emissions from primary aluminum manufacture and coke ovens substantially reduced. Residential wood combustion remains the largest B(a)P emission source in the Great Lakes.

Environment Canada by Environmental Health Strategies.

[9] Based on EPA's 1990 National Toxics Inventory (with 1999 open burning estimates added) and 1999 National Emissions Inventory (updated with 1999 pesticide application emissions data).

[10] Based on the Great Lakes Regional Air Toxic Inventory for 1996 through 2001, with Ontario emissions removed and petroleum refining emissions reduced to approximately 5 lbs beginning in 1997, per revised estimates provided by the American Petroleum Institute (API, 2001).

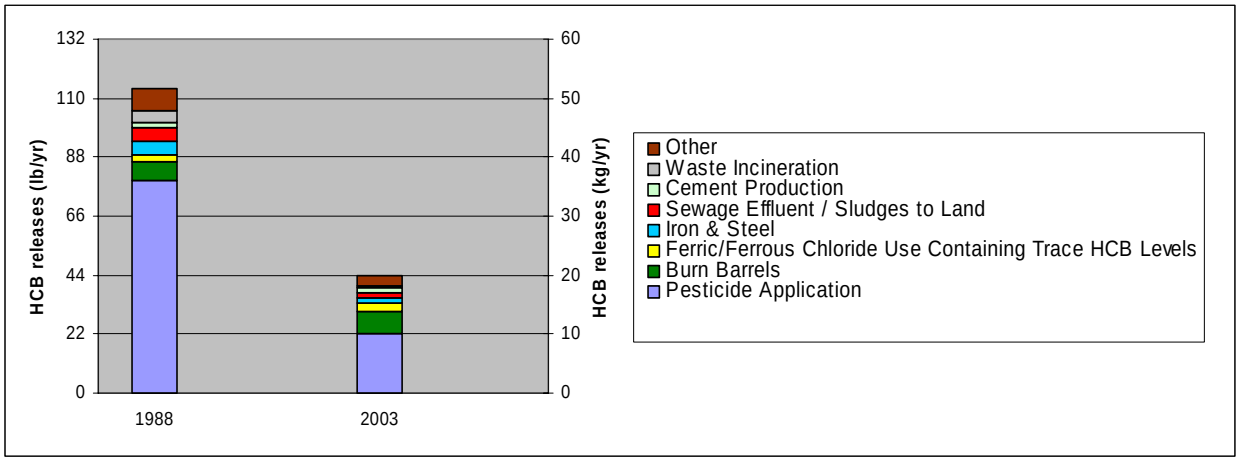


Figure 4-1. **Estimated HCB Releases (to Air and Water) in Ontario by Sector, 1988 and 2003. Source: Environment Canada (Environmental Protection Branch - Ontario Region, Toxics Prevention Division) Inventory as of October 13, 2004, with an update on releases from pesticide application received from Health Canada's Pest Management Regulatory Agency (Letter dated April 11, 2005)**

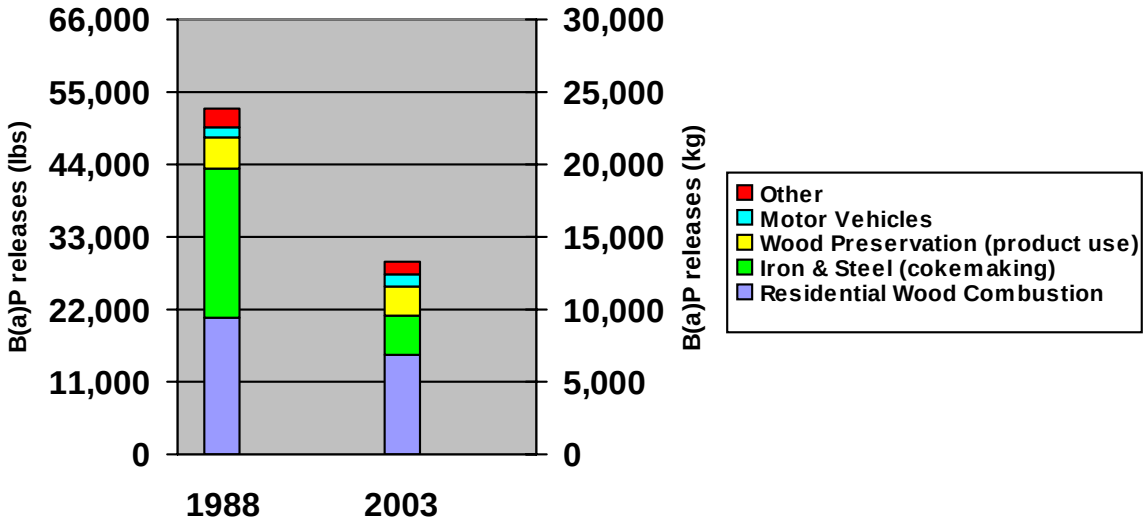


Figure 4-2. **Estimated B(a)P Releases in Ontario by Sector, 1988 and 2003. Source: Environment Canada (Environmental Protection Branch - Ontario Region, Toxics Prevention Division) Inventory as of October 13, 2004**

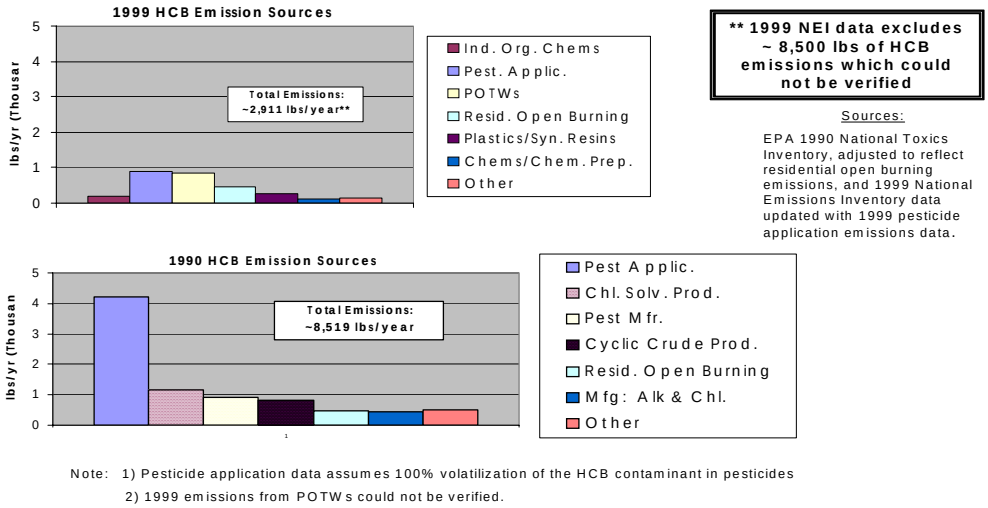


Figure 4-3 Estimated U.S. HCB Releases for 1990 and 1999 (lbs/year) Source: US EPA

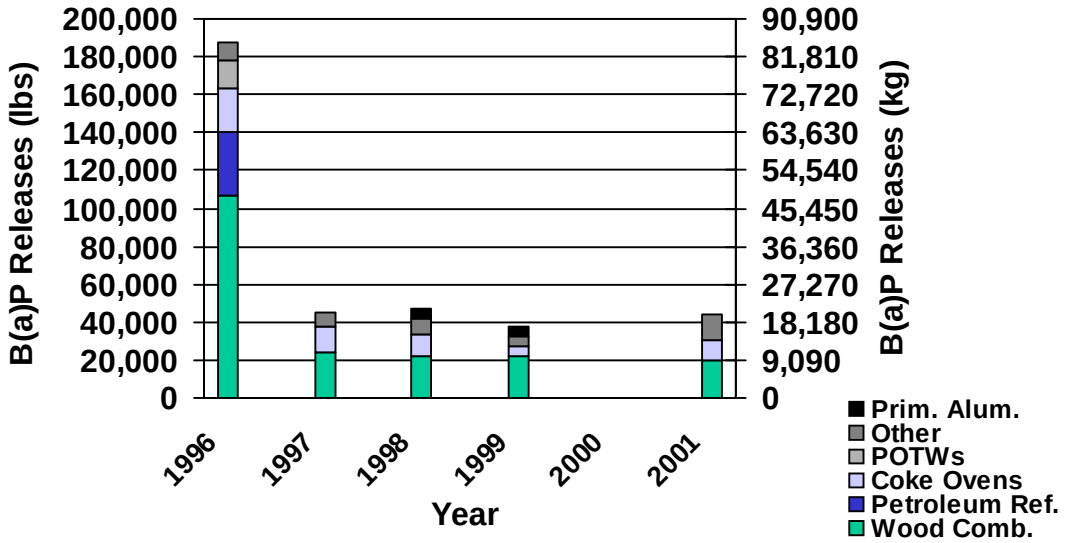


Figure 4-4. B(a)P Releases from the U.S. Great Lakes States, 1996-2001.[11]

[11] Based on the Great Lakes Regional Air Toxic Inventory for 1996 through 2001, with Ontario emissions removed and petroleum refining emissions reduced to approximately 5 lbs beginning in 1997, per revised estimates provided by the American Petroleum Institute (API, 2001).

WORKGROUP ACTIVITIES

In the past year, the HCB/B(a)P Workgroup has:

- Continued to promote existing residential wood combustion programs and initiated new projects aimed at providing consumers with information on clean and safe wood stoves over uncertified models, i.e., US EPA wood stove/fireplace initiatives, and Ontario's "Burn it Smart" program.

- Continued to promote scrap tire pile inventory development and mapping, and clean-up initiatives currently under way in the Great Lakes Region, i.e., US EPA Scrap Tire Pile Mitigation Support Project and Ontario's Tire Stewardship Plan.

- Improved HCB and B(a)P emission inventories, most notably more accurate HCB release estimates for the application of pesticides, a critical inventory issue.

- Completed reassessments on HCB release from use of pentachlorophenol (PCP) - treated wood products, and B(a)P release from creosoted-treated wood products in Ontario.

- Continued EC's voluntary stack testing initiative to generate emissions data on poorly characterized sources of GLBTS substances. As of year 2005, twelve priority sources have been tested, including: crematoria, pulp and paper, biomedical incineration, and metal production facilities.

- Drafted the Management Assessment for HCB and the Management Assessment for B(a)P using the *General Framework to Assess Management of GLBTS Level 1 Substances*.

U.S. Reduction Activities

Wood Stove/Fireplace Initiatives in Progress

- A Fireplace/Wood Stove website is being developed to provide consumers with information on the health effects of wood smoke, benefits of using US EPA-certified stoves, and how to burn efficiently and safely.

- A Wood Stove/Fireplace fact sheet is being drafted to provide information on clean burning, fuel use, and safety; and backgrounder directed towards state, local, and tribal agencies interested in developing wood stove/fireplace emission reduction programs.

- Additional Wood Stove Change-out Programs are being considered for the next few years, i.e., 1 to 3 pilot projects. It is estimated that 85 to 90 percent of operating wood stoves are still uncertified with replacement costs running in the order of $1,000 to $2,000 for a new woodstove, and $1,500 to $2,500 for a gas-fired stove.

- A "Green" Stoves Labeling Program

- A Fireplace Consensus Test Method for testing fireplace emissions. This could lead to a fireplace emission standard and/or national building code and lower emissions.

- US EPA testing of different wax/firelogs to determine fuel properties as well as air emissions, including B(a)P and polycyclic aromatic hydrocarbons (PAHs).

- ASTM "Task Group on Outdoor Wood-fired Hydronic Heaters" looking at developing a test standard for wood boilers.

Scrap Tire Mapping and Inventory Initiative

- Under a *Scrap Tire Pile Mitigation Support Project,* the US EPA continued developing a scrap tire pile inventory, along with GIS mapping of large tire piles (>500 tires); mapping is largely completed in the Great Lake states of Indiana, Michigan, Ohio, New York, and Pennsylvania.

- Ninety percent of scrap tires in the U.S. are located in 11 states, two of which (Indiana and Pennsylvania) do not have scrap tire abatement programs. The Rubber Manufacturers Association is working to promote programs in these states.

- The Rubber Manufacturers Association has given presentations on scrap tire pile abatement and fire prevention and is developing a peer-reviewed article on how to reduce a scrap tire pile.

- In 2004, scrap tire cleanup forums were held in Lansing, MI, and Chicago, IL.

- US EPA's best practices *Scrap Tire Cleanup Guidebook* on how to manage scrap tire piles is expected to be completed in 2005.

US EPA Promulgates Final Rule for Coke Ovens

- Amendments to the 1993 MACT standards for coke ovens, which contain more stringent emission limits for coke oven doors, charge port lids and offtake piping on 17 percent of U.S. coke batteries, were promulgated in April 2005. This action, which addressed "residual risk," was the first of its kind by US EPA. In

April 2003, new MACT rules were promulgated for coke plant emission points, not included in the 1993 rules, for pushing, combustion stacks and quench towers. These MACT rules apply to all U.S. coke plants.

- US EPA finalized rules on wastewater discharges from iron and steel facilities.

Canadian Reduction Activities

Approach to Reduce Residential Wood Combustion (RWC) Emissions Are Working

- *Burn it Smart* public workshops by health, fire safety, and wood burning experts continued in 2005 with seven workshops (including Wood Energy Technology Transfer training promoting safe and efficient use of wood burning systems) held in First Nations communities, 22 workshops in rural Ontario, and two in US border towns. Approximately 1,000 people attended the workshops in 2005.

- Two mock-up stoves of US EPA design were built for shows and displays. Aside from certified wood stoves, Ontario's residential wood combustion program also promotes alternatives such as gas-fired units.

- A plan was developed for distributing residential wood combustion educational materials: fact sheets on *Good Firewood*, *Wood Burning in the City*, and *Don't Burn Garbage*, and videos on wood stove operation and clean firewood.

- Home Depot was selected through a competitive process as a partner with the Government of Canada for a pilot project to promote the *Burn it Smart* program at six Home Depot stores during the fourth quarter of 2005. This pilot project is designed to evaluate the effectiveness of promoting US EPA-certified wood stoves and good wood-burning practices at retail stores.

- In 2001, a multi-government program known as the *Georgian Bay Woodstove Changeout and Education* program was developed. Workshops were conducted during the program. During the first quarter of 2005, a follow-up telephone survey was conducted with 135 participants who attended the workshops in 2001. Preliminary results of the impact of wood stove change-out programs show that over 50 percent of the respondents had improved their wood-burning practices and 34 percent had updated their appliances.

- EC is developing a brochure that focuses on improving First Nations education on wood-burning practices. This brochure is expected to be completed by April 2006.

- EC has entered into a partnership with a U.S. environmental agency to evaluate dioxin/furan and emission data from wax firelogs and regular cord wood. This will provide more information on the burning characteristics from these wax firelogs. This further supports the work being conducted by US EPA on wax firelogs.

Ontario's Tire Stewardship (OTS) Program

- On December 17, 2004, a proposed *Scrap Tire Diversion Program* was posted on the MOE's website for public comment. If approved, the program is expected to promote scrap tire collection and diversion within the province, eliminate illegal dumping of scrap tires through implementation of a registration and manifest tracking system, and clean up existing stockpiles - estimated at 5-6 million scrap tires - within five years. More information on this initiative can be found on the Waste Diversion Ontario Website at http://www.wdo.ca/.

Cokemaking Operations on Track

- Ontario's four integrated steel mills are on target to meet coke oven PAH targets set out in environmental codes of practice, with reductions being achieved through rigorous coke oven battery maintenance and by implementation of innovative battery operating practices and procedures. From a 1988 base year, the sector has reduced B(a)P emissions by approximately 73 percent.

NEXT STEPS

The workgroup will continue ongoing efforts to improve the accuracy of the U.S. and Canadian HCB and B(a)P emission inventories to ensure that all significant emission sources have been identified and included. The focus of the workgroup's inventory efforts include the following source sectors: application of pesticides, use of creosoted-treated wood products, use of pentachlorophenol-treated wood products, residential wood combustion, wastewater releases from sewage treatment plants, and motor vehicles.

The workgroup will continue to pursue emission reduction activities from significant B(a)P source sectors, namely:

- Residential Wood Combustion - *Burn it Smart* initiative, wood stove change-out programs, testing fire/wax logs, and begin to address wood boilers; and
- Scrap Tires - Ontario Stewardship Program, US EPA Best Practices Guidebook, scrap tire pile mapping and inventory initiatives.

The workgroup will also support other actions which impact HCB releases to the Great Lakes Basin including:

- Household Garbage Burning Strategy (Burn Barrel Subgroup);
- Full lifecycle management of PCP-treated wood products;
- Collection of data on HCB levels in the environment; and

- Emission inventory and multiple pathways modeling of HCB to the Great Lakes from North American sources. Aside from providing a basic understanding of HCB releases from various sources and pathways, the proposed study will also be helpful in assessing the relative importance of out-of-basin sources and emissions that impact the Great Lakes.

The workgroup will consider expanding its scope to include substances closely associated with HCB and B(a)P, namely, chlorobenzenes and PAHs.

5.0 INTEGRATION WORKGROUP

Integration Workgroup Highlights 2005

Level 1 Substance Reviews

The GLBTS focuses on persistent toxic substances (PTS) in the Great Lakes ecosystem, in particular those chemicals which bioaccumulate up the food chain. The GLBTS sets forth seventeen (17) interim reduction goals for twelve Level 1 PTSs over a ten year time-frame which ends in 2006. In anticipation of this important milestone, in 2004, the Parties, working with many stakeholders from industry, non-governmental organizations, Provinces, States, Tribes, cities and academia, commenced an overall program review of each of the Level 1[12] substances, to review progress made to date in reducing these substances and to explore future directions for the continued management of these substances. Two non-substance-specific goals in the GLBTS were also addressed: to assess atmospheric inputs of Level 1 substances from world-wide sources, and to complete or be well advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006.

The substance reviews include an overall environmental assessment of Level 1 substances in the Great Lakes environment, including a review of current levels in Great Lakes media and biota, an evaluation of these levels against available health based/risk based criteria, historical trends and projected trends looking forward; and a source reduction assessment that looks at use and emission reductions accomplished to date under the GLBTS against the original targets, as well as an analysis of the remaining source sectors, and further opportunities for the GLBTS and others to continue to effect reductions toward our ultimate goals of virtual elimination. Finally, these reviews provide recommendations to the Parties for the future management of each Level 1 substance. Appendix B contains background information for the Level 1 substance reviews, including summaries of the full assessments and the *General Framework to Assess Management of GLBTS Level 1 Substances*, which served as the framework by which the reviews were conducted.

Brief summaries of the Integration Workgroup meetings held over the past year are presented below.

Integration Workgroup Meeting – March 23, 2005, Windsor

The first Integration Workgroup meeting was held on March 23, and focused on the on Level 1 substance reviews to determine recommendations for the path forward. The Integration Workgroup was given an overview of the *General Framework to Assess Management of GLBTS Level 1 Substances* which was developed by the Integration Workgroup last year. The framework begins by considering the status of progress toward

[12] Mercury, PCBs, dioxins and furans, hexachlorobenzene (HCB), benzo(a)pyrene (B(a)P), octachlorostyrene (OCS), alkyl lead, mirex, aldrin/dieldrin, toxaphene, DDT, chlordane

the challenge goals. This is followed by an environmental analysis that reviews available data and criteria to assess the impact of a substance on the Great Lakes environment. The environmental analysis leads to a GLBTS management assessment in the second half of the framework. The management assessment considers the ability of the GLBTS to effect further reductions and results in one of two outcomes: active Level 1 status or suspend workgroup activities. Following the overview, co-chairs for the substance workgroups presented updates for HCB, B(a)P, PCBs, alkyl-lead, pesticides, mercury, and dioxin that were prepared using the general framework.

Presentations at this meeting included:

- *General Framework to Assess Management of GLBTS Level 1 Substances – Introduction* – Ted Smith, US EPA
    - *HCB Assessment* - Tom Tseng, EC
    - *B(a)P Assessment* - Steve Rosenthal, US EPA
    - *PCB Assessment* - Tony Martig, US EPA
    - *Alkyl-lead Assessment* - Edwina Lopes, EC
    - *Pesticides Assessment* - Dave Macarus, US EPA
    - *Mercury Assessment* - Alexis Cain, US EPA
    - *Dioxin Assessment* - Anita Wong, EC

Integration Workgroup Meeting – May 18, 2005, Toronto

The second Integration Workgroup meeting was held in Toronto on May 18. The focus of this meeting was on the Level 1 substance reviews and ongoing application of the *General Framework to Assess Management of GLBTS Level 1 Substances*. A discussion of management outcomes for each workgroup was presented. In addition, several presentations were made regarding substance emission inventories. US EPA presented information on the 2002 NEI, the Great Lakes Commission presented information on the Great Lakes Regional Air Toxics Emission Inventory, and EC shared information on how inventory data is being used to compute loads of critical pollutants. Finally, presentations were made on two Ontario-based communities and the actions being taken to reduce use and release of GLBTS Level 1 substances.

Presentations at this meeting included:

- *Substance Updates - General Framework to Assess Management of GLBTS Level 1 Substances – Management Outcomes*
    - *Mercury* – Alexis Cain, US EPA
    - *HCB & B(a)P* - Steve Rosenthal, US EPA
    - *PCBs* – Ken De, EC
    - *Dioxin & Furans* - Erin Newman, US EPA
- *Substance Emission Inventories*
    - *National Emissions Inventory* - Anne Pope, US EPA
    - *Great Lakes Regional Air Toxics Emission Inventory* - Jon Dettling, Great Lakes Commission

    - *Emissions Inventory Uses* - Scott Painter and Chris Marvin, Environment Canada
- *Municipal Sector – City of Thunder Bay and Severn Sound*
    - *City of Thunder Bay* - Darrell Matson, City of Thunder Bay
    - *City of Thunder Bay* - Jim Bailey, Eco Superior
    - *Severn Sound* - Keith Sherman, Severn Sound Environmental Association

Integration Workgroup Meeting – September 15, 2005, Chicago

The third Integration Workgroup meeting was held in Chicago on September 15. The focus of this meeting was discussing the future focus of the GLBTS. A presentation summarizing the GLBTS management assessment reports for the Level 1 substances was made to inform GLBTS stakeholders of the parties' intended recommendations to the Binational Executive Committee (BEC). Another presentation shared the results of a long-range transport modeling activity for toxaphene that was conducted by EC and the Meteorological Service of Canada. The majority of the meeting included informational presentations by EC and US EPA on a number of new initiatives that may impact the future focus of the GLBTS. These were followed by a facilitated discussion among stakeholders to offer suggestions to the Parties on the future direction of the Strategy.

Presentations at this meeting included:

- *Reporting to BEC on Management Outcomes from the General Framework to Assess Management of Level 1 Substances* – Alan Waffle, EC
- *Update of Long Range Transport Activities* – S. Venkatesh, EC
- *Future Focus of the GLBTS*
    - History of the GLBTS – Alan Waffle, EC
    - Chemicals of Emerging Concern – Derek Muir, EC
    - National P2/Persistent Toxics Programs – Ted Smith, US EPA
    - Environment Canada Sectors Program – Jim Smith, EC
    - GLWQA Review – Mark Elster, US EPA
    - US Regional Collaboration – Ted Smith, US EPA

Integration Workgroup Meeting – December 7, 2005, Chicago

The final meeting of the year for the Integration Workgroup was held in Chicago on December 7, 2005. This meeting provided an update on the GLBTS management assessments for mercury, PCBs, dioxins, HCB, and B(a)P. Information, cross-cutting issues, and problems requiring the attention of the Integration Workgroup for resolution were also presented.

Presentations at this meeting included:

- *Great Lakes Municipal Sector Panel*
    - *Great Lakes Cities Initiative* – Dave Ullrich, Great Lakes Cities Initiative
    - *Canadian Great Lakes City Initiatives* – Milena Avramovic, Association of Municipalities of Ontario

- *Future Focus of the GLBTS – A Parties' Perspective* – Ted Smith, US EPA
- *Future Focus of the GLBTS* – Reaction by Stakeholders

Outlook for 2006

In 2006, the Integration Workgroup will continue efforts to virtually eliminate the Level 1 substances and begin to focus on emerging contaminants of concern.

Stakeholder Forum Highlights 2005

Stakeholder Forum

A GLBTS Stakeholder Forum is convened biannually with the purpose of highlighting issues and initiatives of relevance to the Strategy, and to allow the workgroups to meet. The following GLBTS Stakeholder Forum meetings were convened in 2005:

- May 17, 2005, Toronto, and
- December 6, 2005, Chicago.

In addition to the Stakeholder Forum meetings, a separate substance workgroup meeting was held on March 22, 2005, in Windsor.

Substance Workgroup Meeting – March 22, 2005, Windsor

The purpose of this day was for workgroups to breakout into their respective groups to discuss their progress under the *General Framework to Assess Management of GLBTS Level 1 substances* – specifically the draft environmental analyses and possible draft management outcomes. The PCB Workgroup met to discuss the revised draft of the Management Assessment on PCBs and HCB/B(a)P Workgroup met to discuss the draft of the Management Assessment for HCB and the Management Assessment for B(a)P. Results and issues were reported out at the Integration Workgroup meeting on March 23.

Stakeholder Forum Meeting – May 17, 2005, Toronto

At the first Stakeholder Forum meeting on May 17, 2005, in Toronto, Jim Abraham, Acting Regional Director General of EC, provided the keynote address. Mr. Abraham presented EC's competitiveness and environmental sustainability framework and gave examples of instances where environmental sustainability is growing. A number of

departments across the government have formed committees, along with industry, to help develop the framework. Mr. Abraham commented that the Great Lakes are a classic example of how the issues of the environment and the economy tie together. He praised the GLBTS for its partnerships, beyond-compliance efforts, and positive outcomes. The workgroup leaders also reported on progress toward the strategy challenges and updates on the substance assessments for mercury, dioxins/furans, PCBs, and HCB/B(a)P.

As part of the PCB Workgroup's PCB Reduction Recognition Award Program, Ken De (EC) presented an award to GM Canada. Bryan Swift of GM Canada, St. Catharine's Plant, accepted the award. Gary Gulezian (US EPA) presented an award to Robert Lyng of Ontario Power Generation, Nanticoke. The PCB Reduction Recognition Program recognizes organizations that have reduced high-level PCBs and have voluntarily met or exceeded the GLBTS challenge goal for PCBs. The plenary session was followed by workgroup break-out sessions for mercury, PCBs, dioxins/furans, and HCB/B(a)P.

Stakeholder Forum – December 6, 2005, Chicago

The second Stakeholder Forum meeting of 2005 featured a keynote address by *[add name]* of the White House Dioxin Interagency Working Group. The workgroup leaders also reported on progress toward the strategy challenges for mercury, dioxins/furans, PCBs, and HCB/B(a)P. The forum was followed by substance workgroup break-out sessions for mercury, PCBs, dioxins/furans, and HCB/B(a)P.

6.0 SEDIMENTS CHALLENGE

Under the Great Lakes Binational Toxics Strategy, EC and US EPA committed to:

> *"Complete or be well-advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006."*

Highlights of sediment assessment and remediation activities undertaken in the U.S. and Canada are described below.

2005 Sediment Assessments with US EPA's *Research Vessel Mudpuppy*

Contaminated sediments are a significant concern in the Great Lakes Basin. Although toxic discharges have been reduced over the past 30 years, high concentrations of contaminants still remain in the sediments of many rivers and harbors. These sediments are of potential risk to the health of aquatic organisms, wildlife, and humans.

To assist in determining the nature and extent of sediment contamination at these polluted sites, US EPA's GLNPO provides the *Research Vessel (R/V) Mudpuppy*. The *R/V Mudpuppy* is a 32-foot-long, flat-bottom boat that is specifically designed for sampling sediment deposits in shallow rivers and harbors. The boat is able to sample at water depths between 2 feet and 50 feet. Using a vibrocoring unit, the *R/V Mudpuppy* can take sediment core samples of up to 15 feet in depth.

To adequately characterize a site, GLNPO uses an integrated sediment assessment approach. This involves collecting data for sediment chemistry, toxicity, and the benthic community at a specific site, and then using the results to determine the extent of contamination that could be impacting the aquatic ecosystem.

Since 1993, the *R/V Mudpuppy* has conducted surveys at 39 locations, including 27 of the 31 Great Lakes Areas of Concern (AOCs). In 2005, the following surveys have been conducted with the assistance of the *R/V Mudpuppy:*

- Ottawa River, Toledo, Ohio – collected samples with support from Ohio EPA to further refine remedial boundaries.

- Indiana Harbor, East Chicago, Indiana – assisted the U.S. Army Corp of Engineers with collection of samples to support a volatile emissions evaluation.

- Saginaw River, Saginaw, Michigan – assisted the MDEQ with collection of samples to determine the distribution and concentrations of dioxin and polychlorinated naphthalene.

- Traverse City Lakes, Traverse City, Michigan – assisted MDNR with collection of samples to assess impacts of dam removal on sediments.

- Ryerson Creek, Muskegon, Michigan – assisted MDEQ with collection of samples to determine nature and extent of contamination.

- Buffalo River, Buffalo, New York – assisted the NY Department of Environmental Conservation and the U. S. Army Corps of Engineers with collection of samples within and outside of the navigation channel to support a feasibility study of the river.

- Presque Isle Bay, Erie, Pennsylvania – assisted the PA Department of Environmental Protection with field support to determine if delisting criteria can be met that are currently being developed as part of a long-term monitoring plan.

- Division Street Outfall, Muskegon, Michigan – assisted MDEQ with collection of sediment cores and ponars to determine nature and extent of contamination.

- Trenton Channel, Trenton/Riverview, Michigan – conducted a post-remediation survey at the Black Lagoon Great Lakes Legacy Act sediment remediation site, and collected samples in the Trenton Channel to further define the nature and extent of contamination.

- Saginaw River and Flint River, Saginaw/Flint, Michigan – assisted MDEQ with collection of samples to more fully delineate a dioxin hot spot.

Great Lakes Sediment Remediation Projects - 2004[13]

In 2004, over 345,000 cubic yards of sediment were remediated from eight U.S. sites and one Canadian site in the Great Lakes Basin. Six sites initiated work for the first time in 2004; two of those sites were the beginnings of large-scale cleanups that will have significant positive impacts to the Basin. Three sites completed their remedial actions in 2004; Dow Chemical Canada's three-year cleanup was completed at the end of the year. The Moss-American and Pine River projects continued with their remedial actions. The Black Lagoon site was the first sediment remediation project funded under the Great Lakes Legacy Act.

The following is a list of details relating to remediation sites in the U.S. and Canada.

U.S. Sites

St. Louis River/Interlake/Duluth Tar – Slip 7: The St. Louis River/Interlake/Duluth Tar Superfund site is located on the north bank of the St. Louis River, approximately four river miles upstream from Lake Superior, and is a state-led National Priority List (NPL) site. The MPCA has set 13.7 mg/kg total PAH as the cleanup level, as PAHs are the primary contaminant of concern (COC). Other COCs include metals (including arsenic,

[13] Sediment remediation data for 2004 is presented because data lag a year behind in reporting (e.g., 2005 data will become available in 2006).

cadmium, chromium, copper, lead, mercury, nickel, and zinc) and VOCs (including benzene, ethylbenzene, toluene, xylene). At Slip 7, approximately 69,000 cubic yards of contaminated sediment were capped using the surcharge technique, which consolidated the underlying sediment and isolated contaminants without reducing water depth and natural resource functions. Approximately 409,000 cubic yards remain.

Lower Fox River and Green Bay, Operable Unit (OU) 1: The joint Superfund and Natural Resource Damage Assessment (NRDA) OU 1 (Little Lake Butte des Morts) project is just the beginning of a much larger cleanup of the Lower Fox River and Green Bay site. From September to November 2004, approximately 17,000 cubic yards of contaminated sediment and 39.4 pounds of PCBs were removed and disposed of in a state-licensed landfill. A spud barge with swinging ladder dredge was used to remove the sediments. Sediments were successfully dewatered using geotubes. The OU1 project has a 1 ppm action level for PCBs and a surface weighted average concentration (SWAC) standard of 0.25 ppm. If these risk standards are not met, the contractor has the option of dredging more sediment or placing a sand cover over the area. A similar process is planned for 2005.

Moss-American: Moss-American is a US EPA Superfund NPL site. The primary sediment contaminants of concern are PAHs from former creosote activity at the Moss-American site. Approximately five miles of the Little Menomonee River downstream of the former creosote facility were believed to have been contaminated. Stream segment 1 underwent remediation in 2002-2003; during 2004 stream segments 2 and 3 were remediated. Approximately 8,560 cubic yards of contaminated sediments were dredged and transported from the Moss-American site to the Peoria Disposal facility. The site-specific cleanup goal is 15 mg/kg carcinogenic PAH. Approximately 6,500 cubic yards remain in the final two site segments.

Pine River: Sediment removal from the river by US EPA Superfund has been ongoing since 1999. A total of 592,000 cubic yards of contaminated sediments have been removed and 830,000 tons have been disposed offsite at landfills, with an average of 6 percent lime used as a drying agent. An estimated 359 tons of DDT have been removed from the environment through the removal of sediments and Dense Non-Aqueous Phase Liquid (DNAPL). By the time the entire project is completed, an estimated 750,000 cubic yards of contaminated sediments will have been removed and 1,100,000 tons will have been disposed offsite. Approximately 4,000 gallons of DNAPL have been removed from the subsurface in the river, including the DNAPL directly pumped from the pool and DNAPL recovered in the collection trenches.

Detroit River, Trenton Channel, Black Lagoon: The Black Lagoon is located within the Trenton Channel of the Detroit River, part of the Detroit River AOC, and is the first project funded under the Great Lakes Legacy Act. PCB compounds, oil and grease, and heavy metals, including mercury, are present at concentrations sufficient to cause acute and/or chronic harm to benthic organisms. In 2004, approximately 55,000 cubic yards of contaminated sediment were removed. The goals for the project are to reduce the risks to human health, wildlife and aquatic organisms within the Detroit River AOC, restore the

aquatic habitat within the Black Lagoon, and prepare the site for recreational and economic redevelopment. The project will accomplish these goals by dredging 116,000 cubic yards, and by placing a layer of sand and gravel over the affected area. Contaminated sediment from the Black Lagoon is disposed of in the Pointe Mouille Confined Disposal Facility.

Consolidated Packaging Corporation: The Consolidated Packaging Corporation site is the area surrounding a former paper mill plan that operated from 1898 until 1978 in Monroe, Michigan. The site includes seven lagoons and a series of drainage ditches that drain the area into the River Raisin. The lagoons and drainage ditches became contaminated by PCBs through disposal of paper pulp waste from carbonless copy paper that used PCBs. MDEQ performed a series of remedial investigations that found PCB contaminated sludges present in seven lagoons and onsite drainage ditches at levels over 1300 ppm in some places. MDEQ was concerned that much of the PCB contamination would ultimately find its way into the River Raisin and Lake Erie. State funding (Part 201) was sought and obtained for site cleanup. On-site drainage ditches were dredged, the sediment and sludges dewatered, and then 30,000 cubic yards were disposed in a sanitary landfill or TSCA landfill depending on PCB concentration. The overall ditch cleanup target of 330 ppb PCB was confirmed with post dredge/excavation sampling.

Alma Iron and Metal/Smith Farms Property: The Alma Iron and Metal/Smith Farms Property site was used as a debris/scrap metal recycling facility during the 1950s – 1970s. Soil and groundwater had been contaminated with regulated metals, volatile organic compounds, semi-volatile organic compounds, and pesticides. In 1989, the Potentially Responsible Party removed drums containing waste material from the site as part of the US EPA Administrative Order on Consent. MDEQ completed the cleanup after the City of St. Louis proposed this site under the Clean Michigan Initiative program in 1999 to be prepared for redevelopment into a recreational facility for the community. In 2004, approximately 15,904 cubic yards of sediment were removed from the pond/wetland area. Waste material was handled by both removal to an off-site landfill and encapsulation on-site. The remedial action objective was to have contaminants above the Residential/Commercial I Part 201 Generic Cleanup Criteria of the state. Any contaminants left on-site were covered with a direct contact barrier. The site is currently ready to be redeveloped. Groundwater investigation and monitoring is on-going.

Paw Paw River: The Aircraft Components site on the Paw Paw River in Benton Harbor, Michigan, was contaminated with chlorinated solvents and inorganics. During remedial investigation activities, inorganic contamination (i.e. lead) was identified in the river sediment and was defined as being limited to the near shore sediments. As part of a larger excavation remedy for contamination of soils with various inorganics constituents, Superfund remediated 349 cubic yards of river sediments through excavation. A steel sheetpile cofferdam was constructed, the cofferdam was dewatered, and the sediments were excavated from the cofferdam by reaching in from the bank. Confirmatory samples were collected. Excavated material was disposed of at a landfill. Remedial action objectives for the river sediments included: cadmium, 0.6 ppm; chromium, 30 ppm; zinc, 123 ppm; nickel, 20.9 ppm; and lead, 35 ppm.

Figure 6-1 presents the cumulative volume of sediment remediated in the U.S. since 1997. Information in the bar graph includes quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the *Great Lakes Sediment Remediation Project Summary Support*, Quality Assurance Project Plan. Detailed project information is available upon request from project managers.

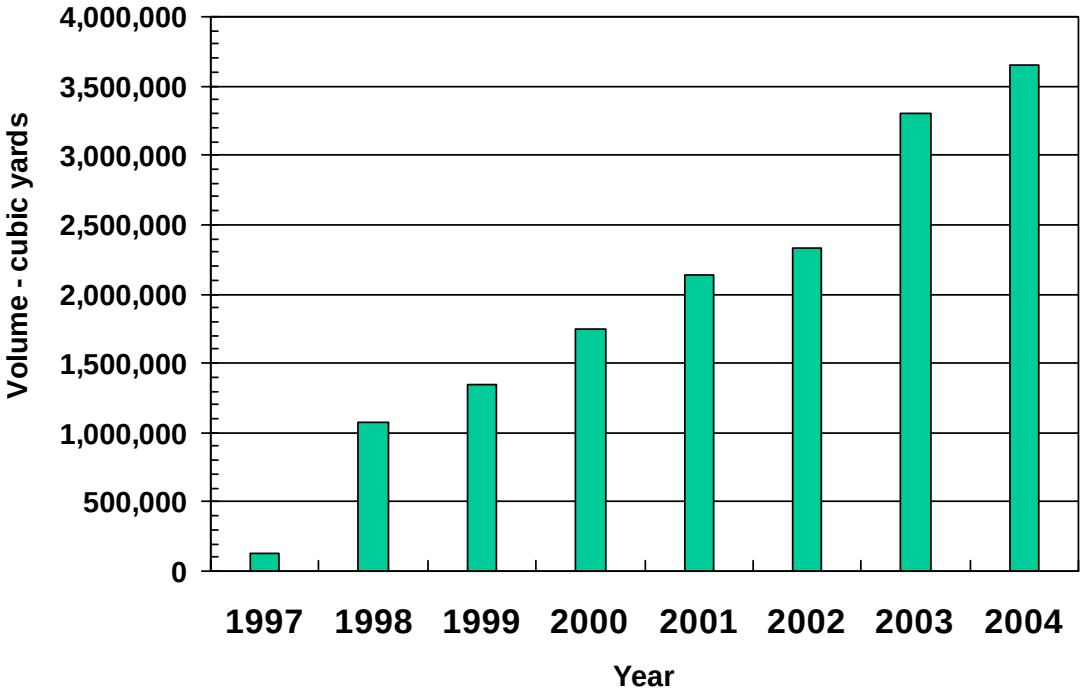


Figure 6-1. Cumulative Volume of Sediment Remediated in the U.S. Since 1997.[14] Source: US EPA – Great Lakes National Program Office

Canadian Sites

Decision-Making Framework for Contaminated Sediments: Under the *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA)* a commitment was made to develop a risk-based decision-making framework for contaminated sediments. The framework has been completed, and internal agency reviews are ongoing with finalization and release scheduled for late 2005. Ongoing sediment assessments in AOCs (i.e. Thunder Bay, Peninsula Harbour, St. Marys River, Detroit River, St. Clair River, Niagara River, Bay of Quinte) are currently utilizing the COA framework to evaluate the need for management actions.

[14] US EPA Great Lakes National Program Office. 2005. Quality Assurance Project Plan for "Great Lakes Sediment Remediation Project Summary Support." Unpublished. Available from Mary Beth G. Ross (ross.marybeth@epa.gov).

St. Lawrence River (Cornwall): Consultation and decisions on the Cornwall Sediment Strategy have been completed. Results of investigations on contaminant levels and distribution, benthic community impairment, sediment toxicity and bioaccumulation/ biomagnification potential were employed in a Canada-Ontario risk-based decision-making framework for contaminated sediments. It was concluded that the mercury contaminated sediments are buried by cleaner material and pose no risk to the aquatic environment; they will be left in place and natural recovery will continue. A seven-party administrative controls protocol has been developed to ensure that the deeper sediments remain undisturbed by human activities. A public meeting and announcement of the strategy is planned.

Hamilton Harbour (Randle Reef): The proposed remedial design for PAH contaminated sediments involves a dry cap engineered containment facility about 9.5 hectares in size. This would cover in-situ about 130,000 cubic metres of sediments and contain about 500,000 cubic metres of contaminated sediments dredged from the impacted area surrounding the containment facility. Work on project feasibility and engineering is underway and should be completed in the summer of 2006.

St. Clair River: During 2004, Dow Chemical Canada Inc. completed Phase 3, the final phase of a three-year sediment remediation project in the St. Clair River adjacent to its industrial plant site at Sarnia, Ontario. Approximately 4,200 cubic metres of sediment were dredged using both hydraulic and shore-based mechanical excavating equipment. Sediment was removed from an area of approximately 58,420 square feet and dewatered at an on-shore facility. Over 67 million U.S. gallons of water were treated at the facility through a series of filters (sand, microfilters and carbon adsorption) before discharge back to the river. Sediment in the facility was layered with organic matter and encapsulated as a biological treatment cell (biocell). The total volume of sediment involved with the three-year project is estimated at 13,690 cubic metres. Contaminants in the sediments include the GLBTS Level 1 substances - mercury, HCB, and OCS, and the Level 2 substance - hexachlorobutadiene.

Thunder Bay and Peninsula Harbour: Assessments of mercury bioaccumulation continued in 2004 at these two AOCs. The technical assessments are being used as the basis for consultations with local stakeholders to determine the need to assess sediment management options.

Supporting Table and Graphics

Table 6-1 reports progress on sediment remediation projects at both AOCs and non-AOCs in the U.S. and Canada, from 1997 through 2004. The maps on the following pages illustrate the progress and achievements made in sediment remediation activities in the Great Lakes from 1997 through 2004. Information included in the tables and maps are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the *Great Lakes Sediment Remediation Project Summary Support* Quality Assurance Project Plan. Detailed project information is available upon request from project managers. On occasion, project managers may submit to GLNPO updated sediment remediation estimates on projects previously reported on. Always refer to the most current version of the GLBTS Progress Report for the most up-to-date sediment remediation estimates.

Table 6-1. Progress on Sediment Remediation in the Great Lakes since 1997*

Site/AOC/non-AOC (*)	Cumulative Mass of Contaminant Remediated (kg)												Cumulative Volume Sediments Remediated 1997 Thru 2004 (cy)	Volume Sediments Remediated 2004 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachloro benzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	Dioxins and Furans	toxaphene			
U.S. Sites															
Aircraft Components - Paw Paw River*													349	349	Landfilled
Alma Iron and Metal/Smith Farms Property*													15,904	15,904	encapsulated on-site
Ashtabula River, OH															
Black River-S. Branch, MI*															
Black River, OH															
Black River, MI* - CR 681													25,000		landfilled
Buffalo River, NY															
Clinton River, MI															
Cuyahoga River, OH															
Deer Lake - Carp River, MI															
Detroit River, MI - Monguagon Creek - Black Lagoon													**80,000** 25,000 55,000	55,000	Confined Disposal Facility (CDF)
Eighteenmile Creek, NY															
Fields Brook Superfund, OH*													53,094		Landfilled
Fox River, Green Bay, WI - Deposit 56/57 - Deposit N - OU 1										**459** 950 51 18			**104,500** 80,300 7,200 17,000	17,000	landfilled landfilled
Grand Calumet, IN - U.S. Steel/Gary Works - U.S.S. Lead							369			7,193	.03		**812,200** 802,200 10,000		Corrective Action Mgmt. Unit Corrective Action Mgmt. Unit

Table 6-1. Progress on Sediment Remediation in the Great Lakes since 1997*

Site/AOC/non-AOC (*)	Cumulative Mass of Contaminant Remediated (kg)												Cumulative Volume Sediments Remediated 1997 Thru 2004 (cy)	Volume Sediments Remediated 2004 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachloro benzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	Dioxins and Furans	toxaphene			
Kalamazoo River, MI - Bryant Mill Pond										10,000			150,000		landfilled
Manistee Lake, MI*															
Manistique River, MI										4,771			186,162		Landfilled
Manitowoc River, WI* - HARP										425			11,800		Landfilled
Maumee River, OH- Fraleigh Creek (Unnamed Tributary)										25,400			8,000		Landfilled
Menominee River, MI/WI - Ansul Eighth Street Slip													13,000		landfilled/awaiting further management
Milwaukee Harbor, WI - North Ave. Dam - Moss American													**26,560** 8,000 18,560	 8,560	 landfilled landfilled
Muskegon Lake, MI															
National Gypsum* - Alpena, MI															
Niagara River, NY - Scajaquada Creek - Buffalo Color - Area D - Gill Creek - Cherry Farm/River Road - Niagara Transformer													**130,870** 17,500 45,000 14,870 42,000 11,500		landfilled/ capped
Pine River, MI* - Velsicol Chemical SF Site - TPI Petroleum, Inc.				325,679									**592,201** 544,100 48,101	150,000	landfilled
Presque Isle Bay, PA															

Table 6-1. Progress on Sediment Remediation in the Great Lakes since 1997*

Site/AOC/non-AOC (*)	Cumulative Mass of Contaminant Remediated (kg)												Cumulative Volume Sediments Remediated 1997 Thru 2004 (cy)	Volume Sediments Remediated 2004 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachloro benzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	Dioxins and Furans	toxaphene			
River Raisin, MI - Ford Monroe Outfall - Consolidated Packaging Corporation										16,795			**57,000** 27,000 30,000	30,000	on-site TSCA facility sanitary landfill & TSCA landfill
Rochester Embayment, NY															
Rouge River, MI - Evan's Product Ditch - Newburgh Lake										**250,000** 4,000 246,000			**406,900** 6,900 400,000		off-site TSCA facility and landfilled
Saginaw River/Bay, MI										4,500			342,433		off-shore CDF
Sheboygan Harbor, WI															
St. Clair River, MI															
St. Lawrence River, NY-Reynolds Metals/Alcoa E.										10,000			86,000		landfilled/ capped
St. Louis River/Bay, MN/WI - Newton Creek/Hog Island Inlet - Interlake/Duluth Tar													**74,855** 5,855 69,000	69,000	landfilled capped
St. Marys River, MI													3,000		landfilled
Ten Mile Storm Drain* - St. Clair Shores, MI													18,500		landfilled
Torch Lake, MI															
Waukegan Harbor, IL															
Waxdale Creek, WI*															
White Lake, MI - Tannery Bay - Occidental Chemical Corp.					495†					495†			**105,500** 95,000 10,500		landfilled landfilled

Table 6-1. Progress on Sediment Remediation in the Great Lakes since 1997*

Site/AOC/non-AOC (*)	Cumulative Mass of Contaminant Remediated (kg)												Cumulative Volume Sediments Remediated 1997 Thru 2004 (cy)	Volume Sediments Remediated 2004 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachloro benzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	Dioxins and Furans	toxaphene			
Willow Run Creek, MI*										200,000			450,000		on-site TSCA facility
Wolf Creek - Unnamed Tributary, MI*													1,948		landfilled
TOTALS				**325,679**	**495**[†]		**369**			**530,038**[†]	**0.03**		**3,755,776**	**345,813**	

[†] Mass displayed is the combined total of PCBs and HCB

Footnote: *Information included in the matrix are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.*

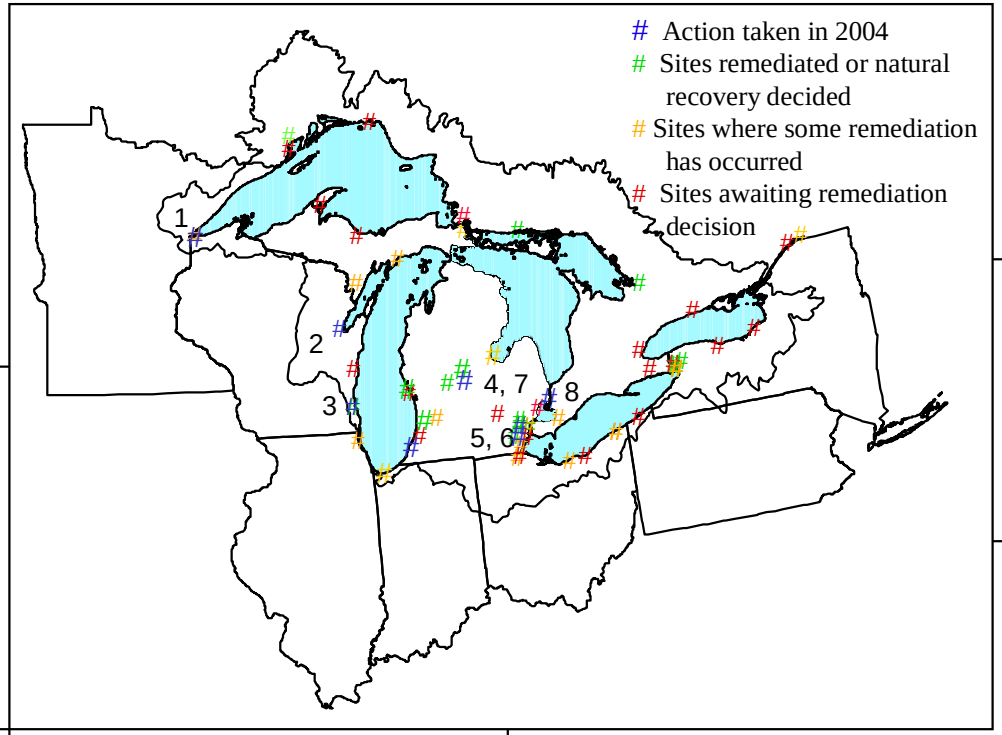
Table 6-1. Progress on Sediment Remediation in the Great Lakes since 1997*

Site/AOC/non-AOC	Cumulative Mass of Contaminant Remediated (kg)												Cumulative Volume Sediments Remediated 1997 Thru 2004 (cm)	Volume Sediments Remediated 2004 (cm)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachloro benzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	Dioxins and Furans	toxaphene			
Canadian Sites															
Thunder Bay - Northern Wood Preservers		2,700											11,000 21,000		Thermal treatment Berm enclosure&capped
Nipigon Bay															
Jackfish Bay															
Peninsula Harbour															
St. Marys River															
Spanish River															
Severn Sound															
St. Clair River							19.3						13,690	4,200	landfilled
Detroit River															
Wheatley Harbour															
Niagara River (Ontario)															
Hamilton Harbour															
Metro Toronto															
Port Hope															
Bay of Quinte															
St. Lawrence River (Cornwall, Ontario)															
TOTALS		**2,700**					**19.3**						**45,690**	**4,200**	

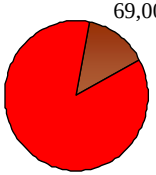
Footnote: *Information included in the matrix are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.*

Great Lakes Sediment Remediations in 2004*

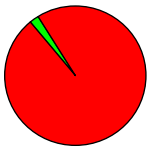
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



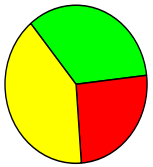
1. St. Louis River/ Interlake/Duluth Tar - Duluth, Minnesota



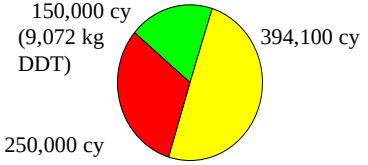
2. Lower Fox River & Green Bay, OU1 – Wisconsin



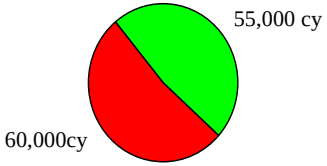
3. Moss-American Milwaukee, Wisconsin



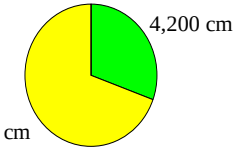
4. Velsicol Chemical / Pine River St. Louis, Michigan



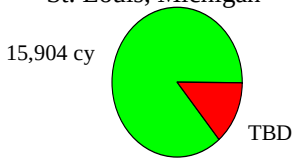
5. Detroit River, Black Lagoon – Trenton, Michigan



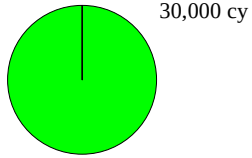
8. St. Clair River - DOW Chemical Canada

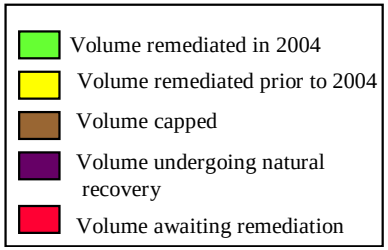


7. Alma Iron and Metal/ Smith Farms Property St. Louis, Michigan



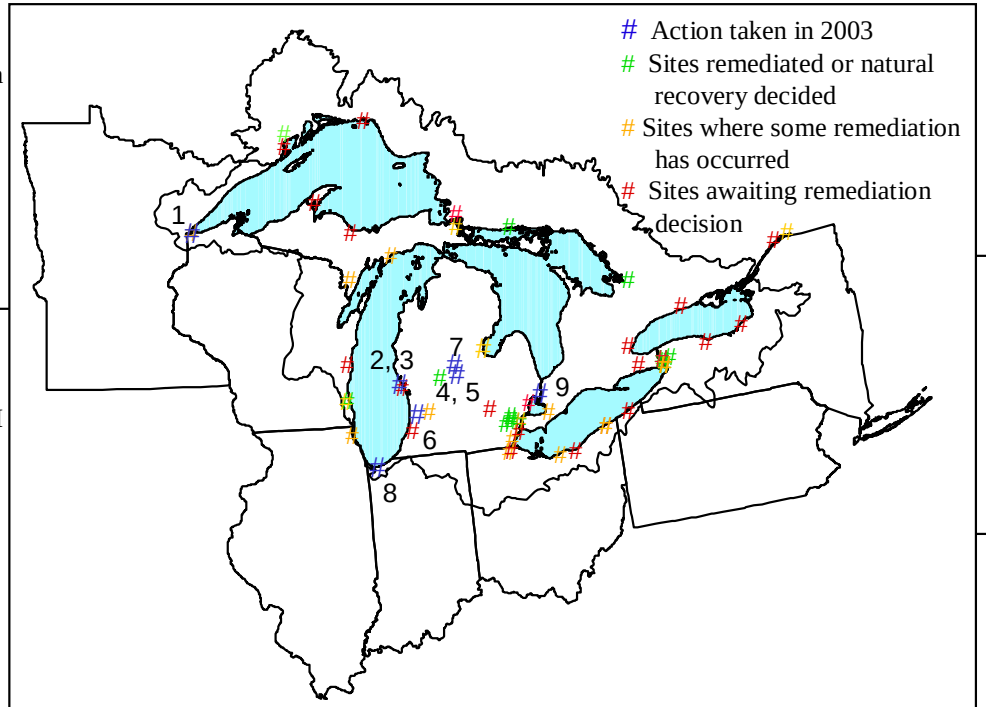
6. Consolidated Packaging Monroe, Michigan



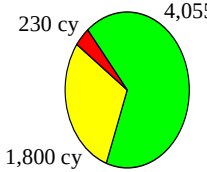


Great Lakes Sediment Remediations in 2003*

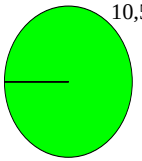
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



1. Newton Creek
Superior, Wisconsin

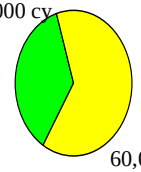


2. Occidental Chem. Corp. – White Lake, MI

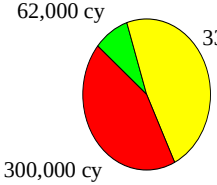


(1,100 pounds PCBs & hexachlorobenzene)

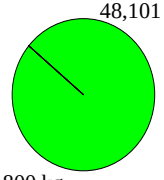
3. Tannery Bay – White Lake, MI



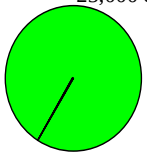
4. Velsicol Chemical – Pine River, Michigan



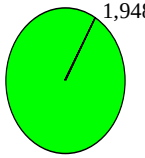
5. TPI Petroleum, Inc. – Pine River & Horse Creek, MI



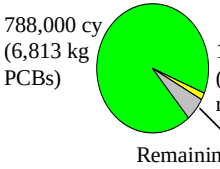
6. CR 681 at Black River – Bangor, Michigan



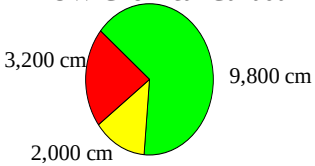
7. Unnamed Tributary to Wolf Creek, Michigan

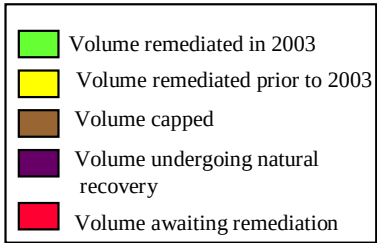


8. U.S. Steel – Gary Works
Gary, Indiana



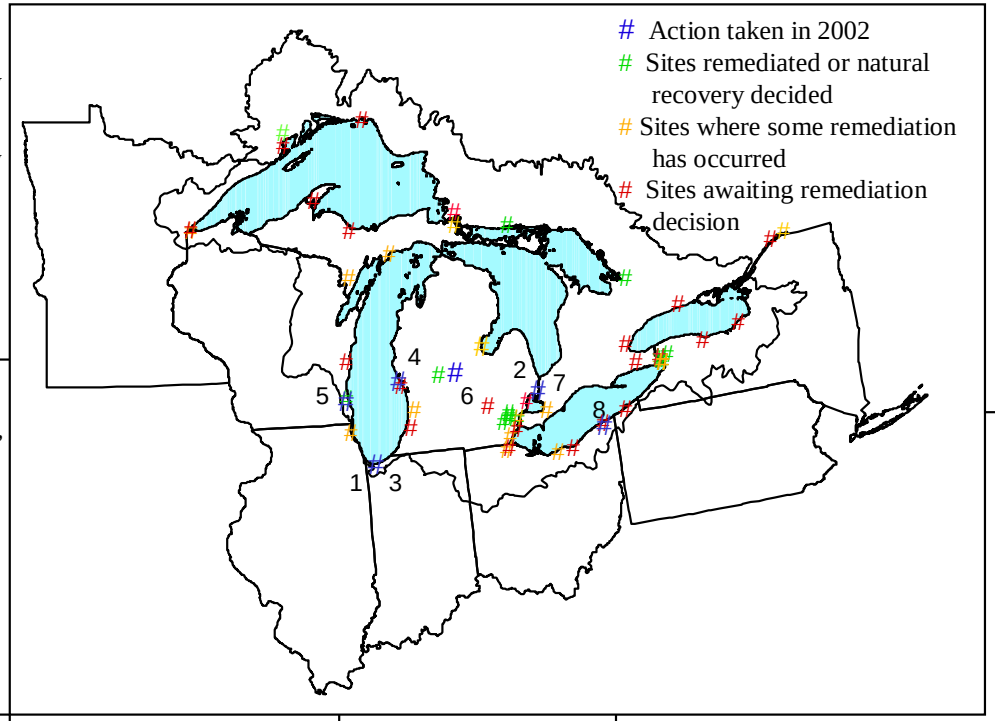
9. St. Clair River - DOW Chemical Canada



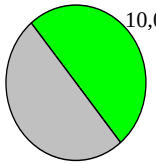


Great Lakes Sediment Remediations in 2002*

*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.

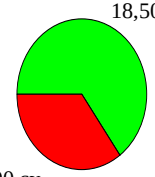


1. U.S.S. Lead Refinery Inc. - East Chicago, IN



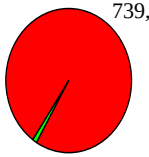
UNDETERMINED

2. Ten Mile Storm Drain - St. Clair Shores, Michigan



13,000 cy

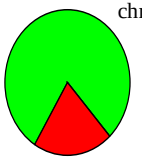
3. U.S. Steel-Gary Works - Gary, Indiana



11,000 cy
(1031 kg PCBs)

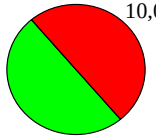
4. Tannery Bay – White Lake, Michigan

60,000 cy (345,000 pounds chromium)



15,000 cy

5. Moss American Milwaukee, WI

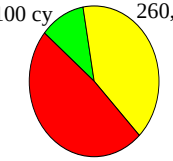


10,000 cy

6. Pine River, Michigan

(244,000 pounds DDT)

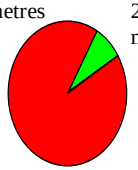
72,100 cy



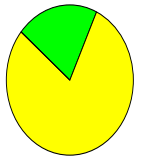
311,000 cy
(Phase 1 and Phase 2)

7. St. Clair River - DOW Chemical Canada

23,000 cubic metres (19.3 kg mercury)



8. Fields Brook Superfund Site – Ashtabula, Ohio

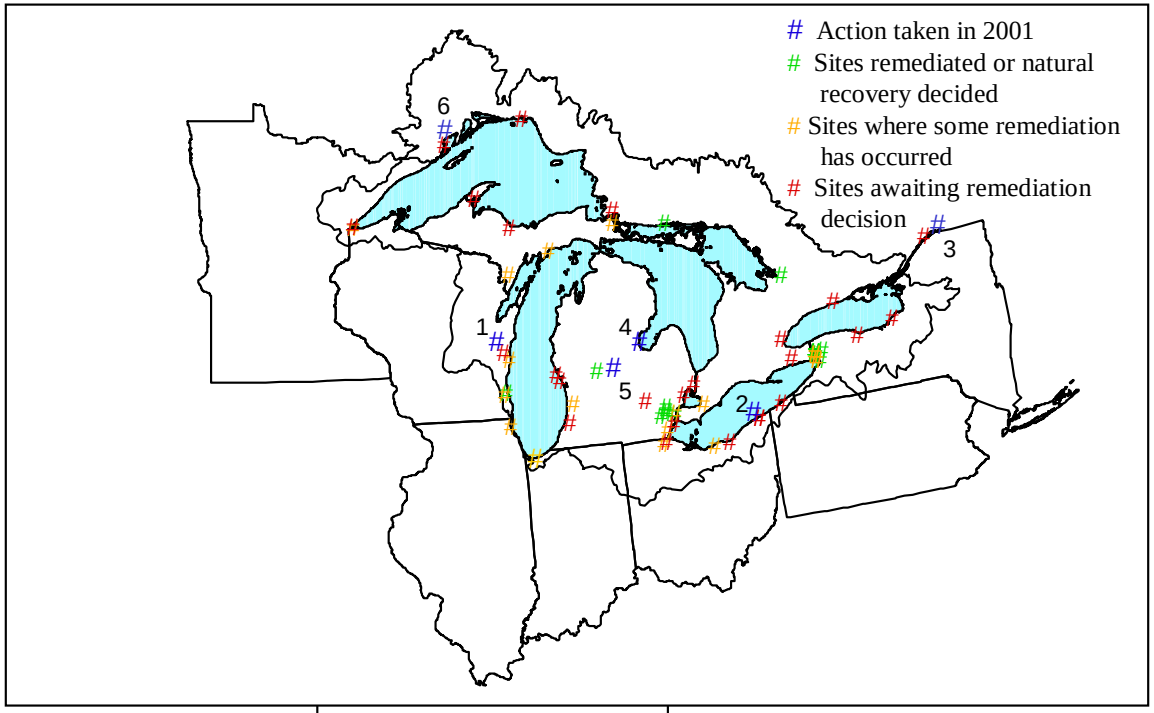


42,000 cy

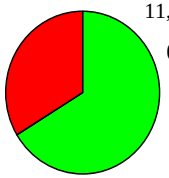
- Volume remediated in 2002
- Volume remediated prior to 2002
- Volume capped
- Volume undergoing natural recovery
- Volume awaiting remediation

Great Lakes Sediment Remediations in 2001*

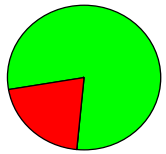
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



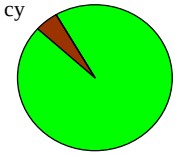
1. Hayton Area Remediation Project - OU1 – Source Abatement, Wisconsin



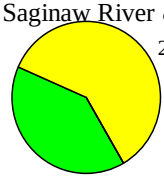
2. Fields Brook Superfund Site, Ohio



3. Reynolds Metals/Alcoa East St. Lawrence River

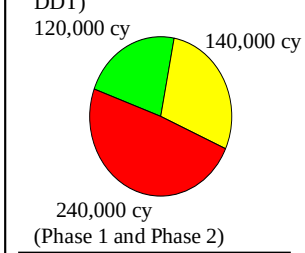


4. Saginaw River & Bay

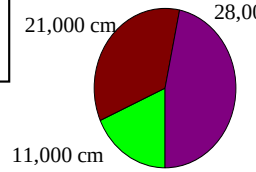


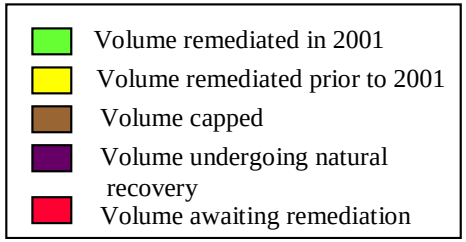
5. Pine River, Michigan

(50,300 pounds DDT)



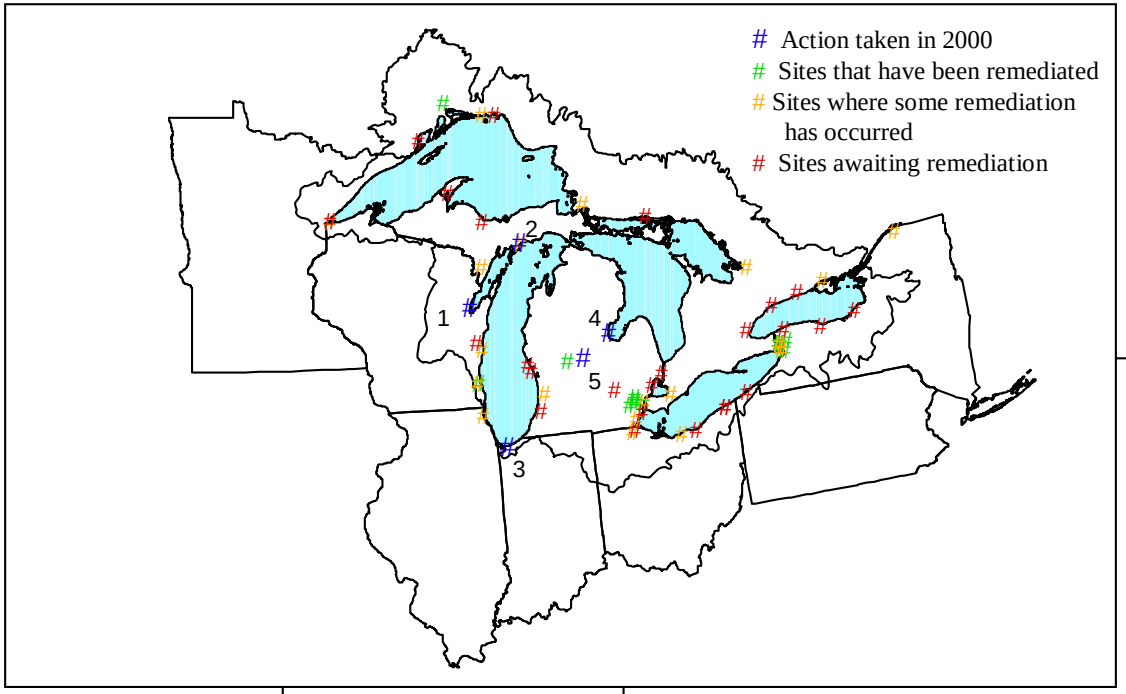
6. Thunder Bay – Northern Wood Preservers, Ontario



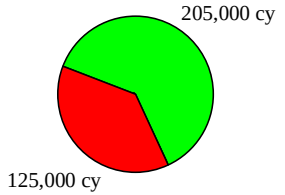


Great Lakes Sediment Remediations in 2000*

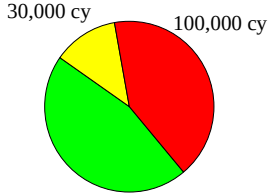
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



4. Saginaw River & Bay

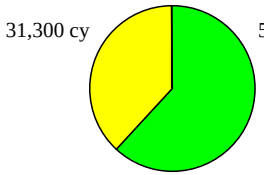


5. Pine River



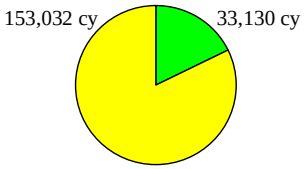
(19,200 pounds of DDT)

1. Fox River – Deposit 56/57



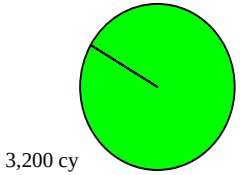
10,900,000 cy total in Fox River

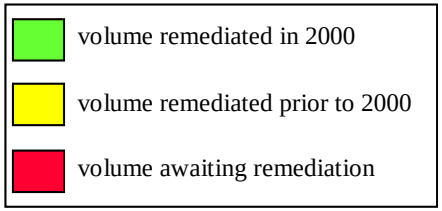
2. Manistique River & Harbor Emergency Removal



(10,600 pounds of PCBs)

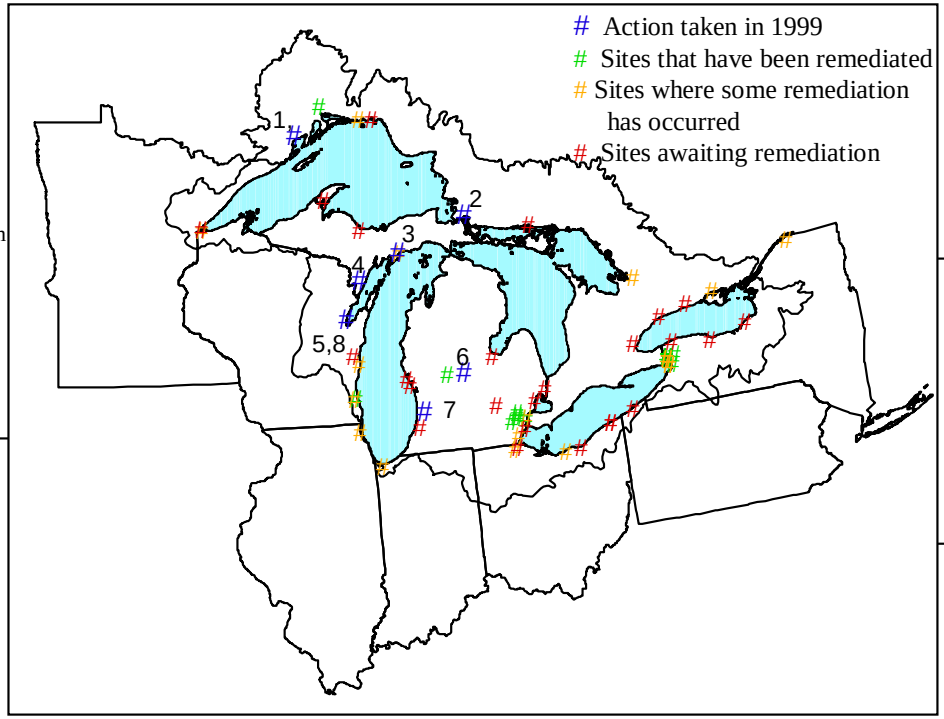
3. USX Vessel Slip Project – Lake Michigan



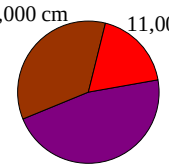


Great Lakes Sediment Remediations in 1999*

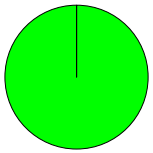
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



1. Thunder Bay – Northern Wood Preservers

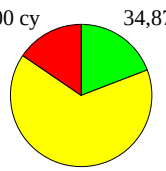


2. St. Marys River

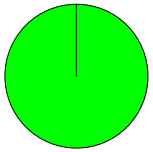


Remainder of contaminated sediments undergoing natural attenuation

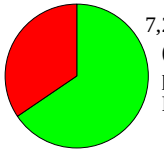
3. Manistique River and Harbor



4. Menominee River - Ansul Eighth Street Slip

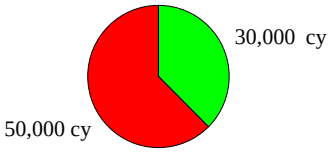


5. Fox River -Deposit N



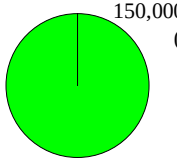
10,900,000 cy total in Fox River

8. Fox River - Deposit 56/57



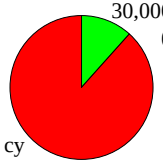
10,900,000 cy total in Fox River

7. Kalamazoo River - Bryant Mill Pond



7,000,000 cy total in Kalamazoo River

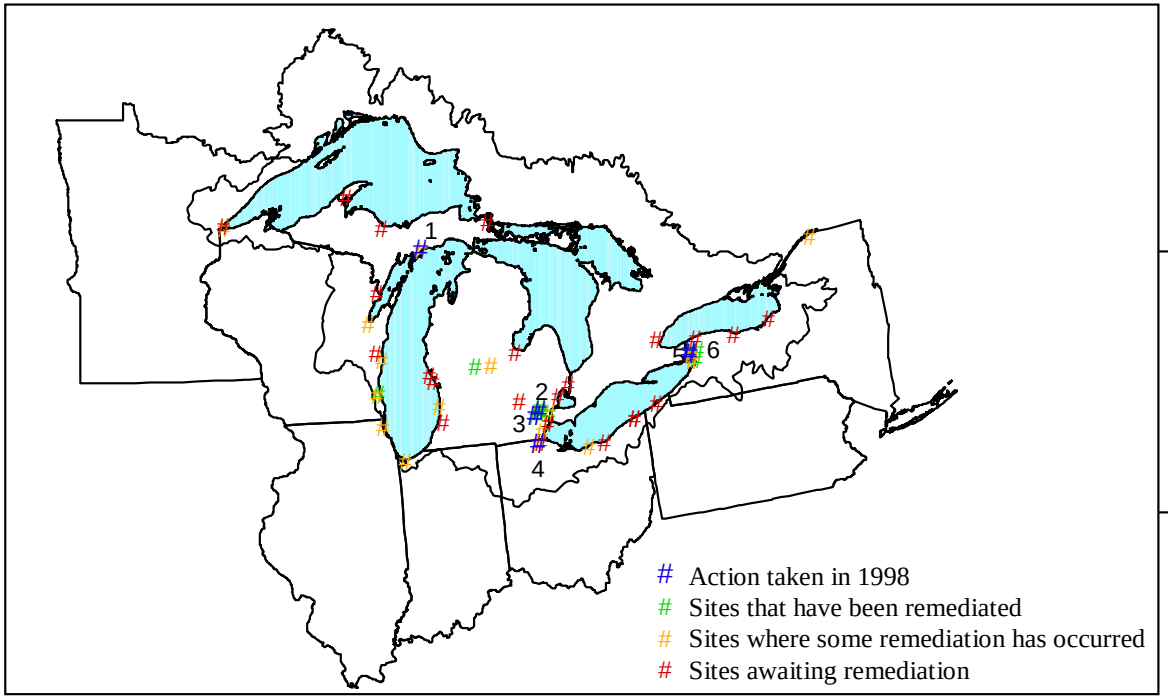
6. Pine River



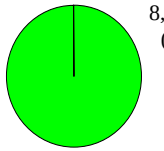
- Volume remediated in 1999
- Volume remediated prior to 1999
- Volume capped
- Volume undergoing natural recovery
- Volume awaiting remediation

Great Lakes Sediment Remediations in 1998*

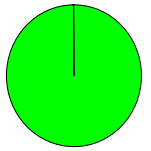
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



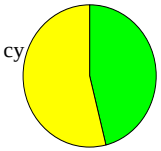
4. Ottawa River - Unnamed Tributary



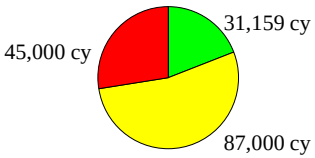
5. Niagara Mohawk - Cherry Farm/River Road



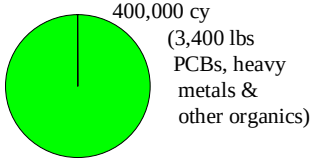
6. Gill Creek



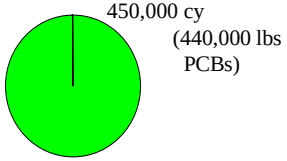
1. Manistique River and Harbor

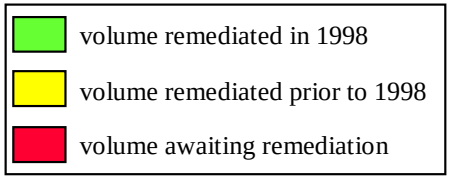


2. Newburgh Lake



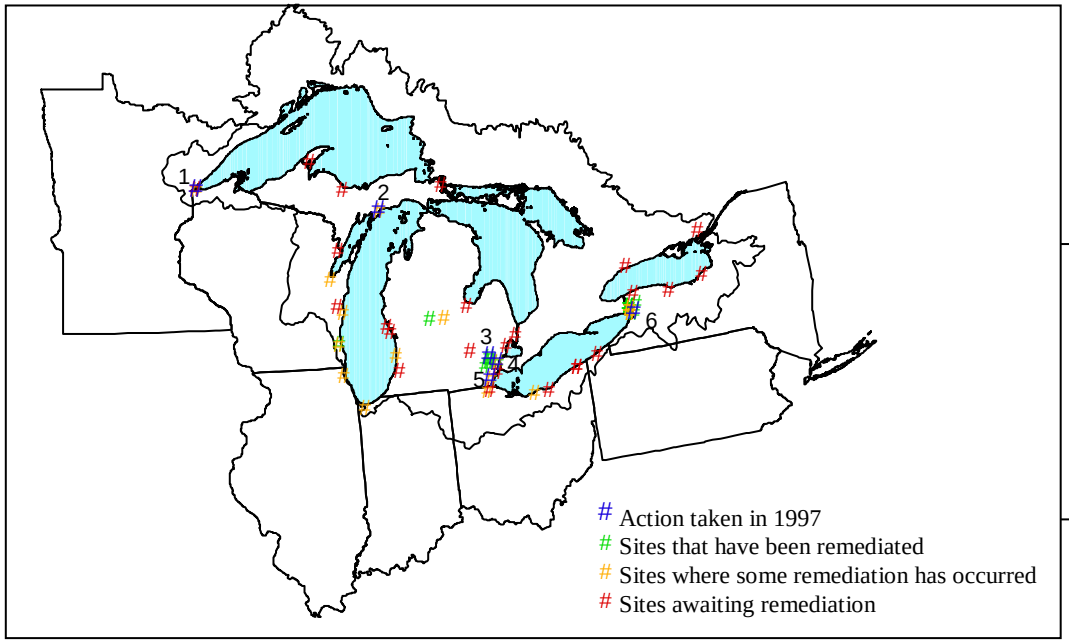
3. Willow Run Creek



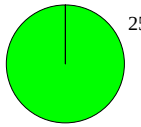


Great Lakes Sediment Remediations in 1997*

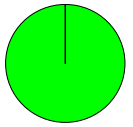
*Information included in the pie charts are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, January 2005). Detailed project information is available upon request from project managers.



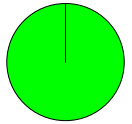
4. Monguagon Creek



5. River Raisin – Ford Monroe Outfall

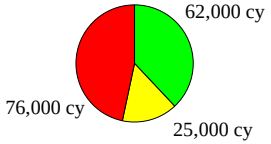


6. Niagara Transformer

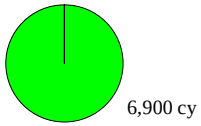


1. Newton Creek/ Hog Island Inlet

2. Manistique River and Harbor



3. Evans Product Ditch – Upper Rouge River



volume remediated in 1997
volume remediated prior to 1997
volume awaiting remediation

7.0 LONG-RANGE TRANSPORT CHALLENGE

Canadian Workgroup co-chair: S. Venkatesh
U.S. Workgroup co-chair: Todd Nettesheim

Under the Great Lakes Binational Toxics Strategy, EC and US EPA committed to:

> *"Assess atmospheric inputs of Strategy substances to the Great Lakes. The aim of this effort is to evaluate and report jointly on the contribution and significance of long-range transport of Strategy substances from worldwide sources. If ongoing long-range sources are confirmed, work within international frameworks to reduce releases of such substances."*

In support of this challenge, the U.S. and Canada have:

- Maintained the Integrated Atmospheric Deposition Network (IADN),
- Improved the integration of monitoring networks and data management,
- Continued research on the atmospheric science of toxic pollutant transport, and
- Worked through existing international frameworks to reduce releases of Strategy substances and better assess the significance of long-range transport.

Canadian Activities

Global and Regional Atmospheric Heavy Metals Model (GRAHM) by A. Dastoor, Meteorological Service of Canada

New chemical kinetics for mercury have been emerging in the last couple of years, including better knowledge of springtime mercury depletion chemistry. EC's Global and Regional Atmospheric Heavy Metals Model (GRAHM) chemical mechanism has been updated to include the most recent mercury chemistry in gas and aqueous phases. Implications of the latest chemistry on the global mercury budgets, the lifetime of mercury, and the long range transport are being investigated.

Anthropogenic emissions for 2000 have been introduced into the model. In addition to increases in total global emissions, there are significant changes in the distribution of the emissions in the latest inventory compared to the 1990 and 1995 inventories. For example, Asian emissions in the 2000 inventory are approximately 52 percent of the total global emissions (2269 tons/yr), an increase of 14 percent compared to 1990. GRAHM model simulations are being conducted to estimate the impact of these changes on the long range transport of mercury into North America. Some preliminary results are presented below.

Chinese emissions are approximately half of the Asian emissions. The model estimates that China and North America contribute approximately 7 percent and 28 percent respectively, to the Great Lakes total mercury deposition. Figure 7-1 shows the seasonal variations of the contribution. Long-range transport from China across the Pacific is

most active in the springtime as observed and also as simulated by the model (Figure 7-1a). The deposition contribution is greatest in the late spring and early fall due to the seasonal variations in transport and precipitation. The North American contribution to the Great Lakes surface mercury concentrations peaks during winter with another deposition maximum in the month of May (Figure 7-1d).

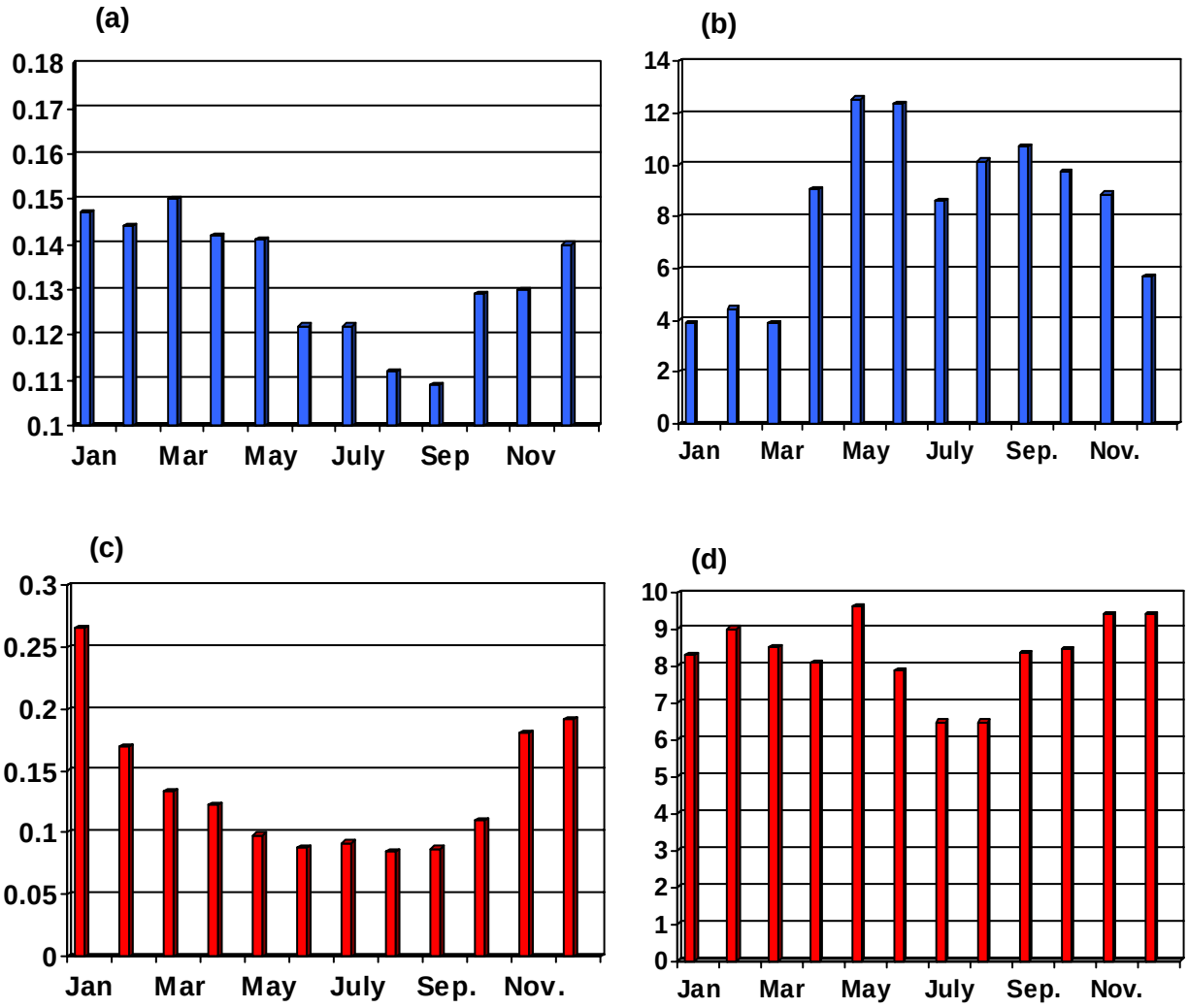


Figure 7-1. GRAHM model derived contribution to the surface air concentrations (ng/m^3) and to the monthly deposition (percentage of annual contribution) to the Great Lakes from Chinese emissions ((a) and (b), respectively) and from North American emissions ((c) and (d), respectively). Source: Meteorological Service of Canada, 2005

Toxaphene Residues in the United States Soils – What is Their Impact on the Great Lakes Basin? – by J. Ma, Meteorological Service of Canada

Considerably high toxaphene air concentrations were detected over the Great Lakes Basin, a region where toxaphene was not used extensively. This suggests that contamination in the Great Lakes and Arctic by toxaphene may not be a local issue but attributable to its volatilization from reservoirs where toxaphene has accumulated from past applications, followed by long-range transport on continental to global scales. Given that the U.S., especially the southern U.S., was the largest user of toxaphene in the world before the mid-1980s, and that a large amount of residues still persist in agricultural and non-agricultural soils in these areas, this region is likely a major source of toxaphene in the Great Lakes basin and the Arctic. To investigate the contribution of the major toxaphene reservoirs in the U.S. to its budget in the Great Lakes basin, a coupled regional-scale atmospheric transport, soil-air and water-air exchange model, the Canadian Model for Environmental Transport of Organochlorine Pesticides (CanMETOP) was used. The modeling looked at toxaphene pathways in multimedia environments in the North American continent in the year 2000. The model results indicated that on an annual basis the southeast U.S. sources made the largest contributions to toxaphene levels in the air and the depositions to all lakes (or basin-wide deposition) at 72 percent for the air concentration, 78 percent for dry deposition, and 88 percent for wet deposition (Figure 7-2).

A significant proportion of these contributions occur during relatively short episodic events, particularly in the winter/spring and summer/autumn transition periods due primarily to the interseasonal changes in atmospheric circulation patterns. A strong episodic long-range transport event of toxaphene air concentration from the southeast U.S. occurring during September 9 -13, 2000, was captured by the numerical simulations (Figure 7-3). During this event, there was a warm and humid air mass moving from the Gulf of Mexico and the southern U.S. to the Great Lakes, resulting in strong precipitation and wet deposition to the Lakes.

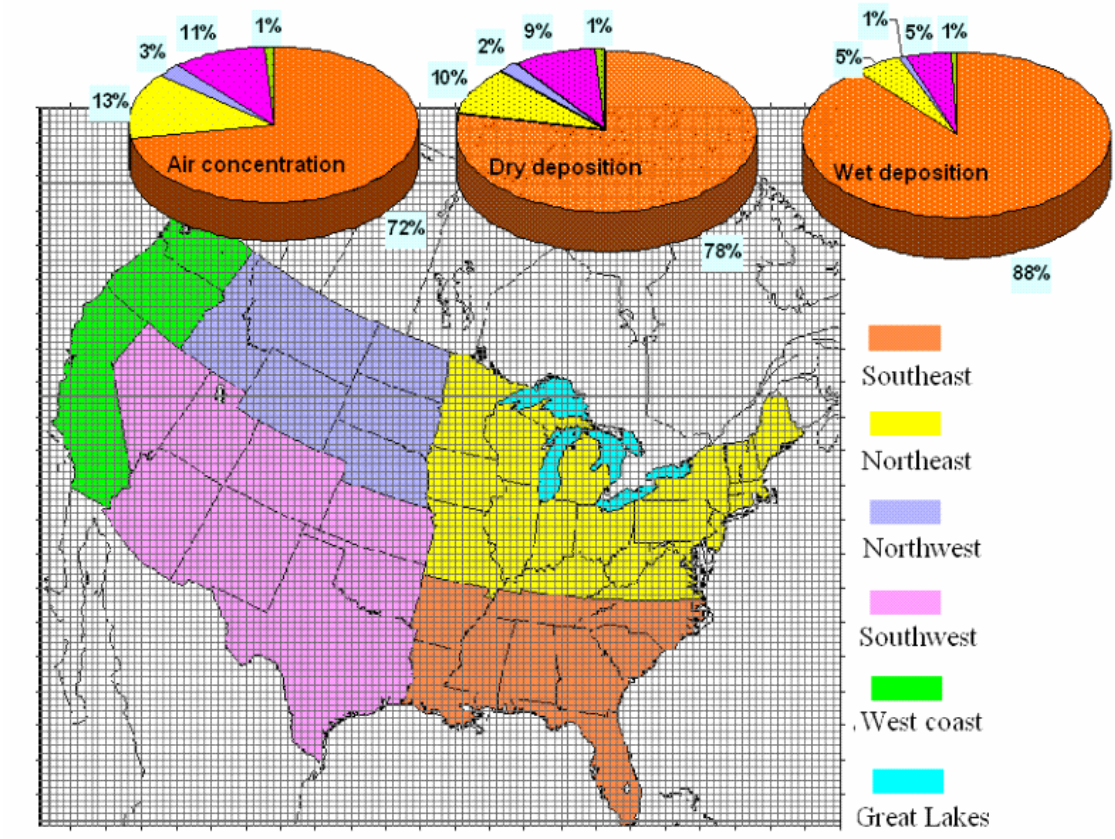


Figure 7-2. Percentage contribution of toxaphene soil residues in different regions of the US to toxaphene air concentration, and dry and wet depositions in the Great Lakes. Source: Meteorological Service of Canada, 2005

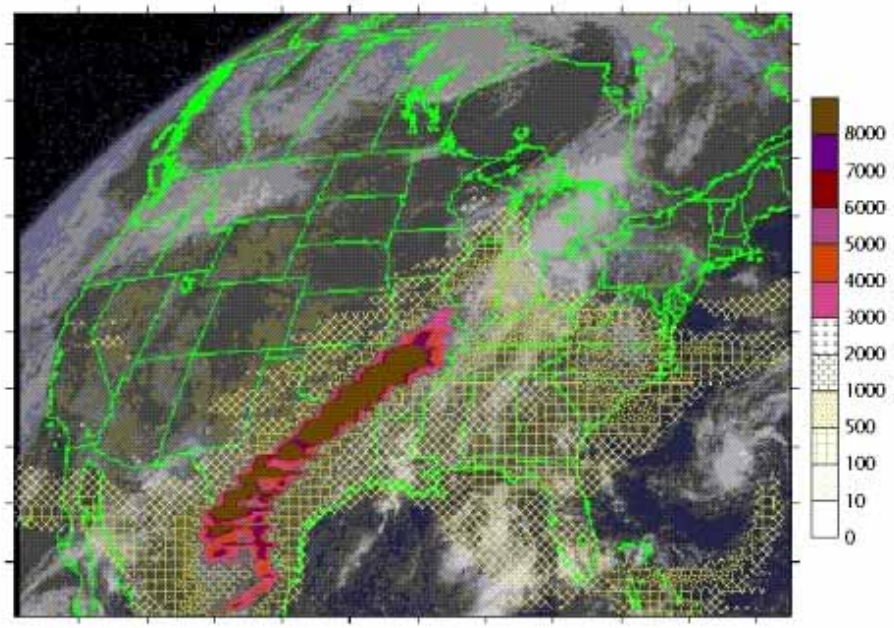


Figure 7-3. Toxaphene air concentration (pg/m^3) at 1200 m superimposed on GOES-8 visible satellite image showing a rain band extending from the Gulf of Mexico and southern U.S. to the Great Lakes on September 10, 2000. Source: Meteorological Service of Canada, 2005

Modeled annual dry, wet and total (dry + wet) deposition fluxes to each lake show that Lakes Erie and Michigan received more toxaphene than the other three lakes (Figure 7-4). In the eastern Great Lakes (Lakes Erie, Ontario and Huron), as a result of higher precipitation rates in this region, wet deposition contributes more to the total deposition, while dry deposition is higher in the two upper lakes (Lakes Michigan and Superior). Comparison of the modeled total deposition values of 1.5, 5.8, and 3.3 kg/yr for Lakes Superior, Michigan,and Ontario for the year 2000 from this study with estimated values of 18.8, 13.6, and 5 kg/yr, respectively, for the mid-1990s by Swackhamer *[need reference]*, indicates a clear decreasing trend in toxaphene loading in each of the three lakes from the mid-1990s to 2000. For more information please see the listed references.

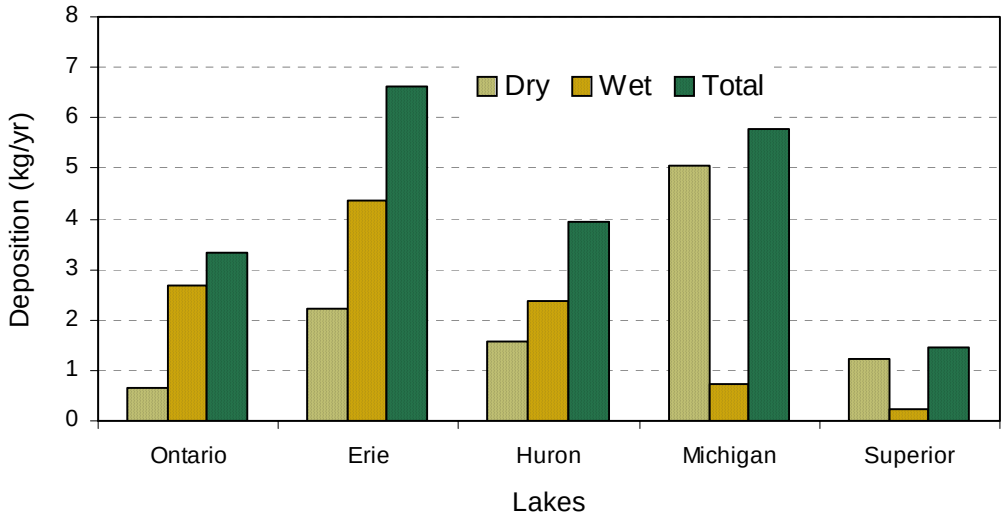


Figure 7-4. Modeled annual dry, wet and total (=dry + wet) depositions (kg yr^{-1}) to each of the Great Lakes in 2000. Source: Meteorological Service of Canada, 2005

References

Ma, J**.,** Venkatesh, S., Li, Y., and Daggupaty, S. M. (2005), Tracking toxaphene in the North American Great Lakes basin – 1. Impact of toxaphene residues in the U.S. Soils, *Environ. Sci. Technol***.,** 39. In press.

Ma, J**.,** Venkatesh, S., Li, Y., Cao, Z. and Daggupath, S. M. (2005), Tracking toxaphene in the North American Great Lakes basin – 2. A strong episodic long-range transport event, *Environ. Sci. Technol***.,** 39. In press.

U.S. Activities

Modeling Transport and Deposition of Level 1 Substances to the Great Lakes – by T. Nettesheim, US EPA Great Lakes National Program Office; and M. MacLeod, W. Riley, and T. McKone, Lawrence Berkeley National Laboratory

The US EPA GLNPO provided support to the Lawrence Berkeley National Laboratory to model the transport and deposition of Level 1 substances to the Great Lakes. Two multimedia mass balance models based on the Berkeley-Trent (BETR) model framework were used to calculate the efficiency of atmospheric transport and deposition to the Great Lakes for emissions of the Level 1 substances in different regions of North America and globally. The BETR model describes contaminant partitioning and fate in the environment using mass balance equations based on the fugacity concept.

The BETR North America model describes the North American environment as 24 ecological regions. Within each region, contaminant fate is described using a 7-compartment fugacity model including a vertically segmented atmosphere, vegetation, soil, freshwater, freshwater sediments, and coastal ocean/sea water.

The BETR Global model is based on the same Berkeley-Trent contaminant fate modeling framework as the BETR North America Model. However, the BETR Global model incorporates several refinements to the general structure to allow more flexibility and to describe the global environment in more detail and with higher temporal resolution. The BETR Global model uses a monthly time scale to specify atmospheric conditions and a 15° by 15° grid coverage of the globe, resulting in 288 multimedia regions.

The model analysis allows the Level 1 substances to be categorized according to the spatial scale of emission likely to impact the Great Lakes:

(1) Local or regional scale – dieldrin, aldin, and B(a)P;
(2) Continental scale – chlordane, 2,3,7,8-tetrachlorodibenzodioxin, *p,p,*-DDT, toxaphene, OCS, and mirex;
(3) Hemispheric scale – PCBs; and
(4) Global scale – HCB and alpha-HCH.

The model's transfer efficiency calculations can be used along with available emission inventory data to estimate the contribution of emissions in different locations to atmospheric deposition fluxes to the Lakes. As a case study, global estimates of emissions to air for individual PCB congeners on a country by country basis between 1930 and 2000 (Breivik et al. 2002 *Science of Total Environment – need reference*) were used as inputs to the BETR Global model.

Comparison of cumulative historical emissions scenarios (Figures 7-5, 7-7, and 7-9) with estimated emissions in the year 2000 (Figures 7-6, 7-8, and 7-10) indicates that the relative contributions from sources outside North America are increasing as sources are curtailed in the U.S. and Canada. In particular, Eastern Europe appears to be becoming a relatively more important source to the Great Lakes. However, under all emission scenarios considered, the majority of PCB deposition to the Great Lakes is attributable to sources in North America.

The uncertainties associated with these assessments are believed to be dominated by uncertainties in emission estimates of the Level 1 substances. Further research should be focused on better characterization of emissions in North America and globally.

References

MacLeod, M., Riley, W.J., McKone, T.E. 2005. Modeling Transport and Deposition of Level 1 Substances to the Great Lakes. Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energies Technology Division.

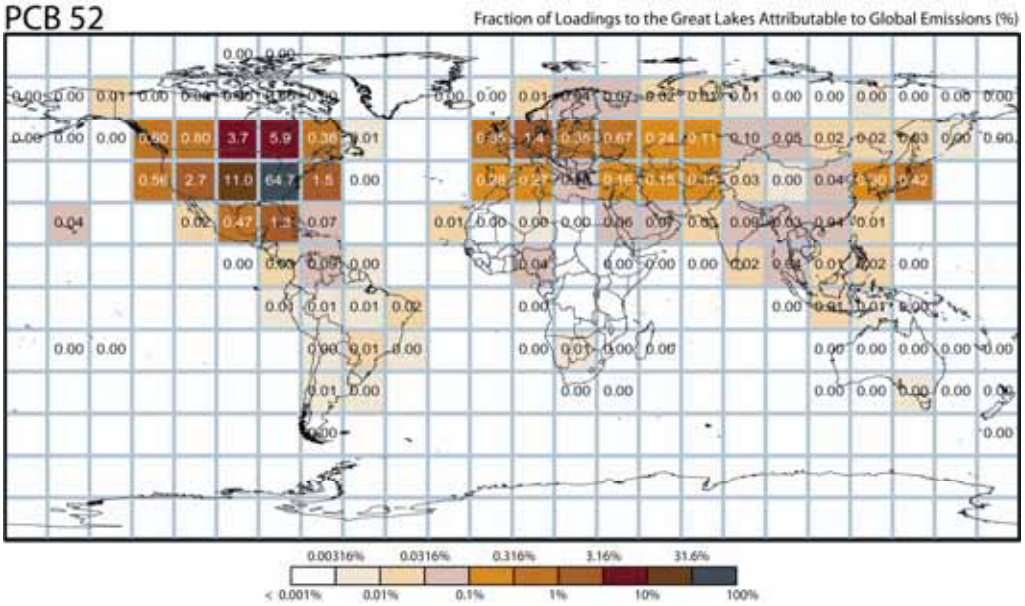


Figure 7-5. Estimated fraction of atmospheric loading of PCB 52 to the Great Lakes attributable to emissions in each region of the BETR Global model from cumulative 1930-2000 emissions. Source: MacLeod et al., 2005

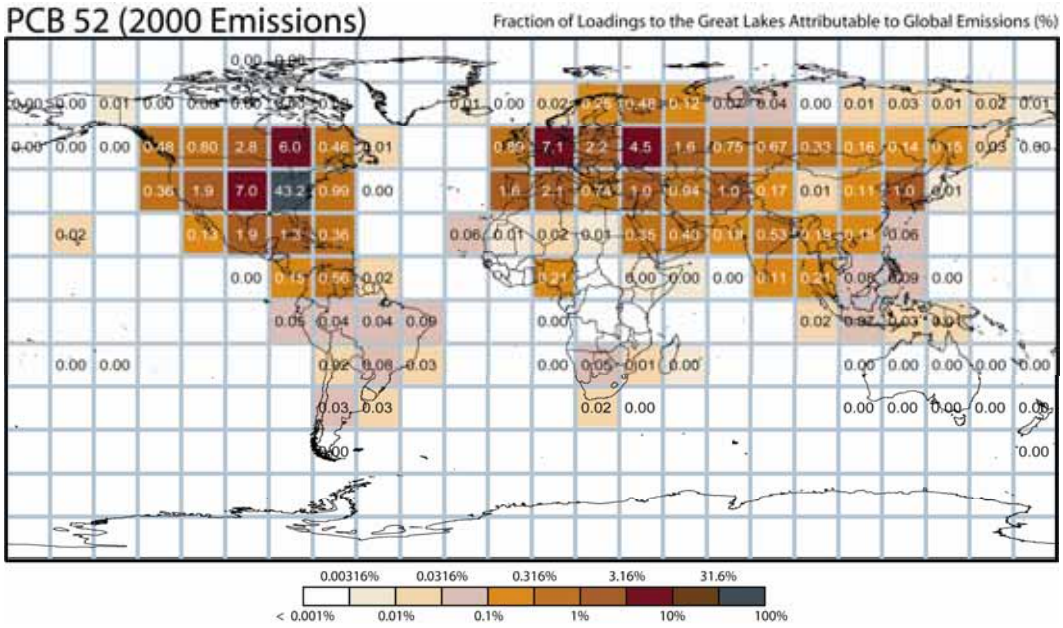


Figure 7-6. Estimated fraction of atmospheric loading of PCB 52 to the Great Lakes attributable to emissions in each region of the BETR Global model due to year 2000 emissions. Source: MacLeod et al., 2005

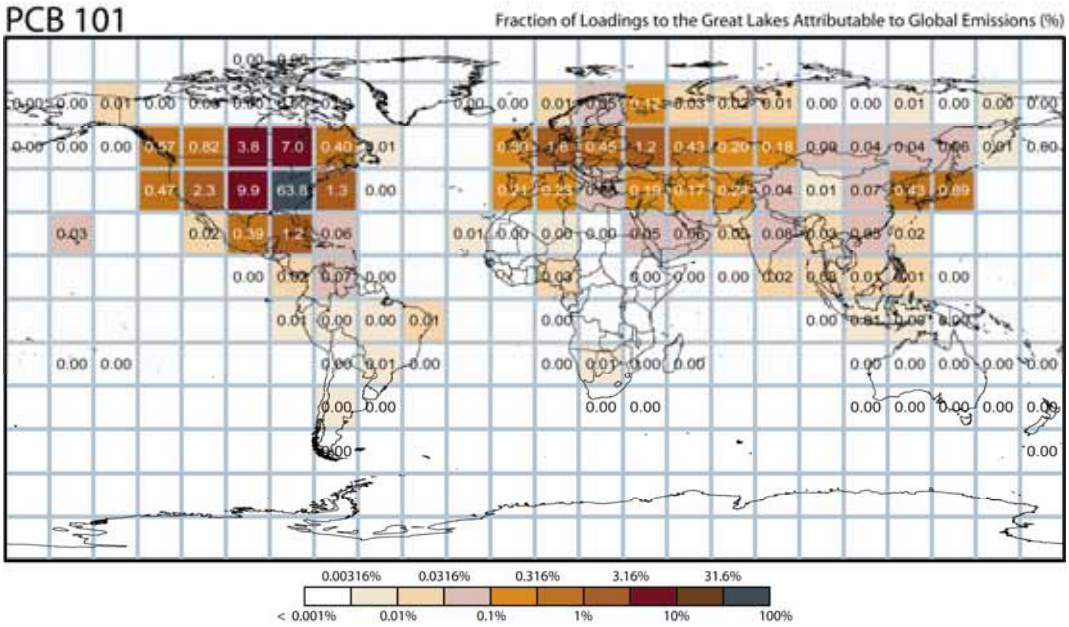


Figure 7-7. Estimated fraction of atmospheric loading of PCB 101 to the Great Lakes attributable to emissions in each region of the BETR Global model from cumulative 1930-2000 emissions. Source: MacLeod et al., 2005

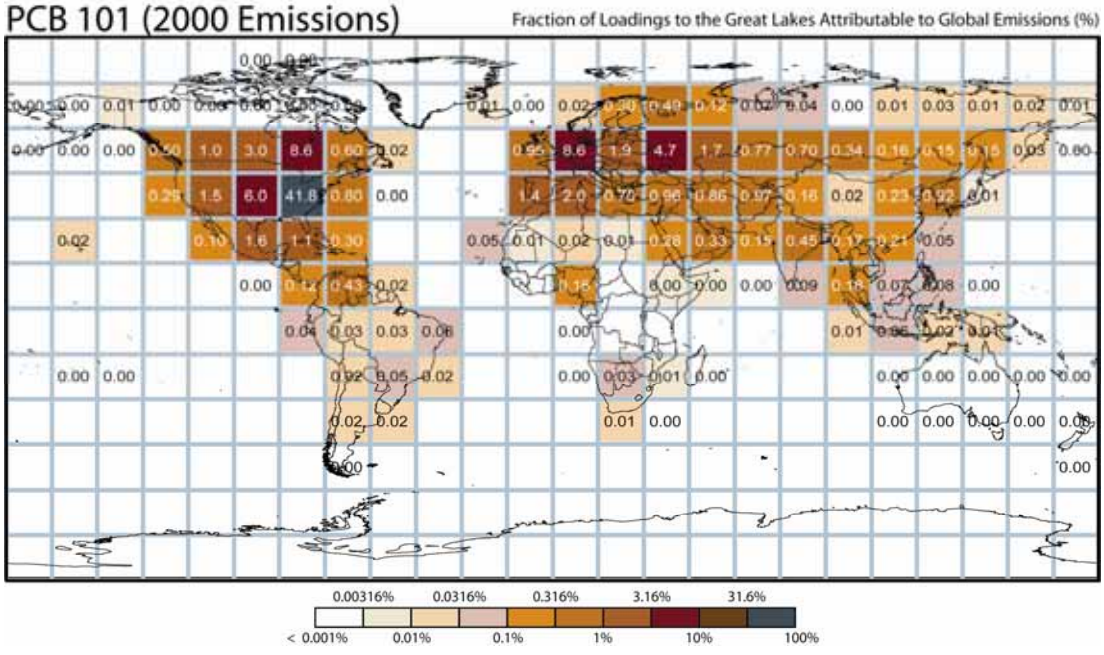


Figure 7-8. Estimated fraction of atmospheric loading of PCB 101 to the Great Lakes attributable to emissions in each region of the BETR Global model due to year 2000 emissions. Source: MacLeod et al., 2005

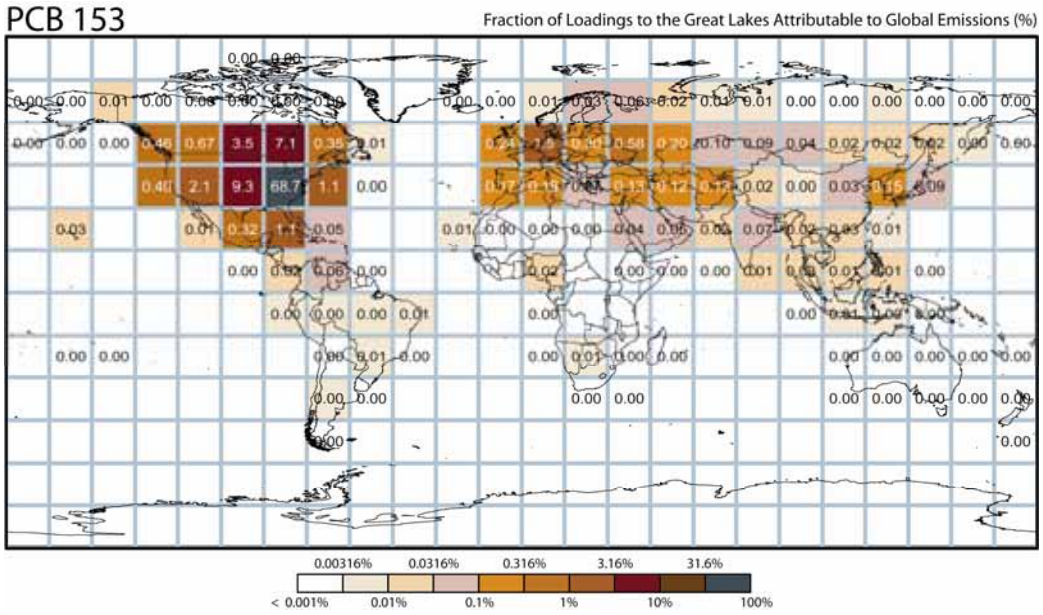


Figure 7-9. Estimated fraction of atmospheric loading of PCB 153 to the Great Lakes attributable to emissions in each region of the BETR Global model from cumulative 1930-2000 emissions. Source: MacLeod et al., 2005

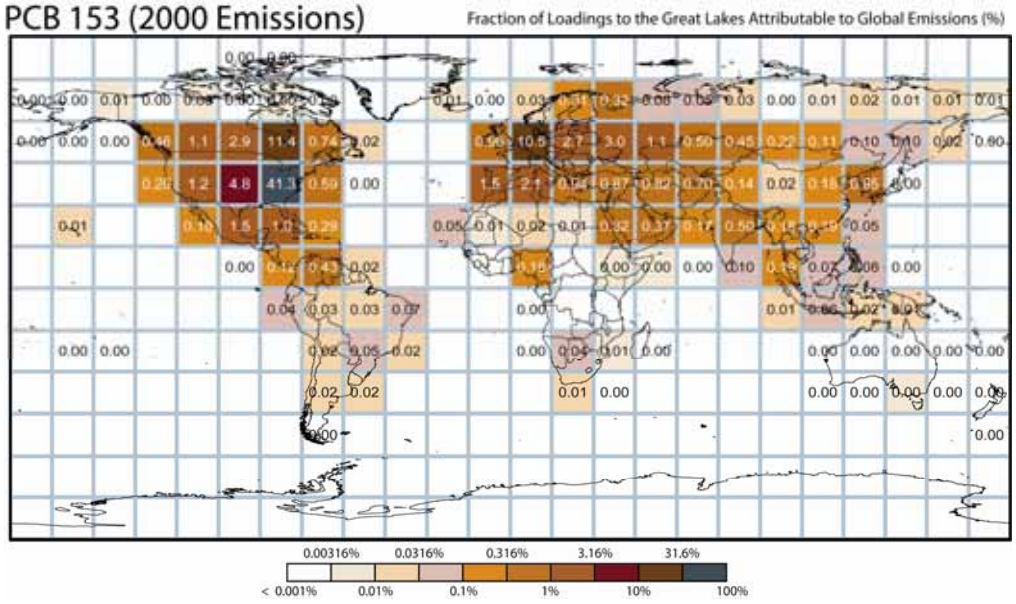


Figure 7-10. Estimated fraction of atmospheric loading of PCB 153 to the Great Lakes attributable to emissions in each region of the BETR Global model due to year 2000 emissions. Source: MacLeod et al., 2005

APPENDIX A

GREAT LAKES BINATIONAL TOXICS STRATEGY (GLBTS)
PROGRESS OVERVIEW 1997 – 2005

GREAT LAKES BINATIONAL TOXICS STRATEGY (GLBTS)
PROGRESS OVERVIEW 1997 – 2005

GLBTS Development, Integration Workgroup, and Stakeholder Forum
1997
- 4/7/97 U.S. and Canada sign the *GLBTS: Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes* - 6/26/97 Stakeholders invited to workshop to develop a draft GLBTS Implementation Plan - 12/97 GLBTS Implementation Plan distributed and Substance participation solicited - 12/97 GLBTS Website is developed
1998
- 3/23/98 Kick-off implementation meeting in Chicago to form seven substance workgroups - 6/19/98 The first GLBTS Integration Workgroup meeting is convened in Romulus, Michigan - 6/98 GLBTS Website is redesigned; PCBs and Mercury Workgroup pages added - 7/98 GLBTS Website is redesigned; Integration, Dioxins, Pesticides, HCB/B(a)P, Alkyl-lead, and OCS Workgroup pages added - 10/21-23/98 GLBTS display and presentation (including GLBTS handouts, a brochure, Website cards, GLBTS progress timeline and activity sheets) at SOLEC in Buffalo, NY - 11/16/98 The first GLBTS Stakeholder Forum is convened in Chicago, IL - 11/16/98 The first GLBTS Progress Report is distributed

GLBTS Development, Integration Workgroup, and Stakeholder Forum
1999
- 1/26/99 GLBTS Integration Workgroup meets in Windsor, Ontario - 4/27/99 GLBTS Stakeholder Forum is held in Toronto, Ontario - 4/28/99 GLBTS Integration Workgroup meets in Toronto, Ontario - EC and US EPA develop draft communications strategy, present it to Integration Workgroup, and revise strategy based on stakeholder comments - 8/24/99 GLBTS Integration Workgroup meets in Detroit, Michigan - 9/23-26/99 US EPA, EC and invited speakers give GLBTS session presentation at the IJC Great Lakes Water Quality Forum in Milwaukee, WI - 9/24/99 A preliminary draft GLBTS Progress Report issued at IJC meeting in Milwaukee, WI - 10/99 GLBTS main and Mercury Workgroup web pages are redesigned - 10/7/99 A Canadian GLBTS *Report on Level II Substances* is posted on the GLBTS Website - 11/18/99 GLBTS Stakeholder Forum is held in Chicago, IL - 11/19/99 GLBTS Integration Workgroup meets in Chicago, IL - 12/99 Preliminary planning initiated for a PCP Workshop (to include the GLBTS pesticides, HCB and Dioxin/Furan Workgroups) - 12/3/99 a U.S. *GLBTS Report on Level II Substances* is posted on the GLBTS Website - 12/15/99 Draft (Full) 1999 GLBTS Progress Report issued - 1999 (various dates) Development of a Canadian GLBTS communications plan
2000
- 1/28/00 Municipal Solid Waste and Incineration Workgroup planning conference call - 2/11/00 Municipal Solid Waste and Incineration Workgroup planning conference call - 2/15/00 GLBTS Integration Workgroup meets in Windsor, Ontario - 5/15/00 Protecting the Great Lakes, Sources of PBT Reductions Workshop on Municipal Solid Waste Management is held in Toronto, Ontario - 5/16/00 GLBTS Stakeholder Forum is held, with the theme “Meeting the Challenge” - 9/22/00 GLBTS Integration Workgroup meets in Chicago, IL - 2000 (various dates) GLBTS communications plan is finalized by EC; “key messages” finalized; various communications products in development (brochure, business cards, display unit, letterhead, Website improvements, success stories)

GLBTS Development, Integration Workgroup, and Stakeholder Forum
2001
- 2/20/01 GLBTS Integration Workgroup meets in Windsor, Ontario - 2/21/01 GLBTS 2000 Progress Report is posted to GLBTS Website - 5/17/01 GLBTS Stakeholder Forum is held in Toronto, Ontario - 5/18/01 GLBTS Integration Workgroup meets in Toronto, Ontario - 6/18/01 GLBTS Sector Subgroup begins a series of conference calls to select a short list of sectors for a pilot effort - 8/28/01 GLBTS Integration Workgroup meets in Chicago, IL - 9/19/01 GLBTS Sector Subgroup begins information-gathering phase focusing on the short list of sectors - 11/14/01 GLBTS Stakeholder Forum is held in Chicago, IL, with the theme "Implementation – Partners in Progress" - 11/15/01 GLBTS Integration Workgroup meets in Chicago, IL - 11/16/01 GLBTS/LaMP Workshop in Chicago, IL, with the theme of "Program Synergies – Partners in Progress, Exploring how we can mutually support the pollutant reduction needs and efforts of each program synergistically"
2002
- 1/25/02 GLBTS Sector Subgroup begins summarizing findings - 2/26/02 GLBTS Sector Subgroup presents summary of findings to Integration Workgroup - 2/26/02 GLBTS Integration Workgroup meets in Windsor, Ontario - The GLBTS EC/US EPA Website "binational.net" is created - 5/29/02 GLBTS Stakeholder Forum and Five-Year Anniversary event are held in Windsor, Ontario - 5/29/02 GLBTS Five-Year Perspective report issued - 5/30/02 GLBTS Integration Workgroup meets in Windsor, Ontario - 9/16/02 GLBTS Sector Subgroup holds conference call to discuss a pilot sector project - 9/18/02 GLBTS Integration Workgroup meets in Chicago, IL - 12/3/02 GLBTS Stakeholder Forum is held in Chicago, IL - 12/3/02 Draft GLBTS 2002 Progress Report issued - 12/4/02 GLBTS Integration Workgroup meets in Chicago, IL

GLBTS Development, Integration Workgroup, and Stakeholder Forum
2003
- 2/25/03 GLBTS Integration Workgroup meets in Windsor, Ontario - 3/01/03 GLBTS Binational.net bookmark created as a marketing tool - 4/01/03 GLBTS CD ROM containing the Strategy, annual progress reports (1998, 1999, 2000, 2001, & 2002), Five-Year Perspective, and various Strategy Updaters (all in both French and English) is created and 5,000 copies are sent to basin stakeholders and Washington and Ottawa government officials - 4/03/03 GLBTS presentation to the Lake Superior LaMP Forum in Duluth, Minnesota - 5/05/03 GLBTS presentation to International Pulp and Paper Conference in Portland, Oregon - 5/13/03 GLBTS presentation to Commission for Environmental Cooperation, Sound Management of Chemicals (SMOC) meeting in Windsor, Ontario - 5/14/03 Final GLBTS 2002 Progress Report posted at www.epa.gov/glnpo/bns and binational.net - 5/14/03 GLBTS Stakeholder Forum held in Windsor, Ontario, in conjunction with CEC SMOC public meeting - 5/15/03 GLBTS Integration Workgroup meets in Windsor, Ontario - 6/01/03 GLBTS Update prepared, as well as GLBTS displays in French, Spanish, and English - 6/11/03 GLBTS presentation to Canadian P2 Roundtable in Calgary, Alberta - 6/16/03 Conference call with Agricultural Subgroup of Integration Workgroup - 6/23/03 GLBTS presentation to IAGLR in Chicago, Illinois - 7/31/03 GLBTS Public outreach tent set up at Chicago Tall Ships event in Chicago, Illinois - 8/11/03 GLBTS presentation at Emerging Chemicals Workshop in Chicago, Illinois - 8/19/03 Conference call with LaMP leads to discuss GLBTS/LaMP Crosswalk of priorities - 9/01/03 *GLBTS 2003 Activity Update* prepared - 9/04/03 Conference call held with small number of Integration Workgroup members to discuss draft GLBTS Level I Substance Assessment Process - 9/11/03 GLBTS Integration Workgroup meets in Toronto, Ontario - 9/11/03 *GLBTS Fall 2003 Workgroup Activity Update* distributed - 9/18/03 GLBTS attendance at the IJC Public Forum in Ann Arbor, Michigan - 10/24/03 GLBTS presentation to European delegation at EU REACH Program in Chicago, Illinois - 11/25/03 Conference call with LaMP and GLBTS Stakeholders to discuss GLBTS Level I Substance Assessment Process - 12/02/03 GLBTS presentation to Lake Superior LaMP Task Force in Thunder Bay, Ontario - 12/16/03 GLBTS Stakeholder Forum is held in Chicago, IL - 12/16/03 Draft *GLBTS 2002 Progress Report* issued - 12/17/03 GLBTS Integration Workgroup meets in Chicago, IL

GLBTS Development, Integration Workgroup, and Stakeholder Forum
2004
- 2/04 Final *GLBTS 2003 Progress Report* posted at www.epa.gov/glnpo/bns and binational.net - 4/13/04 – 4/15/04 GLBTS Management Framework Workshop in Chicago, Illinois - 6/17/04 GLBTS Stakeholder Forum is held in Toronto, Ontario - 6/18/04 GLBTS Integration Workgroup meets in Toronto, Ontario - 10/07/04 GLBTS Integration Workgroup meets in Toronto, Ontario: Draft Management Assessments for OCS and dioxin presented - 10/07/04 GLBTS Fall 2004 Workgroup Activity Update distributed - 11/16/04 – 11/18/04 Presentation at Workshop on Environmental Health Effects of Persistent Toxic Substances – Hong Kong: "The GLBTS as a Governance Model to reduce PTS" - 11/30/04 GLBTS Stakeholder Forum is held in Chicago, IL - 12/01/04 Draft *GLBTS 2004 Progress Report* issued - 12/01/04 GLBTS Integration Workgroup meets in Chicago, IL
2005 and Ongoing
- 3/23/05 GLBTS Integration Workgroup meets in Windsor, Ontario: Draft Management Assessments for HCB, B(a)P, PCB, mercury, alkyl-lead, and pesticides presented - 5/05 Final *GLBTS 2004 Progress Report* posted at http://binational.net/bns/2004/index.html - 5/17/05 GLBTS Stakeholder Forum is held in Toronto, Ontario - 5/18/05 GLBTS Integration Workgroup meets in Toronto, Ontario - 9/15/05 GLBTS Integration Workgroup meets in Chicago, IL - 12/06/05 GLBTS Stakeholder Forum is held in Chicago, IL - 12/07/05 Draft *GLBTS 2005 Progress Report* issued - 12/07/05 GLBTS Integration Workgroup meets in Chicago, IL

Substance Activities: Mercury (Hg)

GLBTS Workgroup Activities and Reports

1998

- 3/23/98 Workgroup (WG) is formed at the first implementation meeting
- 5/5/98 WG conference call is held
- 8/24/98 *Background Information on Mercury Sources and Regulations* is posted on the GLBTS Website
- 9/10/98 Options Paper *Developing a Virtual Elimination Strategy for Mercury* is posted on the GLBTS Website
- 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
- 11/17/98 GLBTS workshop on Potential Mercury Reductions at Electric Utilities is held in Chicago

1999

- 1/99 GLBTS web postings include: *Wisconsin Mercury Source Book* on community Hg reduction plans, findings of the Mercury Reduction at Electric Utilities workshop, and *Mercury Success Stories*
- 2/99 Information and FAQs on mercury fever thermometers posted on the GLBTS Website
- 3/99 GLBTS web postings include: The WDNR guide, *Mercury in your Community and Environment,* and a manual for hospitals, *Reducing Mercury Use in Health Care*
- 4/99 Workshop on community initiatives for reducing Hg
- 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario
- 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
- 11/99 Draft GLBTS Step 1&2 *Sources and Regulations* report for mercury is posted on the GLBTS Website

2000

- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario
- 6/00 GLBTS web page on Mercury Thermometers and FAQs is updated
- 8/00 Memo on progress in reducing mercury use posted on the GLBTS Website
- 9/1/00 A final draft GLBTS *Reduction Options* (Step 3) report for mercury is prepared and posted on the GLBTS Website on 9/29/00
- 10/17/00 Expansion of mercury web page links
- 11/18/00 WG meeting at the GLBTS Stakeholder Forum in Toronto

2001

- 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto
- 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL

Substance Activities: Mercury (Hg)
2002
- 5/29/02 – 5/30/02 WG meeting at the GLBTS Stakeholder Forum in Windsor, Ontario - 12/2/02 WG meeting in Chicago, IL on reducing impact of dental mercury - 12/3/02 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2003
- 5/14/03 – 5/15/03 WG meeting at the GLBTS Stakeholder Forum in Windsor, Ontario - 12/16/03 – 12/17/03 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2004
- 6/17/04 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 8/04/04 Workgroup report revised: *Options for Dental Mercury Reduction Programs: Information for State and Local Governments* - 11/30/04 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2005 and ongoing
- 5/17/05 WG meeting in Toronto, Ontario - 12/06/05 WG meeting in Chicago, IL
Other Mercury Related Activities
1997 and Earlier
- Chlorine Institute voluntary mercury commitment to reduce mercury use by 50% by 2005 - 12/97 *Mercury Report to Congress* is released by US EPA
1998
- 5/8/98 Chlorine Institute releases progress report on voluntary mercury commitment - 6/25/98 US EPA and AHA sign an MOU on reducing medical wastes - 9/15/98 Three northwest Indiana steel mills commit to developing mercury inventories and reduction plans - 10/98 IDEM household mercury collection efforts - Dow Chemical Company commits to mercury reductions - PBT Strategy grant to the Northeast Waste Management Officials' Association to encourage state mercury reduction efforts
1999
- 8/99 As part of 1998 agreement, mercury inventories at Indiana steel mills are completed

Substance Activities: Mercury (Hg)
- 10/99 Mercury waste collection component of the Cook County (Illinois) Clean Sweep pilot begins - Six Ontario hospitals sign MOU to voluntarily reduce Hg - Pollution Probe investigates Hg reduction options for electrical products sector in Ontario - Automotive Pollution Prevention Project efforts to phase out Hg - US EPA grant to Ecology Center of Ann Arbor: promoting mercury P2 in the health care industry - Western Lake Superior Sanitary District (WLSSD) begins multimedia zero discharge pilot / focus on Hg - Michigan Mercury Pollution Prevention Task Force - 11/16/98 Draft *PBT National Action Plan* for Mercury is released by US EPA - Total mercury used in lamps declines from an estimated 17 tons in 1994 to an estimated 13 tons in 1999, even though significantly more mercury-containing lamps are sold in 1999 than in 1994.
2000
- Chlorine Institute reports 42% reduction, production-adjusted, in mercury use - US EPA, state agencies, and academic researchers conduct meetings with chlor-alkali industry representatives to coordinate mercury reduction projects - Olin Corp. cooperates with US EPA, state, and academic researchers on mercury monitoring project at chlor-alkali plant - Indiana steel mills complete mercury reduction plans; extend invitation to suppliers to commit to developing mercury inventories and reduction plans - Auto Alliance commits to eliminate mercury switches in auto convenience lighting; New York DEC and Michigan DEQ implement mercury removal programs at auto scrap yards - Hospitals for a Healthy Environment produces a Mercury Virtual Elimination Plan for hospitals under the AHA-US EPA MOU. State and local governments provide technical assistance to hospitals, and the National Wildlife Federation (NWF) continues its outreach and education efforts, signing up nearly 600 medical facilities to NWF's "Mercury Free Medicine Pledge." - Wisconsin DNR and Department of Agriculture conduct a dairy mercury manometer replacement program; approximately 375 mercury manometers are recycled. - University of Wisconsin extension creates a Website and list server to share information about mercury in schools. - The Thermostat Recycling Corporation collects over 500 lbs of mercury from over 57,000 thermostats collected and processed from January 1, 1998 to June 30, 2000. The program is expanded to the Northeast and will gradually be expanded to include the entire U.S. - The Great Lakes Dental Mercury Reduction Project funded by the Great Lakes Protection Fund produces a brochure template*: Amalgam Recycling and Other Best Management Practices*. Great Lakes Dental Associations reprint and distribute this document to their memberships. The University of Illinois-Chicago dental school and the Naval Dental Research Institute conduct research on controlling mercury in dental wastewater and help to educate dentists about best management practices. - Coalitions including Health Care Without Harm and the National Wildlife Federation successfully encourage several national retailers to stop the sale of mercury-containing thermometers to the public. Duluth, Minnesota, Ann Arbor Michigan, unincorporated areas of Dane County, Wisconsin, and several Dane Country municipalities, ban the sale of mercury thermometers.
2001
- 651 hospitals join the National Wildlife Federation's Mercury-Free Hospitals campaign - Ispat-Inland Indiana Harbor Works, Bethlehem Steel-Burns Harbor Division, US Steel-Gary Works, the Delta Institute, and Lake Michigan Forum created the *Guide to Mercury Reduction in Industrial and Commercial Settings* - Mercury Switch-out Pilot Program launched by Pollution Probe, Ontario Power Generation, Ontario Ministry of the Environment, and Environment Canada to collect mercury switches from old vehicles - 2/21/01 A workshop entitled "Extended Producer Responsibility and the Automotive Industry" is sponsored by the Canadian Autoworkers Union's Windsor Regional Environment Council and Great Lakes United

Substance Activities: Mercury (Hg)

2002

- 2/27/02 Great Lakes United kicks off series of information-sharing sessions about auto mercury-switch removal programs for State agency staff
- 4/5/02 Chlorine Institute releases its *Fifth Annual Report to EPA*, showing a 75% reduction in mercury use by the U.S. chlor-alkali industry between 1995 and 2001, more than meeting this sector's commitment to reduce mercury use 50% by 2005
- 10/1/02 Thermostat Recycling Corporation announces that it collected 28,000 thermostats and 231 pounds of mercury in the first half of 2002, a 15% increase from mercury collections in the first half of 2001. The program began to serve the 48 continental U.S. states in the fall of 2001.
- 10/18/02 The Hospitals for a Healthy Environment (H2E) program has 335 partners representing 1,019 facilities: 347 hospitals, 618 clinics, 22 nursing homes and 32 other types of facilities. These partners are health care facilities that have pledged to eliminate mercury and reduce waste, consistent with the overall goals of H2E.

Substance Activities: Polychlorinated Biphenyls (PCBs)

GLBTS Workgroup Activities and Reports

1998 and Earlier

- As of January 1993, approximately 25,000 tonnes of high-level PCBs are either in use or in storage in Ontario; 1529 active PCB storage sites in Ontario
- 3/23/98 WG is formed at the first implementation meeting
- 6/15/98 WG requests that the IG develop a strategy on sediments
- 11/10/98 Options Paper *Virtual Elimination of PCBs* is posted on GLBTS Website
- 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL

1999

- 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario
- 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
- 11/99 Draft *GLBTS Step 1&2 Sources and Regulations* report for PCBs is posted on the GLBTS Website
- WG solicits and gains commitment of 3 U.S. auto manufacturers to reduce PCBs
- WG solicits commitment of steel producers to reduce PCBs

2000

- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario
- Final draft GLBTS Step 3 *Reduction Options* report for PCBs is prepared (7/14/00) and posted (9/29/00) on the GLBTS Website
- WG continues to use PCB reduction commitment letters, through EC and US US EPA, to seek commitments to reduce PCBs. Specific companies are targeted, primarily major owners of PCB transformers and capacitors, and associations, such as CGLI

Substance Activities: Polychlorinated Biphenyls (PCBs)
- WG solicits and gains commitment to reduce PCBs from 2 Canadian auto manufacturers, 4 Canadian steel producers, and over 30 municipal electrical utilities in Ontario - WG leaders and Council of Great Lakes Industries (CGLI) finalize outreach letters used to seek PCB reduction commitments from trade associations. CGLI identifies specific trade associations to begin outreach. EC mails letters to trade initial associations. US EPA mailings to follow. - WG begins to compile case study reports on reasons why companies remove their PCBs - WG begins to collect photographs of PCB-containing electrical equipment to assist potential owners with identification of equipment which may contain PCBs - WG drafts a fact sheet on PCB-containing submersible well pumps to be used for outreach to potential users of wells and servicers of well pumps. - As of April 2000, approximately 7,500 tonnes of high-level PCBs are either in use or in storage in Ontario; 1,191 active PCB storage sites in Ontario
2001
- WG continues to mail letters to companies and trade associations seeking commitments to phase out PCBs - WG prepares case studies submitted by Bethlehem Steel Corporation's Burns Harbor Division and ComEd Energy Delivery, a unit of Chicago-based Exelon Corporation, for posting on the GLBTS Website - 1/01 PCB federal databases are updated for Canada. - 5/01 PCB WG progress meeting held in Toronto, Ontario, Canada. WG discusses two reasons that companies are unable to commit immediately to PCB reductions: 1) reduction/replacement is dependent on companies' internal planning and budgeting cycle; 2) reduction/ replacement is tied to market conditions. US EPA and EC will continue mailing out the voluntary reduction and commitment letters to the priority sectors and associations seeking additional commitments to reduce PCBs. - 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto - 7/01 US EPA compiles and analyzes data for 1995-1999 submitted by U.S. PCB disposers - 8/29/01 WG posts photographs of electrical equipment which may contain PCBs (transformers, and capacitors) to GLBTS Website to help increase awareness of the types of equipment that may contain PCBs - 9/01 In coordination with LaMP activities, EC mails a package of information to all small quantity PCB owners (over 300 owners) in the Lake Superior and Lake Erie Basins to help raise awareness of PCB initiatives underway in support of the GLBTS. The information package contained a copy of PCB Owners Outreach Bulletin, fact sheets, and maps of PCB Storage sites in the Lake Erie and Lake Superior Basins. - 11/01 PCB WG meeting is held in Chicago, IL. WG discusses the need for more outreach, especially toward small and medium sized companies. Representatives of General Motors outline the company's plan to phase-out all PCB materials from its North American facilities. - As of April 2001, 80% of high-level PCBs (Askarel > 1%, 10,000 ppm) had been destroyed in Ontario, Canada; however only 25% of low-level PCBs were destroyed, mostly from stored contaminated soil from a contaminated site clean-up in Ontario. - As of April 2001, approximately 6,000 tonnes of high-level PCBs are either in use or in storage; 992 active PCB storage sites in Ontario. - 8/30/01 Fact sheet posted to GLBTS Website: PCBs in Submersible Well Pumps - 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2002
- WG continues to modify BNS-PCB Website based on recommendations received in an email survey conducted by EC and US EPA in November 2001 - 5/02 WG meeting is held at the GLBTS Stakeholder Forum in Windsor, Ontario - 5/02 Hydro One representative states that the company is free of all high-level PCBs but still has several small stations and other sources of low-level PCBs. Hydro One has introduced a PCB management program that extends to the year 2020. - 5/02 MOE representative presents a strategy to implement an annual charge for having equipment with PCBs. Amendments for *Regulation 362* are proposed, including the addition of a schedule of destruction targets.

Substance Activities: Polychlorinated Biphenyls (PCBs)	
	- 10/02 Approx. 400 PCB commitment letters are sent to school boards and other sensitive sites in Ontario. - 10/02 Canada develops a new (draft) plan of outreach and recognition to try to increase the rate of PCB phase-out in Canada. The main elements of the draft plan are to identify and recognize contributions made by individual companies or their industry associations that go beyond regulatory requirements and to publicize success stories. - As of April 2002, 84% of high-level PCBs (Askarel > 1%, 10,000 ppm) had been destroyed in Ontario, compared to 1993. - As of April 2002, approximately 4,147.4 tonnes of high-level PCBs are either in use or in storage in Ontario; 916 active PCB storage sites in Ontario.
2003	
	- 5/14/03 WG meeting at the GLBTS Stakeholder Forum in Windsor, Ontario - 9/11/03 PCB Reduction Recognition Awards presented to Enersource Hydro, Hydro One, Slater Steel, and Stelpipe Ltd. - 12/16/03 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2004	
	- 6/17/04 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 6/17/04 PCB Reduction Recognition Awards presented to City of Thunder Bay and Canadian Niagara Power - 11/30/04 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2005 and Ongoing	
	- 5/17/05 WG meeting in Toronto, Ontario - 12/06/05 WG meeting in Chicago, IL

Other PCB Related Activities	
1999 and Earlier	
	- US EPA finalizes PCB regulations which include a requirement for U.S. owners to register their PCB transformers - EC and Ontario government hold two workshops on PCB management in the Toronto area - 10/99 PCB waste collection component of the Cook County (Illinois) PCB/Hg Clean Sweep pilot begins - U.S. PCB transformer registration database is updated - Requests for voluntary PCB reduction commitments are mailed to automotive, iron & steel, and municipal electrical power utilities in Ontario
2000	
	- Region 5 PCB Phasedown Program and pilot phasedown enforcement policy are finalized - A PBT workgroup continues to work on a National Action Plan for PCBs - 2/00 EC mails survey to approximately 500 registered owners of in-use PCB equipment in Ontario, requesting updated information - Cook County PCB/Hg Clean Sweep pilot concludes - 11/00 Canada mails letter to over 2000 registered PCB waste storage owners/managers in Ontario for a recent update of their stored PCB inventory which will be used to modify federal

databases for better tracking and monitoring - Update and modification of Federal PCB databases started in 2000 and will continue until completion in 2003 - Three Canadian Federal PCB Regulations are being amended: (1) Chlorobiphenyl Regulation; (2) Storage of PCB Material Regulations; (3) PCB Export Regulations - Extensive Public Consultation is conducted during summer and fall of 2000 and will continue
2001
- 5/2/01 Final Reclassification of PCB and PCB-contaminated Electrical Equipment rule becomes effective - US EPA finalizes a rule on Return of PCB Waste from U.S. Territories Outside the Customs Territory of the U.S. The rule clarifies that PCB waste in U.S. territories and possessions outside the customs territory of the U.S. may be moved to the customs territory of the U.S. for proper disposal at approved facilities. - EC updates National PCB In-Service Inventory from survey of registered owners and prepares fact sheet - EC's regulatory amendment process proposes the strengthening of federal regulations regarding PCB management
2002
- 42 electrical utilities submit voluntary reduction commitment letters to Environment Canada - Algoma voluntarily commits to eliminate 71,103 kgs (44,400 litres) of PCBs by Dec. 2005 - Approximately 27 school boards and sensitive sites respond to PCB commitment letters; 18 of those companies reported that all PCBs were eliminated from their inventories; 3 reported that all high-level PCBs were eliminated from their inventories
2003 and Ongoing
- Amended Canadian PCB regulations are expected to be published in the *Canada Gazette I* and *II* in 2003. These regulations will target phase-out of high-level PCB use by 2007, low-level PCB use by 2014, and prohibit storage after 2009.

Substance Activities: Dioxins/Furans
GLBTS Workgroup Activities and Reports
1998
- 3/23/98 WG is formed at the first implementation meeting - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
1999
- 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 6/1/99 WG Conference call: sources discussions - 7/7/99 WG Conference call: sources discussions - 9/7/99 WG Conference call: developing a decision tree source prioritization process - 10/5/99 WG Conference call: finishing development of a decision tree process - 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL

Substance Activities: Dioxins/Furans
- 12/7/99 WG Conference call: application of the decision tree process
2000
- 1/11/00 WG Conference call: continuing the decision tree process - 2/1/00 WG Conference call; decision made to initiate a Burn Barrel Subgroup - 3/7/00 WG Conference call: continuing the decision tree process - 4/4/00 WG Conference call: continuing the decision tree process - 4/4/00 Burn Barrel Subgroup has inaugural teleconference - 4/25/00 Burn Barrel Subgroup teleconference: strategy matrix discussed - 5/2/00 WG Conference call: continuing the decision tree process - 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario: decision tree process is completed - 5/26/00 GLBTS draft Step 1&2 *Sources and Regulations* report is prepared - 7/11/00 WG Conference call: developing reduction projects for high priority sectors - 8/1/00 Burn Barrel Subgroup teleconference: discussion Terms of Reference; link to Lake Superior LaMP - 8/18/00 An addendum to the GLBTS Draft *Sources and Regulations* report is prepared to addressed the newly released U.S. Dioxin Reassessment and the draft report is posted (9/29/00) on the GLBTS Website - 9/12/00 WG Conference call: developing reduction projects - 9/12/00 Burn Barrel Subgroup teleconference: discussion of Chisago County "Buyback" program; discussion of survey questions regarding state/local regulatory frameworks, and garbage quantity/quality questions. - Final GLBTS Step 3 *Reduction Options* report is prepared (9/27/00) and the report is posted (9/29/00) on the GLBTS Website - 11/14/00 Burn Barrel Subgroup teleconference: outline of a strategy document prepared. - 11/00 Discussion papers on Landfill Fire and Incinerator Ash Management prepared for workgroup review.
2001
- The WG continues to collect information regarding emissions from steel manufacturing, landfill fires, and incinerator ash management - 1/16/01 Burn Barrel Subgroup teleconference: Burn Barrel Strategy - 2/6/01 WG Conference call - 2/13/01 Burn Barrel Subgroup teleconference: Review presentation for Integration Workgroup - 3/13/01 Burn Barrel Subgroup teleconference: Status of efforts to prepare regulatory profile - 4/10/01 Burn Barrel Subgroup teleconference: Proposal for US EPA funding of subgroup activities - 5/8/01 Burn Barrel Subgroup teleconference: Review Strategy/ Implementation Plan document - 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto: WG approves Burn Barrel Strategy/ Implementation Plan document; Canadian and US presentations on wood preservation - 6/12/01 Burn Barrel Subgroup teleconference: Implementation activities for Summer/Fall - 6/22/01 Burn Barrel Subgroup receives $55k of US EPA PBT funding - 10/9/01 Burn Barrel Subgroup teleconference: Regional Lake Superior campaign - 11/6/01 Burn Barrel Subgroup teleconference: Sharing information - 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL

Substance Activities: Dioxins/Furans
- 12/18/01 Burn Barrel Subgroup teleconference: Sharing information
2002
- 2/12/02 Burn Barrel Subgroup teleconference: web page initiation, bylaws/ordinance discussion. - 3/19/02 Burn Barrel Subgroup teleconference: web page & list serve development, outreach updates - 4/5/02 Lake Superior Region workshop on household garbage burning issue – Thunder Bay, ON - 4/16/02 Burn Barrel Subgroup teleconference: web page & list serve development - 4/24/02 WG Conference call: discussing ash management - 5/14/02 Burn Barrel Subgroup teleconference: finalize web page, prepare for Windsor GLBTS meeting - 5/30/02 WG meeting at the GLBTS Stakeholder Forum in Windsor: demonstration of newly launched subgroup Website "Trash and Open Burning in the Great Lakes". The WG meeting was held jointly with the HCB/B(a)P WG due to common issues that are of interest to both workgroups. - 6/18/02 Burn Barrel Subgroup teleconference: Planned activities for summer, addressing "burners" for sale; purchase Website domain name www.openburning.org - 7/24/02 WG Conference call: discussing the treated wood issue - 9/10/02 Burn Barrel Subgroup teleconference: Updates on activities in various jurisdictions - 11/13/02 WG Conference call: discussing a pilot project on the treated wood issue
2003
- 3/18/03 Burn Barrel Subgroup teleconference: Exploring partnerships with health organizations - 5/14/03 WG meeting at the GLBTS Stakeholder Forum in Windsor, Ontario - 6/3/03 Burn Barrel Subgroup teleconference: EPA Office of Solid Waste outreach materials - 7/31/03 WG teleconference: Draft two-year workplan - 9/9/03 Burn Barrel Subgroup teleconference: WDNR's "Air Defenders" kit - 11/4/03 Burn Barrel Subgroup teleconference: Addressing suppliers of small backyard incinerators - 11/4/03 WG teleconference: Draft two-year workplan; finalizing the Burn Barrel Strategy - 12/16/03 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2004
- 3/02/04 WG teleconference: Progress on issue papers - 3/09/04 Burn Barrel Subgroup teleconference - 5/11/04 Burn Barrel Subgroup teleconference - 6/04 Draft issues papers prepared on *Emissions from Agricultural Burning, Structure Fires, Tire Fires, and Wildfires* and *Prescribed Burning* - 6/17/04 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 9/14/04 Burn Barrel Subgroup teleconference - 9/09/04 Burn Barrel Subgroup teleconference - 10/14/04 WG teleconference: *Draft Management Assessment for Dioxins* - 11/30/04 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL

Substance Activities: Dioxins/Furans
2005 and Ongoing
- 5/17/05 WG meeting in Toronto, Ontario - 12/06/05 WG meeting in Chicago, IL

Other Dioxin/Furan Related Activities
1999 and Earlier
- WLSSD begins multimedia zero discharge pilot / focus on dioxins - Two Ontario utilities eliminate use of PCP in treated poles
2000
- 1/00 WLSSD report on open barrel burning practices is released - 2/00 Wood stove changeover pilot programs in Traverse City, MI, and Green Bay, WI - 6/12/00 draft chapters of the *U.S. Dioxin Reassessment* for external scientific review are released - 9/28/00 Three draft chapters of the *U.S. Dioxin Reassessment* for SAB review are released
2001
- February 2001, Release of *National Inventory of Releases of Dioxins and Furans, Updated Edition*, by EC - May 2001, Release of report "Characterization of Organic Compounds from Selected Residential Wood Stoves and Fuels" by EC
2002
- PCP re-registration review proceeding as joint Canada/U.S. endeavor
2003
- 7/18/03 CEC draft Phase One North American Regional Action Plan on Dioxins and Furans, and Hexachlorobenzene available for public comment - *Ash Characterization Study* in Ontario - Secondary metal smelter release inventory study in Ontario - EPA develops Backyard Trash Burning Website and brochures available at www.epa.gov/nsw/backyard - Public release of first US National Dioxin Air Monitoring Network (NDAMN) ambient air monitoring data - Canada-wide Standards for iron sintering and steel manufacturing endorsed in March 2003 - Release of Wisconsin "Air Defenders" Kit for Burn Barrel education - Dioxin sampler added at an Integrated Atmospheric Deposition Network (IADN site), Burnt Island

2004 and ongoing
- US EPA compiles case studies of open burning reduction efforts

Substance-Specific Activities: Pesticides
GLBTS Workgroup Activities and Reports
1998
- 3/23/98 WG is formed at the first implementation meeting - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - 12/31/98 Draft GLBTS Challenge report for the Level I pesticides is posted on the GLBTS Website
1999
- 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2000
- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - GLBTS U.S. Pesticides Challenge Report: *The Level 1 Pesticides in the Binational Strategy* is finalized (3/1/00) and posted (9/29/00) - 5/00 EC announces that with the cooperation of PMRA they have reevaluated their position on Level I pesticides, and that based on all available information have met the Level I challenge.
2001
- WG reviews pollution prevention opportunities for Level II pesticides (endrin, heptachlor, lindane and HCH, tributyl tin, and pentachlorophenol) and begins preparing report
Other Pesticide Related Activities
1999 and Earlier
- 10/96 EC prepares report: *Canada-Ontario Agreement Objective 2.1: Priority Pesticides Confirmation of No Production, Use, or Import in the Commercial Sector in Ontario* - US EPA funding to four existing Clean Sweep programs for pilot data collection efforts for Level I pesticides
2000
- Draft National Action Plan for Level 1 Pesticides under the U.S. National PBT Initiative completed and released for review and public comment - PBT Pesticides Workgroup reviewing toxaphene remediation in Brunswick, GA - Level I PBT pesticides (except mirex) are regularly collected by ongoing Clean Sweep programs - Phase out of the Level II Pesticides lindane and tributyl tin compounds are the subject of bi-national negotiations through pesticide regulatory agencies in the U.S. and Canada

Substance-Specific Activities: Pesticides	
2001	
	- Waste pesticide collections (Clean Sweeps) continue - 10/5/01 Members of the world's primary maritime organization, the International Maritime Organization, adopt the International *Convention on the Control of Harmful Anti-fouling* Systems on Ships. The agreement calls for a global prohibition on the application of organotin compounds by January 1, 2003, and a complete prohibition by January 1, 2008.
2002	
	- PCP re-registration review proceeding as joint Canada/U.S. endeavor

Substance-Specific Activities: Hexachlorobenzene (HCB) / Benzo(a)pyrene (B(a)P)	
GLBTS Workgroup Activities and Reports	
1998	
	- 3/23/98 WG is formed at the first implementation meeting - 9/98 & 10/98 Discussions are held with the pesticide manufacturing, chlorinated solvent manufacturing, and petroleum refinery industries regarding their emission levels, and to determine any success stories, pollution prevention opportunities, and other planned or possible emission reduction actions - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
1999	
	- 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - 11/99 Draft GLBTS Step 1&2 *Sources and Regulations* Reports for B(a)P and HCB are posted on the GLBTS Website
2000	
	- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - Discussions held with the U.S. Scrap Tire Management Council and scrap tire managers in the Midwest - 6/15/00 Final drafts GLBTS Step 3 *Reduction Options* reports for B(a)P and HCB are prepared - 7/12/00 Final drafts GLBTS Step 3 *Reduction Options* reports for B(a)P and HCB are posted on the GLBTS Website - 9/21/00 WG conference call is held - 10/00 draft Canadian Steps 1& 2 reports for HCB and B(a)P (PAHs) circulated to stakeholders and workgroup members for comments

Substance-Specific Activities: Hexachlorobenzene (HCB) / Benzo(a)pyrene (B(a)P)
2001
- 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto - 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - Canada implements Strategic Options Processes with steel mills and wood preservers - Algoma Steel signs an *Environmental Management Agreement* with EC and OME to address environmental priorities - A Wood-stove Changeout Program is held in Georgian Bay, Ontario, in conjunction with the Hearth Products Association of Canada
2002
- 5/30/02 WG meeting at the GLBTS Stakeholder Forum in Windsor, Ontario - Wood stove change-out outreach material in development, a Website may be developed to promote change-outs and share information with stakeholders - Petroleum refinery B(a)P emissions analysis completed - Preparation of incentives for scrap tire pile recycling begins - Status and potential for reduction of newly inventoried primary aluminum B(a)P emissions determined - Work with Council of Great Lakes Industries (CGLI) and pesticide industry continues to determine pesticide HCB contaminant levels - Success stories of reductions in HCB TRI releases from the chemical industry are identified - Outreach activities (e.g., Website development, preparation of consumer information sheets) are conducted to increase public awareness of environmental impacts, safe handling, and applications of used treated wood - WG seeks to improve linkages and integration of release information and environmental data on persistent toxics - WG works to fill release data gaps, resolve questions about company NPRI release estimates for Level I substances, and develop reduction projects with stakeholders - 12/3/02 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2003
- 5/14/03 WG meeting at GLBTS Stakeholder Forum in Windsor, Ontario - Work with CGLI and pesticide industry, to determine pesticide HCB contaminant levels, continues - Rubber Manufacturers Assn. provides detailed information on scrap tire management in the Great Lakes Basin - Resource needs identified to successfully implement a Scrap Tire Outreach Plan - B(a)P emissions from coke ovens in basin continue to decline as a result of shutdowns and regulations - Work on more accurate B(a)P inventory (especially for air emissions) - Several conference calls held on Woodstove Smoke Reduction contract to encourage best practices and develop outreach materials - Natural Resources Canada *Burn it Smart*! campaign conducts over 300 residential wood-burning workshops across Canada; campaign presentation to be updated to include wood stove change-out and more workshops planned for Ontario - Initial discussions held with Canadian Vehicle Manufacturers' Association on verification of B(a)P release estimates for the on-road motor vehicle sector - 12/16/03 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2004
- 6/17/04 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario

Substance-Specific Activities: Hexachlorobenzene (HCB) / Benzo(a)pyrene (B(a)P)
- US EPA wood stove/fireplace initiatives: media outreach package, Website, fact sheets and labeling program promoting EPA-certified stoves and clean/safe wood burning practices. - Fifty-one *Burn it Smart* public education workshops delivered in 40 Ontario rural and First Nations communities in 2004 - Work with CGLI and pesticide industry to determine pesticide HCB contaminant levels, continues - Re-assessment of Ontario HCB and B(a)P releases from use of pentachlorophenol-treated and creosote-treated wood products. - 11/30/04 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL
2005 and Ongoing
- 5/17/05 WG meeting in Toronto, Ontario - 12/06/05 WG meeting in Chicago, IL

Other HCB/B(a)P Related Activities
1999 and Earlier
- Dow Chemical Company commits to HCB reductions - Two Ontario utilities eliminate use of PCP in treated poles - U.S. chlorothalonil manufacturer reduces HCB content through process improvements - 10/99 Draft Report, *Global HCB Emissions* (Robert Bailey, 1999), is distributed to the WG - 1/99 wood stove changeover pilot program for Eastern Ontario
2000
- 1/00 WLSSD report on open barrel burning practices is released - 2/00 Wood stove changeover pilot programs in Traverse City, MI, and Green Bay, WI - PBT workgroups continue to work on draft *National Action Plans* for HCB and B(a)P - 5/5/00 Robert Bailey prepares report, *HCB Concentration Trends in the Great Lakes*, for the WG
2001
- 2/01-4/01The Hearth Products Association expands the Great Lakes Great Stove Changeout Program to 12 states - 6/01 US EPA issues an administrative order requiring Magnesium Corporation of America (Rowley, UT) to ensure proper handling, containment, and disposal of anode dust found to contain high levels of HCB (>12,000 ppm), as well as dioxins, PCBs, and chromium
2002
- Source release information to improve inventories collected through voluntary stack testing - An emission testing program for wood burning in fireplaces, woodstoves, and pellet stoves developed and implemented with partners to fill information gaps - PCP re-registration review proceeding as joint Canada/U.S. endeavor

2003
- 7/18/03 CEC draft Phase One North American Regional Action Plan on Dioxins and Furans, and Hexachlorobenzene available for public comment - An EPA rule to control emissions (including HCB) from hydrochloric acid production is promulgated - The "Voluntary Woodstove/Fireplace Smoke Reduction Activities and Outreach Materials" contract awarded by EPA - An EPA rule for the control of coke oven battery stack emissions (including B(a)P) is promulgated - HCB added to CEPA listing of prohibited toxic substances; proposed regulation published to prohibit products with concentrations greater than 20 ppb
2004 and Ongoing
- Twelve Wood Energy Technology Transfer Inc. training workshops held in Ontario - USEPA *Scrap Tire Pile Mitigation Support Project* underway promoting mapping and clean-up of tire piles. - Scrap tire pile cleanup forum held in Chicago on February 23 – 24, 2004. - Proposed Ontario Tire Stewardship scrap tire diversion program awaiting approval from OME. - Independent third party audits verify Ontario's four metallurgical coke producers meeting reduction goals set out in best practice manual for controlling PAH (includes B(a)P) releases).

Substance-Specific Activities: Alkyl-lead
GLBTS Workgroup Activities and Reports
1998
- 3/23/98 WG is formed at the first implementation meeting - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - 12/31/98 Draft GLBTS Challenge report for alkyl-lead is posted on the GLBTS Website
1999
- 1/99 EC prepares *Alkyl Lead Inventory Study - Sources, Uses and Releases in Ontario, Canada: A Preliminary Review*, and posts report on the GLBTS Website. The report concludes that the Canadian challenge of reducing alkyl-lead use by 90% between 1988 and 2000 has been exceeded. - 9/8/99 GLBTS and PBT workgroups meet with National Motor Sports Council to discuss voluntary phase-out of leaded gasoline - 10/29/99 draft GLBTS *Sources, Regulations and Options* (Steps 1, 2 & 3) Report for Alkyl-Lead is posted on the GLBTS Website
2000
- GLBTS *Sources, Regulations, and Reduction Options* (Step 1, 2 & 3) report for alkyl-lead is finalized (6/00) and posted (9/29/00) on the GLBTS Website - GLBTS U.S. Challenge on Alkyl-lead: *Report on the Use of Alkyl-lead in Automotive Gasoline* is finalized (6/00) and posted (9/29/00) on the GLBTS Website
2001
- The U.S. meets the challenge of confirming no use of alkyl-lead in automotive gasoline. The US EPA PBT Program takes the lead for the U.S. in coordinating stakeholder efforts to reduce remaining alkyl-lead releases

Substance-Specific Activities: Alkyl-lead	
Other Alkyl-lead Related Activities	
1999 and Earlier	
	- Work begins on a draft *National PBT Action Plan* for Alkyl-lead
2000	
	- 8/25/00 A Draft *PBT National Action Plans* for alkyl-lead is posted on the PBT Website for public review and comment - Auto racing industry expresses interest in working with US EPA to find lead-free gas substitutes
2001	
	- US EPA begins working with NASCAR to permanently remove alkyl-lead from racing fuels used, specifically, in the Busch, Winston Cup, and Craftsman Truck Series

Substance-Specific Activities: Octachlorostyrene (OCS)	
GLBTS Workgroup Activities and Reports	
1998	
	- 3/23/98 WG is formed at the first implementation meeting - 6/16/98 Background Paper and Draft Action Plan for OCS posted on GLBTS Website - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - 12/31/98 Draft GLBTS Challenge report for OCS is posted on the GLBTS Website
1999	
	- 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - Data on OCS trends in fish is assessed by the WG

Substance-Specific Activities: Octachlorostyrene (OCS)	
2000	
	- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 6/30/2000 EC draft report on Octachlorostyrene Sources, Regulations and Programs for the Province of Ontario 1988, 1998, and 2000 forwarded to interested stakeholders - 9/22/00 Draft GLBTS Stage 3 report for OCS is distributed at the 9/22 Integration Workgroup meeting and e-mailed to the OCS Workgroup - 12/00 US EPA and EC convene a meeting of North American magnesium producers to promote sharing of lessons regarding methods for preventing and managing OCS and other chlorinated hydrocarbon wastes
2004	
	- 8/04 Draft *Management Assessment for OCS* (Step 4) Report prepared
Other OCS Related Activities	
1999 and Earlier	
	- 3/10/99 CGLI report, *OCS and Suggested Industrial Sources: A Report to the GLBTS Workgroup*, is submitted to the workgroup
2000	
	- 8/25/00 A Draft PBT National Action Plan for OCS is posted on the PBT Website for public review and comment
2002	
	-4/02 Toxics Release Inventory data for 2000 is made available to the public

Sediments

Canadian and U.S. Activities

1998 and Earlier

- 6/15/98 PCB WG requests that the IG develop a strategy on sediments
- 6/19/98 Integration WG discusses sediments challenge
- US EPA provides guidance to workgroups on how to deal with sediments within chemical-specific workgroups

1999

- 1/26/99 Overview and presentation of IJC SedPAC Activities given at Integration WG meeting
- 2/99 Integration WG members develop a draft charge for a sediments subgroup
- 4/28/99 Draft Sediments subgroup charge presented at Integration WG meeting

2000

- 2/15/00 US EPA and EC present a draft sediment reporting format at the Integration WG meeting. The proposed format will map progress and report annually on sediment remediation in the Great Lakes Basin using 1997 as the baseline year
- 5/16/00 At the Stakeholder Forum, US EPA and EC present the draft sediment reporting format and commit to hold a sediment technology workshop

2001

- 4/24/01 US EPA and EC host a two-day workshop on "Removing and Treating Great Lakes Contaminated Sediment," presenting sediment remediation technologies and case studies

2002 and Ongoing

- Ongoing assessments and remediations in both the U.S. and Canada within the Great Lakes watershed (see Section 6.0)

Related Sediment Activities

1998 and Earlier

- 11/97 The IJC's Sediment Priority Action Committee (SedPAC) issues draft white paper *Overcoming Obstacles to Sediment Remediation in the Great Lakes Basin*
- 12/1-2/98 IJC SedPAC holds "Workshop to Evaluate Data Interpretation Tools Used to Make Sediment Management Decisions" in Windsor, Ontario

2002

- 1/02 The second National Sediment Quality Survey report to Congress, *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States, National Sediment Quality Survey: Second Edition*, is released for review by US EPA

2004

- Work under The Great Lakes Legacy Act begins

Long-Range Transport (LRT) Activities
1999
- 11/19/99 EC presents the status of their LRT effort at the Integration WG meeting
2000
- 3/27/00 EC prepares report: *Long-Range Transport of Persistent Toxic Substances to the Great Lakes: Review and Assessment of Recent Literature* (Ortech Environmental)
2001
- Several studies are undertaken in the U.S. and Canada to characterize global transport processes.
2003 and Ongoing
- 9/16/03 - 9/17/03 EC and USEPA sponsor LRT Workshop in Ann Arbor, MI, with support of the CEC, the IJC, and the Delta Institute - 9/03 LRT workshop background paper, the workshop program, presentations, and draft summary document are posted on the Internet at http://delta-institute.org/pollprev/lrtworkshop/_workshop.html - Research into long-range transport of persistent toxic substances to the Great Lakes continues

General Activities Related to Reductions in GLBTS Substances
US EPA Regulatory Determinations
1998 and Earlier
- 12/95 Maximum Available Control Technology (MACT) rules for large Municipal Waste Combustors (MWC) are promulgated - 9/97 MACT rules for Medical Waste Incinerators (MWI) are promulgated - 4/15/98 Pulp, Paper, and Paperboard Cluster Rule is promulgated - 6/29/98 Amendments to the PCB Disposal Regulations are finalized - 11/12/98 Federal Plan for MACT Implementation for large MWCs is finalized
1999
- 5/28/99 An Advance Notice of Proposed Rulemaking is released for the RCRA LDR for Mercury-Bearing Hazardous Wastes - 7/6/99 Federal Plan for MACT Implementation for MWI is proposed - 8/30/99 MACT for small MWCs are proposed (expected to be final in 2000) - 9/30/99 Final Standards for Hazardous Air Pollutants for HWC are promulgated

General Activities Related to Reductions in GLBTS Substances
- 10/29/99 TRI Amendments: new PBT reporting thresholds
2000
- 12/00 Compliance deadline for large MWC MACT - 9/02 Compliance deadline for MWI MACT - 1/1/00 New TRI reporting thresholds for PBTs become effective
2001
- US EPA finalizes the Reclassification of PCB and PCB-contaminated Electrical Equipment rule and a rule on Return of PCB Waste from U.S. Territories Outside the Customs Territory of the U.S.
2002
- PCP re-registration review proceeding as joint Canada/U.S. endeavor - 4/02 the first year of data reported under TRI PBT rule become available - 2/14/02 President Bush announces Clear Skies Initiative to cut mercury emissions from power plants by 70%
2005
- 5/18/05 US EPA publishes Clean Air Mercury Rule
US EPA Activities
1999 and Earlier
- 6/97 *Deposition of Air Pollutants to the Great Waters: Second Report to Congress* is released - 12/97 *Mercury Report to Congress* is released - 4/98 *Final Emission Inventory Data for Section 112(c)(6) Pollutants* is released - 11/16/98 US EPA's Multimedia PBT Strategy is announced - 11/16/98 Under the PBT Strategy, a draft *National Action Plan for Mercury* is released - PBT Strategy grant awarded to WLSSD to work on reducing open trash burning - U.S. PCB transformer registration database is updated - Sample collection begins for the National Study of Chemical Residues in Fish - U.S. GLBTS workgroup leaders participate in development of Draft National Action Plans of part of PBT Strategy
2000
- 6/00 *Deposition of Air Pollutants to the Great Waters: Third Report to Congress* is released - 6/12/00 draft chapters of the *U.S. Dioxin Reassessment* for external scientific review are released - 9/00 US EPA's 1996 National Toxics Inventory is released - 9/28/00 Three draft chapters of the *U.S. Dioxin Reassessment* for SAB review are released - PBT workgroups continue to work on National Action Plans for HCB, B(a)P, the Level I pesticides, and PCBs

General Activities Related to Reductions in GLBTS Substances
- US EPA's Office of Air and Radiation and Office of Water collaborate on an Air-Water Interface Workplan to address atmospheric deposition of toxics and nitrogen to U.S. water bodies.
2001
- 5/23/01 U.S. signs the United Nation's global treaty on Persistent Organic Pollutants (POPs)
2002
- 1/02 *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States, National Sediment Quality Survey: Second Edition* is released for review - 7/23/02 Final PBT National Action Plan for Alkyl-lead published - Preliminary data from first year of National Study of Chemical Residues in Lake Fish Tissue released
2004
- 5/18/04 Great Lakes Interagency Task Force created by U.S. Executive Order
EC Regulatory Determinations
1999 and Earlier
- *Canadian Environmental Protection Act* is renewed
2000
- Canada-Wide Standards (CWS) (release limits) are developed for mercury, particulate matter, ozone, and benzene, and are being developed for dioxins/furans. - Canadian Strategic Options Processed (SOPs) are under development for the Iron and Steel Manufacturing sector and finalized for the Wood Preservation sector - 6/19/00 EC solicits public comments on proposed amendments to the PCB regulations under CEPA
2001
- 2/19/01 Canada announces $120.2 million in new regulatory and other measures to accelerate action on clean air - 7/7/01 A notice with respect to Polychlorinated Biphenyls in Automotive Shredder Residue is published in the Gazette, Part I, for automobile shredding facilities that generated PCB-contaminated residue during 1998, 1999, or 2000. - EC proposes amendments to the Chlorobiphenyl Regulations and Storage of PCB Material Regulations promulgated in 1977 and 1992, respectively - Canada's PCB Waste Export Regulations (SOR/97-108) are being amended
2005
- 6/05 CCME accepts in principle a draft CWS for the coal-fired electric power generation sector. Final endorsement of the CWS is expected prior to the end of 2005.

EC Activities
1999 and Earlier
- Ontario “Drive Clean” program - 1/99 The Canadian *Dioxins and Furans and Hexachlorobenzene Inventory of Releases* is finalized. - EC upgrades and digitizes its National PCB database
2000
- Draft HCB, B(a)P (PAH), and OCS release inventories for Ontario are updated and circulated for review - EMA with Algoma Steel being finalized. - EC, in coordination with the Hearth Products Association, conducts testing of conventional and US EPA-certified wood stoves to investigate releases of dioxins/furans, PAHs, HCB, and particulate matter
Other Activities
1998 and Earlier
- CEC issues Continental Pollutant Pathways Initiative - 7/98 UNEP POPs negotiations initiated
1999
- Under the GLWQA, The Lake Ontario LaMP Stage 1 report is released - By the end of 1999, emission control retrofits either completed or underway at all large MWC in the U.S. - The initial *Great Lakes Regional Air Toxics Emissions Inventory*, using 1993 data, is released - The Lake Ontario LaMP Update 1999 is released
2000
- Under the GLWQA, Canada and the U.S. work on restoring beneficial uses to 43 AOCs in the Great Lakes Basin through the RAP program - The Lake Erie, Lake Michigan, and Lakes Superior LaMPs 2000 are released - The Lake Ontario Lamp Update 2000 is released - The Lake Huron Initiative Action Plan is released - Numerous pilot projects and pollution prevention/reduction agreements relevant to toxics of concern are underway with the steel, automobile, and other manufacturing industries and utilities in Ontario and the U.S. Great Lakes states - 11/8/00 – 11/9/00 Atmospheric deposition workshop held, *Using Models to Develop Air Toxics Reduction Strategies* - 12/00 Final POPs negotiations - The 1996 Great Lakes Inventory of Toxic Air Emissions is prepared by the Great Lakes Commission
2001
- 2/01 21st session of the UNEP Governing Council is held: UNEP will undertake a global study on the health and environmental impacts of mercury - 8/22/01 The IJC issues a Review of Progress under the Canada-United States Great Lakes Binational Toxics Strategy - Monitoring of air deposition of toxic pollutants in the Great Lakes Basin under IADN

2002
- Monitoring of air deposition of toxic pollutants in the Great Lakes Basin continues under IADN
2003
- 9/19/03 – 9/20/03 IJC 2003 Great Lakes Conference and Biennial Meeting in Ann Arbor, MI - Monitoring of air deposition of toxic pollutants in the Great Lakes Basin continues under IADN
2004 and Ongoing
- 4/23/04 Great Lakes Commission releases 2001 Great Lakes Regional Air Toxic Emissions Inventory, available online at www.glc.org/air - 10/6/04 – 10/8/04 State of Lakes Ecosystem Conference (SOLEC) held in Toronto, Ontario - Monitoring of air deposition of toxic pollutants in the Great Lakes Basin continues under IADN

APPENDIX B

GENERAL FRAMEWORK TO ASSESS MANAGEMENT OF GLBTS LEVEL 1 SUBSTANCES: SUMMARY

Great Lakes
Binational Toxics Strategy
Assessment of Level 1 Substances
Summary

November 2005

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Executive Summary

The Great Lakes Binational Toxics Strategy (GLBTS) was signed by the United States and Canada (the Parties) in 1997 to advance the goals of Article II(a) of the Great Lakes Water Quality Agreement (GLWQA). The Strategy focus has been on persistent toxic substances (PTS) in the Great Lakes ecosystem, in particular those chemicals which bioaccumulate up the food chain, and Article II(a) includes the goal that "the discharge of any or all persistent toxic substances be virtually eliminated". The GLBTS sets forth seventeen (17) interim reduction goals for twelve "Level 1" PTS over a ten year time-frame which ends in 2006.

In anticipation of this important milestone, in 2004, the Parties, working with many stakeholders from industry, non-governmental organizations, Provinces, States, Tribes, cities and academia, commenced an overall program review of each of the Level 115 substances, to review progress made to date in reducing these substances and to explore future directions for the continued management of these substances. This report provides a concise summary of each substance review. This report also addresses two non-substance-specific goals in the GLBTS: 1) to assess atmospheric inputs of Level 1 substances from world-wide sources, and 2) to complete or be well advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006.

The substance reviews include two major parts16: 1) an overall environmental assessment of Level 1 substances in the Great Lakes environment, including a review of current levels in Great Lakes media and biota, an evaluation of these levels against available health based/risk based criteria, historical trends and projected trends looking forward; and 2) a source reduction assessment that looks at use and emission reductions accomplished to date under the GLBTS against the original targets, as well as an analysis of the remaining source sectors, and further opportunities for the GLBTS and others to continue to effect reductions toward our ultimate goals of virtual elimination. Finally, these reviews provide recommendations to the Parties for the future management of each Level 1 substance.

General Outcomes

With regard to source reductions, much progress has been made to date. Of seventeen (17) reduction goals, ten have been met, three more will be met by 2006, and the remaining four will be well advanced toward their respective targets. Notwithstanding these accomplishments, much remains to be done to achieve the ultimate goal of virtual elimination in the Great Lakes.

Overall, the environmental analyses show many of the Level 1 substances remain in the Great Lakes environment at levels which exceed health based criteria, particularly mercury, PCBs, and the cancelled pesticides. These substances continue to impair the Great Lakes, and limit fish

[15] Mercury, PCBs, dioxins and furans, hexachlorobenzene (HCB), benzo(a)pyrene (B(a)P), octachlorostyrene (OCS), alkyl lead, mirex, aldrin/dieldrin, toxaphene, DDT, chlordane

[16] A description of the Management Framework is found in Appendix A of this document.

consumption, particularly among sensitive populations such as pregnant women and children, and among subsistence fishers.

Our analyses suggest that source reduction opportunities remain for the "active substances" (i.e., substances for which we have ongoing workgroup activities), which include mercury, PCBs, dioxins and furans, HCB and B(a)P. With respect to the "inactive" (i.e., no ongoing workgroup activity) Level 1 substances, cancelled pesticides, alkyl lead, and OCS, the Parties have decided to suspend GLBTS workgroup activities indefinitely, pending periodic review, and to leverage other programs, as appropriate. However, these substances will continue to be tracked and monitored in the Great Lakes. Finally, the GLBTS will continue to monitor and report on progress of sediment remediation activities in Areas of Concern in the Great Lakes Basin, and will continue to study issues associated with long-range transport of toxic substances from world-wide sources, in order to better inform our priorities and identify necessary action steps to move forward.

Specific Recommendations

Below is a brief summary of management recommendations and future opportunities by substance/challenge. A more detailed discussion of these is presented within the body of this report.

Substance	Recommendation	Future Opportunities
Mercury	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS Mercury Workgroup in the auto scrap, appliance, industrial equipment, and dental sectors. In addition, the GLBTS will continue to encourage and track efforts to reduce mercury releases in sectors with regulatory systems in place or under implementation (e.g., mercury cell chlor-alkali plants and coal-fired power plants).
PCBs	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS PCB Workgroup to continue to encourage decommissioning of in-service PCB equipment. Other significant future Workgroup opportunities include updating the current inventories, which will help in identifying additional intervention steps; mandatory dates for PCB phase out through voluntary activities and regulatory amendments to existing PCB regulations; and incentives and recognition for PCB phase out and outreach programs.
Dioxins/ Furans	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS Dioxin Workgroup to address the use of burn barrels. Other significant future Workgroup opportunities include characterization of sources such as uncontrolled burning, and exploring pathway interventions to mitigate exposure to dioxins and furans.
HCB	Continue Active	Future Workgroup opportunities include continuing to update and

	Level 1 Status	improve the emissions inventories, identifying long-range transport contributions of HCB to the Great Lakes, and cooperating with the Dioxin Workgroup on similar source sectors to take advantage of the HCB reduction co-benefits that may also be achieved. The Workgroup should determine the co-benefits of reducing specified chlorobenzene compounds as a result of actions that reduce HCB.
B(a)P	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS HCB/B(a)P Workgroup in residential wood combustion and scrap tire pile mitigation. Other significant future Workgroup opportunities may be identified through continued updating and improvement of emissions inventories. The Workgroup should determine the co-benefits of reducing Level 2 PAHs17 resulting from activities that reduce B(a)P emissions.
Alkyl Lead	Suspend GLBTS Workgroup Activities	The Parties will refer to the National Programs to continue to work with National Association of Stock Car Auto Racing (NASCAR) to reduce the use of leaded fuel in race cars, and with the Federal Aviation Administration and aviation industry to find alternatives to leaded gasoline in aviation fuel.
Pesticides (aldrin/ dieldrin, chlordane, DDT, mirex, toxaphene)	Suspend GLBTS Workgroup Activities	The Parties will refer to National, Provincial, State, Tribal and local Clean Sweep programs to continue to address the stockpile of cancelled pesticides in the Great Lakes Basin, and to various remediation programs that address pesticide contamination. The Parties will participate in international fora that address pesticide phase-outs and disposal, world-wide.
OCS	Suspend GLBTS Workgroup Activities	The Parties will continue to monitor OCS in the Great Lakes environment, and study OCS via long-range transport.
Sediments	Continue Remediation Activities	The Parties will continue to report annually on progress made in the Areas of Concern to remediate sediments contaminated with Level 1 Substances
LRT	Continue Study of Long-Range Transport of Level 1 and 2 Substances	The Parties will continue to study the long-range transport of Level 1 and 2 substances to the Great Lakes, evaluate the relative contributions from world-wide sources, and work within international fora such as UNEP to reduce releases.

Conclusions

The GLBTS presents a unique model of how international cooperation and collaborative problem solving of issues that are beyond the reach of existing regulations can lead to real results in

[17] Anthracene, Benzo(a)anthracene, Benzo(g,h,i)perylene, Perylene, Phenanthrene

environmental protection. There may be an important ongoing role for the GLBTS, not only with respect to the current Level 1 substances, but also for newer chemicals of emerging concern. New innovative reduction strategies could be applied to the sources of current Level 1 PTS that can be eliminated from products and production processes as well as to additional chemicals that may fall under the scope of the GLBTS. The Parties intend to focus on next steps for the GLBTS in the coming months. Protecting the chemical integrity of the Great Lakes, advancing the goals of the Great Lakes Water Quality Agreement, and virtually eliminating PTS from the Great Lakes Basin are of paramount importance. The GLBTS is one important tool to move us toward these goals.

1.0 Mercury

Challenge Goal Status

Both Canada and the US have made significant progress in achieving reductions of mercury releases. Canada has reduced releases of mercury from anthropogenic sources in Ontario by approximately 84 percent (1988 baseline), against the goal of a 90 percent reduction. It is unlikely that Canada will meet its reduction goal by 2006. Mercury releases in Ontario have been cut by over 11,700 kilograms (kg) since 1988, based on Environment Canada's 2002 mercury inventory. The US release challenge applies to the aggregate of air releases nationwide and to releases to the water within the Great Lakes Basin. According to the most recent National Emissions Inventory (NEI) estimates, US mercury emissions decreased approximately 45 percent between 1990 and 1999, against a challenge goal of 50 percent. If an estimate of gold mining emissions is included in the 1990 inventory, the estimated reduction increases to 47 percent. By 2006, additional regulations and voluntary activities are expected to reduce US mercury emissions by at least 50 percent (from the 1990 baseline), meeting the challenge goal.

On May 18, 2005, US EPA published the world's first regulations limiting mercury emissions from coal fired power plants. Under the Clean Air Mercury Rule (CAMR), states are required to implement regulations that will reduce power plant mercury emissions 21 percent nationally by 2010, and 69 percent eventually. States can choose to participate in a national mercury emissions allowance trading program, or to achieve required reductions through emissions standards. Under the allowance trading program, power plants will be able to "bank" unused emissions allowances for later use, creating an incentive for reductions beyond the required 21 percent between 2010 and 2017. Use of these unbanked allowances after 2018, when the emissions "cap" is lowered to 15 tons (69 percent below the current level), will allow emissions to exceed the cap for some years beyond 2018. Trading of emissions allowances could cause emissions reduction amounts in some states to differ from the national average. Canada has proposed similar controls for this source sector; however, the draft Canada-wide standard has not been finalized.

Mercury use (or consumption) in the US has declined significantly since 1995. However, the exact amount is difficult to quantify because the US Geological Survey (USGS) stopped reporting estimated US mercury consumption after 1997. On the basis of data reported by the chlor-alkali industry and the lamp industry, it is estimated that mercury use declined by more than 50 percent between 1995 and 2003. This assumes that mercury use by other sectors remained constant between 1997 and 2003. This may underestimate the actual decline, considering likely reductions in the use of mercury in measurement and control devices, switches and relays, and dental amalgam that have not been quantified.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

The consideration of mercury in the environment is complicated by the need to sort through

contributions from natural sources, those associated with legacy sources, and currently occurring anthropogenic sources. GLBTS mercury efforts have been focused on currently-occurring anthropogenic sources. The following points illustrate pieces of the mercury puzzle:

- Mercury levels continue to exceed risk-based criteria within the Great Lakes, most notably for methylmercury in fish and for sediment quality.
- Long-term trends (over 30 years) show a substantial decline (e.g., in herring gull eggs and sediments).
- Shorter term trends are less certain. In the past 10-20 years, mercury levels in fish, bald eagles, herring gull eggs, and atmospheric deposition have not declined.
- Mercury emissions decreased more than 40 percent in the United States and more than 85 percent in Ontario between 1990 and 2000.
- Mercury deposition data show no discernable decrease between 1995 and 2003.
- Mercury concentrations in biota are influenced not only by rates of mercury input into the environment, but also by factors that affect bioavailability and methylation of mercury.

One possible explanation for the lack of correspondence between the emissions trends and recent deposition trends is that reductions in deposition caused by North American emissions reductions have been offset by increases in deposition caused by global emissions. Trends of mercury concentrations in fish may not follow trends in mercury deposition, because mercury fish concentrations may be affected by mercury contributions from sediments, particularly in areas of past high direct water discharges.

Mercury is a major cause of fish consumption advisories in the Great Lakes Basin, with the highest mercury exposures caused by eating fish from certain inland lakes within the Basin. Consumption of fish from the Great Lakes region adds to human body burdens of methylmercury, which often exceed health criteria. However, fish consumption also provides many health benefits, and in many cases Great Lakes fish are lower in mercury than other sources of fish. In the US, NHANES findings indicate that blood mercury levels in young children and childbearing-aged women usually are below US EPA's reference dose; however, blood mercury analyses for 16 to 49-year-old women showed that approximately 6 percent of women in the survey had blood mercury concentrations greater than 5.8 ug/L, a blood mercury level equivalent to the current US EPA reference dose, or the level, following application of an uncertainty factor, at which exposure is considered unlikely to cause appreciable risk. In Canada, exceedances of health guidelines for mercury are comparatively rare, because Canada's guidelines are less restrictive than US guidelines.

Sources of Mercury

Mercury inputs to the Great Lakes environment have been reduced significantly. However, a wide variety of sources continue to impact the Great Lakes, especially atmospheric deposition. Mercury deposition results primarily from releases to the air from anthropogenic sources, both in North America and globally. Mercury from natural sources, as well as historic anthropogenic mercury that has been re-emitted, also contribute to mercury levels in the Great Lakes environment. In Ontario, the largest air emissions sources of mercury include electric power

generation, iron and steel production, municipal waste (primarily land application of biosolids), cement and lime manufacturing, and incineration. In the US, the largest air emissions source of mercury is now coal-fired electric power generation. The recent regulatory action in the US and a proposed draft Canada-wide standard may result in substantial reductions from this sector. (The recently promulgated Clean Air Mercury Rule on coal-fired power plants in the US is under legal challenge.) Other sources of mercury in the US include industrial boilers, production of gold and other metals, steel production using steel scrap, hazardous waste incineration, and chlorine production at mercury cell plants.

Management Assessment

The GLBTS has identified a number of opportunities to reduce mercury releases to the Great Lakes Basin. Since mercury releases can be transported to the Great Lakes via the atmosphere from long distances, the GLBTS has also attempted to influence reductions across North America. The GLBTS can help promote reductions by continuing to share information about cost-effective reduction opportunities, tracking progress toward meeting reduction goals, including reductions achieved through various other programs and regulations, and publicizing voluntary achievements in mercury reduction. Particular attention will be paid to information-sharing in areas where mercury releases are significant but there are no existing federal regulations, or regulations are under development (e.g., contamination of metal scrap by mercury-containing devices, and their resulting emissions). The GLBTS will continue to encourage and track efforts to reduce mercury releases in sectors with regulatory systems in place or under implementation (e.g., mercury cell chlor-alkali plants and coal-fired power plants).

In addition, the GLBTS may have opportunities to promote mercury reduction beyond the US and Canada, for instance by participating in the United Nations Environment Program's efforts to help developing countries identify sources of mercury and strategies for control. As North American releases decrease and global releases increase, an increasingly large share of mercury inputs to the Great Lakes Basin will come from overseas sources. The GLBTS has yet to determine if new reduction targets and challenge goals are appropriate.

Management Outcome

The final management outcome for mercury is continued Active Level 1 status with periodic reassessment by the GLBTS. The Mercury Workgroup will: 1) disseminate information about removal of mercury devices in auto scrap, appliances, and industrial equipment, and on assisting state, provincial, and local governments identify cost-effective reduction approaches for mercury releases from dental offices; and 2) participate in national and international mercury reduction programs.

2.0 Polychlorinated Biphenyls (PCBs)

Challenge Goal Status

The GLBTS established quantitative challenge goals to reduce high-level PCBs in equipment in both the US and Canada. In Canada, the challenge goal of a 90 percent reduction of high-level PCBs (>1 percent PCBs or 10,000 ppm, 1993 baseline) in storage has been achieved based on the information available as of December 2004. Canada is still working to meet its in-service challenge goal of a 90 percent reduction of high-level PCBs (>1 percent PCB or 10,000 ppm) by 2006. The US currently lacks sufficient data to determine the status of its progress toward a challenge goal of a 90 percent national reduction of high-level PCBs (>500 ppm) by 2006. US EPA is currently assessing the PCB equipment inventory, to address this problem.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

PCBs are monitored in fish, herring gull eggs, bivalves, water and sediments, air, food, and human body burdens. Risk based criteria have been developed for PCB levels in fish, sediments, water, and food. Preliminary analysis of the available data suggests that environmental levels of PCBs exceed water, sediment, and fish tissue criteria in some cases. For example, the GLWQA criterion for PCBs in fish is regularly exceeded, particularly in lake trout. In addition, the issuance of fish consumption advisories for PCBs in the Great Lakes Basin (678 in 2003) indicates that PCBs continue to be present at levels of concern. PCBs are one of the most common cause of fish consumption advisories in the Great Lakes (i.e., in the Lakes proper, not including inland water bodies). Trends in PCB levels in water, sediment, air, fish, and wildlife have generally declined since the 1970s. More recent data (including some data showing PCB spikes) are less clear and need further analysis to delineate trends. For example, some decreasing trends are lake-specific or species/community-specific, making it difficult to draw basin-wide conclusions. PCB levels measured in air in rural areas near each of the Great Lakes have generally declined, but there are some localized hotspots (e.g., the Chicago plume) and some unexplained increases have been observed.

Sources of PCBs

Other potential sources of PCBs include:

- Releases (accidental or via gradual emissions) from remaining in-service items containing manufactured PCBs, such as poletop transformers, high-level PCB transformers, capacitors, and PCB ballasts;
- Accidental releases from storage/disposal facilities during the handling of PCB wastes;
- Emissions from combustion or incineration of materials containing PCBs;
- Inadvertent formation during certain chemical production processes;
- Reservoirs of past PCB contamination and environmental cycling (e.g., contaminated sediments, soil, and Superfund sites);

- Long-range transport from outside the Great Lakes Basin;
- Other (e.g., dispersive sources from landfills or storage sites).

A better overall understanding of the potential for these sources to contribute to PCB levels in the Great Lakes Basin is needed.

Management Assessment

Key remaining opportunities for the GLBTS to effect further reductions in PCBs include continuing to solicit industry to decommission and dispose of PCBs in electrical equipment, tracking inventoried PCBs in priority industry sectors (high/low-level PCBs in storage and also in service), updating PCB inventory databases on a regular basis, encouraging the ongoing remediation of PCB-contaminated sediment sites, and monitoring environmental trends in the Great Lakes Basin. In addition to voluntary efforts, there are regulatory programs in place in the US to address certain sources of PCBs (e.g., contaminated sites, coplanar PCBs via dioxin control). In 2006, Canada will propose revisions to its existing PCB regulatory framework to set timelines for ending the use of PCBs in equipment and to accelerate PCB destruction. The GLBTS should develop additional information on the relative contributions of all PCB sources to the Great Lakes environment to help prioritize future PCB reduction efforts. The Workgroup should cooperate with the Dioxin Workgroup on common source concerns, such as those where the formation of both dioxins and co-planar PCBs occur. Collateral benefits should be realized for HCB and OCS as well.

Management Outcome

The final management outcome for PCBs is to continue Active Level 1 status with periodic reassessment by the GLBTS. The PCB Workgroup will continue to:

- Target in-service PCB-containing electrical equipment, as the potential remains for the equipment to be a source of future releases;
- Explore non-traditional opportunities to foster PCB reductions through mentoring and outreach programs, financial incentives (e.g., insurance premiums), and ISO registration (in the US);
- Continue the PCB Recognition Award Program; and
- Collect and assess a more complete set of data on PCB sources and environmental levels, in order to prioritize the remaining opportunities for PCB source reductions, and to elucidate PCB trends and impacts on the environment.

3.0 Dioxins and Furans

Challenge Goal Status

Canada has achieved an 87 percent reduction in dioxin releases (1988 baseline) in the Great Lakes Basin against the challenge goal of 90 percent. Canada will continue to work toward this commitment within the Great Lakes Basin. Total annual dioxin releases from inventory sources in Ontario are currently estimated at 35 g (toxic equivalent) TEQ.

The US is confident that it has met the challenge goal of a 75 percent reduction in national dioxin releases. Because the US challenge goal baseline is defined in terms of the US EPA Dioxin Reassessment which is currently undergoing review by the National Academy of Sciences, formal conformation of the challenge goal achievement will have to wait until the release of the final reassessment. The US EPA draft reassessment estimates emissions for the years 1987 and 1995. In May of 2005, US EPA released a draft inventory for the year 2000. This new draft inventory, which is awaiting peer review, estimates total dioxin emissions for 2000 to be approximately 1500 grams TEQ. This is a greater than 90 percent reduction over the draft 1987 baseline estimate.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

In general, there are sufficient data on the presence of dioxins in multiple media to assess impacts in the Basin. These include data in whole fish, fish tissue, herring gull eggs, sediment, water, air, human serum, and food. Current environmental and health criteria information, though limited, is sufficient to conclude that dioxins have a continued adverse impact on the Basin. For the criteria that exist, current data collected in the Great Lakes indicate exceedances of sediment and water quality guidelines. Dioxin contamination triggers fish consumption advisories for at least one species in each of the Great Lakes. While more research is needed to determine a safe level for dioxins in food, the US government has identified significant risks posed by current levels of dioxins found in foods and has recommended steps to reduce exposure (The Interagency Working Group on Dioxins, 2004).

A long-term downward trend in dioxin/furan levels is seen in US sediment cores, Great Lakes herring gull eggs, and average US human body burdens. Long-term temporal trend information is not available for dioxin/furan levels in open water, fish tissue, ambient air, and the commercial food supply. Despite long-term downward trends in dioxin levels in the environment and humans, current trends are less certain in some media (such as ambient air and beef and dairy products). Current environmental levels of dioxins are extremely low, relative to most pollutants, but because of their extreme toxicity and ability to bioaccumulate, their risk potential is significant.

Sources of Dioxin

Dioxin releases to the Great Lakes environment have come from a wide variety of sources. With stringent controls in place on many of the previously dominant industrial and municipal sources, the largest remaining quantified source in both the US and Ontario is the open burning of household waste. Other major sources include land application of sewage sludge, combustion and incineration, and metals smelting, refining, and processing. In addition to the inventoried sources of dioxin, a number of uncharacterized sources exist. The Dioxin Workgroup has begun to develop estimates for these uncharacterized sources, which include wildfires and prescribed burning, structural fires, and agricultural burning.

Management Assessment

While significant reductions of dioxin releases have been achieved in both the US and Canada, additional opportunities for further GLBTS action remain. The Burn Barrel Subgroup should continue its efforts to actively engage partners on the issue of household garbage burning and to educate public and local officials. US EPA and the Utility Solid Waste Activities Group (USWAG) are preparing a memorandum of understanding (MOU) regarding secondary uses of treated wood. The Workgroup should monitor MOU implementation. The Workgroup should also continue working on pathway intervention and burnishing the emissions inventory for poorly characterized sources. The Workgroup should evaluate the need for a full Workgroup versus a core group that oversees a few subgroups (e.g., focusing on pathway intervention, source characterization, uncontrolled combustion). The Workgroup should also consider the need to engage new members, such as local government officials, and representatives from the fields of health and agriculture. The Workgroup should coordinate with other Workgroups on common issues such as residential wood burning and coplanar PCBs. Setting new quantitative challenge goals would be difficult for the remaining, largely non-point sources of dioxin. Rather than pursue a quantitative challenge goal, the Dioxin Workgroup may consider framing new qualitative challenge goals and examining possible numerical targets for specific sources.

Management Outcome

The recommended management outcome for dioxins and furans is to continue Active Level 1 status. The Dioxin Workgroup will:

- Continue efforts related to household garbage burning;
- Monitor implementation of USWAG/US EPA treated wood MOU;
- Explore exposure pathway intervention;
- Continue to gather information on poorly characterized sources; and,
- Work toward an integrated air monitoring network within the Great Lakes Basin.

4.0 Benzo(a)Pyrene (B(a)P)

Challenge Goal Status

Both Canada and the US have made progress in achieving reductions of B(a)P. Canada has reduced releases in Ontario by approximately 45 percent, relative to a 1988 baseline, and continues to pursue the goal of a 90 percent reduction. However, it is unlikely that Canada will meet its reduction goal by 2006. Total B(a)P releases in Ontario are currently estimated at 29,600 lbs (13,400 kg) per year. The US has reduced B(a)P emissions in the Great Lakes Basin by approximately 77 percent from 1996 to 2001, against a goal of unspecified reductions. Current estimated B(a)P emissions in the US Great Lakes states are 43,700 lbs (19,900 kg) per year.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

In general, basin-wide data indicate that there has been little change in B(a)P concentrations in the Great Lakes environment over the past decade. However, a recent declining trend has been reported in Lake Erie bottom sediment, the only lake with available lakewide sediment data. B(a)P levels in Great Lakes soil and sediment exceed criteria while B(a)P levels in fish tissue, air, and water are below available criteria. Higher concentrations of B(a)P are found on Lakes Erie and Ontario than on the other Great Lakes, at sites near major population centers.

Sources of B(a)P

Eighty percent of Ontario's anthropogenic B(a)P releases are primarily from non-point sources, including: residential wood combustion, use of creosote-treated wood products, motor vehicle emissions, and open burning (prescribed burning and household waste burning). The remaining twenty (20) percent are from iron & steel cokemaking operations. Iron and steel coke ovens remain the largest B(a)P point source in Ontario, though emissions were reduced by 73 percent between 1988 and 2003.

The US Great Lakes inventory is comprised of B(a)P emissions from residential wood combustion, cokemaking, and other sources. Since the 2001 inventory was prepared, it is expected that subsequent coke oven emissions will be lower as a result of additional MACT requirements. Potential sources of B(a)P emissions not listed in the US Great Lakes inventory include: forest and wildfires, residential burning of household waste, scrap tire fires, prescribed burning, and mobile sources. However, forest and wildfires and prescribed burning occur mainly in the Western US and may not contribute significantly to B(a)P levels in the Great Lakes Basin.

The impact of B(a)P is not specific to any one lake basin, though concentrations are higher in the more urban lower lakes and other urban areas such as Chicago. Air monitoring data do not reflect reductions in B(a)P emissions inventories. The absence of a corresponding decrease in the environment indicates that there may be source contributions to the environment that are currently unaccounted for or are underestimated in current inventories.

Management Assessment

The GLBTS has identified a number of opportunities to continue to effect reductions in B(a)P releases to the Great Lakes Basin. These include reducing or preventing B(a)P emissions from residential wood combustion, scrap tire fires, and residential burning of household waste. Other important opportunities include gathering information on emissions from poorly characterized sources, and improving the current emission inventories for Ontario and the US Great Lakes Basin, especially to identify sources that are not included in the inventories. To propose new reduction targets, much effort would be required to develop current and baseline inventories that provide accurate estimates of all potential sources of B(a)P, making it impractical to establish new challenge goals at this time.

Management Outcome

The final management outcome for B(a)P is continued active Level 1 status. The GLBTS B(a)P Workgroup will:

- Continue to pursue reduction activities, especially for the following source sectors:
    1) Residential Wood Combustion: "Burn-it-Smart," wood stove change-out programs, firelog testing, and wood boilers;
    2) Scrap Tires: Ontario Tire Stewardship program, US Best Practices Guidebook, additional training and pile mapping.
- Improve B(a)P inventories by identifying missing sources and source categories that have achieved virtual elimination.
- Determine the co-benefits of reducing Level 2 PAHs resulting from activities that reduce B(a)P emissions.

5.0 Hexachlorobenzene (HCB)

Challenge Goal Status

Both Canada and the US have achieved significant reductions of HCB from sources resulting from human activity. Estimated releases of HCB in the US have been reduced from approximately 8,519 lbs (3,872 kg) in 1990 to 2,911 lbs (1,323 kg) in 1999. In Ontario, releases of HCB have been estimated at 44 lbs (20 kg) in 2003, reduced by approximately 62 percent, relative to a 1988 baseline. This satisfies the US commitment of unspecified reductions. Canada continues to pursue the goal of a 90 percent reduction in HCB releases; however, it is unlikely that this goal will be met by 2006.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

There are sufficient data on the presence of HCB in multiple media to assess its impact in the Basin. The data for HCB show declining concentrations in various media (herring gull eggs, water, sediment, air). There are no HCB triggered fish advisories in the Great Lakes, and HCB levels are below detection limits in fish tissue and human serum in broad national surveys. However, individual research studies have found measurable levels of HCB in tissue samples of residents in the Great Lakes region, including blood and breast milk. A few exceedances of sediment and water quality criteria have been observed in recent years. Continued HCB releases and intercontinental transport may explain the longer-than-expected half-lives for HCB observed in air over the Great Lakes.

Sources of HCB

In addition to HCB releases from sources in the US and Canada, long-range transport and deposition of HCB from elsewhere around the world contribute to loadings in the Great Lakes. HCB is thought to be widely distributed in the global atmosphere with global emissions estimated at 50,600 lbs (23,000 kg). However, the contribution of global HCB concentrations to the Great Lakes is uncertain. It has been estimated that microcontaminant HCB levels in pesticide products in the US have been reduced by at least 95 percent since 1990. Similar reductions have also occurred in Canada. [***the last two sentences need confirmation***] Principal sources of HCB in the US and Ontario are pesticide application (volatilization of HCB as a microcontaminant), residential household waste burning (burn barrels), the manufacture of chemicals and plastics materials, and the use of ferric/ferrous chloride containing trace levels of HCB.

Management Assessment

A number of opportunities for the HCB Workgroup remain. The HCB Workgroup continues to encourage emission reductions from pesticide application and chemical manufacturing. The

HCB Workgroup also supports other actions which impact HCB releases, including: 1) Household Garbage Burning Strategy in the Great Lakes Basin (GLBTS Burn Barrel Subgroup); 2) full lifecycle management of pentachlorophenol-treated wood products; and 3) collection of data on HCB levels in the environment. The HCB Workgroup is working to refine HCB emissions estimates for pesticide application, chemical manufacturing, combustion sources, and publicly owned treatment works. The GLBTS believes that establishing new challenge goals for HCB, in either the US or Canada, would provide no added benefit towards achieving further HCB reductions.

Management Outcome

The final management outcome for HCB is continued active Level 1 status. The HCB Workgroup will:

- Improve emission inventories;
- Continue to work with pesticide and chemical manufacturers to reduce HCB emissions, where possible;
- Identify the impact of long-range transport of HCB to the Great Lakes; and
- Determine the co-benefits of reducing specified chlorobenzene compounds as a result of actions that reduce HCB. Collect, report, and use specified chlorobenzene compound information to show benefits related to the reduction of HCB.

6.0 Alkyl-Lead

Challenge Goal Status

Canada has exceeded its challenge goal to reduce alkyl-lead use, generation, and release by 90 percent between 1988 and 2000. Leaded gasoline sales in Ontario declined by almost 99 percent from 1988 to 1997. The US has met the challenge goal to confirm no-use of alkyl-lead in automotive gasoline by 1998 and continues to support and encourage stakeholder efforts to reduce alkyl-lead releases from other sources. Both Canada and the US have prepared challenge reports documenting their status with respect to the challenge goals.

Environmental Analysis and Sources of Lead

Alkyl-lead itself is not a persistent environmental compound, but rapidly degrades to other forms of lead in the environment. Thus, information on the use of alkyl-lead has been employed in place of environmental monitoring data. Most available information on alkyl-lead use in gasoline is limited to older data or is not readily accessible. However, in general, there are sufficient data for GLBTS purposes relative to the remaining sources of alkyl-lead to assess its impact on the Basin. The dominant historic uses of alkyl-lead have been discontinued (e.g., tetraethyllead in gasoline) in North America and in many other countries, and the remaining uses are limited to aviation fuel for piston-engine aircraft, fuel for racing cars, and fuel for off-road and marine vehicles. The remaining significant sources of alkyl-lead are very small compared to historic on-road automotive sources. As a result of Canadian and US regulations, the production of leaded gasoline and its use in on-road vehicles have declined dramatically, as have estimated lead emissions resulting from on-road vehicles. However, in the past decade, with the elimination of routine reporting of leaded automobile gas production, it is more difficult to assess whether the trend in use has continued downward.

Management Assessment

There is little opportunity for the GLBTS to effect further reductions in the remaining uses or releases of alkyl-lead. Both the aviation and automobile racing sectors, the two primary remaining sources of alkyl-lead, would be more effectively addressed at the national level.

Management Outcome

The final management outcome is to suspend GLBTS workgroup activities, and to refer reduction efforts to national programs that address the remaining uses of alkyl-lead. These include efforts by US EPA to:

- Work with racing associations such as the National Association for Stock Car Auto Racing (NASCAR) for voluntary agreements to reduce the use of leaded fuel in race cars;
- Work with the Federal Aviation Administration (FAA) and aviation industry to seek acceptable alternatives to leaded gasoline in aviation fuel; and
- Continued efforts to enhance and promote the phase-out of leaded gasoline use in motor vehicles world-wide.

A periodic reassessment (e.g., at intervals sufficient to elucidate trends) will be undertaken using the General Framework to Assess Management of GLBTS Level 1 Substances, until the Parties determine that virtual elimination has been reached.

7.0 Pesticides

Challenge Goal Status

The GLBTS established challenge goals for both Canada and the US, which call for confirmation that there is no longer use or release of the Level 118 pesticides from sources that enter the Great Lakes Basin, and for international coordination in the event that long-range sources are confirmed. Both countries have prepared reports confirming that all pesticide uses for all Level 1 pesticides have been canceled, and production facilities have closed in the US and Canada. Although evidence of purposeful release has not been identified, potential release from contaminated sites and remaining unused stocks is still possible. However, ongoing site remediation and waste pesticide collection programs (e.g., Pine River remediation and Clean Sweeps programs) are in place and have continued to make progress in reducing these potential release sources since the preparation of the challenge reports.

For these reasons, we believe that the US and Canada have met the principal intent of their challenges, even though the statement "...no longer use or release..." cannot be confirmed as long as unused stocks and contaminated sites exist. To address the second part of the Level 1 pesticide challenge goals outlined in the Strategy, the US and Canada continue to support international frameworks concerned with reducing or phasing out use and release of these substances world-wide.

Environmental Assessment

Geographic Distribution, Temporal Perspectives, Criteria and Risk

Monitoring data are available on the Level 1 pesticides in fish, herring gull eggs, bivalves, water and sediments, air, food, and human body burdens. Criteria have been developed for fish, sediments, water, and food. These criteria are intended to protect certain populations (e.g., human health, wildlife) or uses (e.g., swimming, drinking water) against unsafe levels of the Level 1 pesticides. Preliminary analyses of available data show exceedances in many areas. Some examples include:

- Fish: Measured concentrations of all of the Level 1 pesticides in Great Lakes fish tissue exceed at least one of the available criteria for the protection of human health; toxaphene levels in larger Lake Superior fish are also high and the cause of fish consumption advisories.
  Eighty-five fish consumption advisories have been issued in the Great Lakes states and Ontario due to chlordane, DDT, mirex, and toxaphene.
- Water: Concentrations of dieldrin, DDT, and toxaphene in most of the Lake waters exceed the GLI water quality guidance criteria for the protection of human health.
- Sediments: Dieldrin and DDT exceeded sediment guidelines associated with probable or severe effects in aquatic life; aldrin and mirex exceeded criteria values representing lowest effect levels.

[18] Aldrin/dieldrin, toxaphene, chlordane, mirex, DDT

Overall, the Level 1 pesticides remain ubiquitous in the Great Lakes environment, and at concentrations that may be of concern for both humans and wildlife.

With regard to trends, available data show that Level 1 pesticides have generally declined over the past twenty years in Great Lakes Basin media. However, due to their persistence and long environmental retention times, declines of the Level 1 pesticides in the Great Lakes environment are slow.

Sources of Pesticides

The Level 1 pesticides have been canceled, production facilities have been closed, and intentional releases have been effectively controlled in the US and Canada. The principal remaining sources of the Level 1 pesticides in the Great Lakes Basin are reservoir sources, including sediments, soils, and localized contaminated industrial sites (Superfund sites). Over 100 National Priority List sites within the eight Great Lakes states show contamination by one or more of the Level 1 pesticides. In addition, ongoing Clean Sweeps collections suggest that significant stored quantities of the Level 1 pesticides exist in the Great Lakes Basin, and thus could represent potential future sources if not stored or disposed of properly. Although available evidence does not suggest new or ongoing sources of Level 1 pesticides in the Great Lakes, the contribution of long-range sources (international and regional) may require further investigation. Continued production and use of the Level 1 pesticides has been reported in India, China, Argentina, and possibly Mexico and Central America.

Management Assessment

Current programs exist to address remaining sources of the Level 1 pesticides in the Basin. These include regulations and activities to reduce remaining stockpiles (e.g., Clean Sweeps conducted at the state and local levels), target reservoir sources (e.g., government remediation activities), and support international programs (e.g., the Stockholm Convention).

Management Outcome

The final management outcome is to suspend GLBTS workgroup activities, and to refer source reduction efforts to state and local Clean Sweep programs and existing government environmental remediation activities. Further reductions in pesticide contamination in the Great Lakes environment will occur over time. The GLBTS will also continue to advocate its interests in international fora (including those targeting pesticide phase out and disposal). A periodic reassessment (e.g., at intervals sufficient to elucidate trends) will be undertaken using the General Framework to Assess Management of GLBTS Level 1 Substances, until the Parties determine that virtual elimination has been reached.

8.0 Octachlorostyrene (OCS)

Challenge Goal Status

The GLBTS established similar goals for the US and Canada, to confirm that there is no longer use or release from sources that enter the Great Lakes Basin. If ongoing, long-range sources of OCS from outside the US and Canada are confirmed, the GLBTS will work within international frameworks to reduce or phase out releases of this substance.

Environmental Assessment

Geographic Distribution, Temporal Perspectives, Criteria and Risk

There is monitoring data for OCS in herring gull eggs (1987-2003), sediment cores, lake trout (Lake Ontario), atmospheric deposition, and human breast milk (Ontario). These data are sufficient to allow for informed management decisions under the GLBTS process. Generally, human health and environmental criteria for OCS have not been established; however, for those that exist, there are generally no exceedances.

Sediment, gull egg, and trout data collectively indicate that OCS has been reduced by more than 90 percent in Lake Ontario, where levels were once the highest. Herring gull egg data indicate a widespread decline in OCS (66 to 90 percent) across all lakes since 1987, but more recent 1997-2003 data show that OCS levels appear to have stabilized at 9 of 15 herring gull colonies, with continued declines at the 6 remaining colonies.

Historically, OCS levels were relatively high in Lakes Erie and Ontario, due to sources along the Niagara River and further upstream. Dated sediment cores indicate that OCS levels in Lake Ontario peaked during the 1960s. More recent surveys of surface sediments at Canadian tributaries to Lake Erie and Lake Ontario (Environment Canada, 2001-2003) detected OCS in none of the 112 tributaries to Lake Ontario, and only 5 of 101 tributaries to Lake Erie.

With regard to atmospheric deposition, OCS has been found in nearly all samples collected at the five Integrated Atmospheric Deposition Network Great Lakes monitoring stations from 1999 to 2002; however, all sites observed a decline in OCS during this time period. OCS deposition is higher at the two sites near Lake Erie and Chicago than the three sites near Lakes Superior and Michigan, which suggests that higher levels are found in urban air-sheds.

A Health Canada study published in 1993 found that, of the 10 provinces studied, OCS residues were detected only in human breast milk samples from Ontario. Health Canada has assessed exposures to the population of Ontario and reported that safety margins for exposure to OCS are 25- to 100-fold under precautionary risk estimates.

Sources of OCS

Electrolytic production of magnesium was among the first recognized sources of OCS. At present, there is one electrolytic magnesium factory in the state of Utah and one operating in the Province of Quebec.
The US and Canada have pooled available information regarding potential sources of OCS and

determined that it is currently generated as an unintended byproduct from a variety of industrial processes (although generation may not necessarily imply current release). Five US firms have recently reported generation and management of OCS wastes to US EPA's Toxics Release Inventory, including three inorganic pigment producers, one chemical and vinyl producer, and one magnesium metal producer; however, other industrial processes may also generate OCS.

There are reasonable grounds for considering that OCS may be produced through processes known to yield chlorinated hydrocarbons. HCB and OCS have close structural similarity, and studies that have analyzed air for both compounds have found both. One reported past source was the chlor-alkali industry; however production technology changes during the 1970s would have ended generation of OCS.

Additional potential candidates for generating OCS, perhaps at low levels, include aluminum foundries and secondary smelters; incinerators; plasma-etching processes in semi-conductor manufacturing; secondary copper smelting; and production of graphite, sodium, nickel, vanadium, niobium, and tantalum. Although there are continuing sources of OCS, improved environmental management of wastes over the past several decades has contributed to declines in levels of this toxic substance across the Great Lakes.

Management Assessment

Potential opportunities to reduce OCS are the same as opportunities to reduce other trace chlorinated hydrocarbon byproducts, such as dioxins and HCB, addressed by the GLBTS. Therefore, sectors that undertake actions to reduce releases of dioxins and HCB will likely also reduce OCS releases as a collateral benefit. Environmental evidence supports the view that there has been substantial progress in reducing releases of OCS in both Canada and the US. As OCS is declining in the environment and there appear to be no grounds for concern about this substance, there is no strong case for pursuing further reductions. Overall, there is no rationale for commissioning a new OCS-specific regulation or study.

Management Outcome

The final management outcome is to suspend GLBTS workgroup activities for OCS. There are no known risk-based grounds for new GLBTS activities or challenge goals regarding OCS. The GLBTS will continue to review OCS in environmental biota and media through monitoring programs and long-range transport studies. If additional sources of OCS are identified, they will be addressed through the appropriate forum or program.

9.0 Long-Range Transport

Challenge Goal

The GLBTS established a common goal for both the US and Canada, to "Assess atmospheric inputs of Strategy substances to the Great Lakes. The aim of this effort is to evaluate and report jointly on the contribution and significance of long-range transport of Strategy substances from world-wide sources. If ongoing long-range sources are confirmed, work within international frameworks to reduce releases of such substances."

Since its inception, the GLBTS has addressed this challenge goal by promoting research and discussion and providing a forum for reporting progress on the assessment of the impact of long-range transport (LRT). The most recent of these activities was a two-day workshop on the LRT of Strategy substances, held in Ann Arbor, Michigan, on September 16-17, 2003. Drawing on a commissioned background paper and over 70 experts from around the world, the workshop reviewed the latest research on the global fate and cycling of persistent toxic substances (PTS), identified critical knowledge gaps, and provided recommendations on future activities necessary to adequately address long-range transport. Workshop participants drafted an "Ann Arbor Statement" which contains recommendations aimed at improving our understanding of the LRT of air toxics, particularly with respect to how it impacts the Great Lakes Basin. The Delta Institute presented the final Ann Arbor Statement at a conference of the International Association for Great Lakes Research (IAGLR) in May 2004. The Ann Arbor Statement is available at http://delta-institute.org/pollprev/lrtworkshop/_statement.html.

The Ann Arbor Statement presents the following conclusions:

- US and Canadian governments, in cooperation with international agencies, need to enhance initiatives to better understand LRT.
- If the Great Lakes Basin continues to be a source and a sink of air toxics, the goals of the Great Lakes Water Quality Agreement will never be realized, thereby compromising the health of the ecosystem and its inhabitants.
- Significant financial capital will be required to coordinate and implement the necessary actions. While progress has been made in understanding LRT, work on this challenge goal still remains.

Environmental Analysis

There are not sufficient data on the contribution of LRT to fully assess its impact on the Great Lakes Basin. However, current research indicates that LRT, both intra- and inter-continental, may be a significant source of Strategy substances to the Great Lakes Basin.

Recent studies have investigated the LRT of many PTS substances. Mercury modeling has shown that the Great Lakes Basin is not only affected by mercury emissions from North American sources but also that emissions from Asia and Europe make a significant contribution to the mercury burden over the Great Lakes. The presence of lindane in the air in the Great Lakes region and in the North American Arctic can similarly be traced to contributions from both North American and world-wide sources. The major North American source for toxaphene, a legacy

chemical, may be the soils of the southeastern US. Although, given the prevailing westerly winds, these sources should not affect the Great Lakes, there are certain meteorological situations, lasting only a few days, where there is a direct pathway from these southeastern sources to the Great Lakes. Under these conditions toxaphene air concentrations in the Great Lakes Basin are about two to three orders of magnitude greater than those when the winds are westerly and could be a major factor in the net impact on the Great Lakes Basin.

Researchers at Lawrence Berkeley National Laboratory investigated the North American and global scale transfer efficiency of Level 1 substances to the Great Lakes using the Berkeley-Trent (BETR) contaminant fate modeling framework. The modeling results were used to group substances according to the geographic scale of emissions likely to be transported and deposited to the Great Lakes, with the following results: 1) Local or regional scale: aldrin, dieldrin, and B(a)P; 2) Continental-scale: chlordane, dioxin, DDT, toxaphene, OCS, and mirex; 3) Northern hemispheric scale: PCBs; and 4) Global scale: HCB and a-HCH.

Management Assessment

The Ann Arbor Statement identifies a number of actions that are considered to be the most critical scientific and research needs to understand and eventually reduce the LRT of chemicals to the Great Lakes. These actions pertain to emissions inventories, monitoring, modeling, and integration and synthesis. The GLBTS can add value to current efforts by addressing some of these needs through support for: 1) the development of better estimates of the use and emissions of PTS substances both within the Basin and on an appropriate broader scale, 2) air monitoring efforts both in the Basin and in potential source regions upwind of the Basin, 3) improved modeling for informed decision-making, e.g., inter-comparison of models to enhance confidence in the use of such models, 4) investigation of the LRT potential of emerging chemicals, and 5) cooperation with international agencies to reduce emissions at the source.

Two international initiatives, in particular, have a direct impact on reducing the transport of Strategy substances to the Great Lakes. The first is a United Nations Environment Program (UNEP) partnership looking at the fate and transport of substances, primarily mercury. The second is a pesticide initiative in which Canada, the US, and China are investigating lindane usage in China and the China-Pacific transport pathway. It is important that the GLBTS participate with these initiatives to further the interests of the Great Lakes region. In addition, implementation of the Stockholm Convention by individual countries will lead to reduced uses and releases of a number of persistent organic pollutants, which should also lead to reduced loadings from other countries to the Great Lakes.

Management Outcome

The current challenge goal for LRT remains relevant, and no changes are recommended at this time. The GLBTS will continue to:

- Support the study of LRT of Strategy substances, including actions to improve emissions inventories, monitoring, and modeling (as recommended in the Ann Arbor Statement);
- Evaluate and report jointly on the contribution and significance of LRT of Strategy substances from world-wide sources; and

- Work within international frameworks to reduce releases.

10.0 Sediments

Challenge Goal Status

The GLBTS established one goal for both the US and Canada, to "Complete or be well advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006." Progress toward this goal continues, as reported annually in GLBTS progress reports. Contaminated sediments remain at a number of sites in the Great Lakes. While it is estimated that tens of millions of cubic yards of contaminated sediment remain in priority sites, progress is made each year in the critical evaluation of sediments, identification of remedial needs, and remediation. On average, the US has remediated over 450,000 cubic yards of contaminated sediment each year since 1997. US EPA has a goal of remediating 300,000 cubic yards of contaminated sediment a year. It is anticipated that efforts in 2005 and projected efforts in 2006 will result in remediation of over half a million cubic yards of contaminated sediment by the end of 2006. In Ontario, since GLBTS reporting was initiated, sediment remediation projects have been undertaken at Thunder Bay and the St. Clair River. Decisions on natural recovery and natural recovery with administrative controls have been taken at the Severn Sound and Cornwall/St. Lawrence River Areas of Concern (AOCs), respectively. Work is continuing over the next two years on the development of sediment management strategies in 6 of 10 AOCs with sediment related issues in Ontario. Progress in US AOCs is difficult to assess. Many US AOCs are extremely large and have been broken down into manageable projects within an AOC. These manageable projects can take many years to remediate due to a variety of factors. For example, US EPA, States, and other stakeholders are still assessing the magnitude and scope of contaminated sediment at some of these sites. In some cases, AOC boundaries have yet to be finalized. However, progress is being made every year. Typically, over three projects are initiated and three projects are completed each year. In 2004, work under the Great Lakes Legacy Act began, providing added emphasis to sediment remediation efforts in the Great Lakes. See the annual GLBTS progress reports for details about sediment remediation projects in the Great Lakes.

Environmental Analysis

There are sufficient data on the presence of contaminated sediments in the Great Lakes Basin to describe the degree and spatial extent of contamination based on exceedances of sediment quality criteria. Remedial interventions also involve assessments of toxicity, benthic community impacts, contaminant bioavailability/ biomagnification, and exposure pathways and risks. Although discharges of monitored toxic substances have declined dramatically over the past 30 years, the legacy of contamination persists in the sediments of many rivers and harbors where concentrations of contaminants remain high, and continue to pose potential risks to the health of aquatic organisms, wildlife, and humans.

Management Assessment

Responsibility for the management and remediation of contaminated sites resides variously with federal, state, and provincial governments, industries, and other interested stakeholders. The GLBTS has provided a forum to report on activity and support outreach (for instance, in 2001, the GLBTS held a workshop to promote the transfer of sediment remediation technologies). The GLBTS reports annually the volume of sediments remediated from priority sites in the Great Lakes Basin (since 1997) and the quantity of Level 1 substances contained in those sediments. Refer to the most current version of the GLBTS Progress Report (at www.binational.net) for the most up-to-date sediment remediation estimates. Aside from the reporting and outreach efforts, the GLBTS provides no further opportunities to add value to current remediation activities.

Management Outcome

The Sediment goal remains relevant to the GLBTS, which supports continuing sediment evaluation and remediation activities at priority sites in the Great Lakes Basin. The GLBTS will continue to report annually the progress made in sediment remediation activities in the Basin, and identify opportunities to support additional information-sharing efforts (similar to the 2001 workshop) as needed.

APPENDIX C

GENERAL FRAMEWORK TO ASSESS MANAGEMENT OF GLBTS LEVEL 1 SUBSTANCES: BACKGROUND, OBJECTIVES, AND DOCUMENTATION

BACKGROUND

Over the past thirty years, the governments of Canada and the United States have joined together with industries, citizen groups, and other stakeholders in a concerted effort to identify and eliminate threats to the health of the Great Lakes ecosystem resulting from the use and release of persistent toxic substances. A major step in this process was the enactment of the *Revised Great Lakes Water Quality Agreement (GLWQA) of 1978* which embraced, for the first time, a philosophy of "virtual elimination" of persistent toxic substances from the Great Lakes. In 1987, the GLWQA was amended, establishing Lakewide Management Plans (LaMPs) as a mechanism for identifying and eliminating any and all "critical pollutants" that pose risks to humans and aquatic life. In 1994, the International Joint Commission's *Seventh Biennial Report* under the GLWQA called for a coordinated binational strategy to "stop the input of persistent toxic substances into the Great Lakes environment." This led to the signing of the *Great Lakes Binational Toxics Strategy* (GLBTS, or Strategy) in 1997. The Strategy specifies Level 1 substances, each targeted for virtual elimination and each with its own specific challenge goals, along with Level 2 substances targeted for pollution prevention. The substances were selected on the basis of their previous nomination to lists relevant to the pollution of the Great Lakes Basin, and the final list was the result of agreement on the nomination from the two countries. The specific reduction challenges for each substance include individual challenge goals for each country, within a time frame that expires in 2006.

Significant progress has been made toward achieving the Strategy's challenge goals. As 2006 approaches, an analysis of progress and determination of next steps is needed to respond to the mandate set forth in the Strategy. The purpose in developing the *General Framework to Assess Management of GLBTS Level 1 Substances* is to provide a tool to assist the Parties (Environment Canada and the United States Environmental Protection Agency) and stakeholders in conducting a transparent process to assess the Level 1 substances.

OBJECTIVE

The framework presents a logical flow diagram for evaluating progress and the need for further action by the GLBTS on the Level 1 substances in order to meet the following objective:

Evaluate the management of GLBTS Level 1 substances with the following potential outcomes:

1. Active Level 1 Status & Periodic Reassessment by GLBTS
2. Consider Submission to BEC[19] for New Challenge Goals
3. Engage LaMP Process
4. Suspend GLBTS Workgroup Activities. Where warranted, refer to another program and/or participate in other fora. Periodic Reassessment by GLBTS, until Parties determine substance has been virtually eliminated.

Additional outcomes that may result from the framework are:

[19] The Binational Executive Committee (BEC) is charged with coordinating implementation of the binational aspects of the 1987 Great Lakes Water Quality Agreement, including the GLBTS. The BEC is co-chaired by EC and US EPA and includes representatives from the Great Lakes states and the Province of Ontario, as well as other federal agencies in Canada and the U.S.

- Recommend benchmark or criteria development as a high priority; and
- Recommend additional environmental monitoring as a high priority.

The framework is intended to serve as a guide in determining the appropriate management outcome(s) for the Level 1 substances: mercury, polychlorinated biphenyls (PCBs), dioxins and furans, hexachlorobenzene (HCB), benzo(a)pyrene (B(a)P), octachlorostyrene (OCS), alkyl-lead, and five cancelled pesticides: chlordane, aldrin/dieldrin, DDT, mirex, and toxaphene. The framework is not intended to specify details of how a Level 1 substance should be addressed once a management outcome is determined.

STRUCTURE OF THE FRAMEWORK

The framework is set up in a hierarchical fashion to allow efficiencies in the decision process. The hierarchy of the framework is to first consider progress toward the challenge goals committed to in the Strategy, then to conduct an environmental analysis and finally, a GLBTS management assessment which leads to various potential management outcomes for a substance.

The environmental analysis (depicted in green) and the GLBTS management assessment (depicted in blue) comprise the two main parts of the framework. The environmental analysis considers available Canadian and U.S. monitoring data and established human health or ecological criteria as the primary basis for an objective evaluation of a substance's impact on the Basin. For substances lacking sufficient risk-based criteria or environmental monitoring data, the framework recommends the development of benchmarks or criteria and additional monitoring as a high priority. While the environmental analysis places emphasis on good monitoring data, evidence of use, release, exposure, or precautionary concerns may also be considered.

If the environmental analysis concludes that there is no basis for concern, GLBTS workgroup activities may be suspended, with periodic reassessment of the substance until the Parties determine that the substance has been virtually eliminated. If, on the other hand, the environmental analysis concludes that there is a reason for concern, the GLBTS management assessment evaluates the ability for the GLBTS to effect further improvements in and out of the Basin. The GLBTS management assessment also considers whether the impact of a substance is basinwide or restricted to a single lake. In cases where the GLBTS can effect further reductions, consideration will be given as to whether new Strategy challenge goals can be established. Virtual elimination is an underlying tenet of the Strategy and should be kept in mind throughout the assessment process.

The GLBTS management assessment can result in a number of potential management outcomes; the outcomes provided in the framework allow a substance to remain in active Level 1 status or GLBTS workgroup activities to be suspended. The outcomes also recognize that it may be appropriate to more actively involve a LaMP process, to refer a substance to another program, to represent GLBTS interests in other fora (e.g., international programs), or to consider proposing new challenge goals. All outcomes include a periodic reassessment by the GLBTS (approximately every two years).

While it is recognized that the Parties have an ongoing responsibility to promote GLBTS interests in other arenas, a potential outcome of the framework is to recommend referral to another program and/or GLBTS representation in other fora. In the GLBTS framework, this option is presented when

there is no evidence of Basin effects, or when the GLBTS cannot effect further significant reductions on its own, but can advocate substance reductions in other programs and in international fora.

It should be noted that, in using the framework to conduct assessments for the Level 1 substances, it may not be possible to definitively answer "YES" or "NO" to all questions. It is not necessary to have a definitive answer to proceed in the framework. For example, in assessing whether there is environmental or health data to assess the impact of the substance in the Basin, it may be determined that, while additional data would be helpful, there is some data on releases and environmental presence in certain media with which to assess the status of the substance. In this case, judgment is needed to decide whether these data are sufficient to proceed along the "YES" arrow or whether the available data are not adequate and the analysis should proceed along the "NO" arrow, placing the substance on a high priority list for monitoring. As a general guide, the framework allows flexibility and judgment in interpreting environmental data and in determining the most appropriate management outcome(s).

Each decision node, or shape, in the framework is illustrated below along with a brief explanation that describes, in further detail, the question to be assessed.

GLBTS Level 1 Substances

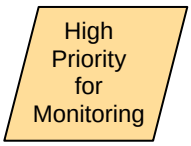
All 12 Level 1 substances will be assessed.

Have the challenge goals for the substance been met?

The first question to consider in assessing the GLBTS status and future management of a Level 1 substance is whether the challenge goals agreed to in the Strategy have been met. The answer to this question informs the subsequent assessment in many ways, not only indicating progress, but also revealing issues associated with the ability to pursue further reductions. Progress toward the U.S. and Canadian goals will be considered jointly. Challenge goals will be evaluated with the best data presently available. Note that some challenge goals target "releases" of a substance while others target its "use". As a result, different types of data may be required to evaluate challenge goal status (e.g., "use" data vs. environmental "release" data). The framework continues with both the environmental analysis and GLBTS management assessment, notwithstanding the status of the challenge goals.

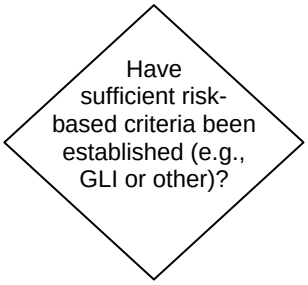
ENVIRONMENTAL ANALYSIS

Characteristics of acceptable monitoring data to assess the temporal, spatial, and population representativeness of a substance in the Great Lakes Basin ecosystem include (but are not limited to) basin-specific measures in water, air, sediment, soil, indoor environments (e.g., dust), fish, biota, or human biological samples. If necessary, use or release data may be used as surrogates (e.g., in the case of alkyl-lead).

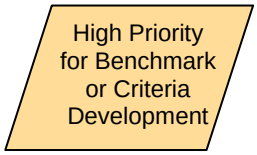


"What gets measured gets managed." Substances entering this box will be recommended as a high priority for monitoring to the Parties. The intent is that these GLBTS substances will be considered by a wide range of government or private agencies when they make decisions regarding which analytes to monitor in the environment. As sufficient monitoring data is developed, substances will be re-evaluated.

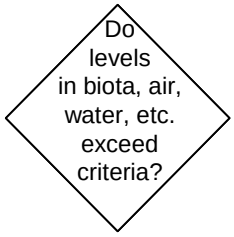
Relevant criteria include, but are not limited to:



- Water quality criteria
- Fish tissue concentrations
- Ambient or indoor air standards
- Sediment or soil standards
- Limits based on reference doses
- Health-based standards for human biota measurements



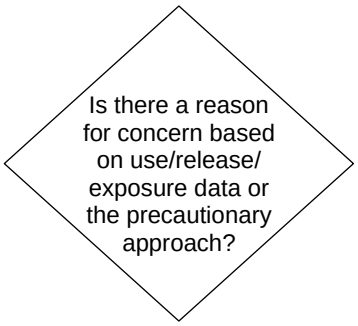
If there are no criteria against which to evaluate current levels, the GLBTS will consider whether there is a need for the Parties to recommend the development of human health or ecological criteria. This box effectively creates a GLBTS list of substances that are in need of human health or ecological criteria with which to identify exceedances in the environment.



As the framework is intended to be flexible in its implementation, the choice of criteria to use in answering this question may vary. For example, the most strict criteria in one or more media may be used to evaluate environmental levels.

If there are no criteria, or if current levels do not exceed criteria, this box considers whether there is a decreasing trend. A decreasing trend could be defined as a statistically significant negative slope. If the trend is decreasing, the substance is evaluated for evidence of concern based on use, release, exposure, or the precautionary approach. If a decreasing trend cannot be established, then the substance moves directly to the GLBTS management assessment to determine the ability of the GLBTS to effect further reductions.

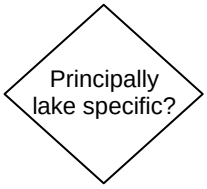
* Note that, in the event that there are established criteria and the GLBTS substance is below those criteria but not decreasing in trend, further analyses may be required to estimate when criteria might be exceeded.



In cases where sufficient monitoring data is not available, or where environmental trends are decreasing and criteria have either not been established or are not being exceeded, the relevant question is whether there is evidence of Basin effects based on documented use, release, or exposure data, or from a precautionary point of view. An example of a precautionary point of view would be documented evidence of significant impact in another geographic location with the same sources and use patterns as in the Basin, or because the effects of a pollutant would be significant by the time it was able to be measured through monitoring.

GLBTS MANAGEMENT ASSESSMENT

Answering this question involves an accelerated version of the first three steps of the GLBTS 4-step process,[20] looking at sources and current programs and regulations to see where the reduction opportunities lie. Part of the assessment will involve consideration of whether the reduction opportunities will be significant enough to merit the effort.



Based on a joint GLBTS-LaMP determination that the impact of a substance is restricted to a single lake, the appropriate LaMP will be engaged for coordination of leadership for reduction actions to be undertaken by the responsible organizations.

The GLBTS will assess the practicality of setting forth new challenge goals.

GLBTS MANAGEMENT OUTCOMES

[20] The GLBTS four-step process to work toward virtual elimination is: 1) Information gathering; 2) Analyze current regulations, initiatives, and programs which manage or control substances; 3) Identify cost-effective options to achieve further reductions; and 4) Implement actions to work toward the goal of virtual elimination.

Active Level 1 Status & Periodic Reassessment by GLBTS

The substance will continue as a Level 1 with reduction actions addressed by the appropriate process and with periodic reassessment, approximately every two years, using the *General Framework to Assess Management of GLBTS Level 1 Substances*.

Consider Submission to BEC for New Challenge Goals

The GLBTS will consider recommending new challenge goals to BEC. The justification for new challenge goals will incorporate the findings of the framework analysis and will include assessment of the desired environmental improvement and feasibility. If the GLBTS decides to propose new challenge goals, the recommendation to BEC will include a reduction percentage, reduction timeline, and baseline for the proposed new challenge goals.

Engage LaMP Process

For substances whose impact is lake-specific, the appropriate LaMP will be engaged to coordinate substance reduction activities with continued support from the GLBTS, recognizing the limited direct implementation capacity of the LaMPs. It is understood that much of the actual implementation would be carried out by the agencies with responsibility to address these substances. A joint review of progress would be undertaken periodically.

Suspend GLBTS Workgroup Activities. Where warranted, refer to another program, and/or participate in other fora. Periodic Reassessment by GLBTS, until Parties determine substance has been virtually eliminated.

In the event that the GLBTS is not able to effect further reductions, or there is no evidence of Basin effects, GLBTS workgroup activities will be suspended. Where warranted, a recommendation will be made to a) refer reduction efforts for the substance to another program, and/or b) represent GLBTS interests in other fora (e.g., Commission for Environmental Cooperation, United Nations Environment Programme). There will be no ongoing workgroup involvement with these substances, though each one will undergo periodic reassessment, approximately every two years, using the *General Framework to Assess Management of GLBTS Level 1 Substances*, until the Parties determine that virtual elimination has been reached.

General Framework to Assess Management of GLBTS Level 1 Substances