WORKING DRAFT
GREAT LAKES
BINATIONAL TOXICS STRATEGY

DRAFT 2001 PROGRESS REPORT

NOVEMBER 14, 2001

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INTRODUCTION

In 2001, implementation of the Great Lakes Binational Toxics Strategy (GLBTS) continued into its third year. This reports highlights actions taken from November 2000 through November 2001. A time line of activities undertaken since the strategy's inception, as well as related events, is presented in the Appendix.

[*to be completed*]

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1.0 Mercury Workgroup Highlights

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

Workgroup Activities and the 4-Step Process

The focus of the Mercury Workgroup has been on Steps 3 and 4: the examination and implementation of reduction options, and the development of partnerships and commitments. The following draft reports have been posted to the GLBTS web site: U.S. Sources and Regulations (Steps 1 and 2) (http://www.epa.gov/glpno/bns/mercury/stephg.html), and Mercury Reduction Options (Step 3) (http://www.epa.gov/glnpo/bns/mercury/Draft_Report_for_Mercury_Reduction_Options.pdf).

Reduction Activities

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. The following is a selection of activities reported by Mercury Workgroup participants. Links to web sites with additional details about many of these activities can be found at http://www.epa.gov/Region5/air/mercury/mercury.html.

Chlor-Alkali Industry: This U.S. industry, through the Chlorine Institute, committed (in 1996) to reducing mercury use 50 percent by 2006. Efforts have involved meetings to address technology issues, plant visits by USEPA, industry workshops, technology transfers between members, and reports of individual company activities to achieve the goal. The industry reported in April 2001 that it has reduced mercury use by 44 percent, in addition to reductions that were the result of decreasing production capacity, between 1995 and 2000. In addition, during the past year the Institute has produced "Guidelines for Mercury Cell Chlor-Alkali-Plants Emission Control: Practices and Techniques" and has cooperated with USEPA on the development of draft proposed maximum available control technology regulations for chlor-alkali plants.

Medical Sector: Under the Memorandum of Understanding between the American Hospital Association and USEPA, Hospitals for a Healthy Environment (H2E) has produced a Mercury Virtual Elimination Plan for U.S. hospitals. In addition, workgroups are implementing work plans on various aspects of hospital waste reduction and on eliminating the use of mercury-containing products. In addition, H2E has consolidated a number of small pledge programs into a single program, initiated a process to increase public participation, and designed an awards program which recognizes the various levels of mercury reduction activities within both health care and non-health care settings. This year the American Hospital Association reconfirmed its commitment to the H2E program.

With the support of EPA's Great Lakes National Program Office, the National Wildlife Federation (NWF) expanded its Mercury-Free Medicine campaign. This project, undertaken in partnership with the Health Care Without Harm Campaign, seeks to convince health care

providers to eliminate mercury in their facilities, thereby reducing and ultimately eliminating the mercury in their waste. This past year, fifteen additional hospitals in the region signed a pledge to become mercury-free, and 78 clinics in the Saginaw Bay watershed also made the commitment to stop using mercury in their facilities. NWF also worked with a coalition of organizations to help convince the Henry Ford Hospital to shut down its medical waste incinerator and use waste disposal methods that do not cause significant mercury emissions. In all, over 160 facilities in the Great Lakes states have pledged to become mercury-free.

USEPA awarded a Pollution Prevention Environmental Justice grant to the St. Clair (IL) County Health Department to promote alternatives to mercury-containing devices among local health care facilities. This project, which takes place in the 'Gateway' area near St. Louis, is considered a model for comparable opportunities, including those in the Great Lakes Basin.

The Indiana Mercury Reduction Pledge Program for Hospitals currently has eight participants, and many other Indiana hospitals are working toward removing mercury-containing equipment from their facilities. The mercury pledge also gives the Indiana Department of Environmental Management an opportunity to work with hospitals on other solid and hazardous waste issues.

In March 2001, the Canadian Centre for Pollution Prevention (C2P2), with support and input from Environment Canada, completed pollution prevention training to health care professionals in Toronto, London, and Thunder Bay, Ontario. To assist health care professionals, C2P2 also developed a resource guide to pollution prevention. On-line pollution prevention information is also available for health care professionals at www.c2p2online.com. The website includes mercury reduction information and several case studies for hospitals which have mercury reduction programs, including: Toronto Hospital for Sick Children, Cambridge Memorial, Orillia Soldiers Memorial, University Health Network (formerly Toronto General, Toronto Western, Princess Margaret, Toronto Medical Laboratories), and St. Mary's Hospital in Kitchener, Ontario.

A new organization called the Canadian Coalition for Green Health Care has recently been established to reduce the environmental impact of Canada's health care system. Members of the coalition include the Canadian Association of Physicians for the Environment, Canadian Centre for Pollution Prevention, Canadian College of Health Services Executives, Canadian Medical Association, the Canadian Nurses Association, Canadian Public Health Association, Canadian Society for Environmental Medicine, College of Family Physicians of Canada, Great Lakes United, Hospital for Sick Children, Toronto, Pollution Probe, Toronto Environmental Alliance/Health Care Without Harm. The web site for the organization is www.greenhealthcare.ca. The web site contains information on Canadian suppliers of mercury-free medical devices.

The Ontario Hospital Association (OHA) annual convention is being held November 5 to 7, 2001. The convention will include a dedicated area of exhibits for environmentally beneficial products and services, including mercury reduction information. The Canadian Coalition for Green Health Care and the OHA have established the Ontario Green Health Care Awards, the first of which will be announced at the convention.

Industrial Use of Mercury-Containing Devices: Bethlehem Steel Burns Harbor, Ispat Inland-East Chicago, and US Steel-Gary have developed mercury reduction plans, focusing primarily on mercury-containing devices, under a voluntary agreement with USEPA, Indiana Department of Environmental Management, and the Lake Michigan Forum. They are also promoting mercury reduction among their suppliers, and with the Delta Institute have developed a Mercury Reduction Guide for Industry. Wisconsin Electric Power (WEPCo) completed a survey in 1999 which showed that mercury-containing equipment in WEPCo's power plants totaled approximately 250 pounds of mercury. In 2001, WEPCo removed mercury-containing equipment from two older Presque Isle Power Plant units which contained a total of approximately 100 pounds of mercury. The remaining mercury is largely contained in hundreds of switches and thermostats located throughout five major coal-fired power plants and three combustion turbine complexes.

Mercury in Schools: The University of Wisconsin extension office has created a website (www.mercury-k12.org) and list server to share information about mercury in schools, including mercury reduction opportunities and mercury cleanup, curriculum, and policy approaches. This effort has also involved presentation of "mercury in schools" workshops to forums of teachers and administrators in the Great Lakes Region. These presentations will also be given in other EPA Regions, with EPA funding.

Many Great Lakes states are implementing school mercury reduction programs. Legislation has been passed in Michigan and Indiana prohibiting the use of mercury in schools.

As part of a school program in London, Ontario, called "E.A.S.E.," project materials and workshops were delivered with great success in over 20 schools across the Thames Valley District School Board and London District Catholic School Board. Students were engaged during an interactive presentation and took information home for household mercury audits. Project materials are also available for other communities.

Mercury lessons and activities for Grades 4-8 are available on the Environment Canada website at www.on.ec.gc.ca/glimr/classroom/millenium/mercury/intr-e.html.

Batteries: The National Electrical Manufacturers Association (NEMA) conducted its annual surveys of mercury levels in alkaline batteries collected in recycling programs in Camden County, New Jersey, Lee County, Florida, and Hennepin County, Minnesota. Average mercury levels were 259 ppm in Lee County, 365 ppm in Camden County, and 388 ppm in Hennepin County. Alkaline batteries had roughly 10,000 ppm before the battery industry began to eliminate mercury from alkalines in the late 1980s. NEMA projects that the mercury levels will decline by 50 percent every two years. Another survey conducted by NEMA concluded that all button cells sold by NEMA manufacturers in the U.S. during 2000 contain roughly 2 tons of mercury.

Lamps: A survey of NEMA lamp manufacturers and Panasonic Lighting showed that mercury levels in lamps have declined from roughly 27 tons in 1990 to 11 tons in 2000. Based on an estimate of lamps recycled in 2000 and sales of lamps by NEMA manufacturers in 1995, NEMA estimates that national lamp recycling levels reached approximately 24% in 2000. Lamp

recyclers claim that the number of lamps they process grew from 75 million lamps in 1997 to 130 million lamps in 2000.

Eco Superior Fluorescent Lamp Recycling is a coordinated effort to recycle spent fluorescent lights on the Canadian side of the Superior Basin. The following organizations in Thunder Bay, Red Rock, and Marathon, Ontario, are part of this effort: Bowater Pulp and Paper, Bombardier Transportation, Provincial Papers, Smurfit-Stone Packaging, City of Thunder Bay, Lakehead University, Confederation College, Ontario Power Generation, Abitibi-Consolidated, Norampac Packaging (Red Rock), Marathon Pulp. All of these facilities now recycle fluorescent lamps. Thousands of spent lights have already been recycled. Eco Superior is currently working with consortium participants to examine all costs associated with the operation of this program, and concrete measures for efficiencies are being seriously examined. This may include the use of one central collection point for all consortium members, rather than pickup at individual facilities. Once all possible steps have been taken to reduce costs, Eco Superior hopes to expand this program to other Lake Superior Basin communities.

Access to collection facilities in Ontario for household lamps has increased significantly over the past year. Households can now return lamps to municipally run facilities in 15 cities in Ontario, including: Toronto, Region of Peel, Ottawa, Region of Durham, London, Sudbury, Chatham-Kent, Guelph, Brantford, Kawartha Lakes, County of Northumberland, County of Wellington, Hawksbury, Township of Augusta, and Bayham. In total, over 2 million households in Ontario have access to lamp collection facilities.

Dentistry: All of the Great Lakes states' dental associations have published and distributed *Amalgam Recycling and Other Best Management Practices*, a document developed with funding provided by the Great Lakes Protection Fund.

The Ontario Dental Association has developed a "Best Management Practices" manual, which includes information concerning amalgam separators. The manual has been distributed to all Ontario dentists. The City of Toronto has passed a sewer use bylaw that requires amalgam separators to be installed in all Toronto dental practices by January 1, 2002. Canada Wide Standards have been proposed for dental amalgam which would require the application of "Best Management Practices," including the installation of an ISO-certified trap or its equivalent in order to achieve a national 95 percent reduction in mercury releases from dental practices by 2005, from a base year of 2000.

The Federal, Provincial, and Territorial Environment Ministers across Canada have agreed to a harmonized standard for managing dental amalgam waste across the country. Ministers signed a Canada Wide Standard on September 23, 2001 in The Pas, Manitoba. The Canada Wide Standard is the application of best management practices to achieve a 95 percent national reduction in mercury releases from dental amalgam waste discharges to the environment from a base year of 2000.

The Indiana Department of Environmental Management (IDEM) met with the Indiana Dental Association's (IDA) Council on Dental Health on September 12, 2001, and discussed various options for mercury reduction programs. No formal agreements have been made, but IDEM will continue to work with IDA.

Dental Wastewater Collection and Recycling System: A grant to the University of Illinois at Chicago College of Dentistry entitled, *Dentist Recycling and Awareness Training Module*, is intended to reduce some of the mercury loadings to wastewater facilities from dental offices and clinics by using relatively simple changes in dental amalgam disposal practices. Given stricter mercury discharge standards, the mercury loading from dental practices and other small sources may influence the ability of treatment facilities to meet National Pollutant Discharge Elimination System (NPDES) permit requirements. Research has indicated that over 50 percent of the mercury in dental wastewater can be collected from particles caught in the in-line trap.

Dental Wastewater Characterization: Through an interagency agreement, an award entitled *Mercury Removal from the Dental-Unit Wastewater Stream* was given to the U.S. Navy, Naval Dental Research Institute, Great Lakes, Illinois. The purpose of this project is to characterize both organic and inorganic mercury in the dental wastewater stream and to identify efficacious and cost-effective methods of removing heavy metals from this waste stream.

Thermometers: Coalitions including Health Care Without Harm and the National Wildlife Federation have successfully encouraged several U.S. retailers to stop the sale of mercury-containing thermometers to the public and have promoted bans on the sale of mercury fever thermometers. Such bans have been enacted in several states and local jurisdictions. The Michigan Department of Environmental Quality is working with local institutions to conduct mercury thermometer exchanges across the state. IDEM is sponsoring thermometer exchanges with various partners, holding twelve events in the last six months. Visit www.in.gov/idem/mercury for a detailed list of events and results for 2000 and 2001. IDEM has also experimented with thermometer exchanges on Headstart Program buses (allowing children to bring in a mercury thermometer from home and have it replaced with a digital thermometer). IDEM is considering the effectiveness of this approach as an outreach tool for some communities.

Fever thermometers containing mercury continue to be distributed to the Canadian public, despite the availability of alternatives such as digital thermometers. Environment Canada is actively engaged with Canadian retailers and distributors to work toward ending the sale of mercury-filled thermometers to the general public.

Environment Canada is also working with retailers and distributors to implement a program to encourage the public to return mercury-containing thermometers to pharmacies. The program will collect and recycle mercury from fever thermometers by increasing public awareness of mercury products in the home. Environment Canada is planning a pilot scale Mercury Fever Thermometer Take Back Program for volunteering retail pharmacies in Thunder Bay, London, and Ottawa, Ontario. The Pilot Program is scheduled for February 2002.

Pollution Probe held a small-scale mercury thermometer exchange at the City of Toronto Fall 2001 Environment Days. Promotion of the exchange appeared on the city's website and in literature distributed by city council members. The public was encouraged to bring mercury thermometers for proper disposal at an on-site household hazardous waste truck, and the first 25 people each day received a free digital thermometer. Initial response from the public has been very positive. There exists great opportunity to work with the city in years to come to heighten the public's awareness of mercury use in the home, promote mercury-free products such as electronic thermostats, and encourage proper disposal of mercury-containing products.

Thermostats: The Thermostat Recycling Corporation (TRC) collected 24,362 thermostats and processed over 210 pounds of mercury from wholesalers in the first half of 2001. This represents nearly a doubling of thermostats and more than a doubling of mercury collected during the same period last year. The TRC has collected over 99,000 thermostats and processed roughly 860 pounds of mercury since it began operation in 1998. The TRC expanded its program in 2001 to cover all the lower 48 states. Over 1,000 TRC containers are in HVAC wholesale stores across the U.S.

Eco Superior has established a thermostat program in Ontario. So far, thermostat recycling depots have been set up in Thunder Bay and in every community on the North Shore of Lake Superior with a hardware store. This includes Nipigon, Schreiber, Terrace Bay, Marathon, White River, and Wawa. Next, Eco Superior hopes to expand this program into Sault Ste. Marie, Ontario.

Dairy Manometer Replacement: The Wisconsin Department of Natural Resources and the Department of Agriculture have conducted a dairy mercury manometer replacement program to allow dairy farmers to replace their mercury manometers for electronic manometers at a discounted price. Dairy equipment dealers are given money to partially cover the cost of mercury manometer removal and replacement, and a contractor picks up the removed manometers for recycling. Approximately 375 mercury manometers have been recycled through this program.

Appliances: The Ontario White Goods Collection and Mercury Switch/Sensor Removal Pilot was launched in April 2001 in the Regional Municipality of Niagara. To date, some 760 appliances have been segregated for inspection at the two sites. Of these, 97 were found to contain mercury switches. Assuming the average mercury content of each switch to be 3.5 grams, the total amount of mercury collected to date is 340 grams. The pilot will be completed in December 2001. Upon completion of the pilot, a cost analysis and procedures manual will be available for other municipalities in Ontario who are being kept informed of the pilot through the Association of Municipal Recycling Coordinators. Workshops on expanding the program will take place in Spring 2002. Another municipality, Owen Sound, has already begun removing mercury switches as part of a white goods program.

Household and Small Business Mercury Collection: Several Great Lakes states have conducted numerous successful mercury collection programs. For instance, since October 1998, Indiana has collected over 4,500 pounds of mercury and mercury-containing items from households. Bowling Green State University, in conjunction with the Ohio EPA and other private and public entities, collects uncontaminated elemental mercury from citizens, academic institutions, medical facilities, industries, and any other sources. This free program has collected more than 2,500 pounds of mercury throughout Ohio, southern Michigan, eastern Indiana, and western Pennsylvania, in addition to mercury collected through thermometer exchange projects. The Wisconsin Mercury Recycling Program is in progress in eight Wisconsin mercury reduction communities. This program allows households and businesses to recycle almost all mercury-containing items for free, or at low cost, at local Clean Sweep events and Household Hazardous Waste Facilities. This program was designed to last one year but may be extended for one more year. In addition, Dane County, Wisconsin, has put together a mercury reduction plan and is working with the respective interest groups, according to the plan's priorities, which include thermostats, switches in autos and appliances, fluorescent lights, medical facilities, and schools.

In the fall of 2000, Illinois EPA sponsored residential mercury collections at 30 suburban Chicago fire stations and four city stations, collecting 1,365 pounds of mercury. The total cost of this program was $41,494.

In 2001, the Menominee Tribe-County collected 100 pounds of mercury (including packaging-container weight) in a household hazardous waste collection during a one-day collection event. The event also collected 300 pounds of fluorescent lamps from households. In addition, a tribe-county program recycles fluorescent lamps from public buildings and the Menominee Casino-Hotel.

Automobiles: The Alliance of Automobile Manufacturers, which represents auto manufacturers with operations in North America, committed to the eventual phase-out of mercury switches used in auto convenience lighting and agreed to work cooperatively with States on pilot programs to encourage auto dismantlers and scrappers to remove mercury switches. The Michigan Department of Environmental Quality (MDEQ) has led discussions with the Automobile Alliance and the Automotive Recyclers of Michigan. DaimlerChrysler has completely phased out mercury-containing light switches, and Ford has provided a verbal commitment to phase out mercury-containing light switches by 2002. General Motors projects that mercury convenience lighting switches will be phased out of all but one low-volume vehicle line by the 2002 model year, with all mercury-containing switches replaced by model year 2006.

A "clean sweep" to collect all mercury switches from vehicles currently in Michigan salvage yards was conducted during September and October, 2000, and recycling programs continue. The New York Department of Environmental Conservation has been implementing programs to remove switches from vehicle fleets and scrapped vehicles. A grant was given to Erie County, New York, for an automotive switch recycling project that consists primarily of outreach to Erie County scrap and salvage yards as well as the collection and disposal of automotive mercury switches removed from vehicles prior to crushing and shredding. The Wisconsin Department of Natural Resources is developing a mercury switch removal project, in conjunction with automotive recyclers.

In June 2001, Pollution Probe initiated the Switch Out Program, Canada's first program to recover mercury switches from end-of-life automobiles before the mercury contained in the vehicles can be released to the environment. With funding from Ontario Power Generation, the Ontario Ministry of the Environment, and Environment Canada, and in partnership with the Ontario Automotive Recyclers Association, the Switch Out Program collected mercury convenience lighting switches from 11 auto dismantlers across Ontario over a six-month period. The name and location of these facilities are presented in the figure below (map courtesy of Pollution Probe). The pilot project was extremely successful, both in terms of meeting the collection target of 2,500 switches and in terms of response from the auto dismantling industry. Preliminary results demonstrate the potential for effective, cost-efficient collection programs for automotive switches to be implemented across Canada. For more information, see http://www.pollutionprobe.org/merc/merc_so.htm.

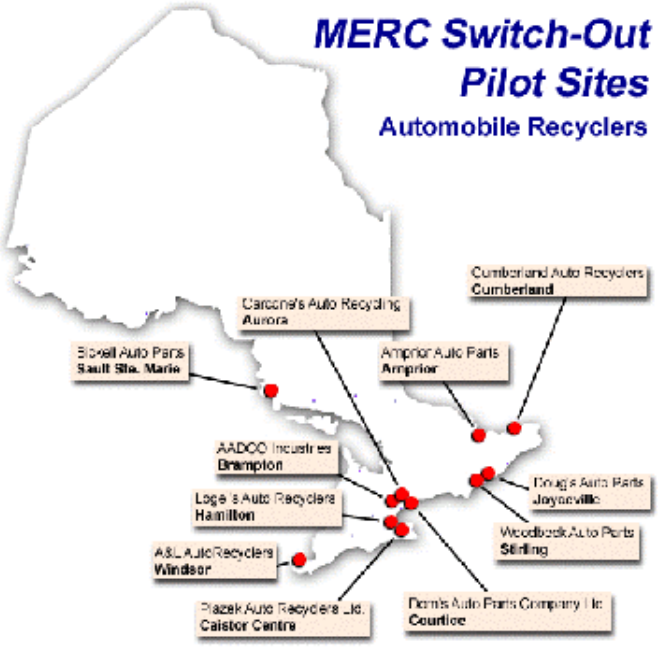


Figure 1-1. Eleven Auto Dismantlers Participating in the MERC Switch Out Pilot Program in Ontario (map used with permission of Pollution Probe)

Emissions from Coal-Fired Utility Boilers: In December of 2000, USEPA made a determination that it would regulate mercury emissions from coal-fired power plants. USEPA will propose regulations by the end of 2003, and promulgate final rules by 2004. In addition, the President has committed to propose legislation that would reduce mercury emissions from power plants as part of a multi-pollutant strategy to reduce air pollution from the power generating sector.

In conjunction with an Information Collection Request (ICR) submitted by USEPA in 1999,

Wisconsin Electric Power Company (WEPCo) initiated a comprehensive evaluation of mercury emissions and a screening assessment of possible emission reduction strategies for coal-fired units, including voluntary testing of six additional units for mercury speciation. Preliminary work completed at WEPCo's Pleasant Prairie Power Plant suggested that sorbent injection is feasible but will likely be both costly and detrimental to fly ash sales for use in concrete due to elevated carbon concentrations. At this plant, sorbent injection removal effectiveness did not appear to be greatly influenced by modest changes in temperature. Testing performed in 2000 and 2001 of commercially available and proprietary SCR catalysts for possible co-removal of mercury were disappointing. Based on preliminary work, future SCR applications at sub-bituminous coal-fired boilers may not affect mercury speciation (e.g., the largely elemental mercury present in these flue gases will not be oxidized) or may make the mercury more removable with existing particulate controls, or by the possible addition of wet FGD devices. In 2000, as a result of the preliminary work, Pleasant Prairie Power Plant was selected by the U.S. Department of Energy as one of four existing power plants where sorbent injection will be tested as a mercury control strategy. Testing at Pleasant Prairie began in September 2001 and will take two months to complete. Tests will include: measuring mercury removal by a number of sorbents; "long-term" tests (two weeks) with the most promising sorbent under optimal operating conditions; impacts of sorbents on emissions of other hazardous air pollutants; impacts of injection on plume opacity; impacts of injection on fly ash chemistry/use in concrete; and impacts of injection on balance of plant operations. The tests should allow more refined estimates of costs associated with this most promising mercury control strategy for Pleasant Prairie as well as for other plants of similar construction and fuel use.

Watershed Approaches: The National Wildlife Federation (NWF) is working with USEPA, Region 5, and the states in the region to explore how states might use a pollution prevention approach and virtual elimination to satisfy their obligations under the Clean Water Act to develop mercury Total Maximum Daily Loads (TMDLs). TMDLs are plans each state must develop and implement to clean up impaired watersheds. Because each of the Great Lakes and thousands of inland lakes and streams are impaired by mercury, the cost of developing such TMDLs can be enormous. Ohio estimated that the costs for its mercury TMDLs would be approximately $25 million over 15 years. NWF, EPA, and the states are exploring whether the states could commit to a twenty-year phase-out schedule for mercury sources within the state in lieu of expending the time and resources in preparing a TMDL plan which is likely to recommend the same outcome. EPA has determined that a phase-out alternative could be structured to meet the states' TMDL obligations. EPA is in the process of defining what that phase-out alternative would be.

Ban on Mixing Zones: USEPA finalized a regulation (Federal Register: November 13, 2000; Vol. 65, No. 219, pp. 67638-67651) that will ban the use of mixing zones that allow discharges of bioaccumulative chemicals of concern (BCCs) into the Great Lakes Basin, subject to certain exceptions for existing discharges. A mixing zone is an area where pollutants are mixed with cleaner receiving waters to dilute their concentration in the water. Inside a mixing zone, discharges of toxic pollutants are allowed to exceed the water quality criteria set by a state, as long as the standards are met outside or near the boundary of the mixing zone. The final rule, Final Rule to Amend the Final Water Quality Guidance for the Great Lakes System to Prohibit Mixing Zones for Bioaccumulative Chemicals of Concern, prohibits mixing zones for new

discharges of BCCs and will phase out the use of existing mixing zones in the Great Lakes over the next 10 years. The regulation will eliminate discharges of up to 700,000 toxic pounds-equivalent annually of BCCs, including mercury, dioxin, PCBs, chlordane, DDT, and mirex, as well as 16 other highly bioaccumulative chemicals. Mercury discharges alone will be reduced by up to 90 percent. Five Great Lakes states – Illinois, Indiana, Michigan, Minnesota, and Wisconsin – already prohibit mixing zones for bioaccumulative chemicals of concern in the Great Lakes Basin, although the mixing zone ban in Wisconsin currently applies only to new dischargers. Under the new rule, any Great Lakes State or Tribe that has not adopted BCC mixing zone provisions as protective as those in the rule (e.g., New York, Ohio, Pennsylvania) will have 18 months to adopt similar provisions prohibiting mixing zones.

Monitoring

Ambient Mercury Monitoring: IDEM, in partnership with the U.S. Geological Survey, has set up four mercury deposition stations throughout Indiana. Data being collected for both wet and dry deposition are just beginning to be evaluated. The Michigan Great Lakes Protection Fund (GLPF) has funded the Michigan Department of Environmental Quality (MDEQ) and the University of Michigan to establish mercury monitoring at three urban sites and two rural sites. In addition, mercury levels in water, sediments, and biota will be measured at an impacted urban lake in southeast Michigan with assistance from the MDEQ Surface Water Quality Division.

Source Monitoring: Under EPA grants, Michigan, Wisconsin, Minnesota, Ohio, and Illinois are purchasing continuous elemental mercury vapor monitoring equipment for evaluating mercury emissions from a variety of sources. Through another EPA grant, Oak Ridge National Laboratory is providing assistance to States monitoring reactive gaseous mercury.

Progress Toward Challenge Goals

It is difficult to evaluate progress in the U.S. over the last year toward the goal of reducing mercury use and release by 50 percent nationally by 2006. Mercury emissions decreased approximately 25 percent between 1990 and 1996, with significant additional reductions occurring through the present as the result of controls on incineration of medical and municipal wastes. Figure 1-2 illustrates this reduction and provides an estimate of projected 2001 U.S. mercury emissions, compared to the strategy goal of a 50 percent reduction by 2006 (from a 1990 baseline). For more information, see http://www.epa.gov/region5/air/mercury/progress.html.

While mercury use declined in the late 1990s, recent progress over the last two years is difficult to gauge given changes in the sources of data about mercury consumption. Figure 1-3 provides an estimate of projected U.S. mercury use for 2001, in comparison to the strategy goal of a 50 percent reduction by 2006 (from a 1995 baseline). For a more detailed evaluation of data and assessment of progress, see http://www.epa.gov/region5/air/mercury/progress.html.

In Canada, mercury releases have been reduced by 78 percent from the 1988 baseline. Figure 1-4 illustrates the progress made toward the Canadian 90 percent reduction target. This figure shows that releases in Ontario have been cut by more than 11,000 kg since 1988, based on Environment Canada's 2000 mercury inventory.

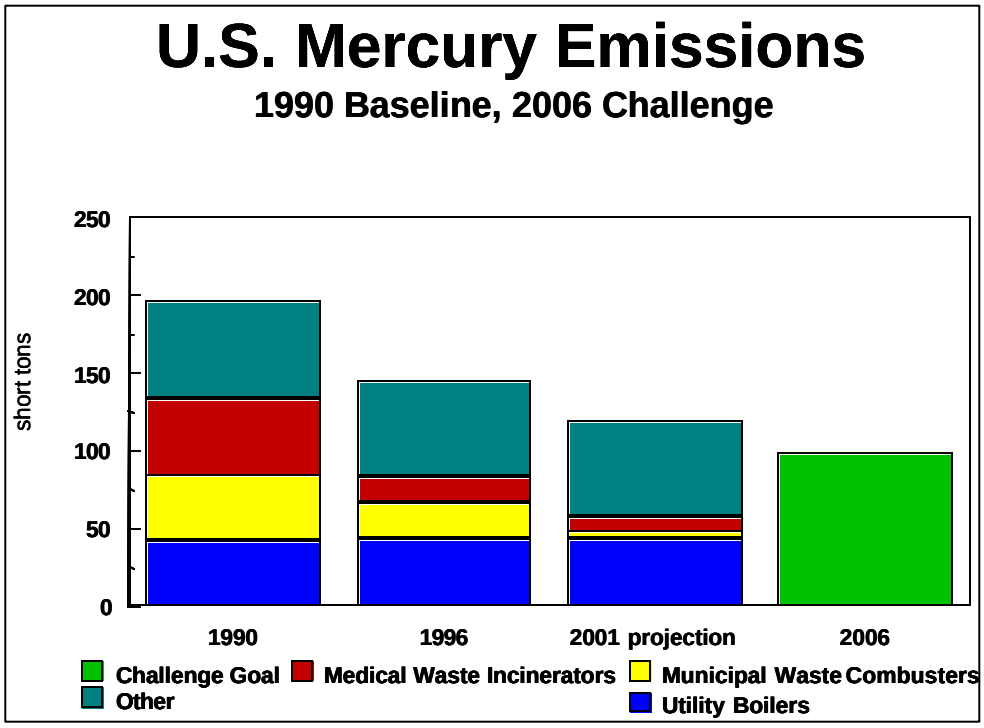


Figure 1-2. U.S. Mercury Emissions: 1990 Baseline, 2006 Challenge

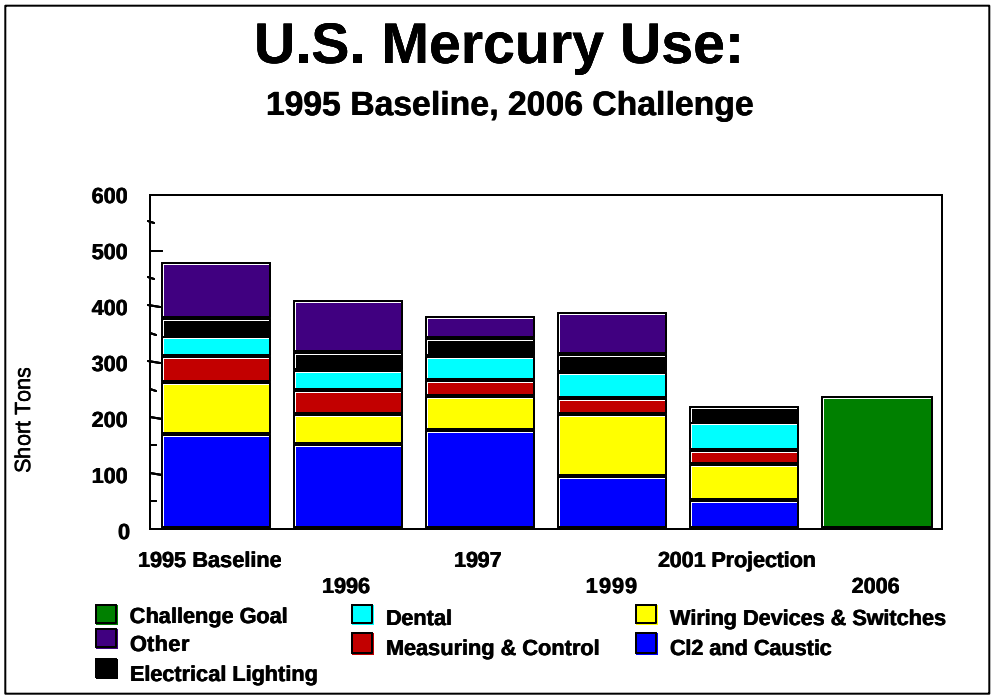


Figure 1-3. U.S. Mercury Use: 1995 Baseline, 2006 Challenge

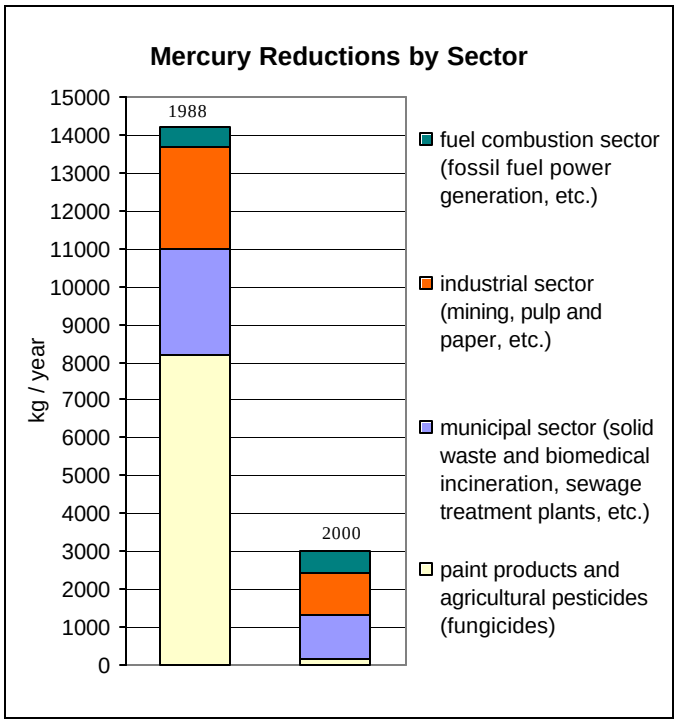


Figure 1-4. Progress Toward the Canadian Challenge Goal: Reductions in Mercury Emissions in Ontario from 1988 to 2000, by Sector

Next Steps

The workgroup will continue to focus on information-sharing about cost-effective reduction opportunities, and tracking of progress towards meeting reduction goals. Continued improvements will be made to the web site, and information about progress towards voluntary commitments will continue to be publicized.

Particular attention will be paid to information-sharing in areas where mercury releases are significant but there are no federal regulations existing or under development. For instance, the workgroup will attempt to focus attention on the contamination of metal scrap by mercury-containing devices and resulting emissions, and provide a forum for discussion of cost-effective approaches to addressing this problem. In addition, the workgroup will help share information about new reduction approaches that have been adopted in some jurisdictions, and which may provide a good example for others--for instance State or Provincial legislation or regulation affecting mercury in products, mercury in schools, dental mercury, and utility mercury emissions.

The workgroup will also seek to gain the involvement of stakeholders not previously engaged in the Binational Toxics Strategy process, including the Portland Cement industry, and additional representatives of the steel and scrap industries.

2.0 PCB Workgroup Highlights

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

Workgroup Activities and the 4-Step Process

The focus of the PCB workgroup in the past year has been on Steps 3 and 4: the identification and implementation of reduction options. Workgroup activities included posting reports to the GLBTS website (www.epa.gov/glnpo/bns/) entitled, *Report on Polychlorinated Biphenyls (PCBs): Sources and Regulations*, and *PCB Step Three Report: Options for Reducing PCBs*. These reports address Steps 1 and 2 and Step 3, respectively. Comments have been received on each report.

Reduction Activities

PCB Reduction Commitment Letters

Canada: Since the PCB Workgroup's PCB Commitment letters were mailed out in late 1999 to the automotive and iron and steel sectors, the three big automotive manufacturers and four steel companies have responded, noting significant progress toward the PCB challenges.

DaimlerChrysler Canada has shown leadership in phasing out hazardous materials at its Ontario facilities. By 2002, the company plans to dispose of their PCBs in the Windsor and Toronto areas. The company has already removed all high-level PCBs from transformers and capacitors at its facilities and shipped them to a government-licensed incinerator in Swan Hills, Alberta, for destruction.

Algoma Steel Incorporated's Ontario operations have voluntarily committed to eliminate, by December 2005, a volume equivalent to the estimated 71,103 kilograms (44,400 liters) of PCBs that were held in approved storage as of the end of 1999. The elimination of the firm's existing stored inventory was originally scheduled to begin in 2001. Algoma seized an opportunity in 2000, a year ahead of its own schedule, to proceed with the direct shipment and destruction of approximately 13,300 kilograms (8,300 liters) of PCBs from equipment being taken out of service.

Slater Steel Company, Hamilton, Ontario, reported that all of their PCB materials had been removed as of 1998.

With deregulation of the Ontario power industry by the Provincial Government now underway, the 250 municipal electrical utilities in Ontario recently amalgamated into approximately 92 new utilities. The workgroup has engaged the Municipal Electric Association to help in re-mailing the PCB commitment letter to these new utilities in October 2001. A previous mailing to the former utilities resulted in 15 of 20 large utilities, including Toronto Hydro, and 21 other utilities

submitting their commitment letters to Environment Canada. For example, Ontario Power Generation (OPG), a major utility in Ontario (formerly Ontario Hydro), adopted a corporate policy to phase out and destroy approximately 81 percent of high-level PCBs by 2005 and 100 percent by 2015.

The Council of Great Lakes Industries (CGLI) has also been engaged to mail PCB phase-out commitment letters to their constituent trade associations or groups. To date, the Aluminum Association of Canada, the Vinyl Council of Canada, the Canadian Petroleum Products Institute (CPPI and its members reported to have eliminated 90 percent of their PCBs), and two of 34 forestry companies have responded. Responses are awaited from the other sectors contacted, namely the Hearth Association, Canadian Portland Cement Association, and Forest Association.

U.S.: EPA, with support from CGLI, sent letters to five major national trade associations seeking their support and assistance in pursuing voluntary reductions of PCBs by their members. Most of the associations have contacted their members about the letter and EPA's voluntary PCB reduction efforts.

Bethlehem Steel submitted a response to EPA's request to voluntarily remove PCBs. They described their extensive efforts to reduce PCBs at their facility and noted that they will strive to do their share to meet the PCB reduction goals. They noted that they have not yet formally committed to eliminate PCBs at their facility due to the impact of the steel market's condition on their ability to address initiatives as they are weighed in conjunction with other pressing environmental issues at the facility which may be driven by regulation or risk. EPA also received a letter from U.S. Steel in which they elected not to commit to the specific schedules of the PCB reduction challenge, but noted that they have committed significant resources to the remediation of PCB equipment and will continue to do so.

EPA identified other individual businesses and trade associations targeted for additional outreach, through which voluntary reductions of PCB equipment will be sought.

U.S. PCB Phasedown Program: In November 2000, EPA Region 5 presented the final PCB Phasedown Program - Pilot Project to eleven of the major utilities in the Great Lakes Basin and sought their commitments to voluntarily phase down their remaining PCB electrical equipment. Under the pilot project, if a utility commits to remove its PCB equipment and self-disclose any potential violations of the PCB or TRI regulations, as an incentive, EPA would offer reductions to any penalty that may be assessed, up to 100% in some cases. Six of the eleven utilities responded to date. All six committed to continue to remove any PCBs they have or find, two stating that they already removed all of their known high-concentration PCBs. None of the six took advantage of the programs' self-disclosure policy. The five utilities which have not submitted formal responses requested more time to consider the obligations, policies, and incentives of the program.

U.S. PCB Phase Out at Federal Facilities: In an effort to reduce PCB equipment owned by the U.S. Government, EPA identified which federal facilities own PCB transformers and then

evaluated ways to phase out the PCBs. The main approach was determined to be a letter from a senior EPA official to counterparts in other federal departments or agencies. The letter would seek reductions of federally owned PCBs and would be combined with necessary follow-up. A draft letter has been developed.

Information Resources: The web site for the PCB Workgroup was updated and information that the workgroup had been working on was posted (see www.epa.gov/glnpo/bns/pcb). The new information included photographs of transformers and capacitors, which should help increase the awareness of the types of equipment that may contain PCBs by displaying actual examples of the equipment; a fact sheet on submersible well pumps; and a case study on the removal of PCBs provided by Bethlehem Steel, which is intended 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. In addition, the workgroup is updating the standard presentation that can be used by members and non-members to help describe the Binational Toxics Strategy, the PCB challenges, workgroup actions, and PCB reduction commitments being sought when they meet and associate with other potential stakeholders. All of this information is intended to encourage and facilitate the identification and removal of PCB equipment.

Survey of PCB In-Use Inventory: Canada updated its inventory of in-use PCB equipment for Ontario. A letter and survey was mailed out in February 2000 to approximately 500 registered owners of in-use PCB equipment in Ontario, requesting updated information if applicable as well as a questionnaire requesting information on plans for decommissioning and destruction. Approximately 51 percent have returned the survey and approximately 31 percent of those that responded indicated a PCB decommissioning plan within the next 5 years. A fact sheet is available from Ken De, P.Eng. at Environment Canada, Ontario by phone (416) 739-5870, or by e-mail: Ken.de@ec.gc.ca.

PCB In-Service Equipment Data Base: In order to update the PCB Waste Inventory (federal and non-federal), a letter was mailed out in November 2000 to over 2,000 registered PCB waste storage owners/managers in Ontario for a recent update of their stored PCB inventory. A large number of companies indicated that they had destroyed or treated all of their PCBs and no longer hold any PCBs, with the submission of copies of destruction certificates, manifests, and recent records. These are being updated to modify federal databases for better tracking and monitoring.

Coordination with Lakewide Management Plans (LaMPs)

Canada: In September 2001, Environment Canada mailed out a package of information to all small quantity PCB owners (approximately 340 companies) in the Lake Superior and Lake Erie drainage basins. The purpose was to raise awareness of PCB initiatives underway in support of the GLBTS. The package included the PCB Owner Outreach Brochure, a PCB Workgroup activity regional update, a fact sheet describing the Ontario PCB in-use inventory survey results, and a PCB location/quantity map for the Lake Superior or Lake Erie Basin.

U.S.: Within EPA, the workgroup leader and the LaMP managers worked together to coordinate the workgroup's PCB reduction efforts with the LaMPs in developing a Great Lakes Commitment Tracking database.

Cook County (Illinois) PCB and Mercury CleanSweep

The Cook County PCB and Mercury CleanSweep Partnership, completed in December 2000, was the capstone of discussions beginning in 1997 among EPA, Illinois EPA, Cook County, the City of Chicago, and industry and academia. Its goals were to provide incentives and an outlet for small businesses and local governments in Cook County to properly dispose of their PCB- and mercury-containing equipment. The Partnership targeted small businesses and local government entities such as electrical contractors, suspected sources of PCBs to used oil processors, park districts, schools, and local government agencies because these entities are not served by household hazardous waste collection events or national enforcement initiatives. An extensive outreach campaign, including a CleanSweep marketing effort, was undertaken.

As incentives, the Partnership offered disposal of PCB- and mercury-containing materials at roughly 50% off usual prices, free recycling of PCB-contaminated used oil through a Supplemental Environmental Project, and anonymity. Other motivators identified through the Partnership included free testing and free waste audits. Offering reduced disposal costs is less of an incentive than originally thought, because the targeted participants typically use the low-cost alternative of disposal in municipal waste. The Partnership collected: 135 HID bulbs; fluorescent bulbs (57 eight-foot boxes and 231 four-foot boxes); fifteen gallons of lab-packed mercury waste for stabilization; 134 gallons of lab-packed mercury for retort; 640 PCB ballasts; hexane/PCB oil (55 gallon drum); one large PCB transformer; and one large and one small PCB capacitor.

Canadian Regulatory Activities: Environment Canada's regulatory amendment process is underway which proposes strengthening of federal regulations regarding PCB management. The Chlorobiphenyl Regulations and Storage of PCB Material Regulations were promulgated in 1977 and 1992, respectively. Combined, these two regulations presently address management aspects including use, sale, manufacture, release, and storage. Highlights of the proposed amendments would strengthen these regulations as follows:

- PCB phase-out from sensitive sites
- Limit levels in products to 2 ppm (pigment)
- PCB storage time of 2 years
- Phase-out of all uses by 2008
- Prohibition against storage after 2010 for existing stored material

An extensive public consultation was conducted during the summer and fall of 2000. The amended regulation could be promulgated in the year 2002 in Gazette II.

Canada's PCB Waste Export Regulations (SOR/97-108) are being amended and are expected to be published in Gazette I in 2002. Public consultation is planned for December 2001.
A notice with respect to Polychlorinated Biphenyls in Automotive Shredder Residue was published in the Gazette, Part I, on July 7, 2001 for automobile shredding facilities that generated PCB-contaminated residue during 1998, 1999, or 2000.

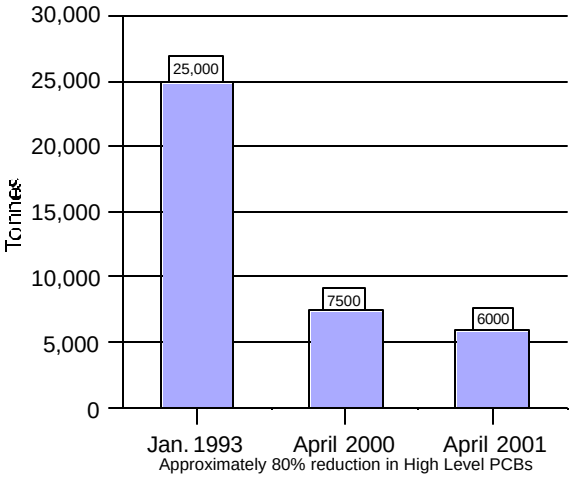
U.S. Regulatory Activities: EPA finalized the Reclassification of PCB and PCB-contaminated Electrical Equipment rule. This rule amended the requirements for reclassifying high-concentration (>500 ppm) PCB transformers to concentrations less than 500 ppm or less than 50 ppm (non-PCB). The rule should accelerate the phase out of PCB transformers and other PCB equipment because it reduces the regulatory and economic burden of reclassification.

EPA also finalized a rule on Return of PCB Waste from U.S. Territories Outside the Customs Territory of the U.S. This rule clarified 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. The rule ensures that a safe and viable mechanism exists for the protection of health and the environment for those citizens in areas of the U.S. where facilities are not available for the proper management and disposal of PCB waste.

Progress Toward Challenge Goals

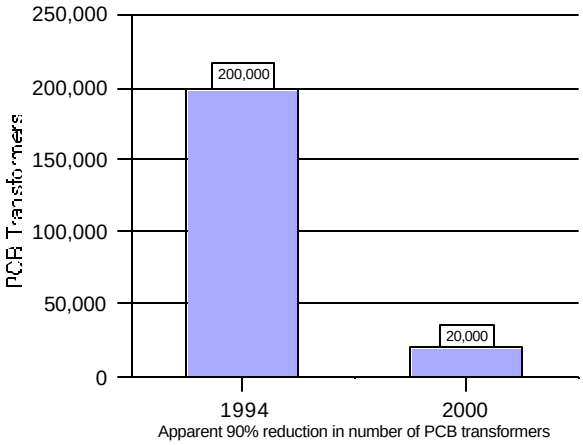
The specific PCB reduction challenges called for under the Binational Toxics Strategy are provided below, along with narrative and graphical information on quantitative progress made toward the challenges as of mid-2001.

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.



As of April 2001, approximately 80 percent of high-level PCB wastes had been destroyed; up from approximately 40 percent from Spring 1998 when work in support of the GLBTS commenced. Further, approximately 25 percent of low-level PCB wastes have been destroyed (a large portion of the remaining low-level waste is soil from a contaminated site clean up, stored in an engineered contaminated facility). It is expected that strong progress toward the target will be sustained. Awareness among owners continues to increase, options available for destruction have increased over the past two years, and owners of large quantities have been able to incorporate PCB phase-

out/destruction into multi-year operating plans.



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.

EPA expects that the U.S. challenge for a 90 percent PCB reduction will be met by 2006. The 1999 PCB Transformer Registration Database shows that there are approximately 20,000 PCB transformers currently registered and in-use in the U.S., but the actual number remaining in use is likely to be higher due to the number of transformers that have not had their oil tested and are not registered in the database. However, reductions of PCB transformers and capacitors continue to occur. EPA is currently evaluating data on the amount of PCBs destroyed over the past five years, which will help to track progress toward meeting the U.S. challenge.

Next Steps

The workgroup plans to continue its core activities, which include 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.

Outreach/Sharing Information: The workgroup will continue to develop, distribute, and post on the workgroup website information which can facilitate and promote, as applicable, the identification and removal of PCB equipment, such as photographs of electrical equipment, fact sheets, case studies which identify reasons companies remove PCBs, and a standard presentation of the PCB Workgroup's challenges and activities. The workgroup will also continue to consider incentives for removing PCB equipment.

PCB Releases from Equipment and Sites: The workgroup will prepare and post on the workgroup website data documenting the release of PCBs from equipment, containers, and storage sites and will identify the best ways to use this information to achieve additional reductions of PCB equipment.

3.0 Dioxin/Furan Workgroup Highlights

Canadian workgroup co-chair: Anita Wong
U.S. workgroup co-chair: Nan Gowda

Workgroup Activities and the 4-Step Process

In the past year, the workgroup has made the following progress in the 4-step process:

- The workgroup met on May 17th, 2001, at the Binational Toxics Strategy Stakeholder Forum in Toronto. The workgroup meeting was held jointly with the HCB/B(a)P Workgroup due to common issues that are of interest to both workgroups.

- At the May 17th meeting, updates on activities from both countries were given on the issue of dioxin contamination in pentachlorophenol treated wood.

- The Burn Barrel Subgroup was formed in the Spring of 2000 to address this emerging issue. Through several conference calls, surveys and research conducted in the past year, the subgroup has developed a strategy to seek reductions in backyard trash burning, and is currently implementing this strategy.

- During 2000, workgroup members and sector experts developed and implemented a decision tree process to assess major dioxin/furan source sectors and assigned them a GLBTS priority level for workgroup focus. The workgroup analysis was focused on dioxin reduction opportunities that went beyond programs or efforts that were already in place and expected to continue. The priority sectors were designated as listed in Table 3-1.

While the workgroup will focus its efforts on sectors with high and medium priority designations, it will continue to monitor progress and gather information for other sectors listed in the table above. As new information becomes available, the table will be revised accordingly, in consultation with the workgroup.

TABLE 3-1. DECISION TREE ANALYSIS OUTCOMES FOR SOURCES * OF DIOXINS/FURANS IN THE GREAT LAKES BASIN

Prepared for the BNS Dioxin / Furan Workgroup
May 2, 2000

Overview of Sector Prioritization: Status in the Decision Tree Process	
Source / Sector	**Priority Designation**
Municipal Waste Combustion (MWC)	**Low Priority**
Medical Waste Incineration (MWI)	**Low (US) / Medium (Canada) Priority**
Backyard trash / open burning	**High Priority**
Residential wood combustion	**High Priority**
Pentachlorophenols (treated wood)	**Medium (US) / Low (Canada) Priority**
Cement kilns (hazardous waste burning)	**Low Priority**
Iron sintering	**Low Priority**
Steel Manufacturing (EAF)	**No priority designation** - testing data needed
Secondary copper smelting	**Low Priority (US) / No ranking (Canada)** due to lack of data
Hazardous waste incinerators	**Low Priority**
Wood waste combustion	**Low Priority**
Industrial / Utility coal combustion	**Low Priority**
Diesel fuel combustion	**Low Priority**
Landfill fires	**No priority designation** - information needed
Forest fires	**Low Priority**

* Sources listed include those that are greater than 2% of either the 1998 Draft U.S. or 1999 Ontario emissions inventories. These inventories represent the best information available at the time of workgroup discussions; values presented in these inventories are currently under review and will potentially change in the final versions.

Reduction Activities

Canada

Residential Wood Stoves

A joint industry-government project was carried out to characterize releases of toxic pollutants, including dioxins and furans (D/F), and their relationship to particulate matter from a conventional wood stove (CS) and an advanced technology system (ATS) EPA-certified wood stove. The key findings of the test were:

1. Confirmation that ATS significantly reduces a number of pollutants (PM, VOCs, PAHs) compared to conventional wood stoves.
2. Average emission factor for D/F from residential wood combustion is 0.5 ng I-TEQ/kg wood burned (down from previous estimates of 2).
3. Under the testing conditions, it was observed that:
   a) D/F releases are higher when maple is burned than when spruce is burned
   b) D/F releases are higher with ATS than with CS

The report of findings, entitled "Characterization of Organic Compounds from Selected Wood Stoves and Fuels," can be obtained from the Environment Canada Green Lane website: http://www2.ec.gc.ca/dioxin/english/res_wood.cfm Additional research will be undertaken to better understand the formation of D/F in residential wood stoves.

Between February and April 2001, a residential wood stove education and changeout program was led by the Hearth Products Association of Canada, in partnership with Ontario Lung Association and various government agencies, to provide information on cleaner wood-burning methods and changeout incentives being offered through retailers in the Georgian Bay area of Ontario. The changeout program resulted in a replacement of 85 old wood stoves with advanced technology stoves and the participation of over 1,200 people in 12 workshops to increase awareness of cleaner, safer burning practices.

Steel Sector

Iron Sintering

The Iron Sintering Plants Canada Wide Standards (ISCWS) for Dioxins and Furans were accepted in principle by the Canadian Council of Ministers of the Environment (CCME) in September 2001. Source standards for dioxins and furans are set in three phases as follows:

Phase 1: 1350 picograms per cubic meter (I-TEQ) by 2002
Phase 2: 500 picograms per cubic meter (I-TEQ) by 2005
Phase 3: 200 picograms per cubic meter (I-TEQ) by 2010

In Canada, there is one remaining iron sintering plant: Stelco Inc. located in Hamilton, Ontario. Based on 1998 emission tests (6 grams TEQ/year), the ISCWS will result in reductions in stack

emissions of dioxins and furans of 50% by 2002, 80% by 2005, and 90% by 2010. The ISCWS also requires annual testing of emissions and the development of a pollution prevention strategy by December 31, 2002. Retrofits of the pollution control equipment at the Stelco iron sintering plant were made in an effort to meet the above standards. Stack tests were conducted in May 2001 to verify the effectiveness of the retrofits.

Electric Arc Furnaces

The Electric Arc Furnace Canada Wide Standards (EAFCWS) for Dioxins and Furans have been proposed as follows:

New and modified plants:	100 picograms per cubic meter (I-TEQ)
Existing plants:	150 picograms per cubic meter (I-TEQ) by 2006
	100 picograms per cubic meter (I-TEQ) by 2010

Based on currently available information, the implementation of these standards will result in a 60 percent reduction of dioxins and furans emissions by 2010. The EAFCWS also requires annual testing of emissions and the development of a pollution prevention strategy by December 31, 2002. Stack tests have been conducted at three electric arc furnaces in Ontario with results ranging from 51 to 153 picograms per cubic meter I-TEQ. The remaining three electric arc furnaces in Ontario are expected to conduct stack tests by 2002.

Waste Incineration

Canada Wide Standards for dioxins and furans have been endorsed by CCME for the waste incineration sector (municipal, medical, sewage sludge, hazardous waste) and the burning of salt-laden wood in coastal pulp and paper boilers. Provinces are then required to prepare and implement a plan (Joint Initial Actions) to meet the numerical targets. Updated information on the Canada Wide Standards can be found on the following website: www.ccme.ca.

Voluntary Stack Tests

Since the initiation of the Voluntary Stack Testing Program in Spring 2000, Environment Canada has conducted stack tests for dioxins and furans and many other substances of concern at three facilities in Ontario. Stack tests were conducted at Falconbridge - Kidd Creek, a nickel base metal smelter; at the medical incinerator of Toronto Hospital for Sick Children; and at Wescast Industries, a steel foundry. Results are currently under review with these facilities. Under the Strategic Options Process, the base metal smelter sector is in the process of conducting stack tests which will include dioxins and furans.

Ambient Air Monitoring

Ambient air monitoring of the GLBTS substances have been conducted since 1996 through the National Air Pollution Surveillance Network (NAPS). Dioxins and furans have been monitored at seven stations, consisting of four urban and three rural sites. Results have shown elevated levels at urban sites compared to rural sites with mean concentrations ranging from 741 to 2096 femtograms per cubic meter (TEQ) at urban sites, and from 182 to 442 femtograms per cubic

meter (TEQ) at rural sites (1996 to 1999). These concentrations remain below the Ontario Ministry of Environment ambient air quality criteria of 5 picograms per cubic meter (TEQ), 24-hour average.

United States and Canada

Burn Barrel Subgroup

As an emerging issue of dioxins and furans, a Burn Barrel subgroup was formed in Spring 2000 to address the burn barrel issue within the Great Lakes Basin. The Burn Barrel subgroup is currently being led by Bruce Gillies of Environment Canada. A survey of Ontario residents was completed in Spring 2001, identifying that 24 percent of the rural population burned their garbage. In keeping with the strategy developed by the Burn Barrel subgroup, the first activities will involve providing information to local community decision makers, and assisting them with identifying local alternatives to burning. In conjunction with the Lake Superior Lakewide Management Plan (LaMP), initial activities will focus on the Lake Superior Region. Addressing challenges in this region is expected to assist in outreach to other areas of the province. Gaps in infrastructure will also be identified over the winter of 2001. These activities are expected to lead to a broad public outreach program on both sides of the Canada/U.S. border in the summer of 2002, involving common messages in media, brochures, and workshops. The Development Committee for the Canada Wide Standards on Dioxins and Furans is also looking to the burn barrel activities in Ontario as a potential model for other parts of the country.

Wood Preservers (Pentachlorophenol)

Canada: This sector is currently being addressed by the Strategic Options Process under the Canadian Environmental Protection Act (CEPA). There are no PCP manufacturers in Canada. A Best Management Practice has been developed and is being applied at industrial users and wood-treating facilities. A national strategy is being developed to manage industrial and consumer-based treated-wood waste. Disposal of treated-wood waste is estimated to be a significant source of dioxins and furans release (35.8 grams TEQ per year) if not managed in an appropriate manner. The workgroup will monitor progress on this issue.

Based on the lack of information on the ultimate disposal fate of PCP-treated utility poles, the Dioxin Workgroup concluded that PCP-treated poles in the U.S. would be designated as a medium priority. The Utilities Solid Waste Activities Group (USWAG) is currently planning an information-gathering effort on the disposal and fate of utility poles in the Great Lakes basin. When finalized, the results of the USWAG information-gathering survey will be assessed by the workgroup and used to focus future priority actions and identify any other information needs. For example, because the USWAG survey will focus only on utilities, the fate of poles in the secondary reuse market may remain an unknown and require additional research. Once information from the survey is available, a re-assessment of the importance of this source will be considered.

Landfill Fires

Preliminary estimations conducted by USEPA showed that landfill fires are a potential source of significant dioxins and furans release. A discussion paper has been prepared by the workgroup co-chairs to present the current situation and the requirements to prevent landfill fires in the Great Lakes Basin. Preliminary investigation has shown that landfill fires appear infrequent, but additional information is required to fully characterize the significance of this source. In Ontario, landfill fires at municipal landfills are infrequent due to existing regulations that ban burning of garbage at landfill sites. It is suspected that landfill fires exist on First Nation lands, but more information on their waste management practices needs to be collected.

Based on information gathered from the Great Lakes States (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin), it could be concluded that landfill fires are infrequent. Information gathered from the Ohio Fire Marshall's office, however, indicates that landfill fires are common. USEPA is currently gathering more information in this regard.

Incinerator Ash Disposal

Concerns have been raised about the generation of ash from waste incineration as a potential source of dioxins and furans release. A discussion paper was prepared by the workgroup co-chairs through the collection of information on how incinerator ash is being managed in the Great Lakes region. In Ontario, bottom ash is normally disposed of at a municipal landfill site, while fly ash is managed as a hazardous waste due to its high metal content. There is currently a lack of data on dioxins and furans in bottom and fly ash generated at waste incinerators. Recent amendments made to the Ontario Waste Management Regulation (Regulation 558) set more stringent requirements for hazardous waste management which are expected to result in more wastes being characterized as hazardous.

Ash from municipal waste incinerators in most of the Great Lakes States (Indiana, Minnesota, Michigan, and Wisconsin) are disposed of in a monocell with liners and leachate collection systems. Ash from municipal waste incinerators in New York, Ohio, and Pennsylvania are disposed of in approved solid waste landfills. Ash is not tested for dioxin/furans in most of the Great Lakes states, except Minnesota. Further information is needed regarding dioxins and furans in both bottom and fly ash generated at waste incinerators.

Progress Toward Challenge Goals

Canada has made significant progress toward meeting the goal of a 90 percent reduction in releases of dioxins and furans, achieving a 76 percent reduction, relative to the 1988 Canadian baseline. Much of the reductions achieved are attributable to the pulp and paper sector after federal regulations were imposed. Figure 3-1 illustrates reductions in the top Canadian (Ontario region) dioxin/furan emission sources from 1990 to 1997 and 1999 (based on "Inventory of Releases - Updated Edition", February 2001, Environment Canada). Canada will continue to seek reductions of dioxins and furans from anthropogenic sources to meet targets and to work toward the goal of virtual elimination.

A new Canada-Ontario Agreement with Respect to the Great Lakes Basin Ecosystem has recently been negotiated and is posted on the Green Lane website for public comment. The Agreement commits to a 90% reduction in the release of dioxins and furans by the year 2005, from a baseline of 1988.

In 1995, the U.S. achieved a 77% reduction in dioxin emissions based on its 1987 draft dioxin emission inventory. The U.S. is expected to achieve a 92% reduction by 2004. This significant reduction is expected, mainly, from implementation of federal and stated regulations requiring the use of MACT (Maximum Available Control Technology) Standards. Figure 3-2 illustrates progress in reducing dioxin emissions in the U.S., by sector, from a 1987 baseline.

Next Steps

Backyard trash burning is an emerging issue and, as more information is gathered and release reductions from other sectors are achieved, is expected to emerge as the largest source of dioxins and furans. As such, the workgroup will focus its efforts on the implementation of the strategy developed by the Burn Barrel subgroup. Both countries are looking to the burn barrel activities in the Great Lakes Basin, especially Lake Superior, as a potential model for other parts of the countries. For other sectors listed in Table 3-1, the workgroup will continue to monitor and update the workgroup on progress made. Most of these sectors are being addressed through existing national or regional programs.

To fill information gaps identified in pollutant inventories for dioxins and furans, the workgroup will engage sectors to participate in studies to collect or develop release information. In Ontario, these sectors include pulp and paper (wood waste combustion boilers, Kraft liquor boilers), foundries, petroleum refineries, secondary aluminum smelting, secondary copper smelting, steel sector (cokemaking, blast furnace, steelmaking), and land application of sludge. Both countries have recently added dioxins and furans to their mandatory release reporting programs (Toxics Release Inventory in the U.S. and National Pollutant Release Inventory in Canada). This may provide additional information to help improve the release profiles for dioxins and furans.

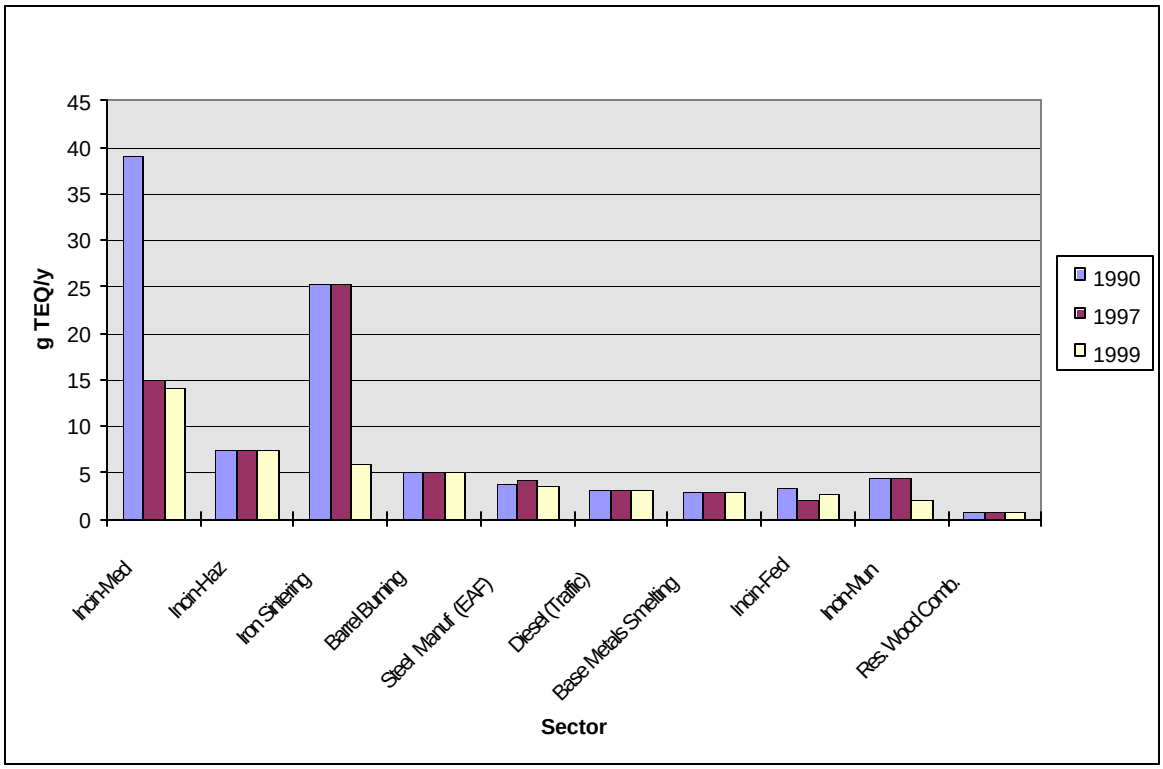


Figure 3-1. Top Canadian (Ontario Region) Dioxin/Furan Emission Sources "Inventory of Releases - Updated Edition", February 2001, Environment Canada

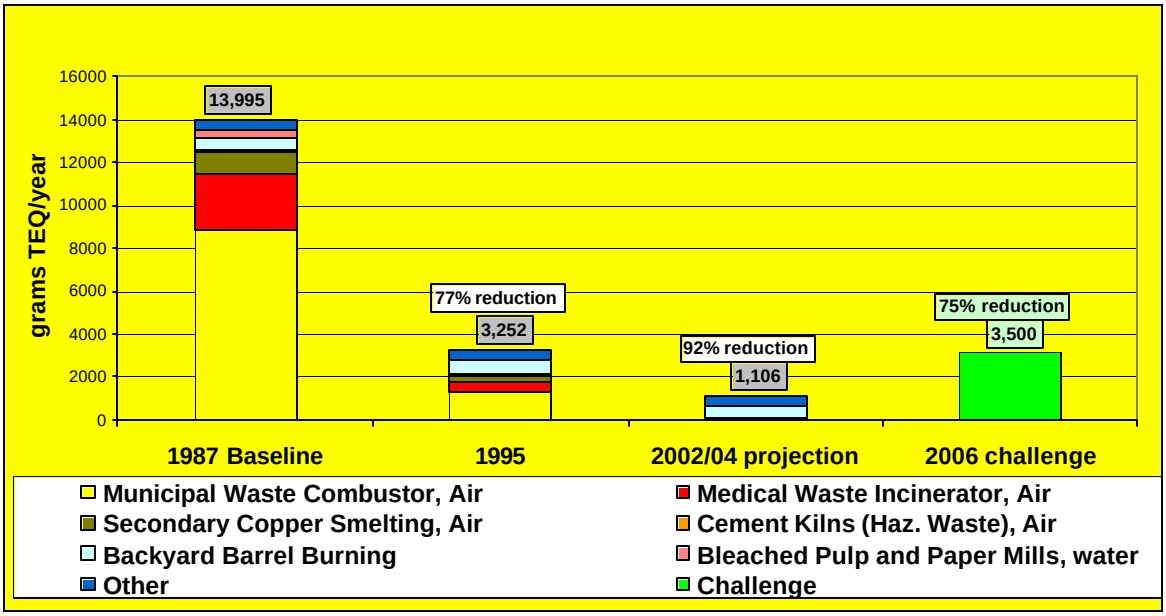


Figure 3-2. U.S. Dioxin Emissions: Achieving 75% Reduction

4.0 HCB/B(a)P Workgroup Highlights

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

Workgroup Activities and the 4-Step Process

Emission Inventories

Additional efforts have been made to resolve disputed hexachlorobenzene (HCB) emission levels from utility coal combustion and rubber tire manufacturing. A review of test data indicates that utility coal combustion does not appear to be a significant source of HCB, and the Rubber Manufacturers Association has performed testing which has shown that rubber tire manufacturing is not a source of HCB. Also, petroleum refinery benzo(a)pyrene (B(a)P) test data have been received that indicate that emissions from this source category may be lower than expected.

U.S. Step 1 & 2 benzo(a)pyrene and hexachlorobenzene reports on sources and regulations and a Step 3 report on reduction options have been completed and posted on the Binational Toxics Strategy website. In addition, a draft addendum to the HCB Step 1 and 2 report has been prepared to incorporate the 1996 National Toxics Inventory results. USEPA's 1996 National Toxics Inventory (NTI) was released around September 2000. This is especially significant because it was prepared using a "bottom-up" approach in which the States determined emission levels from sources located within their boundaries using a common set of emission factors that were used by all States. USEPA and the workgroup have been going through the 1996 NTI to check the accuracy of the HCB emission levels and to try to identify any emission reduction opportunities.

Draft HCB and B(a)P (including polycyclic aromatic hydrocarbons, or PAHs) release inventories for Ontario have been updated and circulated to CGLI workgroup members and affiliates for review and input. Little feedback has been received to date. The inventories will be updated later this year with information already submitted under Canada's National Pollutant Release Inventory (NPRI) new reporting requirements (year 2000) for micro-pollutants.

A review is underway to confirm the current significance of trace HCB levels in some seven pest control products following manufacturers' initiatives over the last decade to reduce HCB levels. Up-to-date information on these trace HCB levels is critical to more accurately estimate HCB releases attributed to the use of these products. Current inventory information suggests that use of these pesticide products is one of the major HCB sources in the Great Lakes Basin. The HCB Workgroup has received assistance from the Pesticide Workgroup in assessing the HCB content of active pesticides and pesticide usage. Additional research has been done on the volatilization of HCB from pesticide application. This indicates that HCB emissions from pesticide application are probably over 2000 pounds/year.

Voluntary Stack Testing

Seven Ontario facilities have responded thus far to the call for voluntary stack testing (base-metal smelters, steel mill and foundry, hospital incinerators, cement plant). Testing has been completed at the Toronto Hospital for Sick Kids, Falconbridge-Kid Creek, and Westcast Industries. Arrangements will be finalized to conduct testing at other sites.

Outreach

Millions of scrap tires burned in several catastrophic U.S. fires in 1999. The more than 800 million scrap tires accumulated in stockpiles throughout the U.S. are a potential threat to human health and the environment. Tire fires are typically caused by wildfires, lightning strikes and arson. These fires are nearly impossible to extinguish and can burn for months, generating considerable air emissions, as well as groundwater contamination and oily runoff, of B(a)P/PAHs. The scrap tire managers for the Great Lakes States and the Scrap Tire Management Council were contacted to learn how each state is handling its scrap tires and potential ways that these fires can be minimized.

Reduction Activities

Wood Stoves

An extensive wood stove change-out program was held from February 1 through April 30, 2001, in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, New York, North Dakota, Ohio, South Dakota and Wisconsin. The purpose of this program was to encourage people to turn in their older, pre-1992 wood stoves for newer wood stoves that meet EPA standards, or for pellet or gas stoves. A wood stove change-out program is the most effective way to reduce B(a)P emissions from residential wood combustion because newer EPA-certified stoves have only about 15 percent of the emissions of the older ones, which account for about 90 percent of existing wood stoves. "The Great Wood Stove & Fireplace Change-out Program" kicked off with media events in early February 2001 in St. Paul, Lansing, and Madison and included demonstrations of clean burning gas stoves as well as old wood stoves and EPA-certified stoves. Press conferences announcing the event received television, radio, and newspaper coverage. The media events, and resulting news articles, informed the public of the environmental benefits of replacing older wood stoves with EPA-certified wood stoves or gas stoves. At least 1,200 old stoves or stove inserts were replaced.

Similarly, in Ontario, a series of evening workshops was provided to communities around the Georgian Bay watershed from February 26 to March 22, 2001. This program accelerated the turnover of old wood stoves and inserts by educating the public about the environmental benefits of replacing old wood stoves and inserts and by providing financial incentives for the purchase of cleaner burning appliances.

This is an extremely important program because residential wood combustion contributes over 50 percent of the B(a)P emitted to the Great Lakes basin, and persuading Great Lakes residents to turn in their old wood stoves and inserts for cleaner burning appliances, whether EPA-certified wood stoves or gas or pellet burning appliances, is considered one of the most effective strategies

for achieving reductions.

Voluntary Actions

In January 2001, an Environmental Management Agreement (EMA) between Environment Canada, Ontario Ministry of the Environment, and Algoma Steel (a major Ontario steel mill) was finalized and signed. Under the EMA, Algoma agreed to develop a facility-based approach to address environmental priorities. The project is similar to Dofasco's EMA and is expected to bring about significant reductions of priority substances, including B(a)P. Algoma will soon submit its second progress report under the EMA.

Standards Development and Implementation

Canada Wide Standards (release limits) have been developed for mercury, particulate matter, ozone, and benzene. CWS are being finalized for dioxins and furans. Implementation of CWS by the major source sectors and the province is expected to bring about HCB and B(a)P release reductions in the next 5-15 years.

Recommendations from two Strategic Option Reports for the iron and steel and wood preservation sectors are in place. Audits against the Codes of Good Practice have been conducted for all three pentachlorophenol (PCP) and creosote facilities in Ontario. Each facility is developing a 5-year implementation plan by December 2001, based on the audit assessment findings, to improve environmental performance. Codes of practice for the iron and steel sector are also being finalized for implementation by the Ontario steel mills.

An EPA-proposed rule to control emissions of toxic air pollutants during hydrochloric acid production is expected to reduce HCB emissions.

Progress Toward Challenge Goals

The U.S. has taken steps toward the goal of seeking (unquantified) reductions of HCB and B(a)P releases to the Great Lakes basin. Figure 4-1 illustrates approximate HCB emission reductions achieved in the U.S. from 1990 to 1997, by source category. Figure 4-2 presents estimated B(a)P emission reductions for the U.S. from 1990 to 1996, by source category.

Canada has made progress toward its goal of a 90 percent reduction in releases of HCB and B(a)P to the Great Lakes Basin. Based on the latest emission inventory estimates (base year ~1990), an approximate 60-90 percent reduction in HCB emissions and a 30-40 percent reduction in B(a)P emissions have been achieved in Canada.

Next Steps

Filling emission data gaps and obtaining voluntary reductions from major source sectors remain the challenges. A major part of the workgroup's focus in the coming year will be to accurately determine HCB emission levels from pesticide application as well as the extent to which HCB contaminant levels can, and are planned to, be reduced. Also, it will be extremely important to determine B(a)P emission levels from petroleum refinery fluid catalytic cracking units.

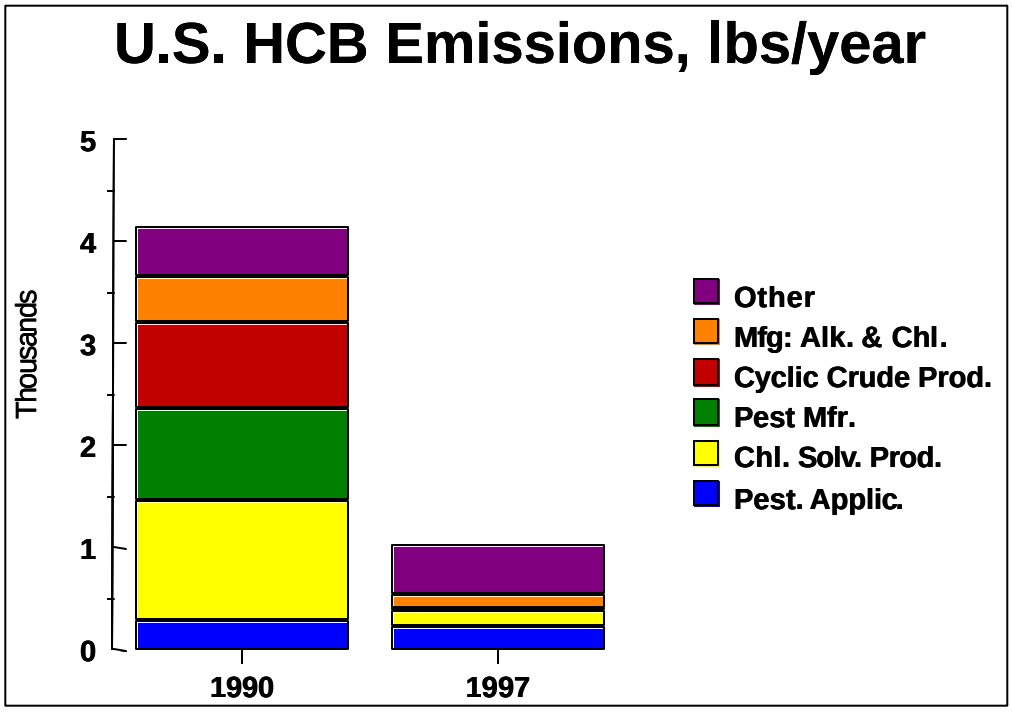


Figure 4-1. U.S. HCB Emissions, lbs/year

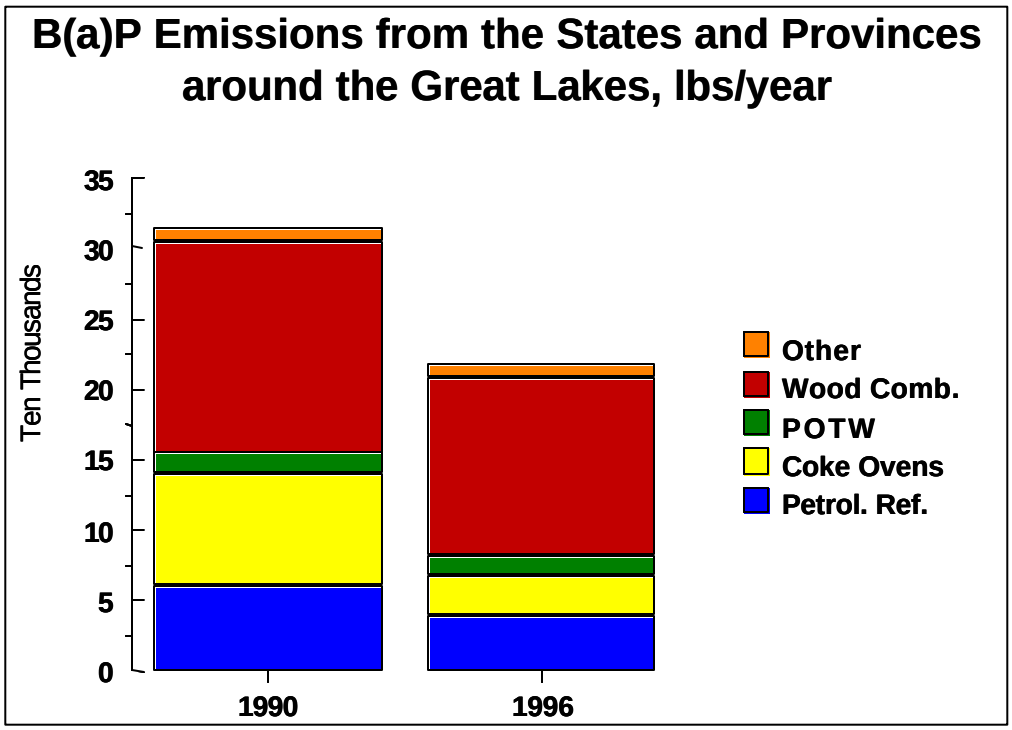


Figure 4-2. B(a)P Emissions from the States and Province around the Great Lakes, lbs/year

5.0 OCS Workgroup Highlights

Canadian workgroup co-chair: Darryl Hogg
U.S. workgroup co-chair: Frank Anscombe

Workgroup Activities and the 4-Step Process

United States

A *Draft Great Lakes Binational Toxics Strategy Octachlorostyrene (OCS) Report: Stage 3* was distributed in September 2000 to workgroup members. In addition, in December 2000, EPA and EC convened a meeting of North American magnesium producers to promote sharing of lessons regarding methods for preventing and managing OCS and other chlorinated hydrocarbon wastes.

Canada

In June 2000, Environment Canada updated and made available to interested stakeholders its GLBTS Stage 1 and 2 report *Octachlorostyrene Sources, Regulations and Programs for the Province of Ontario 1988, 1998 and 2000.* The report concludes that there are no documented OCS releases being reported on the Canadian side of the Great Lakes basin, but identifies potential sources where testing is required in order to confirm that releases do not exist. Work is now underway with several facilities that have indicated a willingness to become involved in a voluntary Environment Canada air testing initiative to help fill data gaps on releases of GLBTS substances, including OCS.

Next Steps

A major finding of the U.S. Step 3 draft report is that there has been a massive temporal decline in environmental levels of OCS across the Great Lakes Basin since the 1960s, and that this decline is strongly indicating the virtual elimination of current OCS releases to the basin. Other than obtaining additional environmental monitoring data that can be used to assess the need for further action, activities of the OCS Workgroup have been linked to the HCB and/or dioxin reduction efforts.

6.0 Pesticides Workgroup Highlights

Canadian workgroup co-chair: Rui Fonseca
U.S. workgroup co-chair: Dave Macarus

Workgroup Activities and the 4-Step Process

The Pesticides Workgroup has reached a state of near completion with respect to the Level I pesticides (aldrin, chlordane, DDT & metabolites, dieldrin, mirex, and toxaphene). Canada and the U.S. have both issued reports covering the four-step process. Briefly, in both countries, all uses of the Level I pesticides have been canceled, the pesticides were never produced in Canada, and the production facilities in the U.S. have all been closed. Remaining reduction activities are the ongoing waste pesticide collections (clean sweeps) and remediation of contaminated sites containing the pesticides.

Last year the workgroup considered the pollution prevention opportunities of the Level II pesticides (endrin, heptachlor, lindane and HCH, pentachlorophenol, and tributyl tin). Endrin has been long canceled, and no domestic manufacturing exists. The production of heptachlor in the U.S. ceased in 1997, and the remaining registrations (only for fire ant control in closed electrical boxes) have been allowed to lapse. Heptachlor was discontinued in Canada in 1985. Lindane and tributyl tin are still in use, but under review by the pesticide regulatory agencies in Canada and the U.S. In Canada the use of organotin antifouling paints is scheduled for prohibition by January 1, 2003. There is no indication that hexachlorocyclohexane was ever registered for use as a pesticide in Canada. Pentachlorophenol has a principal and significant use in the treatment of utility poles. A report of the findings of the reregistration review by the Pesticide Regulatory Agencies of Canada and U.S., originally expected this year, has been delayed, and an optimistic expected date of completion is late 2002.

Reduction Activities

Canada and the U.S. have been active in negotiating the phase out of DDT use in Mexico and Central America, and the U.S. Office of Pesticide Programs has supplied $150,000 to the United Nations for efforts with Persistent Organic Pollutant (POPs) negotiations, for POPs implementation, and for efforts to prevent stockpiling of obsolete pesticides.

Clean sweep collections continue in the U.S., with the State of Michigan reporting collections of 60,218 pounds of waste pesticides so far this year. The collections included the following quantities of toxic chemicals of interest to the Binational Toxic Strategy: 1,036 pounds of chlordane, 570 pounds of DDT, 672 pounds of dieldrin, 986 pounds of mercury and mercury compounds, 251 pounds of pentachlorophenol, 534 pounds of lindane, 609 pounds of methoxychlor and 926 pounds of lead arsenate.

The Crop Protection Institute of Canada and its federal and provincial partners collected approximately 51,015 liters and 28,428 kg of waste pesticides in Ontario in 2000. The

collections included the following quantities of toxic chemicals of interest to the Binational Toxic Strategy: 45 liters and 162 kg of aldrin, 83 liters and 68 kg of chlordane, 956 liters and 5,351 kg of DDT, 62 liters and 120 kg of endrin, and 24 liters and 64 kg of lindane. Collections are currently underway for 2001.

In addition to the revaluation of heavy-duty wood preservatives, Canada is undertaking lifecycle management of toxic substances, including pentachlorophenol, from wood preservative manufacturing, wood preservation facilities, treated-wood use (industrial and consumer based), and management of treated-wood waste. All wood treatment facilities that do not meet the Technical Recommendations outlined in the Wood Preservation Sector Strategic Options Report must submit implementation plans by the end of December 2001. A "National Strategy for the Management of Post-Use Preservative Treated Industrial Wood" document was prepared in March 2001, with the short-term objective of a 20 percent decrease of waste sent to landfill by 2005, based on a 1990 baseline.

7.0 Alkyl-Lead Workgroup Highlights

Canadian workgroup co-chair: Elizabeth Rezek
U.S. workgroup co-chair: Tony Kizlauskas

Workgroup Activities and the 4-Step Process

United States

Following incorporation of comments received during the public comment period, a final report on Steps 1, 2, and 3 of the 4-Step process, entitled *Great Lakes Binational Toxics Strategy Report on Alkyl-Lead: Sources, Regulations, and Options*, was posted on the Binational Toxics Strategy web site in June 2000.

USEPA's Draft National Action Plan for Alkyl-Lead was released for public comment in August 2000. Release of the final National Action Plan for Alkyl-Lead is expected by the end of 2001. The Draft National Action Plan closely parallels the GLBTS Alkyl-Lead Workgroup U.S. Steps 1, 2, and 3 Report, and will be the primary mechanism for implementing further reductions of alkyl-lead in the U.S.

Canada

Steps 1 to 4 were incorporated into a report entitled, *Alkyl-lead an Inventory Study: Sources, Uses, and Releases in Ontario,* that was released in the Spring of 1999 and is available on the GLBTS website. The report confirms that Canada has exceeded its challenge of a 90 percent reduction in the use, generation, and release of alkyl-lead.

Progress Toward Challenge Goals

United States

The U.S. has met the strategy challenge of confirming no-use of alkyl-lead in automotive gasoline. Following incorporation of public comments, a final challenge report, entitled *U.S. Challenge on Alkyl-Lead: Report on Use of Alkyl-Lead in Automotive Gasoline*, was made available in June 2000 on the GLBTS website.

The remaining portion of the U.S. strategy challenge, "Support and encourage stakeholder efforts to reduce alkyl-lead releases from other sources," has been incorporated into the USEPA's Draft National Action Plan for Alkyl-Lead. In response to the draft National Action Plan for Alkyl-Lead, representatives of the U.S. automotive racing sector are currently working with the supplier of NASCAR auto racing fuels to find substitutes for leaded racing gasoline. After the new formulations are developed, NASCAR is interested in having the new formulation reviewed by USEPA. These negotiations are continuing.

Canada

Canada has met the challenge to reduce by 90 percent the use, generation, and release of alkyl-lead. Sources, uses, and releases of alkyl-lead in Ontario decreased over 98 percent from 1988 to 1997. The two primary remaining sources of alkyl-lead in Ontario are aviation gasoline (avgas) and leaded motor gasoline for use in competition vehicles. In 1997, relative to total motor gasoline, aviation gasoline and leaded motor gasoline comprised only 0.2% and 0.05%, respectively, of Ontario's gasoline mix.

Next Steps

A continuing challenge for both Canada and the U.S. in achieving further reductions in the aviation sector is the lack of safe alternatives to replace alkyl-lead in aviation fuel. Research is underway in the U.S., but developing an acceptable alternative is likely to take another 8 to 10 years.

Competition vehicles in Canada and the U.S. are the remaining minor source of alkyl-lead in fuel, aside from the aviation sector. Currently, negotiations are taking place in the U.S. to phase in unleaded racing gas as soon as a safe octane-enhancing additive that meets current environmental standards can be found.

Competition vehicles in Canada are currently exempted from the Canadian Gasoline Regulations, which ban lead in fuel. The exemption for competition vehicles expires in December 2002. Prior to the expiration of the exemption, consultations will be held with the competition sector. The consultations will be coordinated with parallel U.S. efforts.

8.0 Integration Group Workgroup Highlights

An Integration Group, comprised of the governments and interested stakeholders, was formed in 1998 in support of the Great Lakes Binational Toxics Strategy (GLBTS). The Integration Group met for the first time on June 19, 1998 in Romulus, Michigan.

The primary roles of the Integration Group are to assist with organizational, administrative, process, and other cross-cutting issues, which are relevant to but outside the scope of the substance-specific workgroups. The Integration Group is focused on actions, it develops strategies for addressing these cross-cutting issues, and it ensures that the strategy remains focused on achieving reductions of toxic substances. The Integration Group suggests strategic pathways forward for the GLBTS. The Integration Group also strives to:

- broaden awareness of the GLBTS and its goals through public outreach,
- maintain a balanced, well-informed group of active stakeholders, and recruit new members, as necessary,
- receive progress reports from substance-specific workgroups on information gathered and reduction achieved based on workgroup activities,
- assess and communicate substance-specific workgroup progress toward goals,
- review, and target for attention, multi-group or multi-sector technical issues referred by the substance-specific workgroups, such as long-range transport, and provide feedback to the workgroups on recommended solutions,
- identify and develop options for resolving issues arising from differences in GLBTS implementation by U.S. and Canada,
- serve as central point of information about the range of ongoing toxics reduction efforts, both domestic (e.g., PBT) and international
- identify areas where sector-based or targeted multi-chemical approaches are appropriate,
- identify incentives for voluntary reductions/virtual elimination and assess the effectiveness voluntary approaches, and as appropriate, identify alternative pathways to achieve strategy challenge/virtual elimination goals.

During 2001, the Integration Group met on February 20, May 18, and August 28. A fourth meeting is scheduled for November 15, 2001. The Integration Group meeting format typically features information presentations on activities and initiatives related to cross-cutting issues of the GLBTS, stakeholder and government information and activity updates, and facilitated discussions between Integration Group members.

Integration Group Meeting February 20 2001, Windsor, Ontario

At the February meeting, held in Windsor, Ontario, the Integration Group began a process of thinking about new means to advance the strategy. In the capacity of dealing with cross-cutting issues and suggesting strategic pathways forward, the Integration Group participated in a facilitated brainstorming discussion session entitled "Transition Into New Ideas." During this discussion, the group contemplated and suggested new ways to move the strategy forward.

Members of the Integration Group suggested many creative ideas for consideration in the course of planning future steps of the GLBTS. Some of these ideas included increasing efforts to educate about the goals of the strategy and to raise awareness of the strategy, shifting the focus of reduction efforts on sectors as well as on substances and considering new ways to increase stakeholder participation in the GLBTS. From this discussion emerged the concept of a trial sector-based approach to further reductions of GLBTS substances.

In addition to the brainstorming session, the Integration Group received information and progress updates from the substance-specific workgroups, and from its members. Presentations delivered at this meeting include:

- *Wood Stove Change Out and Education Program in the Georgian Bay Watershed*, by Anita Wong of Environment Canada
- *Reducing Barrel Burning in the Great Lakes Basin*, by Sandro Leonardelli of Environment Canada, co-chair of the dioxins/furans workgroup
- *Clean Car Campaign*, by Alexandra McPherson of Great Lakes United
- *An Auto Industry Update*, by Greg Dana of the Alliance of Automobile Manufacturers
- *U.S. Coke industry's efforts to reduce releases of PBTs into the Great Lakes Basin*, by David Ailor of The American Coke and Coal Chemicals Institute
- *GLBTS Toxics of Interest in the Steel Sector*, by Tim Huxley of North American Steel

Integration Group Meeting May 18, 2001, Toronto, Ontario

Following up on the discussion begun at their February meeting, the Integration Group continued to consider new ways to move the strategy forward. During this meeting on May 18, 2001 in Toronto, the Integration Group focused on the new initiatives that were suggested during their February meeting's brainstorming session. Their goal was to pick up on items not currently being undertaken by the main agenda of the GLBTS, and to create synergies between new initiatives and the goals of the GLBTS.

In order to achieve this goal, it was decided that the group would structure an approach to identify sectors with potential reduction opportunities. It was suggested that a sectoral approach to achieve further substance reductions may enable more comprehensive and efficient undertakings, with respect to the allocation of limited monetary and human resources. It was also suggested that this approach may allow for additional flexibility in implementing actions under the GLBTS, and may generate opportunities to focus on the applicability of other innovative approaches to the reduction of toxic substances.

The Integration Group nominated a temporary subgroup to begin the sectoral approach described above. To assist the new subgroup in this undertaking, the Integration Group agreed upon a few guidelines for the temporary subgroup: specifically, that the starting point should come from the substance-specific workgroups, that the temporary subgroup should look for opportunities that address multiple substances, that there should be criteria incorporated to ensure that initiatives make a difference environmentally, and that any sectoral initiatives achieve significant substance

reductions. The Integration Group came to a general understanding of the purpose of the temporary subgroup, specifically: to generate a short list of potential sectors for action and to offer suggestions for possible approaches for implementation. The sector subgroup was asked to report suggestions and rationales to the Integration Group at the August 28, 2001 Integration Group meeting in Chicago, Illinois.

Also, at this meeting, the Integration Group received information and progress updates from the substance-specific workgroups, and from its members. Presentations delivered at this meeting include:

- *Innovative Approaches to Pollution Management,* by David Evers of Battelle
- *An introduction to the concept of a new Interim Subgroup*, by Jim Smith of Environment Canada
- *An introduction to the sector matrix, proposed decision tree and opportunities for sector involvement*, by Dwain Winters of USEPA
- *An overview of the workshop "Treating Great Lakes Contaminated Sediments" held on April 24-25, 2001 in Ann Arbor, Michigan,* by Griff Sherbin

Integration Group Meeting August 28, 2001 Chicago, Illinois

The Integration Group continued the work begun at their February meeting when they first considered innovative ways to move the strategy forward. A new Sector Subgroup had been formed to consider a sectoral approach to resourcefully achieve further substance reductions. At this meeting, on August 28, 2001 in Chicago Illinois, the Integration Group focused on the potential for innovative approaches to efficiently and comprehensively aid the GLBTS achieve its goals.

Members of the Sector Subgroup updated the Integration Group on their progress to date. Four members of the Sector Subgroup presented a short list of nominated sectors and described the process undertaken to generate the list. Next, the Integration Group participated in a facilitated discussion exploring ways to move a pilot sector initiative forward. The group continues to work toward this goal, and new members are encouraged to participate.

The Integration Group participated in a facilitated a discussion of the innovative approaches introduced by Dr. Joseph Fiksel in his presentation entitled *Beyond Compliance: Innovative Environmental Management Approaches*. The Integration Group expressed a desire to increase GLBTS participants' knowledge of these approaches and also to integrate the use of innovative approaches into existing mechanisms within the GLBTS. The Integration Group also participated in an impromptu discussion of the GLBTS Communication Strategy. It was decided that EPA and Environment Canada would look into this matter and report back to the group at its November meeting.

The following two presentations were delivered at this meeting:

- *Sector Pilot Subgroup Progress Update*, by Alan Waffle of Environment Canada, Andy Buchsbaum of the National Wildlife Federation, Dale Phenicie of the Council of Great Lakes Industries, and E. Marie Philips of USEPA
- *Beyond Compliance: Innovative Environmental Management Approaches*, by Dr. Joseph Fiksel of Battelle

Sector Subgroup

From the earliest stages of the GLBTS, it was recognized that a sectoral approach may be an effective and efficient way of achieving reductions for multiple strategy substances. However, it was also recognized that information to be gathered in the first three steps of the analytical process would be crucial to selecting appropriate sectors and formulating an effective multi-substance sectoral approach. With the completion of the substance-specific Step 3 reports in the past year, assessment of cross-substance sector activities was possible.

At its May 18, 2001 meeting, the Integration Group established a temporary subgroup to explore and develop options for a sectoral approach to achieve reductions in multiple strategy substances. Representatives from industry and environmental groups volunteered to participate as members of the sector subgroup, led by EC and USEPA. On June 18th, the first sector subgroup conference call was convened to discuss the rationale, purpose, and goals both in terms of the overall pilot sector effort and in terms of the specific charter of the temporary subgroup. The subgroup's charter was identified as nominating a "short list" of sectors for the focus of a pilot sector effort and gathering information necessary for making a decision on whether and how to proceed with a sector approach.

The subgroup identified an initial list of 27 candidate sectors, based on: Step 3 reports, potential impact of Level 1 substance reductions, association with more than one Level 1 substance, and other criteria presented on a decision tree developed for use by the sector subgroup and presented at the May 18, 2001 Integration Group meeting. In a series of conference calls held during the summer of 2001, the subgroup narrowed the initial list down to a short list of six candidate sectors: utilities, automobile and related manufacturing, publicly owned treatment works, municipal waste incineration, government facilities including schools and public facilities, and secondary copper smelting.

The short list of sectors, and the process used to arrive at it, was presented to the Integration Group at its August 28, 2001 meeting. In September 2001, the subgroup began a process of gathering information about each sector on the short list to determine whether there are opportunities to move forward with a pilot project sector approach. Progress made toward identifying reduction opportunities and the feasibility of a pilot sector approach will be reported at the November 2001 Integration Group meeting.

9.0 Cross-Cutting Activities Highlights

Clean Car Campaign: Great Lakes United (GLU) has completed mercury switch-out trainings in western New York with six major owners of vehicle fleets and is anticipating working in November 2001 with partners in Michigan and Minnesota on a "Switch the Switch" campaign with car dealerships. Through these efforts and a memorandum of understanding with a mercury recycler who has agreed to store the collected mercury switches, we will have removed over 2000 grams of mercury from circulation.

In partnership with other industry groups and environmental organizations, GLU has developed an action plan to pursue a comprehensive solution to the problem of mercury in automobiles. The plan calls for: a manufacturer-sponsored collection and recovery program to capture mercury switches currently in commerce, a requirement for manufacturers to subscribe to Design for Recycling to stop the introduction of new mercury sources into the end-of-life vehicle recycling infrastructure, and a mandate for government entities to take a leadership role by replacing mercury switches in current vehicles and implementing rules that require all future government fleet vehicles to be free of mercury, among other toxic substances.

The partnership is composed of the Automotive Recyclers Association, Clean Car Campaign, Clean Production Network, Great Lakes United, Ecology Center, Environmental Defense, Institute of Scrap Recycling Industries, Steel Manufacturers Association, and the Steel Recycling Institute.

Innovative Approaches Concept: As an alternative to a substance-by-substance approach to strategy reductions, EC and USEPA presented an innovative approaches concept as a means of addressing multiple substances. This concept, which was discussed at the August 28, 2001 Integration Group meeting, includes the application of innovative, cross-cutting pollutant management approaches or tools to help meet the goals of the Binational Toxics Strategy. Environmental Management Systems, Sustainable Product Development, Life Cycle Assessment, and Environmental Accounting are examples of these types of approaches.

Great Lakes Great Stove and Fireplace Change Out: From February through April, the Hearth Products Association, in cooperation with environmental protection agencies, sponsored this program which helps protect the environment by offering incentives for people to change out old wood-burning appliances for cleaner burning appliances. The program also included educational events in St. Paul, Minnesota, Lansing, Michigan, and Madison, Wisconsin, in which each state participated. While focusing on reductions of B(a)P, the program also triggered reductions in other air toxics, particulate matter (PM 2.5), and carbon monoxide.

Western Lake Superior Sanitary District Programs: It has been the goal of the Western Lake Superior Sanitary District (WLSSD) to create a total waste reduction program that is broadly applied to many areas of the organization. Activities and programs undertaken in the past year toward this goal include the following:

Organics Compost Site: In September 2001, WLSSD opened its food waste compost site, accepting food manufacturer waste and restaurant plate waste in order to reduce the volume of this kind of material from the waste stream and to create a high-quality compost product that can be put to beneficial use. It is the intention of the WLSSD to have this compost product, combined with the compost created from its existing yard waste compost site, available for public purchase by Spring 2002.

Burn Barrel Use Reduction: Throughout the past two years, WLSSD has been working on a research project to identify the extent of open garbage burning in the region (specifically through the use of backyard burn barrels) and to create and launch a public education campaign to reduce and/or eliminate burning in the region. The research project's findings showed that 67.7 percent of respondents burn paper and junk mail. Although regional cities and towns have curbside paper recycling services readily available, rural recycling facilities funded by the District did not offer paper recycling. Recognizing that this lack of services may play a big part in rural residents disposal options--and, therefore, their tendency to burn, WLSSD launched a paper recycling pilot project at three rural recycling facilities. After testing proved to be workable, the WLSSD Board of Directors passed a resolution on October 1, 2001 to accept a new waste hauler contract that would haul paper recyclables from all rural recycling sheds.

In addition, at the end of October 2001, WLSSD will be making additional efforts to reduce the amount of junk mail that comes into the region. In its semi-annual newsletter, WLSSD will include articles and advice on how to "reduce the hail of unwanted mail". Phone numbers that consumers can call to be removed from mailing lists of credit card solicitation firms will be published, as well as a postcard that can be mailed to the national mail marketer's association requesting removal of a consumer's name from mailing lists.

Mercury-Free School Zone Project: In 2000, WLSSD partnered with the Minnesota Pollution Control Agency (MCPA) to create and launch an outreach and education program to eliminate mercury from schools in the region. Staff at WLSSD and MPCA contacted over 100 schools in the seven-county region of northeast Minnesota, inviting them to pledge to become "Mercury-Free by 2003". Over 40 percent of the schools made the pledge, and over 130 pounds of elemental mercury and mercury-contaminated equipment was removed from the schools as of May 2001. Many more schools are anticipated to take part in this program this fall and throughout the new school year.

Electronics Recycling Event: On August 24 and 25, 2001, WLSSD partnered with Best Buy Corporation, Waste Management, and a few local organizations to stage an Electronics Recycling Event. Electronics recycling opportunities are few in the region. Over the course of the two-day event, over 27 tons of electronics waste were collected from more than 550 participating residents.

"PVC-Free" Purchasing Policy: WLSSD has developed an internal policy to avoid the purchase of products that contain PVC and to use PVC alternatives whenever possible. With this policy in place, WLSSD has found cheaper and/or more durable products with the purchase of promotional magnets, non-vinyl signage, and table coverings. WLSSD has even found the best option for construction purposes to be PVC-free liners for digestion tanks for its new biosolids processing facility.

Mercury Reduction Projects: WLSSD has begun work on a Beneficiary Group for Environmental Improvement (St. Louis River/Interlake/Duluth Tar Superfund) program to reduce the amount of mercury amalgam in wastewater. Through a grant, approximately 30 advanced amalgam capture devices will be purchased and installed in dental practices within the District's service area. The 30 devices will cover approximately one-half of the dental practices within the District. These new amalgam capture devices trap fine amalgam particles much better than standard equipment and should result in a measurable reduction of mercury. The mass of mercury coming into WLSSD's wastewater treatment plant will be monitored to measure success--ultimately resulting in a report that documents the value of installing these devices.
In addition, through a grant by the Great Lakes Protection Fund, WLSSD completed the Great Lakes Dental Mercury Reduction Project. Through this program WLSSD brought together a collaboration of dental professionals, dental association staff, waste managers, and regulators to improve waste management practices in the dental profession. The group determined that the greatest need was to develop Best Management Practices and promote amalgam recycling as a way to prevent amalgam from being disposed in ways in which it would reach the environment. *Recycling Amalgam Waste* was developed for reprinting and distribution by Great Lakes Dental Associations. All Great Lakes Dental Associations have reprinted the brochure and distributed it to their members as inserts in their dental journals or as a separate distribution. Approximately 50,000 copies of a simple instruction on how to best manage amalgam waste were distributed via the state dental associations. In many states this was the first mercury waste management educational effort for the dental profession.

10.0 Sediments Challenge Highlights

EPA, EC, and the Great Lakes Commission, in cooperation with the Great Lakes Binational Toxics Strategy, sponsored a two-day workshop on "Treating Great Lakes Contaminated Sediment," on April 24-25, 2001, in Ann Arbor, Michigan. The first day included presentations of environmental and industry perspectives on treatment technologies, a history of sediment treatment in the Great Lakes, and various existing and emerging sediment treatment technologies. The second day featured panel discussions focused on solutions to overcoming barriers to sediment remediation and implementation of treatment technologies. The agenda for this workshop is shown in Appendix B. For further information contact E. Marie Phillips, EPA/GLNPO at (312) 886-6034 or Alan Waffle, EC at (416) 739-5854.

Over 100 participants from government, industry, environmental organizations, and consulting and technology firms attended the workshop. The workshop was a milestone in developing and implementing solutions to achieve the challenge to "Complete or be well-advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006".

Relationship with Great Lakes Areas of Concern (AOCs)

The 1987 Great Lakes Water Quality Agreement specifies that Remedial Action Plans (RAPs) be developed to restore and protect beneficial uses in Great Lakes Areas of Concern (AOCs). Forty-two AOCs were identified in Canada, the U.S., and in shared waters. The RAP process involves three stages: problem identification (Stage 1), plan preparation (Stage 2), and action implementation (Stage 3). Development and implementation of a RAP involves public participation throughout the process, with a broad array of membership in a RAP public advisory committee. The International Joint Commission serves in an advisory capacity in the RAP process, providing review and comment on RAP documents.

Much has been accomplished since the RAP program began in 1987, though more work remains to be done. The Binational Toxics Strategy considers the RAP process a valuable means of addressing the strategy challenge. To maintain the momentum established through the RAPs in achieving long-term restoration goals, the Binational Toxics Strategy will continue to capture and report out, on an annual basis, Great Lakes basin-wide contaminated sediment remediation activities.

Table 10-1 presents a format for reporting progress on sediment remediation in the Great Lakes for both the U.S. and Canada. This table illustrates sediment remediation projects at both Areas of Concern and non-Areas of Concern, beginning in 1997 and continuing through 2000. The maps on the following pages illustrate the progress and achievements made in sediment remediation activities in the Great Lakes from 1997 to 2000. Figure 10-1 presents the cumulative volume of sediment remediated in the U.S. since 1997.

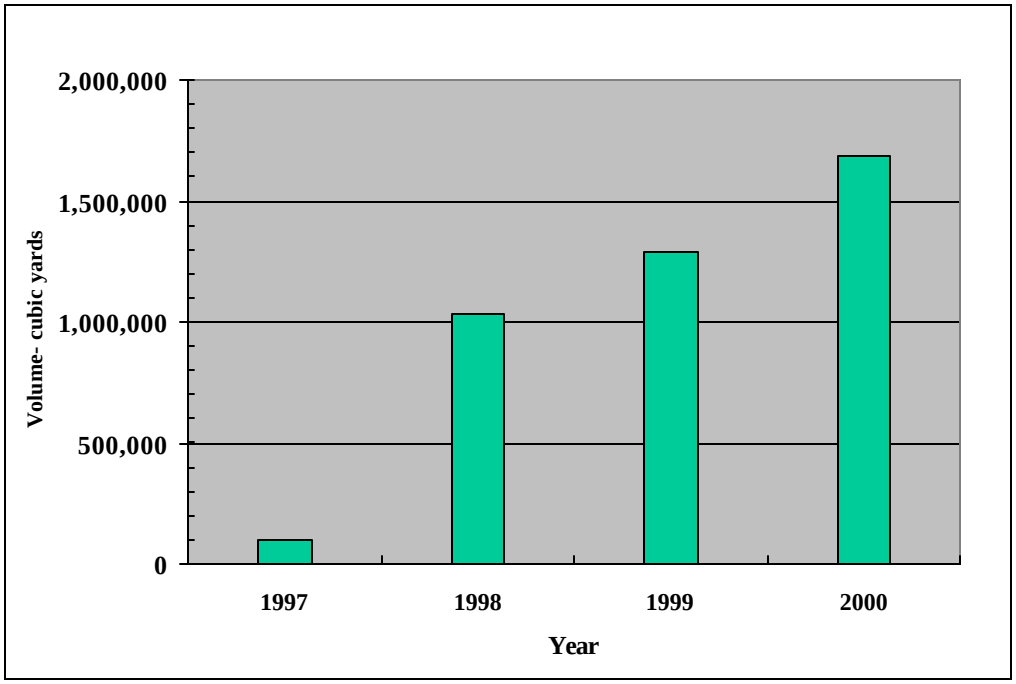


Figure 10-1. Cumulative Volume of Sediment Remediated in the U.S. Since 1997

Update on Sediment Issues in Areas of Concern (Canada)

The following information updates information contained in the GLBTS Progress Report of February 20, 2001. That report should be referred to for additional information on sediment issues in Canadian AOCs.

Port Hope Harbour: Port Hope Harbour is located on the shoreline of Lake Ontario approximately 100 km east of Toronto. Harbour sediments contain elevated levels of some heavy metals and PCBs but due to contamination by uranium series radionuclides, the sediments have been designated as low-level radioactive wastes. The contamination is attributed to historic discharges from the Port Hope refinery of the former federal crown corporation, Eldorado Nuclear Limited. There are other low-level radioactive wastes at disposal sites in the Port Hope area, and efforts by the Government of Canada have been underway since 1988 for the cleanup and long-term storage and management of these wastes. Harbour sediment remediation has been contingent on this initiative.

An agreement between the federal government and the Town of Port Hope and adjacent municipalities was reached in March 2001 on the development of facilities for the long-term management of low-level radioactive wastes. The initial preconstruction and regulatory phases, including a full environmental assessment, are expected to take approximately five years with the implementation of the cleanup taking another projected five years. Implementation of the estimated $260 million project is managed by Natural Resources Canada through the Low-Level Radioactive Waste Management Office.

Table 10-1. Progress on Sediment Remediation in the Great Lakes*

Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2000 (cy)	Volume Sediments Removed 2000 (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															
Ashtabula River, OH															
Black River-S. Branch, MI															
Black River, OH															
Buffalo River, NY - Buffalo Color - Area D													45,000		capped
Chicago River, IL															
Clinton River, MI															
Cuyahoga River, OH															
Deer Lake-Carp River, MI															
Detroit River, MI - Monguagon Creek													25,000		landfilled
Eighteen Mile Creek, NY															
Fox River, Green Bay, WI - Deposit 56/57 - Deposit N										**50** --- 50			**87,500** 80,300 7,200	50,300	landfilled
Grand Calumet, IN															
Kalamazoo River, MI - Bryant Mill Pond										10,000			150,000		landfilled
Manistee Lake, MI															
Manistique River, MI													123,000	33,000	landfilled

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Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2000 (cy)	Volume Sediments Removed 2000 (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															
Manitowoc River, WI															
Maumee River, OH - Fraleigh Creek										25,400			8,000		landfilled
Menominee River, MI/WI - Ansul Eighth Street Slip													13,000		landfilled
Milwaukee Harbor, WI - North Ave. Dam													8,000		landfilled
Muskegon Lake, MI															
Alpena, MI – National Gypsum															
Niagra River, NY - Scajaquada Creek - Cherry Farm/Rivcer Road - Niagra Transformer													**71,000** 17,500 42,000 11,500		landfilled
Pine River, MI				203,708									140,000	110,000	landfilled
Presque Isle Bay, PA															
River Raisin, MI													27,000		on-site TSCA facility
Rochester Embayment, NY															
Rouge River, MI - Evan's Product Ditch - Newburgh Lake										**250,000** 4,000 246,000			**407,000** 7,000 400,000		off-site TSCA facility and landfilled
Saginaw River/Bay, MI													205,000	205,000	off-shore CDF

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Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2000 (cy)	Volume Sediments Removed 2000 (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															
Sheboygan Harbor, WI															
St. Clair River, MI															
St. Lawrence River, NY															
St. Louis River/Bay, MN/WI															
St. Marys River, MI													3,000		landfilled
Torch Lake, MI													3,200	3,200	solid, special and hazardous waste landfilled
USX Vessel Slip Project, IN															
Waukegan Harbor, IL															
Waxdale Creek, WI															
White Lake, MI															
Willow Run Creek, MI										200,000			450,000		on-site TSCA facility
Wolf Creek - Tributary, MI															
TOTALS				**203,708**						**485,450**			**1,765,700**	**401,500**	

*Information included in matrix reports quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

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Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2000 (cm)	Volume Sediments Removed 2000 (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 enclosed & capped
Nipigon Bay															
Jackfish Bay															
Peninsula Harbour															
St. Marys River															
Spanish River															
Severn Sound															
St. Clair River															
Detroit River															
Wheatley Harbour															
Niagara River (Ontario)															
Hamilton Harbour															
Metro Toronto															
Port Hope															
Bay of Quinte															
St. Lawrence River (Cornwall, Ontario)															
TOTALS		**2,700**											**32,000**		

*Information included in matrix reports quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

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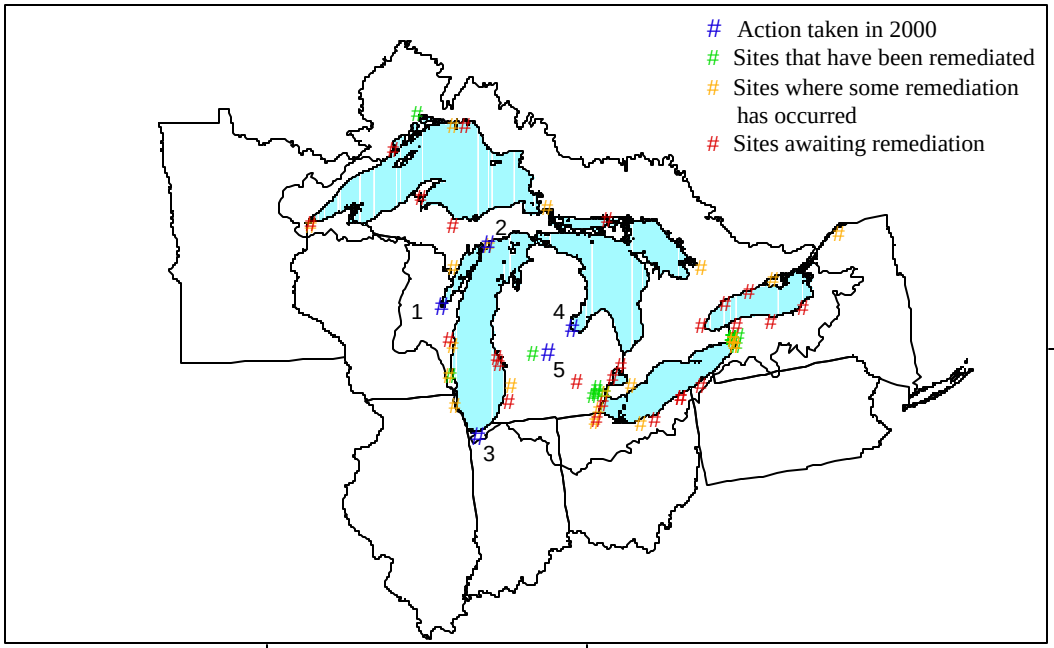
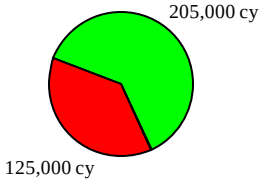
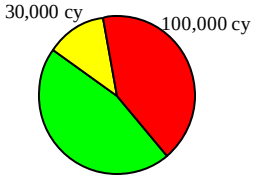
Great Lakes Sediment Remediations in CY 2000



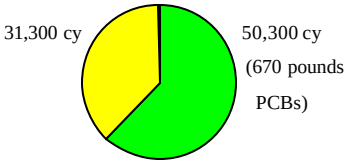
4. Saginaw River & Bay



5. Pine River

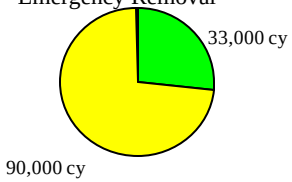


1. Fox River – Deposit 56/57

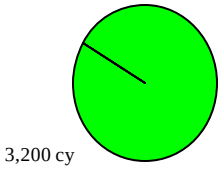


10,900,000 cy total in Fox River

2. Manistique River & Harbor Emergency Removal



3. USX Vessel Slip Project – Lake Michigan



volume remediated in 2000

volume remediated prior to 2000

volume awaiting remediation

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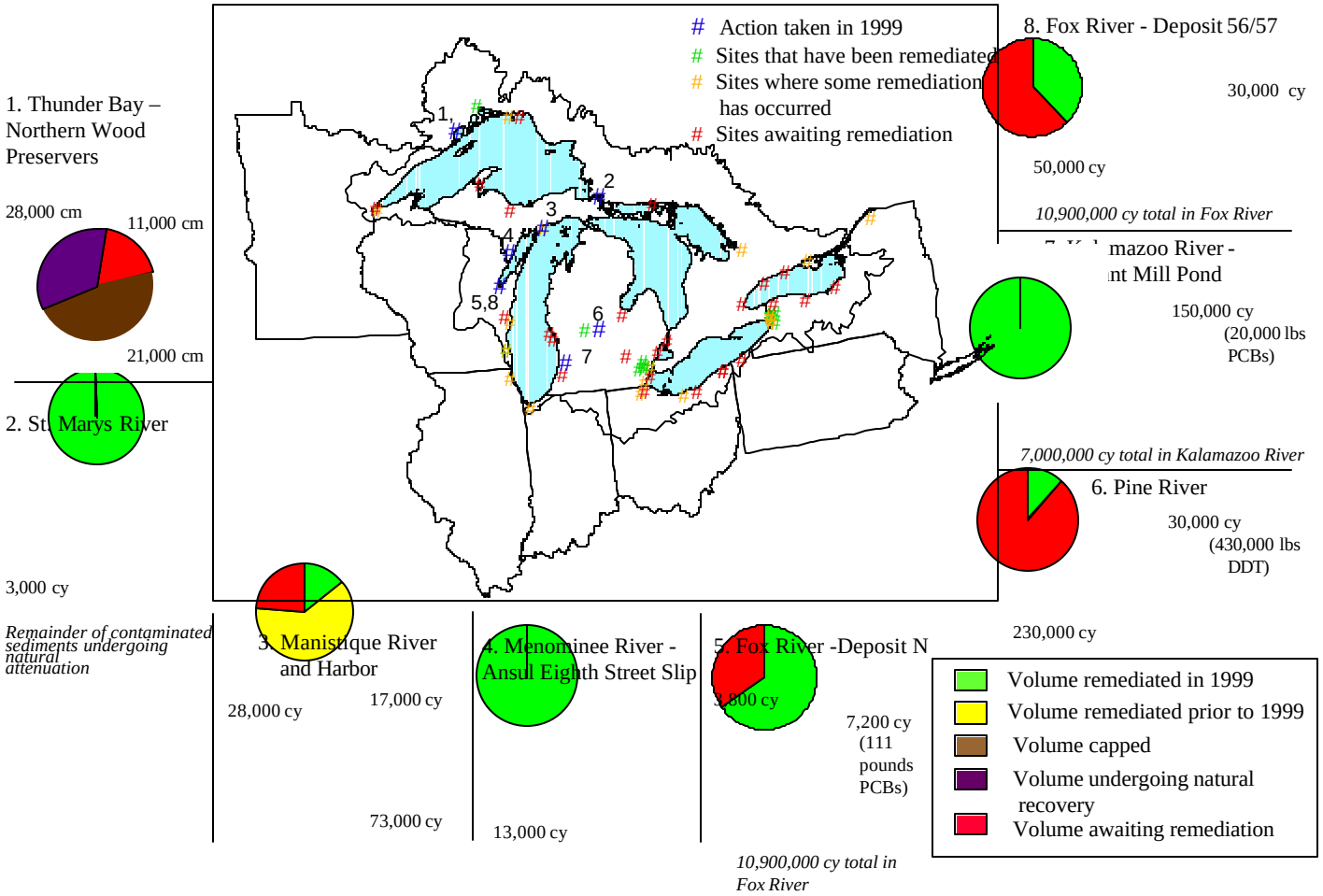
Great Lakes Sediment Remediations in CY 1999



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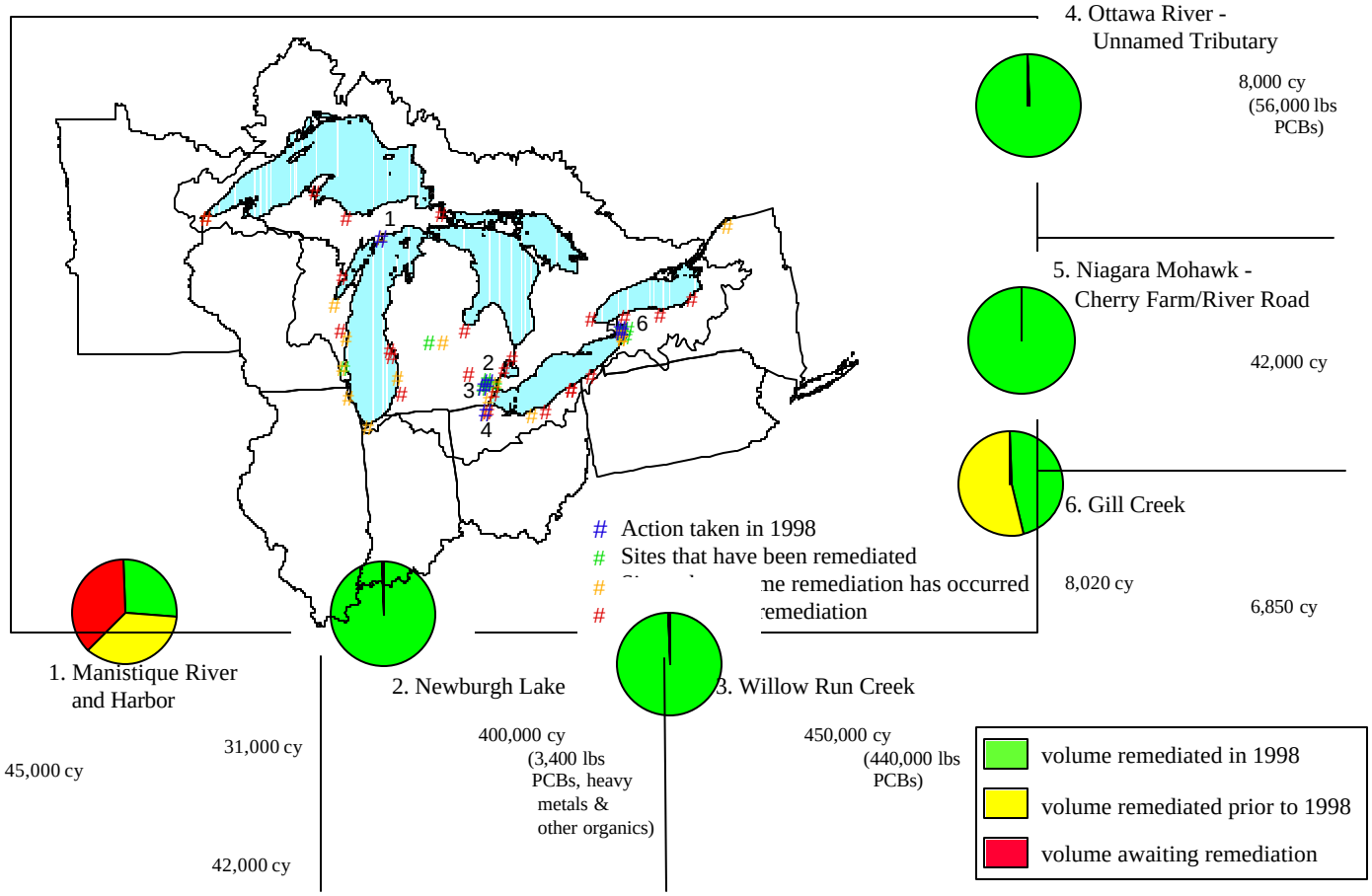
Great Lakes Sediment Remediations in CY 1998



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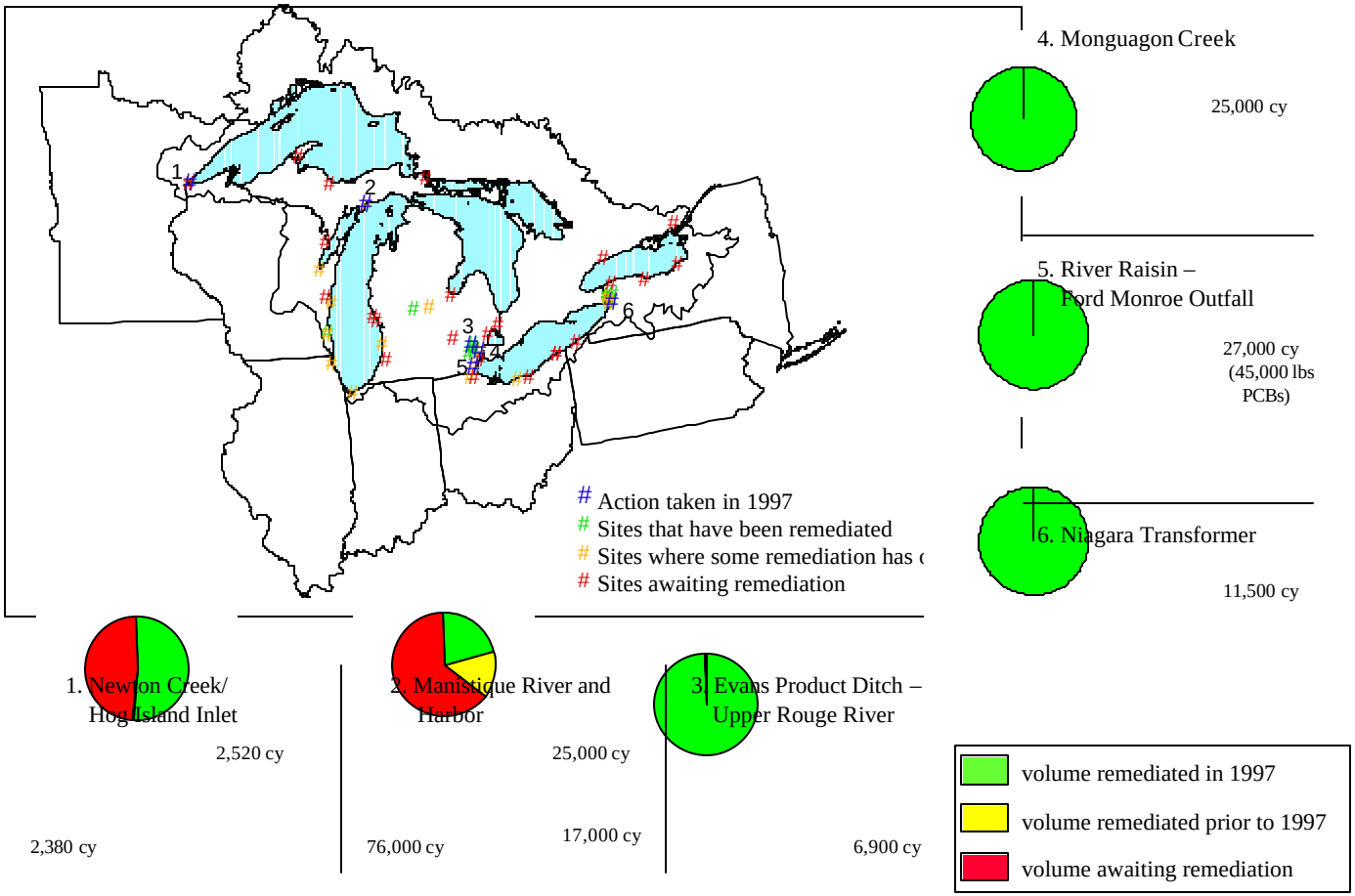
Great Lakes Sediment Remediations in CY 1997



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St. Clair River: Dow Chemical Canada Inc. announced March 22, 2001, its intentions to remediate an area of the St. Clair River adjacent to its property where chemicals associated with historical operations can be found in the sediments. A preliminary estimate of 35,000 cubic metres of sediment contain elevated levels of mercury, hexachlorobenzene, hexachlorobutadiene, octachlorostyrene and PCBs. Further site assessment work has been completed, and Dow has evaluated several remedial options and will identify a preferred option in early 2002. The company anticipates that the entire project from design through consultation, engineering and construction will be completed by the end of 2002.

Thunder Bay Harbour: The Thunder Bay AOC extends approximately 28 km along the shoreline of Lake Superior and up to 9 km offshore from the city of Thunder Bay. There are two areas within the AOC with significant sediment contamination.

1) Northern Wood Preservers. Approximately 21,000 cubic metres of contaminated sediment (total PAH levels between 30 and 150 ppm) were contained within a rockfill berm and capped using clean fill. Approximately 11,000 cubic metres of the most highly contaminated sediment (above 150 ppm total PAH) were dredged, and thermal treatment is underway (Fall, 2001). The remaining 28,000 cubic metres of contaminated sediment (80% of which is less than 50 ppm total PAH) outside the berm is undergoing natural recovery.

2) Provincial Papers. There are an estimated 18,000 cubic metres of mercury-contaminated sediment. Remediation options are under assessment.

Peninsula Harbour (Marathon): Peninsula Harbour is located on the northeast shore of Lake Superior at Marathon. Sediments with elevated levels of mercury and PCBs extend approximately 3 km from Marathon to a depth of 2 to 36 metres. This sediment exceeds guidelines for open water disposal of dredged materials. There is an estimated volume of 55,000 cubic metres of sediment in the shallow water areas of the Harbour (Jellicoe Cove) that exceeds Provincial Sediment Quality Guidelines, with approximately 10,000 cubic metres residing in the area of highest concentration. Assessment and remediation studies are underway.

Hamilton Harbour: The amounts and concentrations of heavy metals, PAHs, and PCBs in the Harbour are the result of discharges over several decades from industrial and urban sources. The Harbour is considered an excellent sediment trap, retaining about 85 percent of all suspended sediment discharged into it. Priority has been given to establishing standards, dredging techniques, risk analysis, and treatment technology for an area called Randle Reef where PAH concentrations are of greatest concern. Remedial options are being assessed for approximately 20,000 cubic metres of contaminated sediment at this site.

11.0 Long-Range Transport Challenge Highlights

Canadian workgroup co-chair: S. Venkatesh (replaces Keith Puckett)
U.S. workgroup co-chair: Todd Nettesheim

Under the Great Lakes Binational Toxics Strategy, EC and 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 Great Lakes Integrated Atmospheric Deposition Monitoring Network
- (IADN) stations,
- Improved the integration of monitoring networks and data management, and
- Continued research on the atmospheric science of toxic pollutant transport.

Following the strategy's 4-step analytical framework to evaluate and report jointly on the contribution and significance of long-range transport of Strategy substances from worldwide sources, the EC and EPA have accomplished the following:

Step 1. Information Gathering - To assess current activities and prepare a report on the state of the contribution and significance of long-range transport of Strategy substances to the Great Lakes from worldwide sources.

ACTION: A literature review and assessment of the long-range transport of persistent toxic substances to the Great Lakes was undertaken in 1999, and a report entitled "Long-range Transport of Persistent Toxic Substances to the Great Lakes: Review and Assessment of Recent Literature" was published by the Canadian firm ORTECH Environmental on March 27, 2000. Additional activities related to the information gathering step are noted below.

Canadian Studies:

- *Lindane Transport to the Great Lakes Region from Application Areas in Saskatchewan*
  A three-dimensional Multicompartment Environmental Diagnosis and Assessment (MEDIA) model (Koziol and Pudykieiwcz, 2001) was used to investigate the transport and diffusion of pesticides applied to crops in the Saskatchewan and Quebec regions of Canada. The study indicated that there is potential for emissions from Saskatchewan to impact the Great Lakes region (see Figure 11-1). Simple air parcel trajectory analyses carried out by Waite et al. (2001) also show that emissions of lindane used on canola crops in Saskatchewan can be transported over the Great Lakes region (Figure 11-2).

- *Model Simulations of the Atmospheric Transboundary Contributions of Lead to the Great Lakes*
  A 3-D atmospheric transport model applied on a regional scale was used to study the contributions of industrial emission sources of lead from parts of Canada and U.S. to the Great Lakes. Although lead is not a strategy substance, cadmium is. From a modeling point of view, their behaviors will be similar. Given the number of common sources for lead and cadmium in the study domain, the results for lead would be somewhat representative of the situation for cadmium. Environment Canada's National Pollutant Release Inventory and USEPA's Toxic Release Inventory were used to assemble the data on lead emissions for 1995 and 1996. The model performance was evaluated through comparison of model-simulated air concentrations of lead with those observed at a few IADN (Integrated Atmospheric Deposition Network) stations. The model simulations were used to estimate lead loadings to the Great Lakes, including separate contributions due to Canadian and U.S. emissions sources (Daggupaty and Ma, 2001). Figure 11-3 shows the estimated lead loadings for 1996.

- *Model Simulations of Mercury to the Great Lakes from Global Anthropogenic Sources*
  Canadian efforts are progressing on the development and testing of a global model for atmospheric transport of mercury (GRAHM – Global and Regional Atmospheric Heavy Metals model). The model, which has been run on 1 degree by 1 degree resolution, can be used to estimate the impact of global sources of mercury on the Great Lakes region. Figure 11-4 is an example of the output from the GRAHM model.

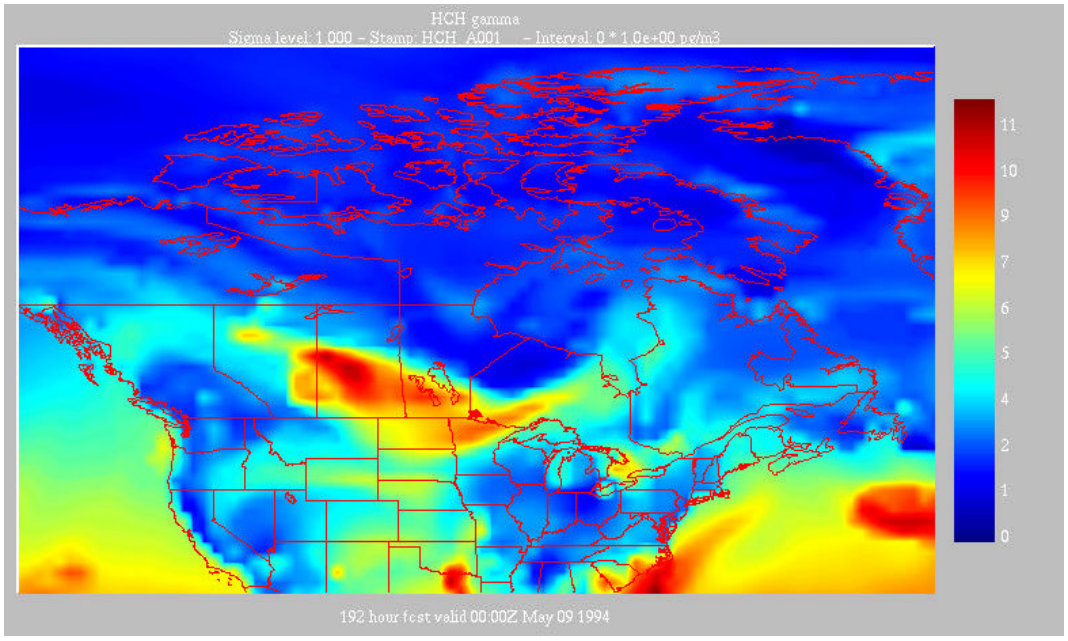

Figure 11-1: Model Simulated Ground Level Air Concentration of g-HCH on May 9, 1994 (From Koziol, 2000)

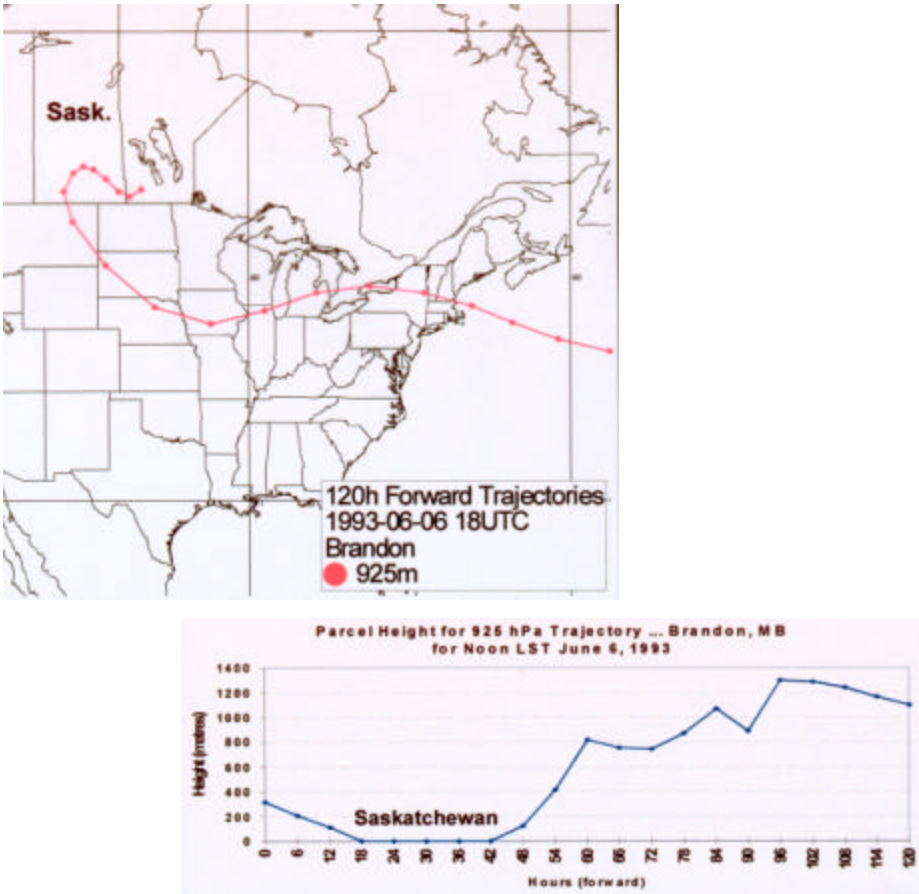

Figure 11-2. Trajectory Plot for An Air Parcel Originating from the 925 hPa Level at Brandon, MB at Noon L.S.T. on June 06, 1993

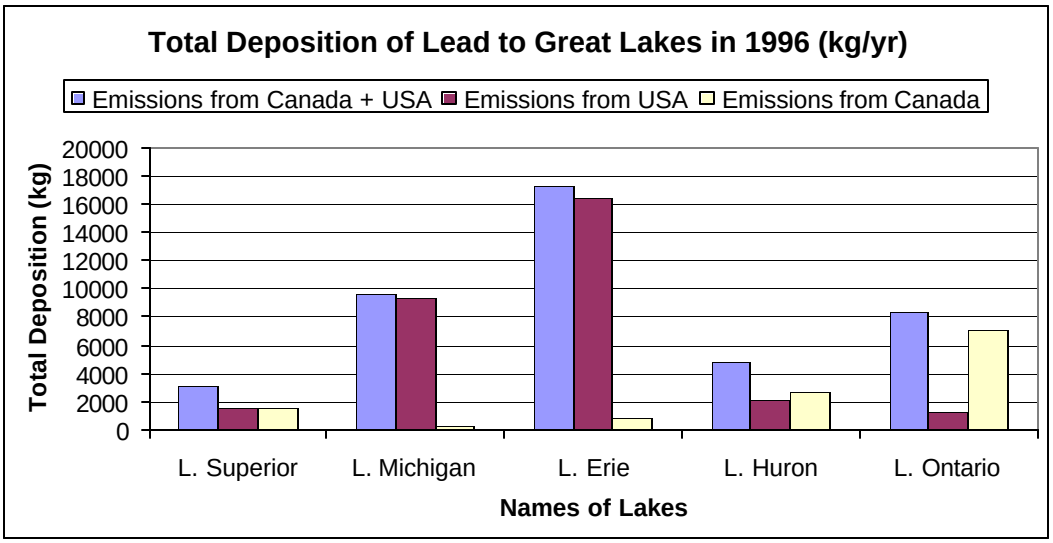

Figure 11-3. Yearly Total Deposition in 1996 to the Great Lakes from Lead Emission Sources from Canada and the U.S.

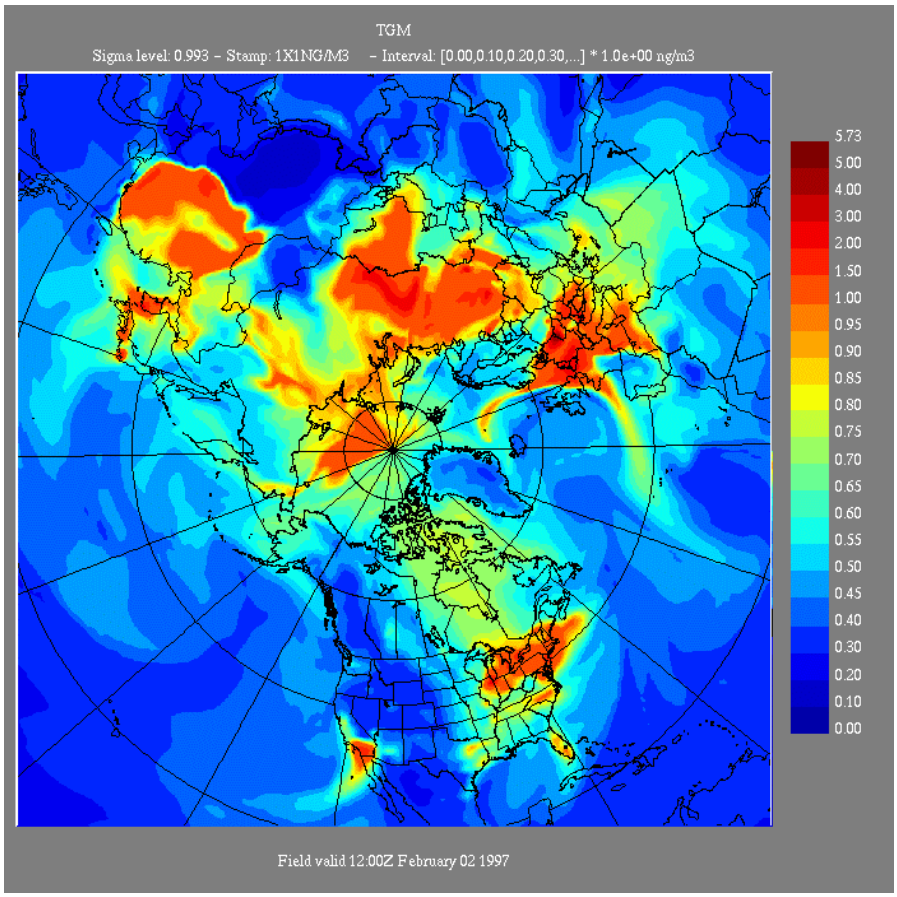

Figure 11-4. Sample Output from the GRAHM Model Showing Air Concentrations of Total Gaseous Mercury at 12Z on February 1997. (Figure Courtesy of A.P. Dastoor)

U.S. Studies:

- *Mercury Monitoring and Modeling*
  EPA is conducting a series of ambient monitoring studies to better understand the behavior of mercury in the atmosphere and the potential for very long-range transport. These studies involve the use of new measurement techniques to determine the relative concentrations of various (elemental and ionic) and physical (gaseous and particulate) forms of mercury in the atmosphere. These new techniques are being applied in surface and aircraft measurements to help apportion the deposition in the Florida Everglades between local and distant sources; in surface measurements in Point Barrow, Alaska, to study the observed depletion of atmospheric mercury during polar sunrise; and in surface measurements at Cheeka Peak, Washington, to characterize trans-Pacific transport. Future studies are being planned in the Ohio River Valley, to examine the differences between local and distant sources, and at Mauna Loa, Hawaii, to characterize intercontinental and global transport processes.

The information from these measurement studies is being used to develop and evaluate a chemical mechanism for mercury that has been incorporated into EPA's Community Multiscale Air Quality model (CMAQ), a state-of-the-art Eulerian regional atmospheric fate and transport model. Through an international model comparison study being conducted under the auspices of the LRTAP/EMEP program, the CMAQ mercury mechanism is being compared to other models of mercury chemistry being developed by U.S. and international experts. Eventually these models will help apportion observed deposition between domestic emissions sources and foreign emission sources that contribute to the global circulation of mercury.

- *Remote Sensing Applications*
  EPA, through a number of small individual grants and cooperative agreements, is examining the potential for integrating remote sensing and surface measurements to characterize inter-continental transport. Satellite and surface observations have been used to document an April 1998 dust event in the Gobi desert and its impact in North America. Additional studies using Probabilistic Transport Pathway Analysis have documented the transport of dust from the Gobi, Sahara, and Taklimakan deserts to North America.

- *International Transport of Air Pollutants (ITAP) Working Group*
  To improve EPA's efforts to address intercontinental transport, the ITAP Working Group was formed within the Agency, co-chaired by the Office of Air and Radiation and the Office of International Activities. The main purposes of this working group are to: (1) share information across EPA programs; (2) identify opportunities and needs for coordination; (3) provide a focal point for interaction with organizations outside the EPA; (4) identify potential domestic and international policy gaps and opportunities; and (5) identify capabilities, resources, and structures needed to effectively address ITAP issues. The activities addressed by the ITAP Working Group include international policy development, technology and information transfer, control technology development, emissions characterization, modeling and assessment, and ambient monitoring.

- *Intercontinental Transport of Air Pollution: Relationship to North American Air Quality. A Review of Federal Research and Future Needs - April 2001*
  This report was developed by the Air Quality Research Subcommittee of the Committee on Environment and Natural Resources (CENR). The National Oceanic and Atmospheric Administration (NOAA) chairs this Subcommittee. The report provides a brief summary of U.S. research related to the intercontinental transport of air pollution, with an emphasis on how it relates to North American air quality. The report provides a brief overview of the science, identifying key knowledge and capability gaps, and is intended as an information piece to guide the development of future federal research programs relative to air quality.

- *Long Range Transport of Persistent Bioaccumulative Toxics from Central America* EPA Region 5 is reviewing the potential for atmospheric transport of toxic substances from Central America to the Great Lakes, using available information on sources, meteorology, and chemistry. This effort will contribute to a framework for evaluating proposed projects to help Central American countries improve their capacity for management of pesticide use or other POPs chemicals.

Step 2. Analysis - Consult experts on knowledge gaps and options for a path forward.

ACTION: A bilateral experts workshop planned for October 2001 has been rescheduled for Spring 2002.

References:

Daggupaty, S.M. and J. Ma, 2001. Numerically simulated atmospheric transboundary contribution of lead loading to the Great Lakes. Proc. NATO-CCMS Symposium on Air Pollution Modeling and its applications, Louvain-La-Neuve, Belgium, October 15-19, 2001

Intercontinental Transport of Air Pollution: Relationship to North American Air Quality. A Review of Federal Research and Future Needs. April 2001. Air Quality Research Subcommittee of the Committee on Environment and Natural Resources (CENR).

Koziol, A.S., 2000. The effect of usage of Gamma-Hexachlorocyclohexane in Canada on the contamination of soil and air. Contract report prepared for The Meteorological Service of Canada, Toronto, Canada M3H 5T4.

Koziol, A.S. and J. Pudykiewicz, 2001. Global-scale environmental transport of persistent organic pollutants. Chemisphere (Accepted for publication).

Waite, D. T., F. Hunter, M. Kellerhals, J. Sproull and D. Quiring, 2001. Atmospheric transport of lindane (g-hexachlorocyclohexane) from the Canadian prairies - a possible source for the Great Lakes? "Our Future Water Supply" International Conference on the St. Lawrence River Ecosystem. St. Lawrence River Institute of Environmental Sciences. Cornwall, ON. May 14-16.

APPENDIX A:
GREAT LAKES BINATIONAL TOXICS STRATEGY
TIME LINE

The following section presents an overview of Great Lakes Binational Toxics Strategy progress and includes not only activities undertaken by the workgroups and the governments since the strategy was signed in 1997, but also various activities related to the goals and objectives of the Binational Toxics Strategy.

GREAT LAKES BINATIONAL TOXICS STRATEGY (GLBTS)
PROGRESS OVERVIEW 1997 - 2001

	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
General GLBTS Activities				
GLBTS Development, the Integration Group, and the Stakeholders Forum	- 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-specific participation solicited - 12/97 GLBTS web page is developed - 3/23/98 Kick-off implementation meeting in Chicago to form seven substance-specific workgroups - 6/19/98 The first GLBTS Integration Group meeting is convened in Romulus Michigan - 6/98 GLBTS web site is redesigned; PCBs and Hg workgroup pages added	- 1/26/99 GLBTS Integration Group meets in Windsor, Ontario - 4/27/99 GLBTS Stakeholder Forum is held in Toronto, Ontario - 4/28/99 GLBTS Integration Group meets in Toronto, Ontario - 8/24/99 GLBTS Integration Group meets in Detroit, Michigan - 9/23-26/99 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 web page - 11/18/99 GLBTS Stakeholder Forum is held in Chicago, Illinois - 11/19/99 GLBTS Integration Group meets in Chicago, Illinois	- 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 Group 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"	- 2/20/01 GLBTS Integration Group meets in Windsor, Ontario - 2/21/01 GLBTS 2000 Progress Report is posted to web site - 5/17/01 GLBTS Stakeholder Forum is held in Toronto, Ontario - 06/18/01 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 Group meets in Chicago, Illinois - 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, Illinois

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
GLBTS Development, the Integration Group, and the Stakeholders Forum	- 7/98 GLBTS web site 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 the SOLEC Conference 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	- EC and EPA develop draft communications strategy, present it to Integration Group, and revise strategy based on stakeholder comments - 12/99 Preliminary planning initiated for a PCP Workshop (to include the GLBTS pesticides, HCB and dioxins/furans workgroups) - 12/3/99 A U.S. *GLBTS Report on Level II Substances* is posted on the GLBTS web page - 12/15/99 Draft (Full) 1999 GLBTS Progress Report issued - 1999 (various dates) Development of a Canadian GLBTS communications plan	- 9/22/00 GLBTS Integration Group meets in Chicago, Illinois - 2000 (various dates) GLBTS communications plan is finalized by EC; "key messages" finalized; various communications products in development (brochure, business cards, display unit, letterhead, web site improvements, success stories)	

Do Not Cite or Quote

	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Substance-Specific Activities				
Mercury (Hg)				
GLBTS Workgroup Activities	- 3/23/98 WG is formed at the first implementation meeting - 5/5/98 WG conference call is held - 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	- 4/99 Workshop on community initiatives for reducing Hg - 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 web page - 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* - 4/27/99 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 11/18/99 WG meeting at the GLBTS Stakeholder Forum in Chicago, Illinois	- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - 6/00 GLBTS web page on Mercury Thermometers and Frequently Asked Questions is updated - 8/00 Memo on progress in reducing mercury use posted on the GLBTS web page - 10/17/00 Expansion of mercury web page links - 11/18/00 WG meeting at the GLBTS Stakeholder Forum in Toronto	- 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto - 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, Illinois
GLBTS Reports	- 8/24/98 Background Information on Mercury Sources and Regulations is posted on the GLBTS web page - 9/10/98 Options Paper *Developing a Virtual Elimination Strategy for Mercury* is posted on the GLBTS web page	- 11/99 Draft GLBTS Step 1&2 *Sources and Regulations* report for Hg is posted on the GLBTS web page	- A final draft GLBTS *Reduction Options* (Step 3) report for mercury is prepared (9/1/00) and posted (9/29/00) on the GLBTS web page	

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Other Related Activities	- Chlorine Institute voluntary Hg commitment to reduce Hg use by 50% by 2005 - 12/97 *Mercury Report to Congress* is released by EPA - 5/8/98 Chlorine Institute releases progress report on voluntary Hg commitment - 6/25/98 EPA and AHA sign a 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 Hg reductions	- PBT Strategy grant to the Northeast Waste Management Officials' Association to encourage state Hg reduction efforts - 8/99 As part of 1998 agreement, Hg inventories at Indiana steel mills are completed - 10/99 Hg waste collection component of the Cook County (Illinois) Clean Sweep pilot begins	- Chlorine Institute reports 42% reduction, production-adjusted, in mercury use - EPA, states agencies, and academic researchers conduct meetings with chlor-alkali industry representatives to coordinate mercury reduction projects - Olin Corp. cooperates with 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-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.	- 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 create a Guide to Mercury Reduction in Industrial and Commercial Settings - Merc 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

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	YEAR			
	1998 and earlier	1999	2000	2001 and ongoing
Other Related Activities	- 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 - EPA grant to Ecology Center of Ann Arbor: promoting mercury P2 in the health care industry - WLSSD begins multimedia zero discharge pilot / focus on Hg - Michigan Mercury Pollution Prevention Task Force - 11/16/98 A draft PBT National Action Plan for Mercury is released by 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.	- 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.	

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	1998 and earlier	1999	2000	2001 and ongoing
Polychlorinated Biphenyls (PCBs)				
GLBTS Workgroup Activities	- 3/23/98 WG is formed at the first implementation meeting - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL - 6/15/98 The workgroup requests that the IG develop a strategy on sediments	- 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, Illinois - Workgroup solicits and gains commitment of 3 U.S. auto manufacturers to reduce PCBs - Workgroup solicits commitment of steel producers to reduce PCBs	- 5/16/00 WG meeting at the GLBTS Stakeholder Forum in Toronto, Ontario - Workgroup solicits and gains commitment of 2 Canadian auto manufacturers, 4 Canadian steel producers, and over 30 municipal electrical utilities in Ontario to reduce PCBs - Workgroup 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. EPA mailings to follow. - Workgroup begins to compile case study reports on reasons why companies remove their PCBs - Workgroup begins to collect photographs of PCB-containing electrical equipment to assist potential owners with identification of equipment which may contain PCBs - Workgroup 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.	- 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 web page - 5/01 WG update is posted on the GLBTS web page - 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto - 7/01 USEPA 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) tp GLBTS web page to help increase awareness of the types of equipment that may contain PCBs - 8/30/01 PCBs in Submersible Well Pumps fact sheet posted to GLBTS web page - 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, Illinois

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
GLBTS Reports	- 11/10/98 Options Paper *Virtual Elimination of PCBs* is posted on GLBTS web page - 11/12/98 Background Information on PCB Sources and Regulations is posted on the GLBTS web page	- 11/99 Draft GLBTS Step 1&2 *Sources and Regulations* report for PCBs is posted on the GLBTS web page	- Final draft GLBTS Step 3 *Reduction Options* report for PCBs is prepared (7/14/00) and posted (9/29/00) on the GLBTS web page	
Other Related Activities	- Automotive Pollution Prevention Project efforts to phase out PCBs - Small Quantity PCB Owner Outreach Program started in Ontario - Municipal Electric Association Outreach Program in Ontario - Ontario Mining Association Outreach program - NORA and Region 5 begin clean sweep program for used PCB oil and wastewater - Region 5 PCB Phasedown pilot project continues - 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) Clean Sweep pilot begins - U.S. PCB transformer registration database is updated - Canadian Steel Producer Association Outreach Program - Association of Municipal Recycling Coordinators Outreach Program in Ontario	- Region 5 PCB Phasedown Program pilot project continues and pilot PCB phasedown enforcement policy is 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 - PCB/Hg Cook County 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	- 5/2/01 Final Reclassification of PCB and PCB-contaminated Electrical Equipment rule becomes effective - 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

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	YEAR			
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Dioxins/Furans				
GLBTS Workgroup Activities	- 3/23/98 WG is formed at the first implementation meeting - 11/16/98 WG meeting at the GLBTS Stakeholder Forum in Chicago, IL	- 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, Illinois - 12/7/99 WG Conference call: application of the decision tree process	- 1/11/00 WG Conference call: continuing the decision tree process - 2/1/00 WG Conference call; decision made to initiate a Burn Barrel Sub Group - 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 Sub Group has inaugural teleconference - 4/25/00 Burn Barrel Sub Group 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 > the decision tree process is completed - 7/11/00 WG Conference call: developing reduction projects for high priority sectors - 8/1/00 Burn Barrel Sub Group teleconference: discussion Terms of Reference; link to Lake Superior LaMP - 9/12/00 WG Conference call: developing reduction projects - 9/12/00 Burn Barrel Sub Group teleconference: discussion of Chisago County "Buyback" program; discussion of survey questions regarding state/local regulatory frameworks, and garbage quantity/quality questions. - 11/14/00 Burn Barrel Sub Group teleconference: outline of a strategy document prepared.	- The WG continues to collect information regarding emissions from steel manufacturing, landfill fires, and incinerator ash management - 1/16/01 Burn Barrel Sub Group teleconference: Burn Barrel Strategy - 2/6/01 WG Conference call - 2/13/01 Burn Barrel Sub Group teleconference: Review presentation for Integration Group - 3/13/01 Burn Barrel Sub Group teleconference: Status of efforts to prepare regulatory profile - 4/10/01 Burn Barrel Sub Group teleconference: Proposal for EPA funding of subgroup activities - 5/8/01 Burn Barrel Sub Group 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 Sub Group teleconference: Implementation activities for Summer/Fall - 6/22/01 Burn Barrel Sub Group receives $55k of USEPA PBT funding - 10/9/01 Burn Barrel Sub Group teleconference: Regional Lake Superior campaign

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
GLBTS Workgroup Activities			- 11/00 Discussion papers on Landfill Fire and Incinerator Ash Management prepared for workgroup review.	- 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, Illinois
GLBTS Reports			- 5/26/00 GLBTS draft Step 1&2 *Sources and Regulations* report is prepared - 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 web - Final GLBTS Step 3 *Reduction Options* report is prepared (9/27/00) and the report is posted (9/29/00) on the GLBTS web page	
Other Related Activities	- WLSSD begins multimedia zero discharge pilot / focus on dioxins	- Two Ontario utilities eliminate use of PCP in treated poles	- 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	- PCP re-registration review proceeding as joint Canada/U.S. endeavor - 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

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Pesticides				
GLBTS Workgroup Activities and Reports	- 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 1 pesticides is posted on the GLBTS web page	- 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, Illinois	- 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) - 05/00 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.	- WG reviews pollution prevention opportunities for Level II pesticides (endrin, heptachlor, lindane and HCH, tributyl tin, and pentachlorophenol) and begins preparing report
Other Related Activities	- 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*	- EPA funding to four existing Clean Sweep programs for pilot data collection efforts for Level 1 pesticides	- 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 1PBT pesticides (except mirex) are regularly collected by ongoing Clean Sweep programs - Phase out of the Level 2 Pesticides lindane and tributyl tin compounds are the subject of bi-national negotiations through Pesticide Regulatory Agencies in the U.S. and Canada	- PCP re-registration review proceeding as joint Canada/U.S. endeavor - 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.

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Hexachlorobenzene (HCB) / Benzo(a)pyrene (B(a)P)				
GLBTS Workgroup Activities and Reports	- 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	- 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, Illinois - 11/99 Draft GLBTS Step 1&2 *Sources and Regulations* Reports for B(a)P and HCB are posted on the GLBTS web page	- 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 web page - 9/21/00 WG conference call is held - 10/00 draft Canadian Steps 1&2 reports for HCB and BaP(PAHs) circulated to stakeholders and workgroup members for comments	- 5/17/01 WG meeting at the GLBTS Stakeholder Forum in Toronto - 11/14/01 WG meeting at the GLBTS Stakeholder Forum in Chicago, Illinois - 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
Other Related Activities	- 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 - 01/99 wood stove changeover pilot program for Eastern Ontario	- 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	- 2/01-4/01The Hearth Products Association expands the Great Lakes Great Stove Changeout to 12 states - 6/01 USEPA 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 - PCP re-registration review proceeding as joint Canada/U.S. endeavor

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Alkyl-lead				
GLBTS Workgroup Activities and Reports	- 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 web page	- 1/99 EC prepares *Alkyl Lead Inventory Study - Sources, Uses and Releases in Ontario, Canada: A Preliminary Review*, and posts report on the GLBTS web page. 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 web page	- 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 web page - 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 web page	- The U.S. has met the challenge of confirming no use of alkyl-lead in automotive gasoline. The USEPA PBT Program has taken the lead for the U.S. in coordinating stakeholder efforts to reduce remaining alkyl-lead releases
Other Related Activities		- Work begins on a draft National PBT Action Plan for Alkyl-lead	- 8/25/00 A Draft PBT National Action Plans for alkyl-lead is posted on the PBT web page for public review and comment - Auto racing industry expresses interest in working with USEPA to find lead-free gas substitutes	- USEPA is working with NASCAR to permanently remove alkyl-lead from racing fuels used, specifically, in the Busch, Winston Cup, and Craftsman Truck Series

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Octachlorostyrene (OCS)				
GLBTS Workgroup Activities and Reports	- 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 web - 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 web page	- 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, Illinois - Data on OCS trends in fish is assessed by the WG	- 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 Group meeting and e-mailed to the OCS workgroup - 12/00 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	
Other Related Activities		- 3/10/99 CGLI report, *OCS and Suggested Industrial Sources: A Report to the GLBTS Workgroup*, is submitted to the workgroup	- 8/25/00 A Draft PBT National Action Plan for OCS is posted on the PBT web page for public review and comment	

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Sediments				
Canadian and U.S. Activities	- 6/15/98 PCB workgroup requests that the IG develop a strategy on sediments - 6/19/98 Integration Group discusses sediments challenge - EPA provides guidance to workgroups on how to deal with sediments within chemical-specific workgroups	- 1/26/99 Overview and presentation of IJC SedPAC Activites given at Integration Group meeting - 2/99 Integration Group members develop a draft charge for a sediments subgroup - 4/28/99 Draft Sediments subgroup charge presented at Integration Group meeting	- 2/15/00 EPA and EC present a draft sediment reporting format at the Integration Group 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, EPA and EC present the draft sediment reporting format and commit to hold a sediment technology workshop	- 4/24/01 USEPA and EC host a two-day workshop on "Removing and Treating Great Lakes Contaminated Sediment," presenting sediment remediation technologies and case studies
Related Activities	- 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			

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YEAR				
1998 and earlier		**1999**	**2000**	**2001 and ongoing**
Long Range Transport				
		- 11/19/99 EC presents the status of their LRT effort at the Integration Group meeting	- 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)	- Several studies are being undertaken in the U.S. and Canada to characterize global transport processes.

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
General Activities Related to Reductions in GLBTS Substances				
U.S. EPA Regulatory Determinations	- 12/95 MACT rules for large MWC are promulgated - 9/97 MACT rules for 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	- 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 10/29/99 TRI Amendments: new PBT reporting thresholds	- 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	- PCP re-registration review proceeding as joint Canada/U.S. endeavor - 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.
U.S. EPA Activities	- 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 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	- 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 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 1 pesticides, and PCBs - 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.	- 5/23/01 U.S. signs the United Nation's global treaty on Persistent Organic Pollutants (POPs)

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	YEAR			
	1998 and earlier	1999	2000	2001 and ongoing
EC Regulatory Determinations	- Canadian Environmental Protection Act is renewed		- CWS (release limits) are developed for mercury, particulate matter, ozone, and benzene, and are being developed for dioxins/furans. - Canadian 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	- 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
EC Activities	- 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	- 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 EPA-certified wood stoves to investigate releases of dioxins/furans, PAHs, HCB, and particulate matter	

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	YEAR			
	1998 and earlier	**1999**	**2000**	**2001 and ongoing**
Other Activities	- CEC issues Continental Pollutant Pathways Initiative - 7/98 UNEP POPs Negotiations initiated - 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	- 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 - 11/8-9/00 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	- 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 continues under IADN

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Abbreviations

AHA	American Hospital Association
AOC:	Area of Concern
B(a)P:	Benzo(a)pyrene
CEPA:	Canadian Environmental Protection Act
CGLI:	Council of Great Lakes Industries
CWS:	Canada Wide Standards
DNR:	Department of Natural Resources
EC:	Environment Canada
EPA:	(U.S.) Environmental Protection Agency
GLBTS:	Great Lakes Binational Toxics Strategy
GLWQA:	Great Lakes Water Quality Agreement
HCB:	Hexachlorobenzene
Hg:	Mercury
HWC:	Hazardous Waste Combustors
IADN:	Integrated Atmospheric Deposition Network
IDEM:	Indiana Department of Environmental Management
IJC:	International Joint Commission
LaMPs:	Lakewide Management Plans
LDR:	Land Disposal Restrictions
MOU:	Memorandum of Understanding
MWC:	Municipal Waste Combustors
MWI:	Medical Waste Incinerators
NORA:	National Oil Recycler's Association
NPDES:	National Pollutant Discharge Elimination System
OCS:	Octachlorostyrene
OME:	Ontario Ministry of the Environment
P2:	Pollution Prevention
PAH:	Polycyclic Aromatic Hydrocarbon
PCBs:	Polychlorinated Biphenyls
POPs:	Persistent Organic Pollutants
RAPs:	Remedial Action Plans
RCRA:	Resource Conservation and Recovery Act
SAB:	Science Advisory Board
SOP:	Strategic Options Process
UNEP:	United Nations Environment Programme
WDNR:	Wisconsin Department of Natural Resources
WG:	Workgroup
WLSSD:	Western Lake Superior Sanitary District

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APPENDIX B: AGENDA
Workshop on Treating Great Lakes Contaminated Sediment

Workshop on Treating Great Lakes Contaminated Sediment

Tuesday, April 24 - Wednesday, April 25, 2001
Holiday Inn, North Campus, 3600 Plymouth Road, Ann Arbor, Michigan

This workshop on sediment treatment technologies is sponsored by the United States Environmental Protection Agency (USEPA)-Great Lakes National Program Office (GLNPO), Environment Canada, and the Great Lakes Commission in cooperation with the Great Lakes Binational Toxics Strategy.

DAY 1

Moderators: Griff Sherbin, Environment Canada and Marc Tuchman, GLNPO

9:00 Registration

10:00 Welcome and Introductions
Gary Gulezian, Director, Great Lakes National Program Office (invited)

10:10 Workshop Objectives and Links to the Binational Toxics Reduction Strategy
Jim Smith, Acting Regional Director, Environmental Protection Branch, Environment Canada

10:25 NGO Perspective on Treatment Technologies
Margaret Wooster, Great Lakes United

10:35 Industry Perspective on Treatment Technologies
Steve Garbaciak, BBL, Inc.

10:45 Overview of the Role of Treatment Technologies in Sediment Management
Jan Miller, U.S. Army Corps of Engineers-Great Lakes and Ohio River Division

11:15 History of Sediment Treatment and Clean-up Technologies in the Great Lakes Basin
- U.S. ARCS Program, Summary of Projects--Scott Cieniawski, GLNPO
- Canada Great Lakes Program, Summary of Projects--Roger Santiago, Environment Canada

11:45 - 1:00 LUNCH *(lunch is provided as part of the registration fee)*

1:00 Site Specific/Regional Approaches
- New York/New Jersey--Eric Stern, USEPA-Region 2
- Puget Sound--John Dohrmann, Puget Sound Water Quality Action Team

1:45 Treatment Technologies
- Cement Lock Process--Anil Goyal, Gas Technology Institute
- Glass Furnace Technology--Terry Carroll, Minergy Corporation

-Manufactured Soil--Chuck Wilde, Biogenesis
- Particle Separation--Trudy Olin-Estes, U.S. Army Corps of Engineers

3:00 Break

3:15 Treatment Technologies (continued)
- Electrochemical Geo-Oxidation-- Dr. Donald G. Hill, Weiss Associates
- TORBED/GPCR Combination--Beth Kummling, Eco Logic

4:00 Bioremediation

-Development of Bioremediation Techniques for Dredge Material from Milwaukee and Green Bay--David Bowman, U.S. Army Corps of Engineers-Detroit
-Daramend Technology;Ex-situ Application--David Raymond-Grace, Bioremediation Technologies

4:45 Question & Answer Session on Regional Approaches

5:00 PM Adjourn for Day

DAY 2

Moderators: Griff Sherbin, Environment Canada and Marc Tuchman, GLNPO

7:30 Continental Breakfast

8:30 Panel Discussion 1 - Solutions to Overcome the Barriers to Sediment Remediation
- Barriers to Sediment Remediation--Gail Krantzberg, Ontario Ministry of Environment
- Panel Members

  Emily Green, Sierra Club
  Bill Fitzpatrick, Wisconsin DNR
  Steve Garbaciak, BBL, Inc.
  Rick Nagle, USEPA-Region 5
  Mike Zarull, Environment Canada
  Tom Nelson, Oneida Nation
- Discussion and Questions (30 minutes)

10:00 BREAK

10:15 Panel Discussion 2- Solutions to Overcome Barriers to Implementation of Treatment Technologies (How do we make treatment a viable option for remediation?)

-Barriers to Use of Treatment Technologies--Dennis Timberlake, US EPA Office of Research and Development

- Panel Members
  - Terry Carroll, Minergy Corporation
  - Margaret Wooster, Great Lakes United
  - Mark Oemke, Michigan DEQ
  - Murray Brooksbank, Environment Canada
- Discussion and Questions (30 minutes)

11:45 Workshop Wrap-Up
Dave Cowgill, GLNPO

12:00 ADJOURN