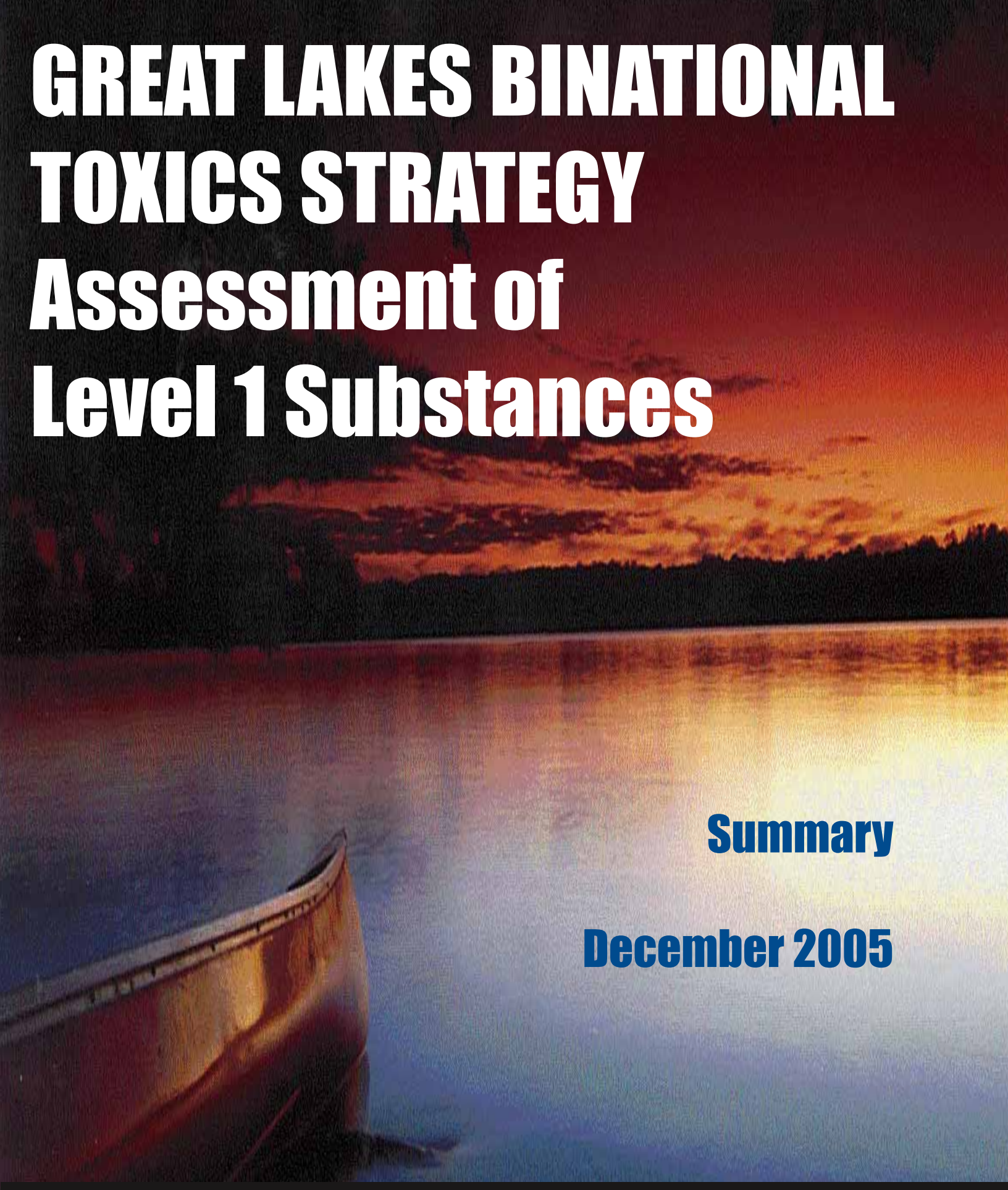
GREAT LAKES BINATIONAL TOXICS STRATEGY Assessment of Level 1 Substances



Summary

December 2005

EPA

Canada

DISCLAIMER

This report is a product of the Great Lakes Binational Toxics Strategy. Participants in the process include a diverse group from government, industry, environmental organizations, and interested citizens. The report does not necessarily reflect the views of the Environmental Protection Agency or of Environment Canada, and no official endorsement should be inferred. The mention of trade names or commercial products constitutes neither endorsement nor recommendation of use.

Great Lakes Binational Toxics Strategy Assessment of Level 1 Substances

Summary

December 2005

Table of Contents

Executive Summary

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

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

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

General Outcomes

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

Overall, the environmental analyses show many of the Level 1 substances remain in the Great Lakes environment at levels which exceed health based criteria, particularly mercury, PCBs, and the cancelled pesticides. These substances continue to impair the Great Lakes, and limit fish consumption, particularly among sensitive populations such as pregnant women and children, and among subsistence fishers.

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

Specific Recommendations

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

Substance	Recommendation	Future Opportunities
Mercury	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS Mercury Workgroup in the auto scrap, appliance, industrial equipment, and dental sectors. In addition, the GLBTS will continue to encourage and track efforts to reduce mercury releases in sectors with regulatory systems in place or under implementation (e.g., mercury cell chlor-alkali plants and coal-fired power plants).

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

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

Substance	Recommendation	Future Opportunities
PCBs	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS PCB Workgroup to continue to encourage decommissioning of in-service PCB equipment. Other significant future Workgroup opportunities include updating the current inventories, which will help in identifying additional intervention steps; mandatory dates for PCB phase out in Canada through voluntary activities (via the anticipated Canadian PCB phase out proposal scheduled for publication next year) and proposed regulatory amendments to existing Canadian PCB regulations; and incentives and recognition for PCB phase out and outreach programs.
Dioxins/ Furans	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS Dioxin Workgroup to address the use of burn barrels. Other significant future Workgroup opportunities include characterization of sources such as uncontrolled burning, and exploring pathway interventions to mitigate exposure to dioxins and furans.
HCB	Continue Active Level 1 Status	Future Workgroup opportunities include continuing to update and improve the emissions inventories, identifying long-range transport contributions of HCB to the Great Lakes, and cooperating with the Dioxin Workgroup on similar source sectors to take advantage of the HCB reduction co-benefits that may also be achieved. The Workgroup should determine the co-benefits of reducing specified chlorobenzene compounds as a result of actions that reduce HCB.
B(a)P	Continue Active Level 1 Status	Source reduction opportunities remain for the GLBTS HCB/B(a)P Workgroup in residential wood combustion and scrap tire pile mitigation. Other significant future Workgroup opportunities may be identified through continued updating and improvement of emissions inventories. The Workgroup should determine the co-benefits of reducing Level 2 PAHs[3] resulting from activities that reduce B(a)P emissions.
Alkyl Lead	Suspend GLBTS Workgroup Activities	The Parties will refer to the National Programs to continue to work with National Association of Stock Car Auto Racing (NASCAR) to reduce the use of leaded fuel in race cars, and with the Federal Aviation Administration and aviation industry to find alternatives to leaded gasoline in aviation fuel.
Pesticides (aldrin/ dieldrin, chlordane, DDT, mirex, toxaphene)	Suspend GLBTS Workgroup Activities	The Parties will refer to National, Provincial, State, Tribal and local Clean Sweep programs to continue to address the stockpile of cancelled pesticides in the Great Lakes Basin, and to various remediation programs that address pesticide contamination. The Parties will participate in international fora that address pesticide phase-outs and disposal, world-wide.
OCS	Suspend GLBTS Workgroup Activities	The Parties will continue to monitor OCS in the Great Lakes environment, and study OCS via long-range transport.
Sediments	Continue Remediation Activities	The Parties will continue to report annually on progress made in the Areas of Concern to remediate sediments contaminated with Level 1 Substances
LRT	Continue Study of Long-Range Transport of Level 1 and 2 Substances	The Parties will continue to study the long-range transport of Level 1 and 2 substances to the Great Lakes, evaluate the relative contributions from world-wide sources, and work within international fora such as UNEP to reduce releases.

Conclusions

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

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

1.0 MERCURY

Challenge Goal Status

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

On May 18, 2005, U.S. EPA published the world's first regulations limiting mercury emissions from coal fired power plants. Under the Clean Air Mercury Rule (CAMR), states are required to implement regulations that will reduce power plant mercury emissions 21 percent nationally by 2010, and 69 percent eventually. States can choose to participate in a national mercury emissions allowance trading program, or to achieve required reductions through emissions standards. Under the allowance trading program, power plants will be able to "bank" unused emissions allowances for later use, creating an incentive for reductions beyond the required 21 percent between 2010 and 2017. Use of these banked allowances after 2018, when the emissions "cap" is lowered to 15 tons (69 percent below the current level), will allow emissions to exceed the cap for some years beyond 2018. Trading of emissions allowances could cause emissions reduction amounts in some states to differ from the national average.

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

This Canada-wide Standard consists of two sets of targets:

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

In Ontario, the 2010 CWS cap (kg/yr) is 0, and in June 2005 the Ontario provincial government also released a plan to phase out all coal-fired plants in Ontario. The first of five plants was closed in April 2005. Three of the remaining four plants will close in 2007, with the remaining station, Nanticoke GS to close in early 2009. Once all plants have been closed, a 100 percent reduction of emissions from this sector will be achieved in Ontario.

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

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

The consideration of mercury in the environment is complicated by the need to sort through contributions from natural sources, those associated with legacy sources, and currently occurring anthropogenic sources. GLBTS mercury efforts have been focused on currently-occurring anthropogenic sources. The following points illustrate pieces of the mercury puzzle:

- Mercury levels continue to exceed risk-based criteria within the Great Lakes, most notably for methylmercury in fish and for sediment quality.
- Long-term trends (over 30 years) show a substantial decline (e.g., in herring gull eggs and sediments).
- Shorter term trends are less certain. In the past 10-20 years, mercury levels in fish, bald eagles, herring gull eggs, and atmospheric deposition have not declined.
- Mercury emissions decreased more than 40 percent in the U.S.
- Mercury releases in Ontario were reduced by 84 percent between 1988 and 2002.
- Mercury deposition data show no discernable decrease between 1995 and 2003.
- Mercury concentrations in biota are influenced not only by rates of mercury input into the environment, but also by factors that affect bioavailability and methylation of mercury.

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

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

Sources of Mercury

Mercury inputs to the Great Lakes environment have been reduced significantly. However, a wide variety of sources continue to impact the Great Lakes, especially atmospheric deposition. Mercury deposition results primarily from releases to the air from past and current anthropogenic sources, both in North America and globally. Mercury from natural sources, emissions from current human activities, and re-emission of historic anthropogenic mercury, each contribute to mercury levels in the Great Lakes. In Ontario, the largest air emissions sources of mercury include electric power generation, iron and steel production, municipal waste (primarily land application of biosolids), cement and lime manufacturing, and incineration. In the U.S., the largest air emissions source of mercury is now coal-fired electric power generation. The recent regulatory action in the U.S. and a proposed draft Canada-wide standard may result in substantial reductions from this sector. (The recently promulgated Clean Air Mercury Rule on coal-fired power plants in the U.S. is under legal challenge.) Other sources of mercury in the U.S. include industrial boilers, production of gold and other metals, steel production using steel scrap, hazardous waste incineration, and chlorine production at mercury cell plants. In addition, mercury levels in some areas are elevated as the legacy of past contamination of water and sediments by direct water discharges of mercury.

Management Assessment

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

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

Management Outcome

The final management outcome for mercury is continued Active Level 1 status with periodic reassessment by the GLBTS. The Mercury Workgroup will: 1) disseminate information about removal of mercury devices in auto scrap, appliances, and industrial equipment; 2) assist state, provincial, and local governments identify cost-effective reduction approaches for mercury releases from dental offices; and 3) participate in national and international mercury reduction programs.

2.0 POLYCHLORINATED BIPHENYLS (PCBs)

Challenge Goal Status

The GLBTS established quantitative challenge goals to reduce high-level PCBs in equipment in both the U.S. and Canada. In Canada, the challenge goal of a 90 percent reduction of high-level PCBs (>1 percent PCBs or 10,000 ppm, 1993 baseline) in storage has been achieved based on the information available as of December 2004. Canada is still working to meet its in-service challenge goal of a 90 percent reduction of high-level PCBs (>1 percent PCB or 10,000 ppm) by 2006. While the U.S. currently lacks sufficient data to determine the precise status of its progress toward a challenge goal of a 90 percent national reduction of high-level PCBs (>500 ppm) by 2006, substantial progress has been made on this front, as illustrated by the efforts of key stakeholder groups, including electric utilities, in voluntarily removing from service high-level PCB-containing equipment.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

PCBs are monitored in fish, herring gull eggs, bivalves, water and sediments, air, food, and human body burdens. Risk based criteria have been developed for PCB levels in fish, sediments, water, and food. Preliminary analysis of the available data suggests that environmental levels of PCBs exceed water, sediment, and fish tissue criteria in some cases. For example, the GLWQA criterion for PCBs in fish is regularly exceeded, particularly in lake trout. In addition, the issuance of fish consumption advisories for PCBs in the Great Lakes Basin (613 in 2004) indicates that PCBs continue to be present at levels of concern. PCBs are one of the most common cause of fish consumption advisories in the Great Lakes (i.e., in the Lakes proper, not including inland water bodies). Trends in PCB levels in water, sediment, air, fish, and wildlife have generally declined since the 1970s. More recent data (including some data showing PCB spikes) are less clear and need further analysis to delineate trends. For example, some decreasing trends are lake-specific or species/community-specific, making it difficult to draw basin-wide conclusions. PCB levels measured in air in rural areas near each of the Great Lakes have generally declined, but there are some localized hotspots (e.g., the Chicago plume) and some unexplained increases have been observed.

Sources of PCBs

Other potential sources of PCBs include:

- Releases (accidental releases, fires, volatilization) from equipment and other remaining in-service items containing manufactured PCBs;
- Accidental releases from storage/disposal facilities during the handling of PCB wastes;
- Emissions from combustion or incineration of materials containing PCBs;
- Inadvertent formation during certain chemical production processes;
- Reservoirs of past PCB contamination and environmental cycling (e.g., contaminated sediments, soil, and Superfund sites);
- Long-range transport from outside the Great Lakes Basin;
- Other (e.g., dispersive sources from landfills or storage sites).

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

Management Assessment

Key remaining opportunities for the GLBTS to effect further reductions in PCBs include continuing to solicit industry to decommission and dispose of PCBs in electrical equipment, tracking inventoried PCBs in priority industry sectors (high/low-level PCBs in storage and also in service), updating PCB inventory databases on a regular basis, encouraging the ongoing remediation of PCB-contaminated sediment sites, and monitoring

environmental trends in the Great Lakes Basin. In addition to voluntary efforts, there are regulatory programs in place in the U.S. to address certain sources of PCBs (e.g., contaminated sites, coplanar PCBs via dioxin control). In 2006, Canada will propose revisions to its existing PCB regulatory framework to set timelines for ending the use of PCBs in equipment and to accelerate PCB destruction. The GLBTS should develop additional information on the relative contributions of all PCB sources to the Great Lakes environment to help prioritize future PCB reduction efforts. The Workgroup should cooperate with the Dioxin Workgroup on common source concerns, such as those where the formation of both dioxins and co-planar PCBs occur. Collateral benefits should be realized for HCB and OCS as well.

Management Outcome

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

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

3.0 DIOXINS

Challenge Goal Status

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

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

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

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

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

Sources of Dioxin

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

Management Assessment

While significant reductions of dioxin releases have been achieved in both the U.S. and Canada, additional opportunities for further GLBTS action remain. However, the Workgroup's level of effort focusing on release reductions is expected to decline. The Burn Barrel Subgroup should continue its efforts to actively engage partners on the issue of household garbage burning and to educate public and local officials. U.S. EPA and the Utility Solid Waste Activities Group (USWAG) are preparing a memorandum of understanding (MOU) regarding secondary uses of treated wood. The Workgroup should monitor MOU implementation. The Workgroup should also continue working on pathway intervention and improving the emissions inventory for poorly characterized sources. The Workgroup should evaluate the need for a full Workgroup versus a core group that oversees a few subgroups (e.g., focusing on pathway intervention, source characterization, uncontrolled combustion). The Workgroup should also consider the need to engage new members, such as local government officials, and representatives from the fields of health and agriculture. The Workgroup should coordinate with other

Workgroups on common issues such as residential wood burning and coplanar PCBs. The Workgroup should continue to track dioxin levels in the environment and examine the impact of dioxin sources outside the Basin through long-range transport. Setting new quantitative challenge goals would be difficult for the remaining, largely non-point sources of dioxin. Rather than pursue a quantitative challenge goal, the Dioxin Workgroup may consider framing new qualitative challenge goals and examining possible numerical targets for specific sources.

Management Outcome

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

- Continue efforts related to household garbage burning;
- Monitor implementation of USWAG/U.S. EPA treated wood MOU;
- Explore exposure pathway intervention opportunities;
- Continue to gather information on poorly characterized sources, including reservoir sources and coplanar PCBs;
- Work toward an integrated air monitoring network within the Great Lakes Basin; and
- Examine the impact of dioxin sources outside the Basin through long-range transport.

4.0 BENZO(a)PYRENE (B(a)P)

Challenge Goal Status

Both Canada and the U.S. have made progress in achieving reductions of B(a)P. Canada has reduced releases in Ontario by approximately 45 percent, relative to a 1988 baseline, and continues to pursue the goal of a 90 percent reduction. However, it is unlikely that Canada will meet its reduction goal by 2006. Total B(a)P releases in Ontario are currently estimated at 29,000 lbs (13,200 kg) per year. The U.S. has reduced B(a)P emissions in the Great Lakes Basin by approximately 77 percent from 1996 to 2001, against a goal of unspecified reductions. Current estimated B(a)P emissions in the U.S. Great Lakes states are 43,700 lbs (19,900 kg) per year.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

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

Sources of B(a)P

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

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

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

Management Assessment

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

Management Outcome

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

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

5.0 HEXACHLOROBENZENE (HCB)

Challenge Goal Status

Both Canada and the U.S. have achieved significant reductions of HCB from sources resulting from human activity. Estimated releases of HCB in the U.S. have been reduced from approximately 8,519 lbs (3,872 kg) in 1990 to 2,911 lbs (1,323 kg) in 1999. In Ontario, releases of HCB have been estimated at 37 lbs (17 kg) in 2003, reduced by approximately 68 percent, relative to a 1988 baseline. This satisfies the U.S. commitment of unspecified reductions. Canada continues to pursue the goal of a 90 percent reduction in HCB releases; however, it is unlikely that this goal will be met by 2006.

Environmental Analysis

Geographic Distribution, Temporal Perspectives, Criteria and Risk

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

Sources of HCB

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

Management Assessment

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

Management Outcome

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

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

6.0 ALKYL-LEAD

Challenge Goal Status

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

Environmental Analysis

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

Management Assessment

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

Management Outcome

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

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

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

7.0 PESTICIDES

Challenge Goal Status

The GLBTS established challenge goals for both Canada and the U.S., which call for confirmation that there is no longer use or release of the Level 1[4] pesticides from sources that enter the Great Lakes Basin, and for international coordination in the event that long-range sources are confirmed. Both countries have prepared reports confirming that all pesticide uses for all Level 1 pesticides have been canceled, and production facilities have closed in the U.S. and Canada. Although evidence of purposeful release has not been identified, potential release from contaminated sites and remaining unused stocks is still possible. However, ongoing site remediation and waste pesticide collection programs (e.g., Pine River remediation and Clean Sweeps programs) are in place and have continued to make progress in reducing these potential release sources since the preparation of the challenge reports.

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

Environmental Assessment

Geographic Distribution, Temporal Perspectives, Criteria and Risk

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

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

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

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

Sources of Pesticides

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

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

Management Assessment

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

Management Outcome

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

8.0 OCTACHLOROSTYRENE

Challenge Goal Status

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

Environmental Assessment

Geographic Distribution, Temporal Perspectives, Criteria and Risk

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

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

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

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

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

Sources of OCS

Electrolytic production of magnesium was among the first recognized sources of OCS. At present, there is one electrolytic magnesium factory in the state of Utah and one operating in the Province of Quebec.

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

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

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

Management Assessment

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

Management Outcome

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

9.0 LONG-RANGE TRANSPORT

Challenge Goal

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

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

The Ann Arbor Statement presents the following conclusions:

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

Environmental Analysis

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

Recent studies have investigated the LRT of many PTS substances. Mercury modeling has shown that the Great Lakes Basin is not only affected by mercury emissions from North American sources but also that emissions from Asia and Europe make a significant contribution to the mercury burden over the Great Lakes. The presence of lindane in the air in the Great Lakes region and in the North American Arctic can similarly be traced to contributions from both North American and world-wide sources. The major North American source for toxaphene, a legacy chemical, may be the soils of the southeastern U.S. Although, given the prevailing westerly winds, these sources should not affect the Great Lakes, there are certain meteorological situations, lasting only a few days, where there is a direct pathway from these southeastern sources to the Great Lakes. Under these conditions toxaphene air concentrations in the Great Lakes Basin are about two to three orders of magnitude greater than those when the winds are westerly and could be a major factor in the net impact on the Great Lakes Basin.

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

Management Assessment

The Ann Arbor Statement identifies a number of actions that are considered to be the most critical scientific and research needs to understand and eventually reduce the LRT of chemicals to the Great Lakes. These actions pertain to emissions inventories, monitoring, modeling, and integration and synthesis. The GLBTS can add value

to current efforts by addressing some of these needs through support for: 1) the development of better estimates of the use and emissions of PTS substances both within the Basin and on an appropriate broader scale, 2) air monitoring efforts both in the Basin and in potential source regions upwind of the Basin, 3) improved modeling for informed decision-making, e.g., inter-comparison of models to enhance confidence in the use of such models, 4) investigation of the LRT potential of emerging chemicals, and 5) cooperation with international agencies to reduce emissions at the source.

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

Management Outcome

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

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

10.0 SEDIMENTS

Challenge Goal Status

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

Environmental Analysis

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

Management Assessment

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

Management Outcome

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

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

BACKGROUND

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

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

OBJECTIVE

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

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

1) Active Level 1 Status & Periodic Reassessment by GLBTS
2) Consider Submission to BEC[35] for New Challenge Goals
3) Engage LaMP Process
4) Suspend GLBTS Workgroup Activities. Where warranted, refer to another program and/or participate in other fora. Periodic Reassessment by GLBTS, until Parties determine substance has been virtually eliminated.

Additional outcomes that may result from the framework are:

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

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

STRUCTURE OF THE FRAMEWORK

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

The environmental analysis (depicted in green) and the GLBTS management assessment (depicted in blue) comprise the two main parts of the framework. The environmental analysis considers available Canadian and U.S. monitoring data and established human health or ecological criteria as the primary basis for

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

an objective evaluation of a substance's impact on the Basin. For substances lacking sufficient risk-based criteria or environmental monitoring data, the framework recommends the development of benchmarks or criteria and additional monitoring as a high priority. While the environmental analysis places emphasis on good monitoring data, evidence of use, release, exposure, or precautionary concerns may also be considered.

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

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

While it is recognized that the Parties have an ongoing responsibility to promote GLBTS interests in other arenas, a potential outcome of the framework is to recommend referral to another program and/or GLBTS representation in other fora. In the GLBTS framework, this option is presented when there is no evidence of Basin effects, or when the GLBTS cannot effect further significant reductions on its own, but can advocate substance reductions in other programs and in international fora.

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

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

GLBTS Level 1 Substances

All 12 Level 1 substances will be assessed.

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

Have the challenge goals for the substance been met?

ENVIRONMENTAL ANALYSIS

Do we have environmental or health data to assess the impact of the substance in the Basin?

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

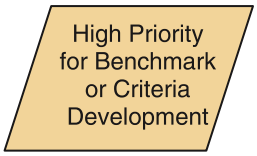
High Priority for Monitoring

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

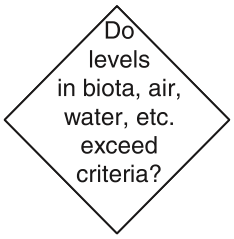
Have sufficient risk-based criteria been established (e.g., GLI or other)?

Relevant criteria include, but are not limited to:

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



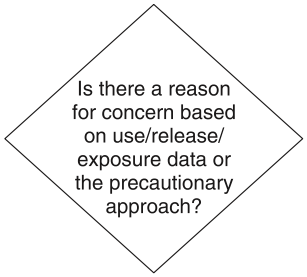
If there are no criteria against which to evaluate current levels, the GLBTS will consider whether there is a need for the Parties to recommend the development of human health or ecological criteria. This box effectively creates a GLBTS list of substances that are in need of human health or ecological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



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

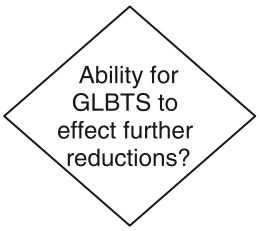
If there are no criteria, or if current levels do not exceed criteria, this box considers whether there is a decreasing trend. A decreasing trend could be defined as a statistically significant negative slope. If the trend is decreasing, the substance is evaluated for evidence of concern based on use,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

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



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

GLBTS MANAGEMENT ASSESSMENT



Answering this question involves an accelerated version of the first three steps of the GLBTS 4-step process,[36] looking at sources and current programs and regulations to see where the reduction opportunities lie. Part of the assessment will involve consideration of whether the reduction opportunities will be significant enough to merit the effort.

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

Principally lake specific?

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

Can new challenge goals be established?

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

GLBTS MANAGEMENT ASSESSMENT

Active Level 1 Status & Periodic Reassessment by GLBTS

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

Consider Submission to BEC for New Challenge Goals

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

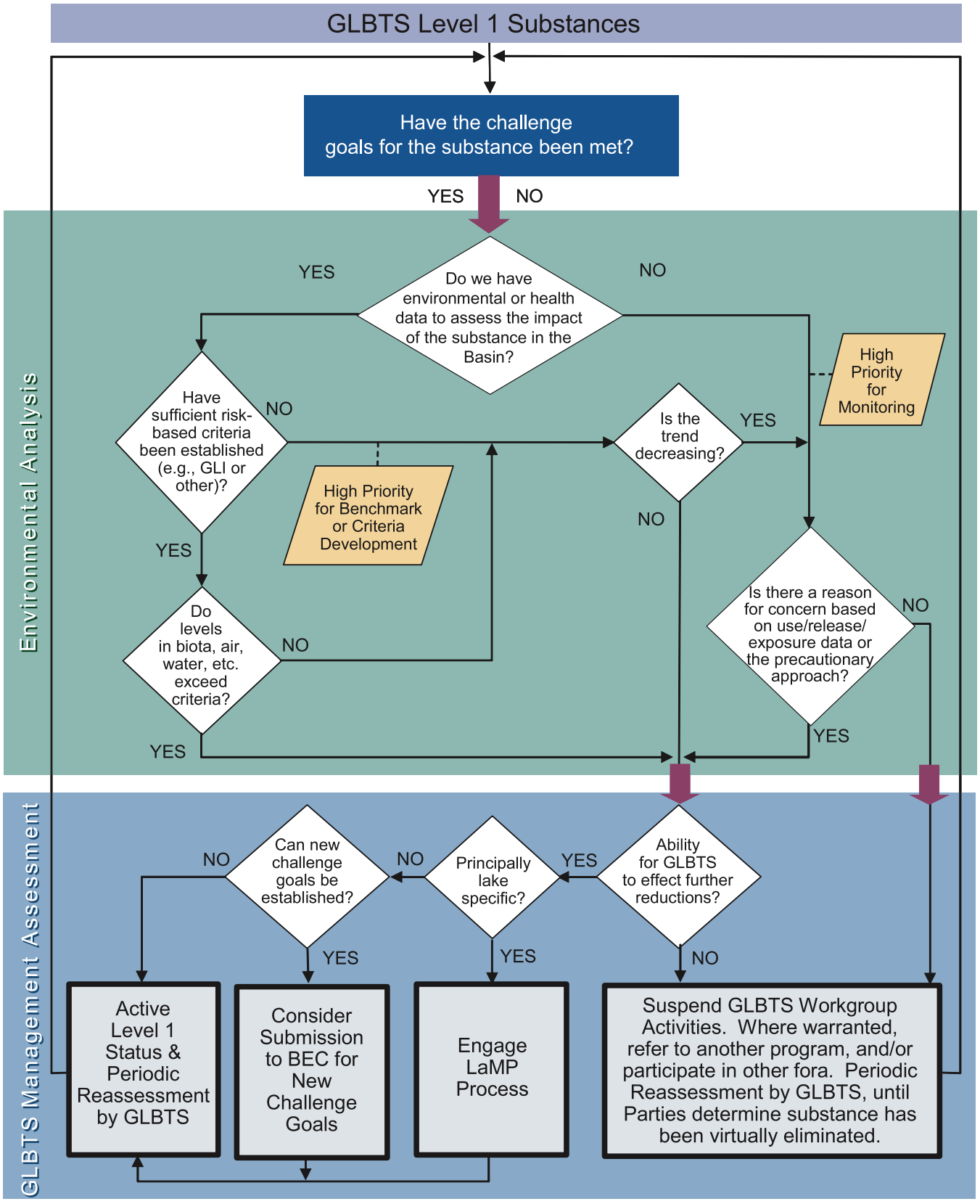
Engage LaMP Process

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

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

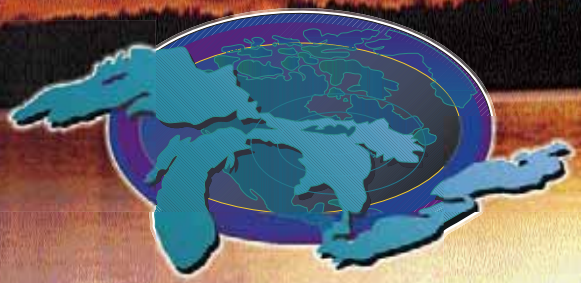
In the event that the GLBTS is not able to effect further reductions, or there is no evidence of Basin effects, GLBTS workgroup activities will be suspended. Where warranted, a recommendation will be made to a) refer reduction efforts for the substance to another program, and/or b) represent GLBTS interests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

General Framework to Assess Management of GLBTS Level 1 Substances



APPENDIX B:
Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes

GREAT LAKES BINATIONAL TOXICS STRATEGY



CANADA -- UNITED STATES STRATEGY FOR THE VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES IN THE GREAT LAKES

EPA

Canada

This page intentionally left blank

Great Lakes Binational Toxics Strategy

CANADA -- UNITED STATES STRATEGY FOR THE VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES IN THE GREAT LAKES

Lakeshore Sunset
Lake Superior Dog Harbour, Ontario
Photo by Robert F. Beltran

TABLE OF CONTENTS

Page

Waterfall in Cascade Park-Where Two Branches of the Black River Join
Elyria, Ohio
Photo by the Ohio Lake Erie Office

PURPOSE

In keeping with the objective of the Revised Great Lakes Water Quality Agreement of 1978, as amended by Protocol signed November 18, 1987 (1987 GLWQA) to restore and protect the Great Lakes, the purpose of this binational strategy (the Strategy) is to set forth a collaborative process by which Environment Canada (EC) and the United States Environmental Protection Agency (USEPA), in consultation with other federal departments and agencies, Great Lakes states, the Province of Ontario, Tribes, and First Nations, will work in cooperation with their public and private partners toward the goal of virtual elimination of persistent toxic substances resulting from human activity, particularly those which bioaccumulate, from the Great Lakes Basin, so as to protect and ensure the health and integrity of the Great Lakes ecosystem. In cases where this Strategy addresses a naturally-occurring substance, it is the anthropogenic sources of pollution that, when warranted, will be targeted for reduction through a life-cycle management approach so as to achieve naturally-occurring levels. An underlying tenet of this Strategy is that the governments cannot by their actions alone achieve the goal of virtual elimination. This Strategy challenges all sectors of society to participate and cooperate to ensure success. The goal of virtual elimination will be achieved through a variety of programs and actions, but the primary emphasis of this Strategy will be on pollution prevention. This Strategy reaffirms the two countries' commitment to the sound management of chemicals, as stated in Agenda 21: A Global Action Plan for the 21st Century and adopted at the 1992 United Nations Conference on Environment and Development. The Strategy will also be guided by the principles articulated by the International Joint Commission's (IJC) Virtual Elimination Task Force (VETF) in the Seventh Biennial Report on Great Lakes Quality. This Strategy has been developed under the auspices of the Binational Executive Committee (BEC), which is charged with coordinating the implementation of the binational aspects of the 1987 GLWQA. The BEC is co-chaired by EC and USEPA, and includes members of the Great Lakes states, the Province of Ontario, and other federal departments and agencies in Canada and the United States (U.S.).

ENVIRONMENTAL CONTEXT

The Great Lakes are an extraordinary natural endowment, holding 18 percent of the world's supply of surface fresh water. They are home to 33 million people, 47 percent of whom draw their drinking water from the Lakes. The Great Lakes are also vital to many North American fish and wildlife species. Their wealth of natural resources has long made the region a heartland of economic strength.

During the 1970s, it became apparent that pollution caused by persistent toxic substances was harming Great Lakes species and posing risks to human and wildlife consumers of fish. Accordingly, under the Great Lakes Water Quality Agreement of 1978, the U.S. and Canada pledged to seek the virtual elimination of the discharge of persistent toxic substances to the Great Lakes.

The risks to human, fish and wildlife health came to the fore again during the 1980s when public attention became focused on the Niagara River and Lake Ontario. These concerns led to the negotiation and signing, separate from the 1987 GLWQA, of the four-party Niagara River Declaration of Intent (DOI) in 1987, and the development of the Lake Ontario Toxics Management Plan, which has been incorporated into the Lake Ontario Lakewide Management Plan (LaMP) program.

The 1987 GLWQA established a process, set of commitments, and general principles for developing and implementing Remedial Action Plans (RAPs) for geographic Areas of Concern (AOCs) and LaMPs.

In 1991, in response to a recommendation from the IJC, the governments of Canada, the U.S., Michigan, Minnesota, Ontario and Wisconsin developed the Binational Program to Restore and Protect the Lake Superior Basin (Binational Program). The purpose of the Binational Program was to protect the high quality waters of the Lake Superior Basin, to restore degraded areas therein, and to achieve zero discharge of designated persistent and bioaccumulative toxic substances from point sources in the Basin.

In 1994, the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA) was established to ensure implementation of the requirements of the 1987 GLWQA. In 1995, in the U.S., the final Water Quality Guidance for the Great Lakes System (GLI) was published, establishing a process for developing consistent water quality standards across the Great Lakes system. The Strategy builds on and complements all of these efforts.

Significant successes in reducing persistent toxic substances in the Great Lakes include cleanup of contaminated sediment sites at Great Lakes harbors, reduced levels of PCBs, dioxins and DDT, and improved sport fisheries. Researchers have also observed an increase in the number of certain wildlife species (e.g., eagles and cormorants).

Even with the important accomplishments in toxics reduction achieved by the RAPs, the LaMPs, the Niagara River DOI and the Binational Program over the past decade, and the actions taken by both countries to ban, cancel, and restrict the use of a number of persistent toxic substances, these substances continue to be present in the Great Lakes ecosystem. For example, contaminated bottom sediments pollute certain harbors, impeding navigational dredging and the economic potential for use of these waters. Unacceptable levels of PCBs, methyl mercury, and toxaphene require the continued issuance of fish consumption advisories, suppressing the economic potential of the region's fisheries industries and presenting a continued human health risk. More recently, there has been growing public concern about, and active government investigation into, toxic pollutants that may produce non-cancerous health effects in wildlife and in humans, including reproductive and hormonal disruption and learning disabilities.

The continuing presence of these persistent toxic substances is the result of atmospheric deposition, release from contaminated bottom sediments, releases from various industrial processes, releases from non-point sources, and continuous cycling of naturally-occurring and anthropogenic substances within the Great Lakes themselves. In some cases, there may also be illegal or accidental discharge of stored substances for which production and use has previously been cancelled or banned. All of these factors highlight the need for more to be done.

This Strategy acknowledges and builds on the existing Canadian and U.S. regulatory programs which address the targeted substances. In Canada, these include the programs under the Canadian Environmental Protection Act, the Fisheries Act, the Canadian Environmental Assessment Act, the Pest Control Products Act, the Ontario Environmental Protection Act, the Ontario Water Resources Act, the Ontario Environmental Assessment Act, and an array of other federal and provincial acts which bear on protection of the Great Lakes Basin Ecosystem from the polluting effects of these substances. In the U.S., these include the Comprehensive Environmental Response, Compensation and Liability Act, the Resource Conservation and Recovery Act, the Clean Water Act, the Clean Air Act, the Toxic Substances Control Act, the Federal Insecticide, Fungicide, and Rodenticide Act, and other regulatory programs. Both countries acknowledge that more needs to be done.

The "unfinished business" of virtually eliminating persistent toxic substances in the Great Lakes Basin remains a significant challenge. To contribute to the resolution of this problem, more strategic and coordinated interventions are required at various geographic scales, from the local watershed/AOC to the lakewide, basin-wide, national, and international arenas. Movement of persistent toxic substances does not respect jurisdictional or geographic borders. In particular, the inter-basin transfer of persistent toxic substances from one lake to another and the short- and long-range movement and deposition of these substances from the air have compelled EC and USEPA to develop this coordinated binational Strategy. The Strategy is intended to encourage ongoing programs or emerging initiatives to better address toxic releases; to provide a context of basin-wide goals for localized actions; and to provide "out of basin" support to Great Lakes Basin programs such as LaMPs and RAPs.

Approach to Virtual Elimination

In Article II(a) of the 1987 GLWQA, the two countries agreed that "...the discharge of any and all persistent toxic substances be virtually eliminated" and agreed to develop programs and measures to implement the GLWQA, including "measures for the control of inputs of persistent toxic substances including control programs for their production, use, distribution, and disposal..." (GLWQA, Article VI (k)). To accomplish this objective, the IJC in 1990 urged the Parties to develop and implement "a comprehensive, binational program to lessen the uses of, and exposure to persistent toxic chemicals found in the Great Lakes environment." In their response to the IJC's Seventh Biennial Report on Great Lakes Water Quality, both the U.S. and Canada reaffirmed their commitment to work on such a binational Strategy, to promote implementation of commitments in the 1987 GLWQA. Since that time, both countries have undertaken their own virtual elimination efforts, Canada through its Toxic Substances Management Policy (TSMP), and the U.S. through its Virtual Elimination Pilot Project.

In February 1995, Prime Minister Chrétien and President Clinton confirmed the commitment by the U.S. and Canada to work together to develop a binational strategy to address the most persistent toxic substances in the Great Lakes environment. The two countries prepared this Strategy, building on past and ongoing virtual elimination efforts in the Basin, including the extensive work by the IJC in its framework outlined in the VETF report. The Strategy also incorporates suggestions, ideas and concepts embodied in the 6th and 7th IJC Biennial Reports.

This Strategy will follow the framework outlined in Agenda 21: A Global Action Plan for the 21st Century and

adopted at the 1992 United Nations Conference on Environment and Development. In this framework, the U.S. and Canada (and other nations) committed, where appropriate to:

> *undertake concerted activities to reduce risks for toxic chemicals, taking into account the entire life-cycle of the chemicals. These activities could encompass both regulatory and non-regulatory measures, such as promotion of the use of cleaner products and technologies; emission inventories; product labeling; use limitations; economic incentives; and the phasing out or banning of toxic chemicals that pose an unreasonable and otherwise unmanageable risk to human health and the environment, including those that are toxic, persistent and bioaccumulative and whose use cannot be adequately controlled;*
>
> *and adopt policies and regulatory and non-regulatory measures to identify, and minimize exposure to, toxic chemicals by replacing them with less toxic substitutes and ultimately phasing out the chemicals that pose unreasonable and otherwise unmanageable risk to human health and the environment and those that are toxic, persistent and bioaccumulative and whose use cannot be adequately controlled.*

This concept of Virtual Elimination, as acknowledged by the IJC and for purposes of this Strategy, also recognizes that it may not be possible to achieve total elimination of all persistent toxic substances -- some may be produced by, or as a result of natural processes and so may persist at background or "natural" levels. In addition, total or complete elimination may not be possible for technological or economic reasons. In cases where the Strategy addresses a naturally-occurring substance, it is the anthropogenic sources of pollution of that particular substance which, when warranted, will be targeted for reduction through a life-cycle management approach so as to achieve naturally-occurring levels. To accomplish the objective of restoring and maintaining the integrity of the Great Lakes, the Strategy seeks to reduce and virtually eliminate the input of persistent toxic substances to the Great Lakes[1]. Virtual elimination will be sought within the most expedient time frame through the most appropriate, common sense, practical and cost-effective blend of voluntary, regulatory or incentive-based actions. All feasible options will be considered, including pollution prevention, phase-outs and bans[2].

Actions identified in this Strategy will be complemented by other existing or proposed regulatory and non-regulatory initiatives. In addition, it is anticipated that actions and challenges identified in this document will evolve over time as information about opportunities, cost effectiveness, and benefits becomes available. Virtual elimination may not be achievable tomorrow, but the challenges and actions outlined in this Strategy represent significant milestones on the path toward this goal.

Analytical Framework

EC and the USEPA, in cooperation with their partners, will use a four-step process to work toward virtual elimination.

1. Information gathering

Identify to the extent feasible, the full range of sources, both point and non-point, within and outside the Basin which release the selected substances, by economic sector, and examine which sector(s) may be contributing to the presence of the substance in the Basin. Within each source, identify why and how the substance is used or released, e.g., used as a product or released as a byproduct. This step may include examining the entire life cycle of the substance, from initial decision to use through eventual disposal. Also, specific characteristics of a substance such as whether it is naturally occurring, or whether its release results from human use, will be considered. Information gaps and uncertainties as to sources, multi-media loadings and associated impacts of specific substances will be identified and actions recommended to address them.

2. Analyze current regulations, initiatives and programs which manage or control substances

Assess how existing laws, regulations and programs influence the presence of these substances in the Basin, and their long-range transport across states, provinces, regions and international borders. Identify the gaps in these regulations, programs and initiatives that offer opportunity for the most effective and appropriate reductions of these substances.

3. Identify cost-effective options to achieve further reductions

Identify options that may offer opportunities for new or modified measures, including emission trading

[1] Hereafter, the terms "substances" or "Strategy substances" shall mean persistent toxic substances resulting from human activity, particularly those which bioaccumulate, and which are the focus of efforts under this Strategy. For further information on the meaning of persistent toxic substances, see the Glossary and Appendix I.

[2] In the U.S., existing and currently planned regulatory actions will contribute to meeting the goal of virtual elimination; however, this Strategy is not a regulatory action, nor is it expected, in and of itself, to lead to the promulgation of any rule or regulation. To the extent that regulatory actions are taken with regard to Strategy substances, they will be governed by the statutes authorizing the actions.

schemes, pollution prevention, or other alternative approaches, which may speed up the pace or increase the level of reductions, taking into account cost effectiveness.

4. Implement actions to work toward the goal of virtual elimination

Using cost-effective measures, recommend and implement actions that work toward the goal of virtual elimination, consistent with the approach outlined in this Strategy.

With respect to some substances, EC and USEPA have already taken one or more of these steps, as discussed further in Attachment 1.

Principles

This Strategy builds on the framework adopted by Canada and the U.S. and other countries around the world in Chapter 19 of Agenda 21 on Environmentally Sound Management of Toxic Chemicals, and the principles advanced by the IJC's VETF for a virtual elimination strategy. Therefore, it is agreed that in implementing this Strategy, EC and the USEPA, in cooperation with their partners:

- recognize that the Strategy substances do not respect international boundaries; they pass between nations via the atmosphere, in shared waters, and through trade or transboundary movement of products and wastes. Therefore, the two nations cannot protect their citizens solely through bilateral actions. Canada and the U.S. will work with other nations to share scientific information and work with them toward international accords to address these substances, where appropriate. Some examples of the international efforts with which Canada and the U.S. will be coordinating include: the development of a global agreement on persistent organic pollutants (POPs), as called for in a recent meeting of the Governing Council of the United Nations Environment Programme (UNEP); the development of protocols on POPs and heavy metals under the United Nations Economic Commission for Europe (UNECE) Convention on Long Range Transboundary Air Pollution (LRTAP); cooperative actions to implement the October 1995 Resolution on the Sound Management of Chemicals developed by the Commission for Environmental Cooperation (CEC) under the North American Agreement on Environmental Cooperation (NAAEC); and other chemicals-related activities under UNEP, the Intergovernmental Forum on Chemical Safety (IFCS) and other bodies.
- reaffirm their shared responsibility to work toward the goal of virtual elimination and to recognize that the two countries' respective domestic measures to achieve that goal must respect the institutional, environmental and socio-economic context of each country. Each country has discretion to include and act in accordance with its domestic national policies in meeting the commitments of this Strategy, recognizing the need for flexibility in determining how to meet these commitments and the possibility that some actions and challenges will evolve over time as information about opportunities, and their associated costs and benefits becomes available. Canada and the U.S. are free at all times to take actions and pursue targets more stringent than those identified in this Strategy. Each country will build on the efforts of states/provinces, industries and local communities, both within and outside the Basin.
- favor "cleaner, cheaper and smarter" ways to reduce the Strategy substances, focusing on the best opportunities across a substance's life to reduce its releases. EC and USEPA believe that pursuing a long-term, phased strategy through prevention where possible and remediation when necessary, is a common sense, practical approach to achieving environmental objectives.
- are committed to an open, interactive, public participation process, which includes issuing regular progress reports to the public. While the two federal governments must lead, they alone cannot achieve the goal of virtual elimination. Other levels of government, industry and society as a whole must share the responsibility to restore and maintain the health of the Great Lakes Basin.
- will collaborate in, and support voluntary initiatives by major use and release sectors and others to reduce and eventually eliminate the use, generation or release of Strategy substances. In the case of naturally-occurring substances, collaborative efforts will consider life-cycle management approaches to achieve the desired reductions.

Scope and Effect

Recognizing that virtual elimination is a long-term objective, this Strategy provides a framework to achieve specific actions from 1997 to 2006. These actions and goals represent milestones along the path to virtual elimination. This Strategy embraces actions to reduce and virtually eliminate persistent toxic substances resulting from human activity, particularly those which bioaccumulate, that affect or have the potential to affect the Great Lakes ecosystem, taking into account all relevant factors. In cases where this Strategy addresses a naturally-occurring substance, it is the anthropogenic sources of pollution that, when warranted, will be targeted for reduction through a life-cycle management approach so as to achieve naturally-occurring levels. This Strategy reflects the firm commitment of Canada and the U.S. to better focus and coordinate existing programs toward the goal of virtual elimination of Strategy substances, without giving rise to legal obligations on the governments or on the public. Nothing in this Strategy affects the legal status of the 1987 GLWQA.

The scope of the Strategy and its associated commitments and activities will be focused primarily on the Great Lakes Basin. However, with respect to atmospheric deposition, consistent with the provisions of Annex 15 of the GLWQA, the traditional concept of the geographic area which impacts the Basin will be expanded to recognize the long-range transport of Strategy substances adversely affecting

the quality of the Great Lakes ecosystem.

To facilitate the reductions envisaged in the Strategy, EC and USEPA will work in cooperation with other responsible jurisdictions on a national and international basis, to strengthen linkages to all existing toxics reduction efforts, and to ensure that goals are harmonized and actions are coordinated to achieve environmental progress. As part of this task, EC and USEPA will work to coordinate efforts under the Strategy so that they are complementary with other international efforts cited earlier, such as efforts to develop LRTAP Convention Protocols on Persistent Organic Pollutants (POPs) and heavy metals, the CEC Resolution on the Sound Management of Chemicals, the UNEP and IFCS initiatives, and the multilateral negotiations on POPs.

This Strategy includes those actions undertaken jointly by EC, USEPA and their partners, as well as those actions undertaken individually through each nation's domestic programs and processes. Within the context of the Strategy, EC and USEPA will seek the cooperation of their partners to address Strategy substances coming from long-range transport outside the Basin that enter the Great Lakes ecosystem, while supporting and building upon the ongoing processes in the LaMPs and the RAPs to reduce "within basin" sources. It is expected that the LaMPs and RAPs will make important contributions to the goal of virtual elimination and will provide means to identify opportunities to achieve "within-basin" load reductions. The individual LaMPs will be focused on those chemicals that are of concern in that particular basin, and those which have the potential to migrate to other lakes or waterways; the LaMP reduction targets may also be more stringent than those in the Strategy. Reductions achieved through within-basin efforts will be very important to meeting the challenges, and helping to ensure the success, of this Strategy.

EC and USEPA recognize that many "critical pollutant" lists exist. For purposes of this Strategy, they have chosen to focus actions first on those substances that have been identified for priority action by multiple screening criteria and processes (see Appendix I). In essence, these are substances that are present in the water, sediment or aquatic biota of the Great Lakes system and that are exerting, singly or in synergistic or additive combination, a toxic effect on aquatic, animal, or human life.

"Level I" substances as listed in Appendix I represent the primary focus around which the governments will concentrate and lead actions and efforts. Since these Level I substances have been associated with or have the potential to cause deleterious environmental impacts because of their presence in the Basin, they represent an immediate priority and are targeted for virtual elimination through pollution prevention and other incentive-based actions that phase out their use, generation or release in a cost-effective manner within the most expedient time-frame. For anthropogenic sources of naturally-occurring substances, the Strategy will, when warranted, seek to reduce such sources so as to achieve naturally-occurring levels.

The Strategy also includes actions for a second set of substances ("Level II" substances) -- listed in Appendix I -- that have been identified by one or both countries as having the potential to significantly impact the Great Lakes ecosystem through their use and/or release. Until and unless these substances are placed on the Level I list, the governments encourage stakeholders to undertake pollution prevention activities to reduce levels in the environment of those substances nominated jointly by both countries, and to conform with the laws and policies of each country, including pollution prevention, with respect to those substances nominated by only one country.

USEPA and EC intend to consult with stakeholders on proposed changes to the lists at the biennial meeting of the State of the Lakes Ecosystem Conference (SOLEC) or another appropriate forum. Existing processes for nominating or elevating substances will be used, e.g., Bioaccumulative Chemicals of Concern (BCCs) in the U.S., TSMP, and COA in Canada, or LaMP Critical Pollutants. It is not the intent of the Strategy to initiate a new nominating process. Existing nominating and chemical screening processes already include a strong public participation component.

The two nations will share information regarding the persistence, bioaccumulation potential, and toxicity of Level II substances. In addition, EC and USEPA in cooperation with their partners will periodically examine the substances addressed by the Strategy to determine whether any Level II substances should be elevated to the Level I list, whether new substances which present threats to the Great Lakes ecosystem should be considered for inclusion on the Level I or II lists, and whether any other changes should be made. If a substance is identified as Level I the two countries will set binational virtual elimination challenges for it. Elevation to Level I or removal of a substance from Level II will be made with appropriate opportunity for public review and comment.

Challenges

EC and USEPA, working in cooperation with their partners, accept the following challenges as significant milestones on the path toward virtual elimination. These milestones will be achieved by implementing voluntary efforts to achieve reductions of particular Level I substances and through currently anticipated regulatory actions under environmental laws in both countries. In Canada, the baseline used for these milestones will be 1988, in keeping with the Accelerated Reduction and Elimination of Toxics Program (ARET) baseline and the 1987 GLWQA. For the U.S., the baseline from which

reductions will be measured is unique for each substance, and is identified in Attachment 1; the best available data will be used, which in most cases is the most recent baseline.

As new information and data on opportunities, and their associated costs and benefits become available, EC and USEPA may revise the milestones, using a public consultation process involving their partners. In some cases, the challenges may differ between EC and USEPA based on different start dates for their respective domestic toxics reduction programs, different regulatory and legislative authorities, and different chemical data bases, baselines and inventories.

EC and USEPA will work with their partners to:

U.S. Challenge: Confirm by 1998 that there is no longer use or release from sources that enter the Great Lakes Basin of five bioaccumulative pesticides (chlordane, aldrin/dieldrin, DDT, mirex, and toxaphene), and of the industrial byproduct/contaminant octachlorostyrene. If ongoing, long-range sources of these substances from outside of the U.S. are confirmed, work within international frameworks to reduce or phase out releases of these substances. **Canadian Challenge:** Report by 1997, that there is no longer use, generation or release from Ontario sources that enter the Great Lakes of five bioaccumulative pesticides (chlordane, aldrin/dieldrin, DDT, mirex, and toxaphene), and of the industrial byproduct/contaminant octachlorostyrene. If ongoing, long-range sources of these substances from outside of Canada are confirmed, work within international frameworks to reduce or phase out releases of these substances.

U.S. Challenge: Confirm by 1998, that there is no longer use of alkyl-lead in automotive gasoline. Support and encourage stakeholder efforts to reduce alkyl-lead releases from other sources. **Canadian Challenge:** Seek by 2000, a 90 percent reduction in use, generation, or release of alkyl-lead consistent with the 1994 COA.

U.S. Challenge: Seek by 2006, a 90 percent reduction nationally of high-level PCBs (>500 ppm) used in electrical equipment. Ensure that all PCBs retired from use are properly managed and disposed of to prevent accidental releases within or to the Great Lakes Basin. **Canadian Challenge:** Seek by 2000, a 90 percent reduction of high-level PCBs (>1 percent PCB) that were once, or are currently, in service and accelerate destruction of stored high-level PCB wastes which have the potential to enter the Great Lakes Basin, consistent with the 1994 COA.

U.S. Challenge: Seek by 2006, a 50 percent reduction nationally in the deliberate use of mercury and a 50 percent reduction in the release of mercury from sources resulting from human activity. The release challenge will apply to the aggregate of releases to the air nationwide and of releases to the water within the Great Lakes Basin. This target is considered as an interim reduction target and, in consultation with stakeholders, will be revised if warranted, following completion of the Mercury Study Report to Congress. **Canadian Challenge:** Seek by 2000, a 90 percent reduction in the release of mercury, or where warranted the use of mercury, from polluting sources resulting from human activity in the Great Lakes Basin. This target is considered as an interim reduction target and, in consultation with stakeholders in the Great Lakes Basin, will be revised if warranted, following completion of the 1997 COA review of mercury use, generation, and release from Ontario sources.

U.S. Challenge: Seek by 2006, a 75 percent reduction in total releases of dioxins and furans (2,3,7,8-TCDD toxicity equivalents) from sources resulting from human activity. This challenge will apply to the aggregate of releases to the air nationwide and of releases to the water within the Great Lakes Basin. Seek by 2006, reductions in releases, that are within, or have the potential to enter the Great Lakes Basin, of hexachlorobenzene (HCB) and benzo(a)pyrene [B(a)P] from sources resulting from human activity. **Canadian Challenge:** Seek by 2000, a 90 percent reduction in releases of dioxins, furans, HCB, and B(a)P, from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 COA. Actions will focus on the 2,3,7,8 substituted congeners of dioxins and furans in a manner consistent with the TSMP.

U.S. and Canadian Challenge: Promote pollution prevention and the sound management of Level II substances, to reduce levels in the environment of those substances nominated jointly by both countries, and to conform with the laws and policies of each country, including pollution prevention, with respect to those substances nominated by only one country. Increase knowledge on sources and environmental levels of these substances.

U.S. and Canadian Challenge: Assess atmospheric inputs of Strategy substances to the Great Lakes. The aim of this effort is to evaluate and report jointly on the contribution and significance of long-range transport of Strategy substances from world-wide sources. If ongoing long-range sources are confirmed, work within international frameworks to reduce releases of such substances.

U.S. and Canadian Challenge: Complete or be well advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006.

Priority Activities

To meet the above challenges, EC and USEPA will implement the four-step analytical framework outlined earlier and will regularly reassess progress being made. Through this framework, the governments will engage key partners, both inside and outside the Basin, in the process of setting more specific milestones and in developing and implementing solutions to achieve those milestones. Where possible, formal or informal agreements may be developed. EC and USEPA will publicly recognize the successful efforts undertaken by all segments of society.

In addition, EC and USEPA will enlist the support of municipalities, industries, product manufacturers and others outside the Basin to assist in meeting the challenges in the Strategy, especially for those substances which may be entering the Great Lakes via long-range transport, consistent with the approaches outlined in the Strategy.

Joint Progress Measurement and Reporting Activities

The following are examples of joint priority Canadian-U.S. activities. EC and USEPA will review these joint projects annually for additions and/or modifications.

It is recognized that, for some of the Level I and II substances, measurement of releases or ambient levels is not always feasible using routine sampling and analytical techniques. EC and USEPA are committed to adopting, where feasible or necessary, a range of indicators from process measurements (e.g., the number of formal or informal agreements entered into with business sectors to achieve specific reductions) to environmental endpoints (e.g., fish contaminant levels) in order to measure progress. Indicators will be identified to address the use, generation, and release of Strategy substances. The Strategy recognizes that the information contributed by our ongoing joint emissions inventory work will be extremely useful in addressing major sources within the jurisdictions bordering the Great Lakes.

To fulfill the implementation requirements of this Strategy and other critical bilateral Great Lakes activities, EC and USEPA will work with federal, state, and provincial departments and agencies, to review, within the context of existing resources, the state of Great Lakes related surveillance and monitoring programs in order to improve their coordination.

EC and USEPA commit jointly to report on progress (including release reductions leading to virtual elimination) under this Strategy at the biennial meeting of SOLEC or another appropriate forum. In addition, EC and USEPA will periodically convene a stakeholder forum to assess progress, identify new opportunities for reductions, and, if appropriate, evaluate the status of the Level I and II substances and refine the challenge milestones. These reporting mechanisms may be modified if necessary.

As well, in order to assess progress toward achieving the above commitments, EC and USEPA will establish a process for determining baseline release levels and loadings of Level I and II substances through a data synthesis and modelling effort, based on best available data and scientific information.

Significant Issues

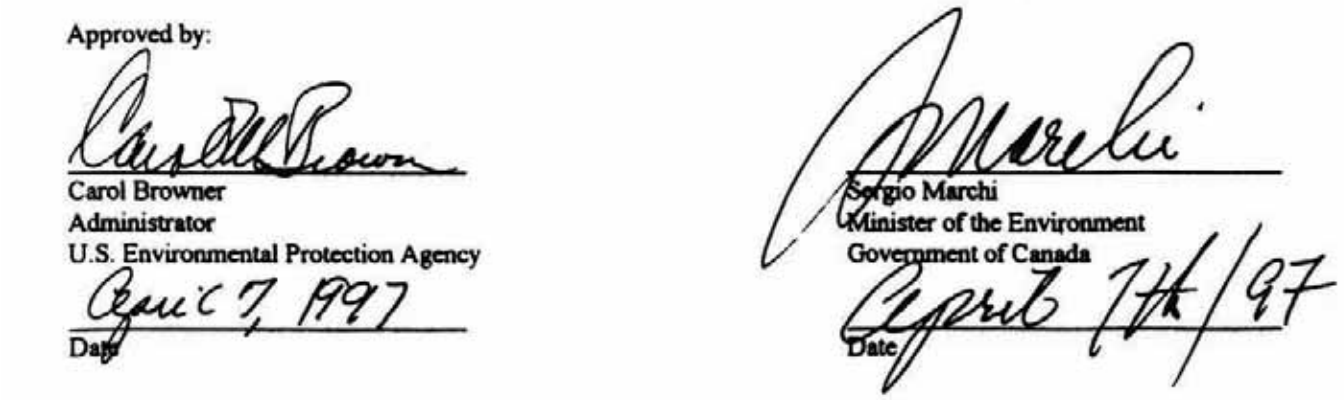
EC and USEPA will work together to address significant toxic substances-related issues which affect the whole Great Lakes Basin throughout the implementation of this Strategy. These issues will be selected in consultation with our partners. For example, these issues may include the transboundary effects of incineration, the transboundary movement of hazardous wastes and bilateral sector-specific pollution prevention initiatives.

The technical support document (Attachment 1) describes more detailed action steps to be undertaken either individually by EC and USEPA, or jointly by both, in conjunction with their partners, to meet each challenge.

Approved by:

Carol Browner
Administrator
U.S. Environmental Protection Agency
April 7, 1997

Sergio Marchi
Minister of the Environment
Government of Canada
April 7, 1997



Sergio Marchi and Carol Browner
Signing the Great Lakes Binational Toxics Strategy

Appendix I

PERSISTENT TOXIC SUBSTANCES FOCUSED ON BY THE *CANADA--UNITED STATES STRATEGY FOR THE VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES IN THE GREAT LAKES*

Level I Substances

Aldrin/dieldrin
Benzo(a)pyrene {B(a)P}
Chlordane
DDT (+DDD+DDE)
Hexachlorobenzene (HCB)
Alkyl-lead
Mercury and mercury compounds
Mirex
Octachlorostyrene
PCBs
PCDD (Dioxins) and PCDF (Furans)
Toxaphene

Level II Substances

Cadmium and cadmium compounds
1,4-dichlorobenzene
3,3'-dichlorobenzidine
Dinitropyrene
Endrin
Heptachlor (+Heptachlor epoxide)
Hexachlorobutadiene (+Hexachloro-1,3-butadiene)
Hexachlorocyclohexane
4,4'-methylenebis(2-chloroaniline)
Pentachlorobenzene
Pentachlorophenol
Tetrachlorobenzene (1,2,3,4- and 1,2,4,5-)
Tributyl tin

Plus PAHs as a group, including but not limited to:
Anthracene
Benzo(a)anthracene
Benzo(g,h,i)perylene
Perylene
Phenanthrene

How Strategy Substances were Selected

Level I Substances

Substances were selected on the basis of their previous nomination to lists relevant to the pollution of the Great Lakes Basin Ecosystem. These included:

- "Bioaccumulative chemicals of concern" (BCCs) from the "Final Water Quality Guidance for the Great Lakes System," USEPA, March 1995;
- Substances identified by the "Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA)," 1994;
- Substances identified as critical pollutants by the International Joint Commission (IJC), 1987;
- Substances designated "Lakewide Critical Pollutants" in Lakewide Management Plans (LaMPs);

As a measure of further corroboration for their environmental impact, reference was made to the persistent organic pollutants (POPs) of concern identified in the United Nations Environment Programme Governing Council Decision 18/32 of May 1995, and incorporated into the Council of the Commission for Environmental Cooperation's Sound Management of Chemicals Agreement between the U.S., Canada, and Mexico (Resolution #95-5), October 1995.

The intent of the Strategy is to identify and focus efforts on those substances which are persistent and toxic, especially, but not exclusively, those which bioaccumulate. Rather than use a new screening and assessment process, the Strategy seeks to build upon the most recent and relevant science-based selection processes used in either country. These processes considered a wide range of factors such as chemical and physical properties, potential to cause cancer, toxicity, risk to human health and wildlife, presence in the environment, as well as adverse impacts observed in the environment. Asymmetries in the approaches or information used by the two nations, or in definitions of bioaccumulation produced some differences in lists identified by each country. However, because the Strategy is a binational activity, the final list of chemicals was the result of agreement on the nominations from the two countries.

Level I Substances

aldrin/dieldrin[1,2,3,4,5]
benzo(a)pyrene[2,3,4]
chlordane[1,2,4,5]
DDT (+DDD+DDE) [1,2,3,4,5]
hexachlorobenzene[1,2,3,4,5]
Alkyl-lead[2,3,4]
mercury and compounds[1,2,3,4]
mirex[1,2,3,4,5]
octachlorostyrene[1,2,4]
PCBs[1,2,3,4,5]
PCDD (Dioxins) and PCDF (Furans)[1,2,3,4,5]
toxaphene[1,2,3,4,5]

Legend:
[1]U.S. BCC
[2]Canadian COA
[3]IJC Critical Pollutant
[4]LaMP Lakewide Critical Pollutant
[5]POPs from CEC Council Resolution #95-5

Level II Substances

Level II substances are those for which one country or the other has grounds to indicate its persistence in the environment, potential for bioaccumulation and toxicity. These grounds have not as yet been sufficiently

considered by both nations such that they can agree to set joint challenge goals for these substances at this time. Until and unless these substances are placed on the Level I list, the governments encourage stakeholders to undertake pollution prevention activities to reduce levels in the environment of those substances nominated jointly by both countries, and to conform with the laws and policies of each country with respect to those substances nominated by only one country.

Level II Substances

cadmium and cadmium compounds[2,4]
1,4-dichlorobenzene[2]
3,3'-dichlorobenzidine[2]
dinitropyrene[2]
endrin[5]
heptachlor (and heptachlor epoxide)[5]
hexachlorobutadiene and hexachloro-1,3-butadiene[1]
hexachlorocyclohexane [1,2,4,6]
4,4'-methylenebis(2-chloroaniline)[2]
pentachlorobenzene[1]
pentachlorophenol[2]
tetrachlorobenzene (1,2,3,4- and 1,2,4,5-)[1]
tributyl tin[2]
PAHs as a group, including anthracene, benzo(a)anthracene, benzo(ghi)perylene, perylene, and phenanthrene[2]

Legend:

[1]U.S. BCC
[2]Canadian COA
[3]IJC Critical Pollutant
[4]LaMP Lakewide Critical Pollutant
[5]POPs from CEC Council Resolution #95-5
[6]In Canada, all agricultural pesticides were excluded from the COA Tier II list and are dealt with separately under COA and are not Canadian nominations to this list.

Future Changes in the Chemical Listing Process

USEPA and EC intend to consult with stakeholders on proposed changes to the lists at the biennial meeting of SOLEC or another appropriate forum. Existing processes for nominating or elevating substances will be used e.g., BCCs in the U.S., TSMP, and COA in Canada, or LaMP Critical Pollutants. It is not the intent of the Strategy to initiate a new nominating process. Existing nominating and chemical screening processes already include a strong public participation component.

The two nations will share information regarding the persistence, bioaccumulation potential, and toxicity of Level II substances. If a substance meets Level I criteria, the two countries will set binational virtual elimination challenges for it. Elevation to Level I or removal of a substance from Level II will be made with appropriate opportunity for public review and comment.

Technical Support Document Attachment 1 ACTIONS UNDER THE BINATIONAL STRATEGY

For the U.S.[3], the baseline from which reductions will be measured in most cases is the most recent and appropriate inventory. In the case of mercury, for example, the most recent inventory is based on estimated emissions during the early 1990s. For Canada, the baseline is defined by a 1988 emissions inventory based on the ARET program.

Canada recognizes that the GLWQA remains in perpetuity while COA expires in 2000. At that time, Canada and Ontario will review progress and assess what further steps would be required to ensure that Canada's obligations under the GLWQA and the Strategy are being met.

The following list of activities is not meant to be exhaustive or comprehensive; rather, it is illustrative of the many activities currently taking place or expected to take place. We understand that the states, Tribes, the Province of Ontario, First Nations, and Great Lakes stakeholders are undertaking many additional actions to achieve toxic reductions. For purposes of brevity, we have listed selected actions only.

U.S. Challenge: Confirm by 1998 that there is no longer use or release from sources that enter the Great Lakes Basin of five bioaccumulative pesticides (chlordane, aldrin/dieldrin, DDT, mirex, and toxaphene), and of the industrial byproduct/contaminant octachlorostyrene. If ongoing, long-range sources of these substances from outside of the U.S. are confirmed, work within international frameworks to reduce or phase out releases of these substances.

Canadian Challenge: Report by 1997, that there is no longer use, generation or release from Ontario sources that enter the Great Lakes of five bioaccumulative pesticides (chlordane, aldrin/dieldrin, DDT, mirex, and toxaphene), and of the industrial byproduct/contaminant

[3] When developing the Strategy and the reduction targets, the U.S. started with the presumption that releases of the Level I substances could be reduced by roughly an order of magnitude (90 percent) by 2006. Early drafts of the Strategy contained this goal. However, analysis of baseline emissions inventories has shown in some cases that reductions of this level may not be practical from a technical or economic standpoint. For instance, an analysis of U.S. mercury emissions shows that even a considerable regulatory and pollution prevention effort is unlikely to result in reductions of 90 percent between 1991 and 2006. However, a reduction of roughly one-half from the emissions levels in the most recent mercury emissions inventory is believed to be feasible. Thus, the U.S. challenge in the binational Strategy sets a goal of 50 percent reduction in mercury emissions by 2006.

octachlorostyrene. If ongoing, long-range sources of these substances from outside of Canada are confirmed, work within international frameworks to reduce or phase out releases of these substances.

- EC and USEPA will continue to support Great Lakes watershed "clean sweeps," which receive unwanted and hazardous agricultural chemicals for appropriate disposal. These programs have previously received sizeable quantities of these pesticides.
- EC and USEPA will undertake actions to verify that these five pesticides are no longer used or released in the Great Lakes watershed, based on the weight of evidence from use and environmental monitoring data. EC will also undertake actions to verify no commercial production, use or importation of these five pesticides in the Great Lakes watershed, based on the weight of evidence from use and environmental monitoring data. In the U.S., it is recognized that there may be continued legal use of some of these cancelled pesticides; the goal is to encourage decreased use of these products. In addition, alternative methods of disposal are encouraged.
- EC and USEPA will verify that octachlorostyrene (OCS) is no longer deliberately released to the Great Lakes watershed; efforts to eliminate OCS formation as a byproduct will be promoted.
- If ongoing local sources of toxaphene in Lakes Superior and Michigan are confirmed, undertake appropriate actions to seek reductions. If ongoing long-range sources of toxaphene are confirmed, work within international frameworks to reduce or phase out releases of the substance.
- Assess and pursue recommendations from the joint U.S.-Canada technical workshop on toxaphene in the Great Lakes, held in Spring 1996.
- EC and USEPA will develop and implement a joint monitoring plan through the LaMP monitoring committee to track toxaphene levels in Lake Superior. Monitoring of toxaphene in Lake Michigan and the high Arctic will be integrated with Lake Superior monitoring to track reductions in this class of pollutant.

In the United States:

- USEPA will work with stakeholders to reduce reliance on high-risk pesticides and to promote wider use of biointensive Integrated Pest Management. Additionally, USEPA will work with the states to help incorporate such concepts in the development of their State Management Plans (SMPs) to protect ground water from pesticide contamination.

In Canada:

- Registration of chlordane, aldrin/dieldrin, DDT and toxaphene was voluntarily discontinued by the registrants. Mirex was never registered as a pest control product in Canada. The federal Pest Management Regulatory Agency (PMRA) is working with stakeholders on risk reduction strategies and to support the implementation and use of sustainable pest management strategies such as integrated pest management. Partners in these initiatives include provincial governments, both regulatory and extension programs, pesticide manufacturers, researchers, federal government departments, grower and trade associations, and environmental groups.

U.S. Challenge: Confirm by 1998, that there is no longer use of alkyl-lead in automotive gasoline. Support and encourage stakeholder efforts to reduce alkyl-lead releases from other sources.

Canadian Challenge: Seek by 2000, a 90 percent reduction in use, generation, or release of alkyl-lead consistent with the 1994 COA.

In the United States:

In concert with stakeholders, investigate measures to reduce alkyl-lead from other sources.

In Canada:

- Provincial monitoring programs indicate a 96 percent decline in atmospheric lead levels to date.
- It is estimated that releases of alkyl-lead (1,000 kg/yr) in Ontario are almost entirely from aviation fuel. Minor generation through industrial or mining processes utilizing lead is possible and will be investigated. Elimination of alkyl-lead in aviation fuel will be investigated in partnership with responsible sources.

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

Canadian Challenge: Seek by 2000, a 90 percent reduction of high-level PCBs (>1 percent PCBs) 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.

In the United States:

PCB production was banned in the U.S. in 1977; certain uses were banned while other existing PCBs could be used for the remainder of their useful, economic life. The most significant remaining use of high- and low-level PCBs is in electrical equipment. These PCBs may pose risk due to the potential for spills. This challenge goal is targeted at increasing the pace of removal of high-level PCBs in electrical equipment so as to minimize the risk of releases to the environment. The challenge goal takes into account the usual process of retiring or decommissioning electrical equipment.

Transformers: Reductions will be measured using as a baseline the estimated 200,000 transformers containing high-level PCBs in use in 1994. This figure includes an estimate of the transformers containing intentionally manufactured PCBs, or askarel, and an estimate of the transformers containing mineral oil dielectric fluid contaminated to concentrations greater than 500 ppm. In

striving to reduce the number of transformers containing high-level PCBs, USEPA will also strive to reduce the number of transformers containing low-level PCBs.

Capacitors: Reductions will be measured using as a baseline the estimated 1,473,000 capacitors containing high-level PCBs in use in 1994.

The U.S. has already achieved substantial reductions in the amount of PCB wastes in existence within its borders. On a national basis, the U.S. disposed of (i.e., destroyed) 3.4 billion kilograms of PCB wastes during 1990-94. In addition, a number of Great Lakes electric utilities have already removed almost 90 percent of the PCBs that they once had in service. However, there are many facilities whose electrical equipment contains PCBs. Progress toward phase down at these facilities is unknown; this goal seeks the voluntary accelerated phase down of remaining high- and low-level PCBs at these facilities. Concurrently, as described elsewhere in this Strategy, USEPA will continue ongoing cleanup activities involving sediment contaminated with PCBs.

- U.S. progress in relation to this objective will be measured based upon data submitted to EPA regarding PCB removals from service and PCB wastes destroyed.
- The U.S. aim is to promote accelerated removal of PCBs on a voluntary basis, with an emphasis on high-level PCBs (those >500ppm) in electrical equipment, while ensuring compliance with present management requirements for PCBs that may be used indefinitely. In addressing this challenge, USEPA will give priority to sources in areas with the greatest potential to affect the Basin.
- USEPA will finalize the PCB Disposal Amendments, proposed in 1994 (50 FR 62788-62877, December 6, 1994), which aim to reduce disposal costs through reduced administrative requirements for, and self implementation of, certain activities, including the decontamination (of equipment and materials) and disposal of PCBs.
- USEPA, in cooperation with Great Lakes states, may consult with potential users of PCBs such as utilities, government facilities, commercial buildings, and manufacturing facilities, including pulp and paper mills, steel mills, aluminum smelters, and transformer rebuilders, and request their accelerated removal of high-level PCBs (those >500 ppm) from use.
- USEPA will, through the issuance of grants, promote activities involving the collection of information on the use, release, disposal or environmental levels of PCBs at any concentration.
- USEPA will finalize the Reclassification of PCB and PCB Contaminated Transformer Rule, proposed in the Federal Register of November 18, 1993, which aims to reduce the regulatory and economic burdens associated with reclassifying electrical equipment by amending reclassification requirements.
- USEPA will request that efforts promoting the reduction of PCBs be included in cooperative agreements with states.

In Canada:

- Over 40 percent of Ontario's high-level PCBs have been decommissioned. Continued efforts to decommission the remaining PCBs to meet the 90 percent target will be pursued in conjunction with owners and interested stakeholders, with a goal of "one-stop decommissioning and destruction" where possible.
- The target for PCB destruction applies to the 18,614 tonnes of high-level PCB wastes now in storage; 1300 tonnes have been destroyed as of December 1995. Demonstrations of new technologies for PCB destruction are being undertaken, in partnership with PCB owners across Ontario. Consolidation of small quantities for destruction, and decontamination to reduce storage/destruction volumes, is being considered.
- New federal regulations, effective February 1997, permit Canadian PCB wastes to be exported to the U.S. for destruction under strict environmental controls. These new controls will expedite the elimination of existing Canadian PCB wastes presently in storage.
- Significant progress is being made by the federal government on the decommissioning and destruction of federally-owned PCBs in the Great Lakes watershed. Over 50 percent of federally-owned PCBs have been decommissioned and destroyed. Work continues by federal government departments on the decommissioning and destruction of their remaining inventories.

U.S. Challenge: Seek by 2006, a 50 percent reduction nationally in the deliberate use of mercury and a 50 percent reduction in the release of mercury from sources resulting from human activity. The release challenge will apply to the aggregate of releases to the air nationwide and of releases to the water within the Great Lakes Basin. This challenge is considered an interim reduction target and, in consultation with stakeholders, will be revised if warranted, following completion of the Mercury Study Report to Congress.

Canadian Challenge: Seek by 2000, a 90 percent reduction in the release of mercury, or where warranted the use of mercury, from polluting sources resulting from human activity in the Great Lakes Basin. This target is considered as an interim reduction target and, in consultation with stakeholders in the Great Lakes Basin, will be revised if warranted, following completion of the 1997 COA review of mercury use, generation, and release from Ontario sources.

Through the Lake Superior Binational Program, Canada and the U.S., along with Ontario, Michigan, Minnesota and Wisconsin, have begun implementing a zero discharge demonstration project for mercury. A use-source tree for mercury was developed, and emission estimates generated. Strategies for reducing mercury emissions to "zero" are being developed in consultation with the Lake Superior Binational Forum. The Forum has provided recommendations to the governments consisting of a timeline for achieving zero discharge of mercury.

In the United States:

The primary remaining source of mercury in the Great Lakes ecosystem is atmospheric deposition of mercury emissions, often transported over long distances. The U.S. is using the most recent mercury emissions inventory, i.e., that which was conducted during the early 1990s, to measure reductions. This inventory suggests that the U.S. currently releases about 200 tons of mercury to the atmosphere annually. Standards for municipal waste combustors (which have been finalized for major sources and which will be re-promulgated for minor sources) and medical waste incinerators (proposed) will, when implemented by 2002, provide about a 70 ton reduction in mercury emissions, or 35 percent of current total U.S. emissions. Implementation of other Maximum Available Control Technology (MACT) standards offers the probability of further mercury emission reductions, though these cannot be estimated prior to their development. Direct controls on emissions will be complemented by the promotion of innovative technologies to reduce use and increase recycling, in order to reduce the amount of mercury entering the incinerator waste stream. Increased consumption of fossil fuels may, however, increase mercury emissions in the future. The U.S. has reduced mercury use 75 percent during the past 15 years, most of which has occurred since 1988. Given a 30-year trend away from mercury use in the U.S., it is expected that companies will continue to develop and market mercury-free alternatives as was done with alkaline batteries. Chlorine production, for example, is the largest national use of mercury. However, as new chlorine production plants are built, this industry is shifting from the mercury cell process to successor technologies which avoid the use of mercury. USEPA expects to release its Mercury Report to Congress in 1998.

- With the assistance of the Great Lakes states and others, USEPA will consult with potential users and releasers to seek their commitment to release and use reduction targets. Several Great Lakes states have mercury task forces which are working with stakeholders to undertake innovative mercury pollution prevention activities.
- USEPA and their Great Lakes state partners propose to include mercury release and use reduction as a goal to be included in the Performance Partnership Process, giving each state the opportunity to fund state-specific mercury projects, reflective of priorities in each state.
- USEPA will seek the assistance and cooperation of the Great Lakes states to target one or two specific sectors to undertake a major voluntary effort to reduce emissions and releases.
- USEPA will explore innovative approaches to reduce mercury, e.g., labelling requirements, reductions in use in non-essential items, or through product substitutions.
- USEPA will help strengthen and streamline federal/state coordination of mercury reduction activities by inviting participation in national mercury initiatives, and by helping to convene periodic Great Lakes meetings or symposia on mercury reduction activities, including state mercury reduction legislative initiatives, private sector actions, and other innovative projects.
- USEPA has promulgated standards for municipal waste combustors and proposed standards for medical waste incinerators.
- USEPA is developing rules for hazardous waste incinerators and cement kilns which burn hazardous wastes. Implementation of these rules should reduce mercury emissions from these sectors.
- USEPA expects that this challenge can be met primarily through existing and proposed regulations of municipal waste combustors and medical waste incinerators, supplemented by voluntary initiatives. USEPA does not expect this challenge to require new regulatory initiatives. In addressing this challenge, USEPA will give priority to sources in areas with the greatest potential to affect the Basin.
- Implementation of Clean Air Act provisions which apply to other sectors which emit mercury may provide further reductions; it is not possible, however, to estimate resulting reductions, prior to development of these standards.
- The U.S. federal government (DOD, EPA) will study alternatives to the sale of surplus mercury from DOD stockpiles. The U.S. government holds 11.5 million pounds of mercury, which made it one of the world's principal suppliers before sales were suspended in 1994, pending review of environmental implications.
- USEPA will study alternatives to the incineration option for treatment of organomercuric hazardous wastes.

In Canada:

- It has been estimated that between 2,700 and 3,450 kg of mercury are released to the atmosphere in Ontario annually from anthropogenic sources, while up to 2,500 kg are released to the waters of the Great Lakes Basin annually. Through an analysis of mercury uses and sources, significant sources of mercury have been identified and prioritized. These sources will be encouraged to develop strategies to reduce their releases by 90 percent from a baseline year of 1988 through adoption of pollution prevention measures.
- In partnership with Pollution Probe, Canada and Ontario have identified potential industrial partners to participate in a unique three-way initiative to reduce or eliminate mercury in industrial or commercial applications. Coordination of this effort with U.S. partners is being considered, and the findings and approaches are being shared with the U.S. Virtual Elimination Pilot Project.
- Activities by companies to date have resulted in significant reductions in mercury content in batteries (60 - 90 percent), fluorescent lamps (44 percent) and switches, while further reductions are planned, such as 70 percent by fluorescent lamp manufacturers by 2000. One impact of

past mercury usage is that landfill emissions may be a source of mercury releases in the Great Lakes Basin, but the quantities released and possible control mechanisms need further consideration.

- In applying the analytical framework in addressing mercury, relevant information from research projects undertaken by Environment Canada, Natural Resources Canada, and other agencies will be considered.
- Canada will work with the U.S. and Mexico in implementing the North American Regional Action Plan for Mercury and will incorporate mercury reduction targets in its partnerships with commercial and industrial sectors in Ontario.

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

Canadian Challenge: Seek by 2000, a 90 percent reduction in releases of dioxins, furans, HCB, and B(a)P, from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 COA. Actions will focus on the 2,3,7,8 substitute congeners of dioxins and furans in a manner consistent with the TSMP.

Through the Lake Superior Binational Program, Canada and the U.S., along with Ontario, Michigan, Minnesota and Wisconsin, have begun implementing a zero discharge demonstration project for dioxins, furans, HCB and octachlorostyrene. Analysis of uses and sources for these pollutants were developed as were emission estimates. Strategies for reducing emissions to "zero" are being developed in consultation with the Lake Superior Binational Forum. The Forum has provided recommendations to the governments consisting of timelines for achieving zero discharge of critical pollutants.

In the United States:

- USEPA will use its September 1994 draft dioxin Reassessment as an interim baseline for calculating dioxin emission reductions. Once USEPA has completed and released its final dioxin Reassessment, it will use the Reassessment's emissions inventory for 1987 as the challenge baseline. In the draft Reassessment, USEPA estimated that total releases to air from all sources is 9300 grams/annually, with 5100 grams from medical waste incinerators (55 percent) and 3000 grams from municipal waste incinerators (32 percent). Over a dozen sources make up the remaining 1200 grams.
- USEPA will complete its re-evaluation of the hazards presented by dioxin, as outlined in the draft Reassessment report released during 1994 for public comment. The Agency will also complete a policy assessment of dioxin, anticipated to be finalized with the release of the Final Reassessment.
- USEPA has promulgated standards for major source municipal waste combustors, and will finalize standards for medical waste incinerators and for minor source municipal waste combustors. These combustors and incinerators are regarded as significant sources of dioxins and furans; these substances are inadvertent by-products of combustion. Implementation of these standards is anticipated to reduce releases of dioxins from these sectors by more than 75 percent by 2006.
- Sizable reductions in HCB emissions are anticipated from municipal waste combustors and from cement kilns that burn hazardous wastes. Improvement for incineration of HCB-contaminated waste is also likely. Current information does not yet provide support for a more specific reduction challenge but as soon as data are available, a target will be included.
- Since current information does not yet provide support for a more specific reduction challenge for B(a)P, the U.S. will continue efforts to identify and quantify emissions of PAHs (and B(a)P in particular). Used oil re-refining may reduce the amount of B(a)P released to the environment.

In Canada:

Significant progress has been made in meeting this challenge under the COA and related activities such as the ARET program. This trend will be further promoted in partnerships focusing on priority sources of these pollutants. Implementation of the federal government's TSMP will facilitate additional cooperative actions in these and other sectors, consistent with the mandates of the different federal departments.

- Preliminary Ontario release estimates for B(a)P, HCB, dioxins and furans suggest more than 90 percent of the releases are direct atmospheric releases. A substantial natural emission of B(a)P may also be present from forest fires, complicating analysis of environmental trends in this contaminant. This analysis has identified and prioritized sources of these pollutants for subsequent development of reduction strategies.
- Through ARET, participating companies have reported reductions in emissions of HCB of 80 percent and of dioxins and furans of 98 - 99 percent. Through pollution prevention, participating companies reported 4,300 tonnes of hydrocarbon emissions and 16,000 tonnes of other waste emissions reduced. Participation and reporting of reductions undertaken voluntarily is growing in the Canadian portion of the Great Lakes Basin, signalling a trend away from controls and treatment toward eliminating use and generation.
- Both Canada and Ontario have promulgated stringent effluent requirements for the pulp and paper sector and pulp mills have invested heavily in the past five years to achieve compliance with the regulations. Canada and Ontario will confirm in 1997 that all mills using chlorine-based bleaching are in full compliance with the "non-

measurable" effluent concentration requirements and have virtually eliminated dioxins and furans from their effluent.

- Dioxins, furans, and HCB have been assessed and declared toxic under the Canadian Environmental Protection Act. HCB and the 2,3,7,8 substituted congeners of dioxins and furans are proposed for management on a national level under Track I (virtual elimination) of the TSMP. A federal/provincial task force is being established to evaluate control options for dioxins and furans and a multistakeholder group will also be established soon to develop options for HCB. Similarly, control options for polycyclic aromatic hydrocarbons (PAHs) including B(a)P are being developed for the major source sectors such as iron and steel and wood preservation.
- Registration of HCB as a fungicidal seed treatment has been discontinued in Canada since 1976, and uses of HCB as a pesticide are considered illegal under the Pest Control Products Act.
- In lifting its ban on new municipal waste incinerators, Ontario has adopted emissions limits at least as stringent as the MACT standards adopted in the U.S.

U.S. and Canadian Challenge: Promote pollution prevention and the sound management of Level II substances, to reduce levels in the environment of those substances nominated jointly by both countries, and to conform with the laws and policies of each country, including pollution prevention, with respect to those substances nominated by only one country. Increase knowledge on sources and environmental levels of these substances.

In Canada, the federal government will manage Level II substances consistent with federal legislation, the TSMP and COA.

- EC and USEPA will investigate levels of these contaminants in the Great Lakes where appropriate and, where possible, gather additional information on resulting impacts to the ecosystem.
- EC and USEPA will also continue to inventory emissions of selected substances and model their loading to the Great Lakes.
- EC will develop information on the occurrence, fate and effects of organometal compounds (including tributyl tin).
- EC will also upgrade and improve public access to an existing import/export information database concerning imports/exports of hazardous waste.
- Implementation of the Clean Air Act in the U.S. will substantially reduce emissions of PAHs.

U.S. and Canadian Challenge: Assess atmospheric inputs of Strategy substances to the Great Lakes. The aim of this effort is to evaluate and report jointly on the contribution and significance of long-range transport of Strategy substances from world-wide sources. If ongoing long-range sources are confirmed, work within international frameworks to reduce releases of such substances.

- EC and USEPA will, as a priority, coordinate efforts to identify sources of atmospheric pollutants in order to better define and coordinate emission control programs.
- EC and USEPA will maintain atmospheric deposition monitoring stations to detect deposition and transport of Strategy substances.
- EC and USEPA will continue research on the atmospheric science of toxic pollutants to refine and improve existing source, receptor and deposition models, fundamental to impact assessment. They will also improve integration of existing air toxic monitoring networks and data management systems to track deposition of contaminants within the Great Lakes.
- EC and USEPA will conduct an assessment of the long-range transport of persistent toxic substances from world-wide sources.
- By 1999, Canada will complete inventories of 10 selected air pollution sources to support assessment of the environmental impacts of air toxics. In addition, by 2001, EC will demonstrate alternative processes to lessen emissions from 5 predominant sources.

U.S. and Canadian Challenge: Complete or be well advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006.

In the United States:

- The Assessment and Remediation of Contaminated Sediments (ARCS) Program, a five-year study/demonstration project relating to the assessment and treatment of toxic pollutants from bottom sediments, has been undertaken.
- Continue ongoing contaminated sediment cleanup activities in the following AOCs as well as other priority areas: Ashtabula Harbor, Ohio; Erie Canal at Lockport, New York, Fox River, Wisconsin; Grand Calumet River, Indiana; Kalamazoo River, Michigan; Manistique River, Michigan; Niagara River, New York; Ottawa River, Ohio; River Raisin, Michigan; Rouge River, Michigan; Sheboygan River, Wisconsin; and St. Lawrence River, New York.
- Continue to assess and develop remediation plans for AOCs, and other contaminated sites.

In Canada:

- Document the evaluation and assessment of 250 innovative technologies developed under the auspices of the Great Lakes 2000 Cleanup Fund for the safe handling and treatment of contaminated sediments.
- Promote, on a pilot basis, the application and use of a computerized, searchable and user-friendly Sediment Technology Directory (SEDTEC) of 250 technologies for the handling and treatment of sediments, soils, and sludges.

- Describe effects and appropriate remediation measures, working to ensure cleanup of priority contaminated sediments such as in Thunder Bay, Sault Ste. Marie, Hamilton Harbour, and Port Hope.
- Develop long-term approaches to remediate intermediate contamination such as in Jackfish Bay, Metro Toronto, and Cornwall.

EC and USEPA will encourage and support voluntary programs by industries to reduce the generation, use, or release of targeted contaminants.

- Continue or establish partnerships with key Great Lakes industries (e.g., automotive, printing) to foster "cleaner, cheaper, smarter" ways of preventing or reducing pollution. Examples include Project XL and ISO 14000.
- Pollution prevention programs will be promoted and encouraged at targeted industrial facilities discharging to the Great Lakes using a variety of ongoing efforts, including within Canada, the Pollution Prevention Pledge Program for Ontario and ARET. Within the U.S., the Common Sense Initiative and other programs will support this action.

GLOSSARY

The following definitions are for purposes of this Strategy only.

Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA): Canada and Ontario have entered into an agreement in 1994 to renew and strengthen federal-provincial planning, cooperation and coordination in implementing actions to restore and protect the ecosystem, to prevent and control pollution into the ecosystem, and to conserve species, populations and habitats in the Great Lakes Basin Ecosystem. Implementation of this agreement contributes substantially to meeting Canada's obligations under the 1987 GLWQA.

Great Lakes Basin: The Great Lakes Basin means all of the streams, rivers, lakes and other bodies of water that are within the drainage basin of the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the U.S., as defined by the 1987 GLWQA.

Great Lakes Water Quality Agreement of 1978, as amended by Protocol signed November 18, 1987: An agreement between the U.S. and Canada to restore and maintain the chemical, physical, and biological integrity of the water of the Great Lakes Basin Ecosystem.

Life cycle: Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal.

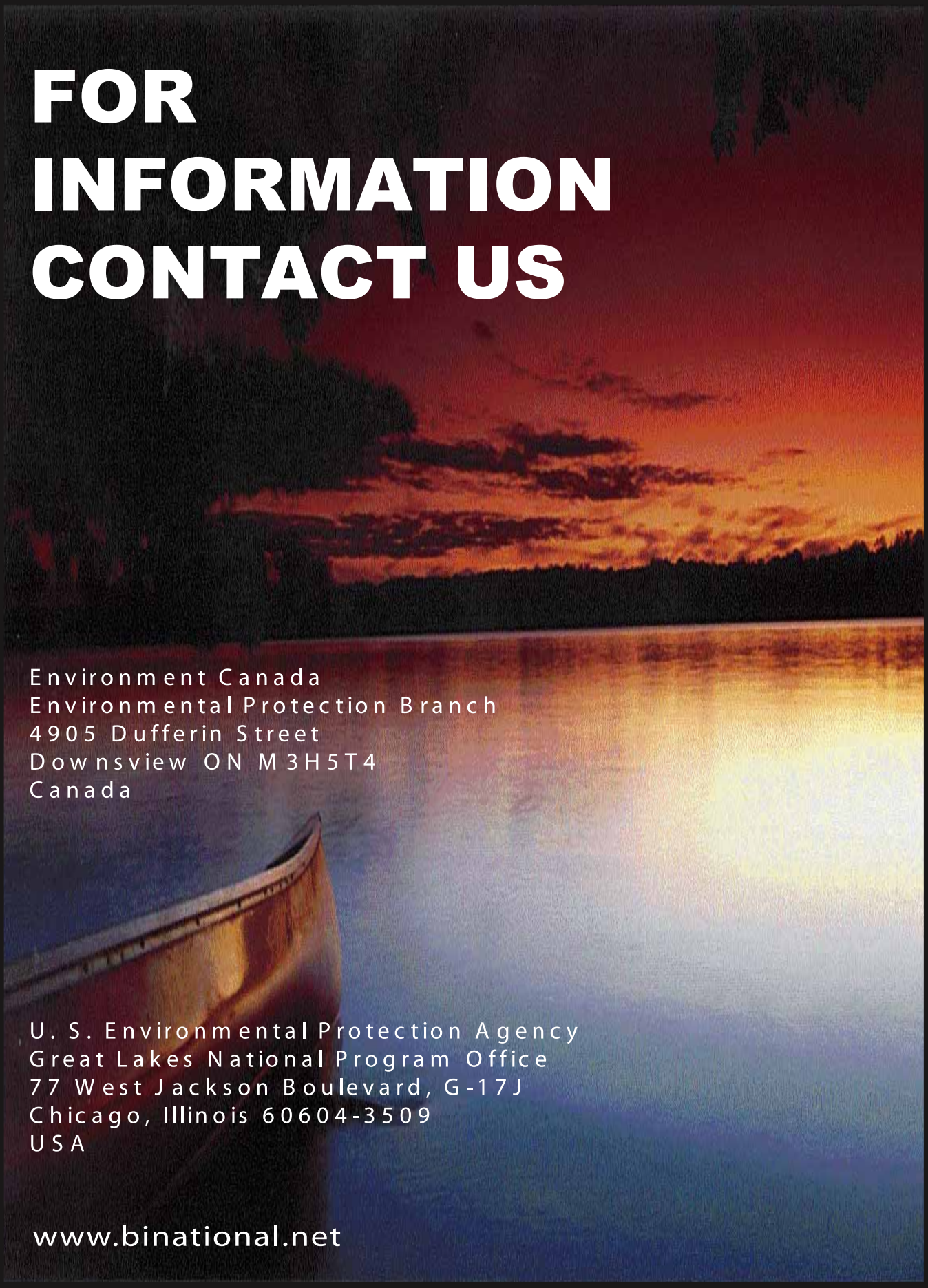
Persistent Toxic Substances: Those substances which have a long half-life in the environment. Substances identified in the Strategy have been nominated from multiple selection processes. It is recognized that there are different definitions of persistence which are used in the various U.S. and Canadian domestic programs.

Release: A release is any introduction of a toxic chemical to the environment as a result of human activity. This includes emissions to the air; discharges from point and non-point sources to bodies of water; introductions to land, including spills or leaks from waste piles, contained disposal into underground injection wells, or other sources.

Resulting from human activity: Any and all sources resulting from human activity, including but not limited to releases from industrial or energy-producing processes, landfilling or other actions.

Toxic Substance: "Any substance which can cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or which can become poisonous after concentration in the food chain or in combination with other substances." Source: 1987 GLWQA

This page intentionally left blank



FOR INFORMATION CONTACT US

Environment Canada
Environmental Protection Branch
4905 Dufferin Street
Downsview ON M3H5T4
Canada

U. S. Environmental Protection Agency
Great Lakes National Program Office
77 West Jackson Boulevard, G-17J
Chicago, Illinois 60604-3509
USA

www.binational.net