Minister of Foreign Affairs

Ministre des Affaires étrangères

Ottawa, Canada K1A 0G2

Mr. Murray Clamen
Secretary, Canadian Section
International Joint Commission
100 Metcalfe Street
Ottawa, Ontario
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Dear Mr. Clamen:

I am pleased to convey to you Canada's Response to the Recommendations in the Ninth Biennial Report on Great Lakes Water Quality of the International Joint Commission.

The report was prepared by Environment Canada in conjunction with various federal and provincial ministries which contribute to the Canadian Great Lakes Program. The response has also benefited from consultations with the United States on those recommendations which call for some form of binational initiative.

I wish you success at the upcoming Biennial Forum on Great Lakes Water Quality in Milwaukee, Wisconsin. The Canadian Government looks forward to continuing to work closely with the Commission, both at the Biennial Forum and through ongoing communications and exchanges.

Sincerely,

Lloyd Axworthy

Enclosure

CANADA'S RESPONSE

TO THE

RECOMMENDATIONS IN THE

NINTH BIENNIAL REPORT ON GREAT LAKES WATER QUALITY

OF THE

INTERNATIONAL JOINT COMMISSION

SEPTEMBER 1999

INTRODUCTION

Canada welcomes the recommendations contained in the *Ninth Biennial Report* and acknowledges the important role that the International Joint Commission (IJC) continues to play in helping to shape Great Lakes activities. Canada shares the Commission's sentiment that there are positive signs the Great Lakes are returning to better health since the Agreement was initially signed in 1972.

The responses to the recommendations of the International Joint Commission's *Ninth Biennial Report* reflect the input of a number of federal and provincial agencies which contribute to the overall Canadian program on the Great Lakes. Governments, however, cannot clean up the Great Lakes on their own. The achievements of the program would not be possible without the contributions of our partners - municipalities, industry, conservation authorities, environmental and conservation interest groups, First Nations, and private citizens - who all help to deliver environmental results.

Government of Canada action to clean-up and protect the Great Lakes ecosystem and fulfill Canada's international obligations under the *Great Lakes Water Quality Agreement* (GLWQA) was formalized in 1989 with the launch of the Great Lakes Action Plan. The program was renewed in 1994 as the Great Lakes 2000 initiative, a six year partnership among seven federal departments.

The *Canada-Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem* was also renewed in 1994, and commits the federal and provincial governments to work jointly to achieve specified measurable results that contribute to the restoration of degraded areas, the prevention of pollution and the conservation of human and ecosystem health. Together, the Great Lakes 2000 initiative and the Canada-Ontario Agreement make up the Canadian Great Lakes Program.

The significant progress achieved by the Canadian Great Lakes Program since 1994 is reported biennially through the COA Progress Report.

As we look forward to the next millennium, we recognize that much has been accomplished in relation to meeting the intent and objectives of the GLWQA, and much more remains to be done. Both Canada and Ontario are committed to continuing efforts to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem, thereby ensuring an healthy and sustainable future. The Governments also support a balanced effort between reducing the chemical risk to human health and maintaining the overall health of the ecosystem, particularly the protection of physical habitat, biological diversity and the integrity of biological systems.

RESPONSE TO RECOMMENDATIONS

Contaminated Sediment

Canada and Ontario are strongly committed to contaminated sediment remediation and management. The *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* (COA), signed in 1994, commits Canada and Ontario to:

- describe effects, demonstrate and implement the clean up of severely contaminated sediments, with emphasis on contamination at priority sites in Remedial Action Plan (RAP) Areas of Concern, and
- develop long term strategies for remediation of areas of intermediate contamination at ten locations in the Great Lakes Basin ecosystem by the year 2000.

Progress against these targets is outlined in the "Third Report of Progress Under the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem 1997-1999". Environment Canada, in co-operation with other agencies, has completed its demonstration phase of sediment remediation technologies that are now being promoted and used for full-scale implementation.

1. Governments provide detailed work plans, schedules and benchmarks to complete sediment remediation projects in the eight Areas of Concern for which remediation decisions have been made but action is pending.

Of the eight Areas of Concern (AOCs) identified by the IJC for which remediation decisions have been made but action is pending, two are in Canadian waters - Thunder Bay and Hamilton Harbour.

Canada is pleased to report that substantial progress has been achieved and actions are underway in both AOCs.

Thunder Bay

In 1997, a five-party Agreement was signed providing funding for a remediation project in Thunder Bay Harbour around the Northern Wood Preservers site. Abitibi-Consolidated Inc. (Abitibi), Canadian National Railway Company (CNR), Northern Wood Preservers Inc. (NWP), Environment Canada and the Ontario Ministry of Environment (MOE) committed $9.3 Million (Cdn.) in funding for the cleanup and recognized Abitibi as lead for project management. Construction of a rockfill berm enclosing the project area and removal (dredging) of the most highly contaminated sediment have been completed and treatment of the contaminated sediment on-site is currently underway. Construction of a clay isolation barrier and wastewater collection system surrounding NWP operations is scheduled to be completed by the summer of

2000. Habitat enhancements at the site commenced in the fall of 1998 and are continuing. Procedures are in place to oversee and monitor progress against planned project targets and schedules, including the implementation of environmental monitoring activities.

Hamilton Harbour

The Randle Reef sediment remediation project in Hamilton Harbour is in the final planning stages. The project involves three components: 1) the removal of approximately 20,000 m^3 of sediments contaminated with high concentrations of polynuclear aromatic hydrocarbons (PAHs exceed 800 ppm); 2) dewatering and conditioning (bio-remediation) of sediments on Hamilton Harbour Commission property; and 3) re-use of the conditioned sediments by Stelco. Total project cost is estimated to be about $7.3 million (Cdn) which includes significant in-kind contributions from Stelco, Hamilton Harbour Commission and the Regional Municipality of Hamilton-Wentworth. Full funding for the project has been secured and an Environmental Assessment Screening Report is being updated. Negotiations are continuing with Stelco and MOE for the development of a multi-stakeholder agreement that would include respective contributions and responsibilities of the stakeholders. It is expected that project implementation will commence in the Spring 2000.

2. Governments make sediment remediation and management decisions for the 31 Areas of concern that remain under assessment, and provide detailed work plans, schedules and benchmarks to initiate and complete sediment remediation.

For the remaining Canadian AOCs which the IJC categorizes as still being under assessment and for which the IJC recommends that sediment remediation and management decisions be made by governments, substantial progress has also been achieved.

Long term strategies have been developed and source controls have been implemented for: Nipigon Bay, Spanish Harbour, Severn Sound, Collingwood Harbour, Wheatley Harbour and Bay of Quinte. In addition full-scale cleanups have been completed at Collingwood Harbour, Severn Sound (Penetanguishene), and Niagara River - Canadian side (Welland River - Atlas Steel site). Through the RAP process it has also been agreed that no further action will be required to restore sediment quality in these AOCs. Monitoring will continue to track recovery and the full achievement of RAP restoration targets.

The current status of sediment remediation and management for the remaining Canadian AOCs is as follows:

Peninsula Harbour, St. Marys River, and St. Lawrence River (Canadian side) - further study and investigation of options is being carried out;

Jackfish Bay - source control has been adopted as the preferred remedial strategy;

St Clair River - physical, chemical and biological assessments have been completed and a risk assessment analysis is currently underway to confirm remedial strategies;

Detroit River - within the context of a new implementation framework, a reassessment of contaminated sediment is currently underway on the Canadian side of the Detroit River, with a view towards a joint binational modeling effort with the United States;

Toronto and Region - the results of a comprehensive sediment survey indicate general improvement in sediment quality and no further active intervention is planned;

Port Hope - the Port Hope RAP for the harbour is tied to the larger project on the siting of a hazardous waste facility for low level radioactive wastes. Once the siting decision is made, options for the disposal of contaminated sediments will be addressed.

The MOE and Environment Canada have also been developing a state-of-the-art, science-based framework for making decisions regarding the severity of sediment contamination, and on the need for active intervention. Expert review and support for a Canada/Ontario approach was received in July 1998 at a workshop organized by the Ministry, and verified at a joint IJC/Parties' sponsored workshop in December 1998. In support of the IJC's Sediment Priority Action Committee, in September 1999 we will jointly publish data-interpretation techniques to facilitate decision making with our U.S. colleagues. These new data interpretation techniques and the decision-making framework will enable us to reach decisions at site specific locations where previously it has been difficult to agree on the environmental consequences of contaminants in sediment.

Air Pollution

3. **Governments accelerate development of integrated, binational programs, including common benchmarks and schedules, to reduce and eliminate sources of specific toxic and persistent toxic substances to the atmosphere, including sources outside the Great Lakes basin.**

Under the Great Lakes Binational Toxics Strategy (BTS), Environment Canada and the United States Environmental Protection Agency have committed to a cooperative approach to the reduction and elimination of toxic and persistent toxic substances in the basin.

Environment Canada's commitments to the BTS are consistent with commitments made under the COA, specifically to seek a 90% reduction in the use, generation or release of

seven Level I substances (benzo(a)pyrene, alkyl-lead, mercury, octachlorostyrene, dioxins, furans and hexachlorobenzene) by the year 2000. Canada will promote pollution prevention and the sound management of Level II substances in order to reduce their impact to the environment, and will increase knowledge on sources and environmental levels of these substances. Some of the fourteen Level II substances include, Cadmium, 1,4-dichlorobenzene, Pentachlorophenol, Tributyl tin, and PAH's as a group.

Environment Canada will work within the Strategic Options process under the Canadian Environmental Protection Act (CEPA) and the Canada-Wide Standards development process for these substances to develop standards and programs that will contribute to the achievement of the COA and BTS commitments.

Environment Canada is also negotiating international protocols under the United Nations Economic Commission for Europe (UN ECE), United Nations Environment Programme (UNEP), and the North American Agreement on Environmental Cooperation (NAAEC), on obligations to manage persistent organic pollutants (POPs) and heavy metals. Many substances and commitments in these protocols are expected to support existing Great Lakes and federal initiatives on toxics management.

In July 1998, the MOE announced the Ontario Smog Patrol under which warnings are being issued to drivers of cars, trucks and buses emitting visible smoke. In 1999, Drive Clean facilities were in place, where cars are required to pass a clean air test. The Drive Clean Program will reduce smog causing emissions from vehicles by 62,000 tonnes.

Ontario's sulphur dioxide emissions have been reduced by 70% from 1980 levels. During "bad air days", 50 per cent of the ground level ozone comes from the U.S. MOE's Minister has met with and written to government officials in eleven U.S. states to pursue cooperative action in cleaning up our common airshed.

4. **Governments develop and communicate to the public, by December 31, 2000, a comprehensive strategy for altering established energy production and use patterns to achieve reductions in mercury and nitrogen oxide (NOx) emissions.**

Environment Canada is participating jointly with other federal departments and provincial governments in the development of Canada-Wide standards for mercury and ground-level ozone, the implementation of which will contribute to the reduction of emissions of mercury and nitrogen oxide (NOx). The Power Generation Strategic Options process under CEPA is also expected to contribute to reductions of these substances.

Ontario is currently in the process of restructuring their power generation sector, and expects to have developed and in place by December 31, 1999 a new legislative/regulatory framework to address, control and reduce the emissions of NOx and other pollutants from the restructured sector. Options under consideration for the

framework include regulating emission caps, emission allowance trading, emission performance standards and promotion of renewable fuels. The expectation is that the legislative framework will drive the sector to the cleaner generation of energy.

In January 1998, Ontario's Smog Plan was released. Forty four signatories from government, industry and other sectors have committed to reduce smog-causing NOx and volatile organic compound emissions by 45 per cent.

Agricultural Practices

5. **Governments adopt the following agricultural and land-use goals and targets:**

   - **to place at least 55 per cent of the Great Lakes basin row-crop acreage into conservation tillage by 2002;**
   - **to increase buffer-strip mileage in the Great Lakes basin by at least 30 per cent by 2002; and**
   - **to reduce herbicide loads to the Great Lakes by at least 30 per cent by 2005.**

By working with the agricultural industry through a number of cooperative partnerships among government agencies, researchers, agricultural chemical companies and the farming community, Ontario continues to position itself as a leader in having a healthy and environmentally sound agriculture and food production system.

Through the adoption of best management practices, environmental impacts by agriculture are being minimized. Examples of these best practices can be found in initiatives such as the delivery of the Ontario Environmental Farm Plan, Growers Pesticide Education Courses/Certification, Best Management Practices series books and a Nutrient Management Planning Strategy.

Conservation Tillage

The Ontario Environmental Farm Plan, a provincial education and awareness building program, driven by the Ontario Farm Environmental Coalition, promotes voluntary assessments by farmers of the environmental risks on their farms. The area of soil management (conservation tillage practices) is where most farmers have invested most of their money toward environmental improvements. The agricultural census data for 1991 and 1996 provides the amount of farmland acres in types of tillage by county, township, and aggregated as Southern, Western, Central and Eastern Ontario. The following table shows the changes in tillage practices for southwestern Ontario for these two census periods.

Census Year	% Conventional Tillage	% Conservation Tillage	% No-Till
1991	78	18	4
1996	57	22	21

No-till was virtually unseen in the Great Lakes Basin in 1986. Between 1991 and 1996, conventional tillage decreased by 21% in the Lake Erie Basin. During this same period, conservation tillage rose by 4% and no-till increased dramatically by 17%. Conservation tillage and no-till combined increased from 22% in 1991 to 43% in 1996. These trends are a positive sign that more Ontario farmers are adopting more sustainable tillage practices that will help to reduce sediment and nutrient loads to the Great Lakes.

Canada's Great Lakes 2000 Cleanup Fund supports the demonstration of conservation tillage practices and landowner stewardship initiatives including rural non-point source control in Areas of Concern. Projects to develop and implement remedial strategies aimed at delisting beneficial use impairments are carried out in co-operation with local agencies such as Conservation Authorities. In the Bay of Quinte AOC for example, 16,962 ha of farmland have been converted to conservation tillage or no-till practices.

Agricultural Buffers

Buffers are being put in place through various efforts such as Canada's Great Lakes 2000 Cleanup Fund and the Environmental Farm Plan. Through delivery of stewardship projects with landowners and participation in the development of Environmental Farm Plans, producers are encouraged to have buffers in place as an effective way of dealing with farm nutrients, pesticides and other practices that may affect adjacent water quality.

The Cleanup Fund has participated in initiatives that have rehabilitated 530 km of streambank throughout AOCs. Rehabilitation of another 225 km is in progress.

Best Management Practices (BMP) books have been developed that offer practical, affordable approaches to conserving farm soil and water resources on the farm. The books serve as educational materials, and with associated extension materials, complement delivery of the Environmental Farm Plan. These books provide farmers with extension advice regarding best management practices including buffers. Many BMP books have received the American Society of Agricultural Engineers Blue Ribbon Award for excellence. There are approximately 60,000 of these BMP book titles in circulation to farmers and rural landowners. Sixty-six percent (66%) of farmers surveyed who had read BMP publications reported adopting some BMP on their farm.

The highly successful National Soil and Water Conservation Program, Permanent Cover I and II, which ran from the fall of 1990 until 1992 and the fall of 1992 to November 1993,

encouraged farmers, through bidding, to establish their own level of compensation for the permanent retirement, protection and maintenance of fragile agricultural land. The focus of this initiative was to concentrate crop production efforts on areas having a higher potential for economic yield at a lower environmental cost. The following are the results of this two-year program.

	Permanent Cover I	Permanent Cover II	Totals
Projects (Number)	1201	616	1,817
Area (ac.)	5000	2397	7,397(3,000 ha.)
Buffer strips (miles)	670	214	884 (1,100 km.)

Conservation authorities which manage water quality and quantity on a watershed basin basis have also been actively promoting the adoption of stream bank buffer strips through "Total Water Quality Initiatives". The "Rural Water Quality Program" which involves the Grand River Conservation Authority (GRCA), the Regional Municipality of Waterloo and partners such as farm organizations and the Ontario Ministry of Agriculture, Food and Rural Affairs (OMFRA), works with agricultural communities to share the cost to protect and improve water quality at source.

Under the Rural Water Quality Program, buffers are eligible funding items with assistance covering a performance incentive for up to three years after establishment. The South Nation Conservation Authority in eastern Ontario offers similar assistance to establish buffers through its Clean Water Program.

Pesticide Usage

Ontario farmers represent only 20% of all pesticide sources that are applied in the Great Lakes Basin. The benefits of pesticides to agricultural producers include the ability to competitively produce safe, quality, abundant and low cost supplies of fresh fruits and vegetables. The substitutions of older products with "newer herbicide" families that are low volume pesticides are a significant factor in the continued reduction in use of certain types of pesticides throughout Ontario.

To help ensure pesticides are applied responsibly, Ontario producers are now certified for the safe use and handling of pesticides every five years by attending pesticide safety courses and passing an exam. This is a requirement for purchasing and using pesticides on Ontario farms. The results of the Survey of Pesticide Usage in Agriculture has shown that pesticide use has been reduced in Ontario between 1983 and 1993 by 28%. This is represented by a reduction of active ingredient from 8,127 tonnes in 1983 to 5,812 tonnes in 1993. This survey is being updated in 1999. Atrazine use in field corn declined 41% between 1988 and 1993.

Initiatives such as mandatory attendance at Pesticide Education and Certification courses, Integrated Pest Management, Environmental Farm Plans, and Best Management Practices publications, along with advisory and extension activities, have provided farmers with readily available information on best management practices technologies and awareness of proper handling, storage and application techniques of pesticides.

Areas of Concern

6. **Governments implement the eight recommendations presented in the Commission's report, Beacons of Light, that deal with human health, public-private partnerships, funding and staffing, public participation, information transfer, quantification of environmental benefits and public advisory council funding.**

COA partners are currently involved in a review of the LaMP and RAP programs in the Great Lakes basin, in order to streamline the process and optimize the resources available. This review involves a stock-taking by the partners for various elements of the program including monitoring and surveillance, human health, resourcing, implementation frameworks and public participation. The *Beacons of Light* recommendations that are appropriate will be incorporated into the RAP process through the outcomes of this review exercise.

7. **Governments review the current environmental status and programs in place to address environmental issues in the Lake St. Clair and the St. Joseph River areas, and report this information to the Commission, so that the Commission may direct the Great Lakes Water Quality Board to advise on their possible designation as Areas of Concern under the Agreement.**

Canada does not believe that the designation of Lake St. Clair as an AOC is warranted at this time. Canada has reviewed the report and recommendations made by the Macomb County Blue Ribbon Commission on Lake St. Clair and is currently reviewing its own environmental data and programs. Following this review, further specific actions that may be warranted to address the environmental issues in Lake St. Clair will be identified. Based on a preliminary assessment most of the issues appear to be local in nature and can best be addressed by local jurisdictions. Mechanisms and agencies are in place to deal with these issues.

The relative small volume and rapid flushing of the lake means it is very sensitive to upstream and tributary influences. Given the substantial progress that has been made in the St. Clair AOC, where point source discharges of critical pollutants have been reduced significantly and the zone of sediment contamination has shrunk by more than 75% since 1978, it is expected that these improvements will be reflected in the water quality of Lake St. Clair. The main focus of attention needs to be the tributary watersheds on the

Canadian side, most notably the Thames and Sydenham. Sources of contamination in these watersheds are being actively addressed.

Science and Research

8. Public and private sectors

- **fund research that expands understanding about the incidence of endocrine disruption in humans and wildlife;**
- **conduct programs to measure and establish the concentration of endocrine-disrupting chemicals in human tissues and fluids; and**
- **investigate endocrine-disrupting capability of chemical mixtures.**

The Government of Canada recognizes the importance of scientific research to expand understanding of the links between toxic substances, environmental effects and human wellbeing. Canada recently launched the Toxic Substances Research Initiative (TSRI), which is being managed jointly by Environment Canada and Health Canada. TSRI will fund research on specific health and environmental issues, including research on endocrine disrupting chemicals (EDCs). The renewed Canadian Environmental Protection Act (CEPA), which is expected to be in force by the fall of 1999 is being amended to direct the Ministers of Environment and Health to conduct research and studies relating to hormone disrupting substances, methods related to their detection, methods to determine their actual and likely short or long-term effect on the environment and human health, and preventive, control and abatement measures to deal with those substances in order to protect the environment and human health. Canada is also working with international organizations such as the Organization for Economic Cooperation and Development (OECD) and others, to address this emerging global issue.

Within Environment Canada, EDC research programs are focused on developing new tools to conduct more comprehensive environmental assessments, on applying these tools in field and laboratory studies to determine the extent to which the Canadian environment may be impacted and on developing remedial options and controls to protect the Canadian environment from the effects of EDCs. Multidisciplinary research studies are carried out in priority ecosystems in partnership with universities and industry.

Health Canada-sponsored research in the area of endocrine disruption covers epidemiology, screening of test substances for potential endocrine effects, hazard characterization, biomarker development and mechanistic studies to determine the biological relevance and regulatory value of selected endocrine endpoints. Studies in high fish consumers and non-consuming or low-consuming control populations and past breast milk surveys are establishing concentrations of persistent toxic chemicals in human tissues and fluids.

Canada is studying the endocrine-disrupting capabilities of chemical mixtures. Health Canada has recently published a special scientific journal supplement covering its research study of the effects on laboratory animals of mixtures of contaminants found in fish. Several of the endpoints selected are responsive to endocrine modulation. Environment Canada is assessing environmental sites and sectors which have been identified as having the highest potential for causing endocrine disruption, e.g., pulp and paper effluents, emerging issues such as intensive agriculture (pesticides and animal wastes), and urban effluents (especially sewage). This approach combined with laboratory validation will be the most effective to addressing the complex mixture and interactions of chemicals in the environment.

Environment Canada has also been involved in studies assessing endocrine disruption of orchard pesticides on songbirds and amphibians and have detected effects on reproduction, development and immune function. Ongoing studies have examined impacts of chlorinated organic contaminants on reproduction and development of snapping turtles and colonial waterbirds in the Great Lakes. A new study will assess contaminant body burdens and sexual development in mink.

Many of the substances (e.g., dioxins and furans, mercury, PCBs) that are being implicated as endocrine disrupters have other adverse effects. Environment Canada and the MOE have addressed many of them through their policies and programs dealing with persistent toxic substances, pollution abatement and prevention. For example, priority toxic substances are being dealt with under the Canadian Environmental Protection Act and the new Canada Wide Standards process. Many suspect industrial chemicals are also being addressed through Ontario's standards setting process and its Municipal and Industrial Strategy for Abatement (MISA).

Communication of Scientific Information

9. Governments actively participate in the work of the Communications Task Force under the Council of Great Lakes Research Managers.

The Government of Canada strongly supports the need for timely and useful scientific information being made available to policy makers so that informed decisions can be made regarding Great Lakes issues. In fact, communication of science is one of our government's priorities. Canada, together with our United States colleagues, has held a series of biennial State of the Lakes Ecosystem Conferences (SOLEC) since 1994. SOLEC was established by the Governments of Canada and the United States in partial fulfillment of their obligations to report progress under the Great Lakes Water Quality Agreement. One of the key objectives of SOLEC is to inform and influence decision makers in all sectors of society. These decision makers are invited to hear presentations by pre-eminent researchers on a variety of topics regarding the health and future of the Great Lakes ecosystem, and to participate in subsequent discussions on these topics. SOLEC has proven to be enormously successful in disseminating important Great Lakes

information in easily understood reports and INTERNET postings. In the years between SOLEC, State of the Great Lakes reports are prepared and widely distributed. In addition, both the United States and Canada are firmly committed to the timely release of information via the INTERNET and other outlets. Since SOLEC is held, in part, to provide the IJC with information on which to assess progress under the Agreement, it is important to maintain strong ties with the IJC.

One of the important outlets for State of the Great Lakes information is the proposed Communications Task Force (CTF) under the IJC's Council of Great Lakes Research Managers (CGLRM). This concept has evolved into the Great Lakes Communicators' Network, with representatives from several agencies that are members of the CGLRM, as well as other expert communicators, and the International Association for Great Lakes Research (IAGLR). The first meeting of the Network was convened in March 1999. This was followed up with a session at IAGLR's annual conference in May 1999 and will continue with a session at the Milwaukee IJC Biennial Forum.

The Network's mandate is to explain the work of the researchers of their agency to the general public and elected officials/decision-makers, and convey the findings and importance of research and science in effective management of the Great Lake Basin Ecosystem. This work would include, but would not be limited to, results from SOLEC. The Network seeks to explain research needs, priorities, and capabilities, and to involve these audiences in the process to identify the needs and set priorities.

Some of the important duties of the Network are to: include the Great Lakes education community so that research results can be taken into the schools of the region; make use of the latest technology to disseminate information, while continuing to use traditional means to reach all audiences; and involve the private sector and the media.

Canada fully endorses, and will actively promote the involvement of agencies on the Council of Great Lakes Research Managers and the Great Lakes Communicators Network.

Ecosystem Models

10. Governments support the development and application of models to assist in the testing, evaluation and implementation of ecosystem indicators, monitoring strategies and management strategies for water quality, contaminants, fisheries and other ecosystem issues.

The Great Lakes have undergone profound ecological changes over the past decade. The number and complexity of issues facing Great Lakes researchers and managers is increasing exponentially. The Government of Canada recognizes the importance and value that modeling contributes to evaluating and understanding ecosystem processes,

developing and implementing appropriate management and monitoring strategies, and in the selection of indicators of ecosystem health.

For example, work under the Great Lakes 2000 program and the COA has supported the development and use of models to:

- assess the potential for zebra mussels and other exotic species to affect the distribution of contaminants in aquatic foodwebs;
- evaluate how energy is transferred and partitioned in Lakes Erie and Ontario;
- develop a set of scientifically defensible ecosystem objectives and indicators for Lake Erie;
- assess the effects of land use and fertilizer application rates on rural water quality in selected Great Lakes tributaries;
- study the impacts of climate change on lake hydrodynamics and water quality in Lakes Ontario and Erie; and
- assess the impacts of zebra and quagga mussels on phosphorus budgets in Lake Erie.

Canada also provides advice and scientific expertise to U.S. modeling initiatives such as the Lake Erie Ecological Modeling Project and the new generation of toxic chemical models being developed for Lake Ontario.

Canada will continue to support the development and application of appropriate models in order to better understand, manage and monitor the impact of human activities on the Great Lakes ecosystem.

Surveillance and Monitoring

11. Governments identify surveillance and monitoring programs essential to track contaminant loadings to and concentration trends for each of the Great Lakes; provide assurances to the Commission and the public that these programs will be maintained; and provide on a timely basis data and information to quantify load reductions and ecosystem improvements.

The Government of Canada acknowledges the essential role of surveillance and monitoring in tracking loadings and concentration trends of contaminants in the Great Lakes. Canada, in concert with the relevant provincial and United States agencies, has been pursuing mechanisms to optimize and streamline Great Lakes surveillance and monitoring activities to derive maximum benefits from available resources. The Canadian and Ontario governments are committed, under the COA, to set up federal-provincial mechanisms to ensure effective coordination of activities, including appropriate integration of research, reporting, and monitoring and surveillance activities, to fulfill commitments under the GLWQA.

The Government of Canada is committed to continue to plan, coordinate and implement essential surveillance and monitoring programs on the Great Lakes, and to provide timely reports on findings.

Dioxins and Furans

12. **Governments adopt a three-part strategy relating to: existing commercial operations, including manufacture, import, use and release into the environment; present day combustion facilities; and the legacy of dioxin-like substances from past human activities. Further, Governments adopt and report on a schedule outlining appropriate measures to be taken.**

The Government of Canada and the provinces, through the Federal-Provincial Task Force on Dioxins and Furans, have developed an inventory of releases of dioxins and furans in Canada. A report on this inventory has been finalized and is publicly available on Environment Canada's "Green Lane" web site (at: http://www.ec.gc.ca/dioxin/index.htm). The inventory indicates that for:

- Air releases, between 1990 and 1997, an 18% reduction in atmospheric releases was observed. In 1999, it is projected that an additional 25% reduction will be achieved compared to 1990, due to announced facility up-grades or closures, for a total reduction of 43% compared to base year 1990. Beyond the reductions to date, a number of priority sectors can be identified to develop prevention and/or reduction measures consistent with the objective of virtual elimination.
- Water releases, between 1990 and 1997, almost 99% reduction was achieved compared to base year 1990 due to the adoption and implementation of the pulp and paper regulations. Releases of effluents from the pulp and paper sector have already been reduced to below the "measurable concentration" level as per the regulations, which is in keeping with the objective of virtual elimination. For this sector, no additional work is recommended for releases to water.

In the winter of 1999, based on the inventory report, priority sectors will be identified for action consistent with the objective of virtual elimination. Stakeholder working groups will be invited to develop targets and timelines for the prevention/reduction of releases. In the spring of 2000, these targets and timelines will be used to develop Canada-Wide Standards, as appropriate, for six priority sectors.

Mercury

13. Governments and business apply incentive-based approaches to identify and eliminate specific uses of mercury.

As part of the discussions with the USA and Mexico under the NAFTA-CEC initiative for the sound management of chemicals, Canada has proposed a supportive position towards incentive-based approaches. This position is now under detailed review by federal departments and the public as part of the Mercury North American Regional Action Plan (NA-RAP) stakeholder consultation process.

Taking into account the risk of release into the environment, Canada's position, when adopted, would support programs and consider incentives to encourage the substitution and phase-out of mercury use in products or processes. Substitutes should be cost effective and must pose less risk than the original mercury-containing product or process.

It is noted that any such support must respect the "polluter pays" principle, and would focus on the promotion of technology development and demonstration, pollution prevention planning, and clean technologies. In addition, public education material and government purchasing policies may be used as incentives for innovative approaches that support effective substitution and phase-out of mercury use in products and processes.

Polychlorinated Biphenyls (PCBs)

14. Governments develop a detailed program, including benchmarks and schedules, for the systematic destruction of PCBs in storage, in use and in the Great Lakes environment.

Under the Great Lakes Binational Toxics Strategy, Environment Canada and the United States Environmental Protection Agency have committed to a cooperative approach to the reduction of PCBs. Specifically the Canadian challenge under the Binational Toxics Strategy is to:

" 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 "

This is consistent with Environment Canada's commitment under the Canada - Ontario Agreement Respecting the Great Lakes Basin Ecosystem.

A binational PCB workgroup has been established under the Binational Toxics Strategy to develop and implement a systematic approach for actions and activities towards meeting the goals of the PCB challenges. The workgroup includes participation from a

wide range of stakeholders. Information concerning the activities of the workgroup can be found on the website: http://www.epa.gov/glnpo/bns/bnspcb.html

Environment Canada maintains a database to track both PCBs in use (federal and non federal) and PCBs in storage (federal). The MOE maintains an inventory of non federal PCBs in storage as waste.

As of 1998 over 50 percent of the high level PCBs in service have been decommissioned and over 50 percent of the PCB waste in storage has been destroyed.

Radioactivity

15. **Governments comprehensively review all monitoring at nuclear facilities in the Great Lakes basin with a view to making the monitoring more accommodating to the needs of the Agreement.**

16. **Governments monitor toxic chemicals used in large quantities at nuclear power plants, identify radioactive forms of the toxic chemicals and analyze their impact on the Great Lakes ecosystem.**

17. **Governments investigate and report toxicological and ecological problems associated with tritium, carbon-14, iodine-129, isotopes of plutonium and radium-226.**

Recommendations 15, 16 and 17 all relate to the monitoring and assessment of ecological impacts associated with nuclear facilities. The discussion in the Ninth Biennial Report suggests that the current atomic energy legislation focuses on annual human exposure to radiation and does not fully consider environmental impacts and ecosystem effects.

In Canada there are two recent initiatives which address this concern.

The first is the new Nuclear Safety and Control Act (NSCA). This new act replaces the Atomic Energy Control Act. When it comes into force, protection of the environment will be explicit in Canadian nuclear legislation. The scope of the regulatory responsibility in the area of environmental protection will also be widened to include non-human biota and non-radiological stressors. The regulatory approach to be taken under this act would involve consideration of the environment as an ecosystem. In implementing the Act, regulatory guidance pertaining to environmental monitoring will be updated and monitoring programs will be reviewed.

The second initiative involves the assessment of releases of radionuclides from nuclear facilities (effects on non-human species) under the Priority Substances Assessment Program. The CEPA requires the Ministers of the Environment and Health to establish a Priority Substances List (PSL) that identifies substances to be assessed on a priority basis.

The assessment is to determine if the substance is toxic as defined by CEPA. Releases of radionuclides from nuclear facilities have been included on the PSL and are currently being assessed to determine if they may have harmful effects on the environment. The assessment will cover the effects of radiation on plants and animals that live in and on the ground and water. The assessment is being conducted in cooperation with the Atomic Energy Control Board and the results will be used in developing regulatory approaches for nuclear facilities.

Transition

18. Governments structure a transition study and develop a transition model by December 31, 1999, for one of the chemicals presently under investigation through the Great Lakes Binational Toxics Strategy.

Canada supports this recommendation and believes that it has already made progress towards the goal of transition, and has a number of the elements required for a transition study and model already in place. The Government of Canada has adopted a Toxic Substances Management Policy that specifies that toxic substances determined to be persistent, bioaccumulative and resulting from human activity will be virtually eliminated from the environment. Broad classes of persistent toxic substances have been targeted through regulatory and non-regulatory programs (e.g., CEPA regulations for PCBs, dioxins, furans, polybrominated biphenyls, polychlorinated terphenyls and ozone-depleting substances). In these cases, a transition process is already underway.

Chlorinated substances are a particular concern. The federal Chlorinated Substances Action Plan outlines Canada's approach to the management of chlorinated substances. This management takes place in the context of "pruning the chlorine use-tree" as opposed to "cutting the tree down" or a "chlorine ban". Under this Plan, work has been done to inventory chlorine supply, demand and trends in use. As well, a chlorine options study was completed in order to provide background information on chlor-alkali industry products, their applications, and options (or alternatives) to the use of these products.

Under the mandate of the Canadian Council of Ministers of Environment, federal, provincial and territorial government agencies are developing Canada-wide standards for priority substances, including mercury, dioxin and furans, ozone and particulates and benzene. Each standard will be accompanied by action plans for the strict control or virtual elimination of these substances from particular sources or classes of sources. Such plans would serve to outline changes necessary to accomplish required objectives to meet and maintain the standards for a given source or class of source. A bill to amend the CEPA will enshrine both virtual elimination and pollution prevention planning.

Through the NA-RAP for mercury, DDT, PCBs and Chlordane, Canada, Mexico and the United States are cooperating to achieve further reduction of these substances on a continental basis, given the long range transport of these substances through atmospheric

deposition. The development and implementation of these plans provide a framework to institute changes which result in the further reduction in the release of these chemicals. For example, through implementation of the NARAP for DDT, Mexico initiated a program to phase out the use of DDT without endangering its population to further risk of malaria, while in Canada and the United States, DDT has been banned for use for some time.

Canada is firmly committed to working with U.S. government agencies and other partners to implement the Great Lakes Binational Toxics Strategy which incorporates a practical approach to the reduction of priority substances in pursuit of the objective of virtual elimination of these substances. By way of an open and highly consultative process, all sources of a priority substance are identified and priorized, status of existing controls are examined, gaps and further actions identified and recommended for adoption. The process is designed to focus attention on factors which need to be changed in order to address a particular substance. Such factors would include information on sources and impacts, availability of alternatives, technological availability, costs, public awareness and preferences, and social impacts which are the elements of the transition analysis.

Socio-Economic Value

19. Governments commission a study to evaluate the practical value of utilizing the ecological economics approach.

Canada supports this recommendation and believes that it has already made progress towards this goal. Under the Remedial Action Planning process, and more generally, Canada has done work looking at valuing the contribution of the environment and ecosystem services to human, economic and social well-being, for example, wildlife, wetlands, greenspaces, and groundwater. Other studies, noted in the Ninth Biennial report, have examined the economic benefits of restoration and protection clean-up activities carried out in several RAP areas, in particular, Hamilton Harbour, Collingwood Harbour, Nipigon Bay, Thunder Bay, St. Lawrence River-Cornwall, and Toronto. Canada has also provided expertise and advice to the Blue Ribbon Panel of Economists formed by the Northeast Midwest Institute to assist in the development of a guidebook for the evaluation of Great Lakes resources. There are also other similar works supported by Canada that are consistent with the purposes of this recommendation.

Overall, this work includes considerations of sustainability, and elements of ecological economics. There is more and similar work planned for the future.