"The Parties shall continue to develop and implement programs and other measures to fulfil the purpose of this Agreement and to meet the General and Specific Objectives."

Article VI
Great Lakes Water Quality Agreement
1978

International Joint Commission
December 1984

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International Joint Commission

SECOND BIENNIAL REPORT UNDER THE GREAT LAKES WATER QUALITY AGREEMENT OF 1978 TO THE GOVERNMENTS OF THE UNITED STATES AND CANADA AND THE STATES AND PROVINCES OF THE GREAT LAKES BASIN

IJC Commissioners

J. Blair Seaborn
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INTERNATIONAL JOINT COMMISSION

December 31, 1984

The Right Honourable Joe Clark, P.C., M.P.
Secretary of State External Affairs
Lester B. Pearson Building
125 Sussex Drive
Ottawa, Ontario K1A 0G2

The Honorable George Shultz
Secretary of State
Department of State
Washington, D.C. 20520

Dear Sirs:

With this letter we transmit to Governments the second report of the International Joint Commission pursuant to its responsibilities under the 1978 Great Lakes Water Quality Agreement.

This report is intended to bridge the Commission's first biennial report and its third biennial report scheduled for public release in 1986. Our objective in the present report is to bring Governments up to date regarding Agreement progress in the last two years and generally to describe some major issues confronting Agreement institutions.

The 1983 Reports to the International Joint Commission from its Great Lakes Water Quality Board and Science Advisory Board, as well as the public discussion in Indianapolis, Indiana, in November of that year, have formed an important basis for this report. The Boards' findings are not repeated here as they have been forwarded to Governments and have been made public. Copies of Board reports may be obtained by writing one of the Commission offices.

Robert C. McEwen
Chairman

J. Blair Seaborn
Chairman

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A. Introduction

In the twelve years since Canada and the United States signed the 1972 Great Lakes Water Quality Agreement, the Commission's advisory boards have reported annually on progress in meeting the Agreement goals. In 1972, the Great Lakes basin community faced serious problems that threatened the ecology of the lakes and the uses of this large natural resource. The substantial efforts and funds directed by Governments have not eliminated the problems, but important milestones have been reached.

Significant achievements have been recorded in controlling certain types and sources of pollution, particularly in the areas of point source control of phosphorus and in the control of a number of other conventional pollutants. Technological, scientific and regulatory programs have been and remain the major means of dealing with pollution and accomplishing the goals and purposes of the Agreement. More remains to be achieved by these means, especially in addressing the changing problem of toxic substances in the water, in the air, and on the land. People are becoming more aware of the problems related to Great Lakes water, and their perceptions and attitudes are increasingly important. There are limits to what technical and scientific programs can accomplish when fundamental elements are not only technological but also societal and attitudinal. As technological and scientific limitations on progress become more apparent, the challenge becomes increasingly one of engaging public support for the new approaches and programs that are needed.

This is the International Joint Commission's second report pursuant to the 1978 Great Lakes Water Quality Agreement. The first biennial report, signed in June, 1982, examined in considerable detail the nature of the Agreement and focused on the need for the Governments of the United States and Canada to reaffirm their commitment to the goals and purposes of that Agreement. The Commission appreciates the Governments' detailed responses to that report reaffirming their commitment to the Agreement.

This report is a brief interim assessment of some of the initiatives and progress since the 1982 assessment, and a bridge to the third biennial report which will express the Commission's views to governments on the kinds of future initiatives that would be mutually beneficial to the people and ecosystem of the Great Lakes region, and to the Governments of the United States and Canada.

Much of what follows is addressed to governments, at the federal, state and provincial levels, including their political, administrative and technical-scientific institutions. The report is also directed, however, towards the communities of the Great Lakes basin including individual citizens, organizations and local governments.

B. Progress Under the Agreement

Eutrophication

At the time the 1972 Great Lakes Water Quality Agreement was being negotiated, the major water quality problem of the Great Lakes was considered to be man-induced or cultural eutrophication. The causes included phosphorus in household detergents, municipal sewage and agricultural fertilizers. Advanced eutrophication is characterized by an abundance of nuisance algae and other aquatic plants, turbidity and oxygen depletion in bottom waters. These impacts can lead to clogged water intakes and filters, taste and odour problems, and changes in the distribution and abundance of fish populations and other organisms.

Point Sources

Controlling phosphorus inputs was a main focus of the 1972 Agreement. Programs included limiting the phosphorus content of household laundry detergents and reducing the phosphorus concentration to 1.0 milligram per litre in the effluents of municipal wastewater treatment plants discharging more than 1 million gallons per day. Since 1972, the United States and Canada have spent more than $7.6 billion to construct and upgrade municipal wastewater treatment plants in the Great Lakes basin. Though significant progress has been made in constructing municipal treatment facilities, 39 of the 390 major facilities in the basin missed the December 31, 1982, construction deadline and difficulties have been encountered in operating some plants to their design capabilities.

In November, 1983, the Commission's Water Quality Board reported that nine major municipal wastewater treatment plants in the lower lakes were still discharging effluents with phosphorus concentrations exceeding the l mg/litre limit. These included the sewage treatment plants of Cleveland Southerly, Cleveland Westerly, Wyandotte, London Greenway, Toronto Humber, Hamilton, Niagara Falls, N.Y., Buffalo and Amherst.

These phosphorus control programs have improved water quality. Nutrient goals for Lake Superior have been met; Lakes Erie and Ontario continue to show declines in phosphorus concentrations; Saginaw Bay on Lake Huron, which experienced accelerated eutrophication in the late 1960's and early 1970's, is also improving. The Commission reminds the Parties, however, of their commitment in the 1978 Agreement to achieve the effluent discharge requirement of 1 mg/litre at all major municipal wastewater treatment facilities and where necessary to reduce the effluent discharge to 0.5 mg/litre in order to meet target loads.

Non-Point Sources

Even if all the commitments with respect to phosphorus control at specific or point sources are met and detergent phosphorus limitations are continued, the full extent of the phosphorus problem will still not have been addressed. It has been known for some time that non-point sources are a major contributor of phosphorus to the Great Lakes. Based

on major international research efforts, the Commission again recommends a comprehensive strategy be developed for dealing with non-point pollution, including phosphorus. While there have been some successful demonstration programs to control known non-point sources, a wide-spread, co-ordinated and systematic approach has not been implemented. The Commission's advisory boards have indicated that a technological basis exists for major programs to control non-point pollution sources of phosphorus, and that such programs can often be implemented without major costs and with economic and environmental benefits. It is important to proceed.

The Commission notes the signing of Annex 3 of the Great Lakes Water Quality Agreement, which confirms the Governments' commitment to specific phosphorus reductions. The Commission reiterates its support for the kind of broadly-based efforts such as those outlined by the Commission's Task Forces on Non-Point Source Control (1983) and Phosphorus Management Strategies (1980) as well as the Commission's 1981 Supplemental Report on Phosphorous Management Strategies.

Toxics

Unlike the efforts to control phosphorus, there has been limited success in coming to grips with the overall problem of toxics in the Great Lakes basin.

Specific regulatory measures have had an impact on controlling levels of some targeted substances such as mercury and DDT. However, there are many thousands of chemicals in use in the Great Lakes basin and new chemicals are being introduced continually. Even if only a few are known to be harmful, it is becoming increasingly apparent that their individual, combined and long-term effects do present serious environmental problems.

Effects

Except for spills, toxic chemicals are seldom present in water in large quantities and therefore may be undetectable in water samples. They may, however, exert adverse biological effects at dilute concentrations and bioaccumulate in aquatic organisms in the food chain to toxic proportions. These effects may include impaired reproductive processes and birth defects, neurological dysfunctions and behavioural aberrations, abnormal growth patterns including tumours and neoplasm production and reduced immunity capacities. Organisms exhibiting these effects are potentially useful as an early warning system to alert to potential threats to humans and biota.

Control Strategies

The Commission has previously recommended that a comprehensive toxic substances control strategy be implemented by Governments. The Governments expressed general support for developing such a strategy in their responses to the first biennial report as well as in their briefing to the Commission in January, 1984, on the Governments' toxic

substances control programs. In the Commission's opinion, however, these programs have not advanced far enough. Given the state of understanding of environmental problems and the nature of legislation and regulatory practices in both countries, much remains to be done and the Commission urges Governments to increase their efforts in support of a co-ordinated strategy which addresses the problem of toxic and hazardous substances beginning at their source or manufacture and continuing on through the transport, use and life of these substances.

Recently there has been a tendency for Commission resources to be used to implement parts of this strategy on behalf of the Parties. The Commission is concerned about the use of its limited resources and the implications for its role under the Agreement should this tendency continue. When Commission groups act on behalf of the Parties in implementing such a strategy, the Commission's ability to comment on the effectiveness of programs and strategies under the Agreement is compromised and the obligation is removed from the responsible government agencies. The Commission has reviewed its recommendations on control strategies for toxic substances and concludes that by virtue of the Agreement, the recommended strategy is appropriate to the Parties', not the Commission's, institutions.

Research Needs

In addition to the necessity of a comprehensive toxic substances control strategy, the Commission sees the need for more research in specific areas in support of this strategy. Greater emphasis should be placed on new and broadly applicable technologies to treat toxic chemicals. Pre-treatment technologies for certain industrial wastes received by municipal wastewater treatment plants and the limited treatment of toxic chemicals in conventional waste treatment processes need additional research, as do such residual disposal technologies as land disposal of sludges, carbon filtration, and high temperature incineration. Siting difficulties make land disposal of toxic substances problematic. Carbon filtration does not remove all classes of toxic substances, and has different treatment capacities depending on the nature of the toxic chemicals present. The effectiveness of incineration technology is in many cases uncertain, especially in the destruction of selected organic materials which are toxic at extremely low levels in the environment. The Commission encourages support for improving and developing new technologies to treat toxic chemicals.

Groundwater Monitoring

The Commission also recommends that serious attention be given by the Parties to development of monitoring strategies for groundwater resources in the Great Lakes region. Concern has been expressed in certain areas of the basin over leachate movement from toxic waste disposal sites to groundwaters and eventually to the lakes. Proper

management of waste disposal facilities to prevent movement of contaminants requires effective monitoring practices. But development of effective monitoring practices may be inhibited because of the difficulty in sampling groundwater for toxic contaminants. The Commission therefore believes that groundwater research for sampling geochemical and microbiological constituents, and the development of standard protocols for the effective monitoring of the potential leachate movement from toxic waste repository sites, are important, despite the fact that the Agreement does not explicitly address groundwater problems.

Integrated Air, Water Monitoring

The Commission repeats its support for the application of an "ecosystem approach" to Great Lakes environmental research. In particular, an ecosystem approach should underlie field research and monitoring studies of the transport and behaviour of toxic materials throughout the Great Lakes basin. Water and air parameters should be measured in an integrated fashion in the same locations at the same times as opposed to measurements in different locations at different times. With this in mind, the IJC co-sponsored a workshop at the Philadelphia Academy of Natural Sciences in October, 1984, to explore the desirability and feasibility of developing an integrated transboundary monitoring and surveillance network. Such a network would include the Great Lakes basin and would contribute to the information base required by the Commission to assess programs and progress under the Agreement.

Risk Assessment

In the Commission's opinion, attention should be directed toward an evaluation of current techniques used to measure the effects of the exposure of ecosystem components to toxic chemicals. The Commission questions the adequacy of present risk assessment techniques and the confidence placed in them. Present approaches in exposure assessment rely on data and models for locations and situations largely unrelated to Great Lakes ecosystem problems and therefore may not provide a reliable assessment of risk.

Areas of Concern

Since 1972, the Great Lakes Water Quality Board and the Commission have pointed out specific areas—often near major population centres—that do not conform to the requirements of the Agreement. Such locations, referred to originally as "problem areas," and more recently as "areas of concern" occur throughout the system. Despite considerable attention from governments and the public, there has been little significant overall improvement in these areas.

Class A and B Areas

The 1983 Report of the Great Lakes Water Quality Board listed eighteen Class "A" areas of concern exhibiting significant environmental degradation and severe impairment of beneficial uses. The number is the same as in 1981. In a few instances, the remedial programs are considered to be adequate or timely. In most, there is little or no expectation of resolution, or an anticipated long time lag in environmental response, if any, to current measures. The Niagara River is one example where, despite remedial efforts by Governments, the ecosystem of the Niagara River and Lake Ontario will continue to be degraded by pollutants for the foreseeable future.

One example where a new co-operative approach is being attempted in restoring a Class "A" area of concern is the Grand Calumet area in Indiana. During the past year, representatives of federal, state, local public interest, environmental, academic and other groups have met to develop a plan to resolve the area's environmental problems. Initiatives such as this and one in Green Bay, Wisconsin, are illustrative of how a consensus-based, co-operative approach to a problem area might be applied in other areas of concern.

There are also twenty-one Class "B" areas with environmental degradation and possible impairment of beneficial uses. The Commission is concerned that areas in this category may be given low priority by governments and that they will consequently be neglected until their problems escalate.

Because of the apparent lack of progress in resolving the problems identified as areas of concern, the classification system for these areas is under review by the Water Quality Board in order to provide better, up to date information on the status of each with respect to problem identification and the development, implementation, and success of remedial programs. Major additional efforts must be made to correct these situations. Solutions to these problems will lie in co-operative, comprehensive strategies, not just in adversarial procedures and piece-meal measures. The setting of goals for such programs and arriving at a consensus on what is achievable will be an important beginning.

In Situ Contaminants Workshop

An important event which addressed some of the above concerns was a workshop on "The Ecological Effects of *In Situ* Sediment Contaminants" convened at the University of Wales, Aberystwyth, in August of this year. The workshop evolved from the areas of concern as locations with serious in-place contaminated sediment problems. The primary purpose was to explore the scientific dimensions of rehabilitating such systems, but an opening discussion recognized that the social context is an important basis for, rather than an incidental adjunct to, generating scientific advice.

Two highlights of the workshop were the general agreement that understanding among social and natural scientists is essential to dealing successfully with the problem of *in situ* contaminants and the conclusion that there are times when it will be necessary to begin to deal with in-place pollutants through rehabilitative measures rather than relying solely on pollution controls.

Water Quality Objectives

Specific Objectives

There are specific objectives for thirty-eight chemical substances in the Agreement. The Commission has since recommended new or revised water quality objectives for eleven substances. These substances are: pentachlorophenol, polychlorinated dibenzodioxins, nutrients (phosphorus), cyanide, selenium, mirex, chlorine, lead, microbiological indicators, diazinon, polyaromatic hydrocarbons. The limitations of using single water quality parameters for assessing the state of the environment and the adequacy of programs were discussed in the addendum to the Commission's first biennial report. While the Commission believes that additional research is necessary to develop more sophisticated measures, water quality objectives remain a basic part of the environmental monitoring and remedial approach under the current Agreement. The Commission therefore continues to encourage Governments not only to adopt these objectives but to develop more comprehensive measures of ecosystem quality.

Limited Use Zones

Article IV of the Agreement calls for the designation of "limited use zones" in the vicinity of municipal, industrial and tributary point source discharges where some of the objectives may not apply. After the 1978 Agreement was negotiated and formally entered into by the Governments, the Commission was informed by the United States Environmental Protection Agency that limited use zones are inconsistent with existing United States domestic law. The Commission believes that the Parties should consult at the earliest opportunity to resolve this issue and provide clarification for the Commission as to the interpretations appropriate in reporting on progress toward achieving the goals and purposes of the Agreement. In the absence of limited use zone designations, the Commission must assume that specific Agreement objectives apply throughout the lakes. However, objectives are being exceeded in many parts of the Great Lakes system, and there are a number of locations at which some objectives will be very difficult if not impossible to achieve.

If the concept of limited use zones as outlined in the 1978 Agreement is unworkable, then the designation by Governments of areas where objectives currently are not being achieved, analagous to the areas of concern identified by the Great Lakes Water Quality Board, might be one of the options considered. Monitoring and surveillance programs would provide the basis for an assessment of the extent to which the various specific objectives are not currently being achieved, and the extent to which beneficial uses are being impaired. This, together with information regarding planned measures and a time-table for dealing with problems, would provide the Commission with a better information base for assessing the state of the Great Lakes system and the adequacy of governmental programs.

Information Base

The Commission is not satisfied that the information it now receives enables it to assess adequately programs and progress as required under the Agreement. The primary sources of data on Great Lakes water quality are discharge permits or control orders, and monitoring data from Great Lakes surveillance activities. While those data serve some purposes for control and assessment, they do not establish a firm link between the implementation of programs within the jurisdictions and the achievement of the specific objectives or other undertakings of the Agreement. The Water Quality Board has formed a committee to review the Commission's information needs and to recommend appropriate data requirements.

C. Problems of the Management of Science Under the Agreement

Both the scientific and administrative resources of the Parties are essential to the programs designed to achieve the general and specific Agreement objectives. The Commission is concerned that inadequate attention to the management of scientific programs may be diminishing the effectiveness of such programs in support of the Great Lakes Agreement.

The following brief summary describes a few current problems in the planning, funding, administration, and management of science under the Agreement. The Commission is confident that the difficulties discussed may also be seen as opportunities for positive changes and encourages the Parties to take steps to address these concerns.

Funding

While Agreement-related research funding has remained relatively constant, the scheduling and allocation of funds and available expertise have not always been well co-ordinated. Uncertain levels of support, timing of awards and receipt of funds have affected the ability to keep essential levels of personnel in certain activities and have inhibited co-ordinated research programs. The result is an uncertain research climate and a diminished human scientific resource base for needed work. For example the lack of expertise, notably in ecotoxicology and the technology of industries with special pollutant problems, contributes to the difficulties of jurisdictions in carrying out certain programs. There is also a sense that Agreement research needs have not been given adequate priority by federal and jurisdictional agencies. Approval procedures for projects and their integration into short-term and long-term planning cycles have become so complex and time-consuming that they may actually be disincentives to research.

Planning

Fiscal year calendars tend to create artificial start and finish dates for projects. To assure uninterrupted funding, many projects are planned for completion in less than a fiscal year making the implementation of essential multi-year studies difficult. This is unfortunate since environmental processes and phenomena occur on time scales and with seasonal patterns unrelated to the budget and fiscal year calendars. Follow-up studies and trend analyses needed to confirm previous results and assure the success of work undertaken are often not carried out as a result of fiscal year complications.

Priorities

In the 1978 Agreement, the Parties stated that "Research should be intensified to determine the pathways, fate and effects of toxic substances aimed at the protection of human health, fishery resources and wildlife of the Great Lakes basin ecosystem." (Annex 12:7) Research projects usually compete for fixed resources on the basis of program priority and

scientific quality. New research needs and changes in priorities may result in a re-allocation of resources and therefore affect ongoing programs. The Commission is unaware of the extent to which the general and specific objectives of the Great Lakes Water Quality Agreement enter into the management decisions of the Parties and jurisdictions in assigning resources and priorities to specific research projects. The Commission is concerned that changing priorities could significantly hamper the Parties' ability to carry out their responsibilities under the Agreement, and requests assurance from the Parties that changes in Great Lakes related programs will not adversely affect their ability to meet their respective obligations under the 1978 Great Lakes Water Quality Agreement. The Parties also are encouraged to take any necessary steps to ensure that such programs, especially the research, monitoring and surveillance activities, are maintained at a level consistent with both the letter and the spirit of the Agreement.

Laboratory Operations

The Commission also notes that management problems have affected laboratory operations. Specialized analytical and toxicological testing facilities have had problems meeting increased testing demands because of difficulties in equipment acquisition, backlogs of samples awaiting specialized testing, and the need to assure proper storage and preservation of samples for future use. Management approaches to overcome these problems have included consolidation or regionalization of laboratories or use of contract operations to perform special tests, but have had mixed success.

The Commission believes effective scientific quality control programs are important for all laboratories of the major agencies of the Parties. Quality control applies not only to operation of laboratories but also to the implementation of field studies, surveillance operations, and data management.

D. Ecosystem Approaches and their Implications

The Great Lakes Water Quality Agreement is a milestone document, one of the first international statements that technical, diplomatic, and administrative approaches to resource management need to be considered in terms of holistic ecological concepts. Land, water, air and biota interact and are mutually influenced. Existing resource management approaches which partition the environment into separate components of land, water and air with associated biota are recognized as inadequate since management of a resource component in isolation from adjacent or interacting components would likely produce short-sighted strategies to protect one component of the environment at the expense of another. Because existing environmental and resource programs are separated, compartmentalized and spread throughout various bureaus, agencies, ministries and departments, the new approach requiring a holistic overview entails, at the very least, a reorganization of thinking, and perhaps a reorganization of institutional arrangements.

A seemingly unrecognized dimension is the extent to which institutional arrangements limit the ability of scientists and scientific institutions to focus on relevant research leading to the technical resolution of environmental problems. Compartmentalization is often associated with rigid interpretations of "missions" or "mandates" as expressed by legislation or regulations which authorize programs. The restrictions of the "mandate" or regulation are then translated into limitations on the style of technical solutions. This approach has led to considerable frustration on the part of individuals who have recognized the importance of holistic approaches to solving environmental problems.

The first recommendation in the Commission's first biennial report contained the following statement: "The Commission recommends therefore that: 1. Parties, Jurisdictions and others foster and encourage policies, programs and institutions that (a) help develop and maintain a long-term ecosystem perspective with respect to the pursuit of their other legitimate goals and to be more anticipatory in their actions." The Commission continues to encourage stronger activities in support of this recommendation to enable our environmental scientists to focus their attention on more long-term, ecologically important considerations.

The Commission believes an ecosystem approach will produce greater appreciation for the overall impacts of environmental management decisions and man's activities generally. It may also lead to changes in existing methods of analysis and actions which are currently constrained by geographical, disciplinary, functional, institutional or jurisdictional compartmentalizations. Adopting an ecosystem approach would catalyse changes in the practice of ecosystem science, with less emphasis being given to discrete, well-defined but often less important problems, and more emphasis being directed to the more complex and important problems which confront us today. An ecosystem approach is being taken by work groups of the Water Quality Board to develop surveillance plans for the Great Lakes and their connecting channels, including some co-ordination of air and water monitoring.

E. Roles Under the Agreement

Throughout this report, the Commission has identified a number of areas that require attention if the general and specific objectives of the Agreement are to be achieved. These concerns are the shared responsibility of the Commission, Governments, and the Great Lakes community. The following comments highlight some Commission concerns and perspectives regarding the assumption of various roles and responsibilities emanating from the Agreement.

Commission and Government

The Great Lakes Water Quality Agreement is an agreement between the Governments of Canada and the United States to meet mutual obligations and undertake programs to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes basin ecosystem. The role of the Commission in assisting the Governments is quite specific. The Commission's direction is derived from Article VII of the Agreement which is, in fact, a reference under Article IX of the Boundary Waters Treaty. Its supporting institutional framework is provided under Article VIII of the Agreement.

The Commission recognizes that the great value of providing a meeting ground for various jurisdictional personnel far exceeds the narrow responsibilities of the Commission. However, it must also ensure that its own integrity as an independent commentator on governmental programs be maintained.

It is the task of federal, state and provincial governments to integrate and co-ordinate governmental activities, supply scientific expertise and provide technical and financial resources. They are responsible for program implementation. They can foster public consultation and promote discussions which focus public consideration on Agreement principles and issues and provide the public with a credible base of information.

Specifically it is the prerogative and responsibility of governments to undertake, among other things, the following:

a) adoption of new water quality objectives;
b) provision of reliable information for adequate program assessment;
c) development of demonstration programs for non-point source reduction of phosphorus and other pollutants;
d) consideration of a comprehensive toxic substance strategy; and
e) implementation of clean-up programs in the areas of concern.

Commission and Community

Great Lakes water quality problems cannot be addressed adequately in isolation from the individual and the overall social context. In particular, the problems posed by toxic contaminants are not nearly as visible and evident as was eutrophication. Governmental

intervention without public awareness and support makes program development and implementation difficult if not impossible.

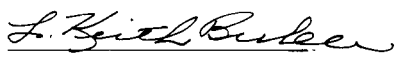
Without active community support, it is probably beyond the reach of any agency or government, alone or in combination, to achieve Agreement objectives. The challenge is therefore one to be met not only by governments, or the scientific community, or citizens, but by all three.

In one sense, the Great Lakes as a resource are not "owned" by anyone as this word is customarily understood. The lakes are a shared resource and thus a shared responsibility, a heritage held in trust for future generations. There is a need to explore the nature of society's stewardship and creative means to encourage its pursuit. Community leadership and initiative are essential. Individual and community responsibility need to be encouraged to complement professional and governmental responsibility in seeking to restore and maintain the integrity of the water of the Great Lakes basin ecosystem.

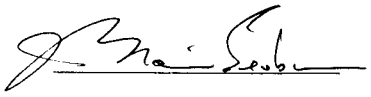
The Commission has an important role in this process. A central concern has always been that all groups and individuals interested in any Commission proceeding or inquiry be given opportunity to be heard. The Commission's public hearing process is an integral part of its activities, but it has not always been a successful mode of public participation. In its first biennial report under the 1978 Agreement, the Commission spoke of the need for "a more direct form of discourse between the various institutions which are involved in the regulation of the environmental quality of the Great Lakes system and the many individuals in the basin who would be affected directly by institutional decisions ... therefore it should consider broadening its base of information in order to establish a process for understanding the human context of Great Lakes goals and achievements." The Commission's Great Lakes Water Quality meeting in Indianapolis was an attempt to foster this more direct form of discourse. The Commission has also directed its Boards to increase the level of public participation. As a result, the Science Advisory Board has taken steps to encourage public discussion by scheduling meetings in areas around the basin, beginning with Green Bay, Wisconsin; Montreal, Quebec; and Niagara-on-the-Lake, Ontario.

There is a need to anticipate rather than react to past or existing problems. The Commission, in its third report to Governments under the present Agreement, will emphasize this perspective in a detailed review and evaluation of the Agreement, and will consider ways for the public to comment on and contribute to the Commission's analyses. The Commission encourages governments, the Great Lakes community and its own institutions to join in a co-operative approach to addressing the problems and the opportunities posed by the Agreement.

Signed this 31st day of December 1984 as the International Joint Commission's Second Biennial Report Under the Great Lakes Water Quality Agreement of 1978.



L. Keith Bulen



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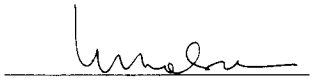

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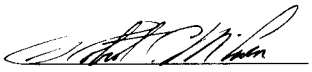
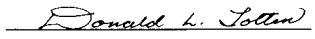


Robert C. McEwen



Donald L. Totten

"It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

The Boundary Waters Treaty of 1909
Article IV