1984-11-01

**Great Lakes Water Quality Board. Interim Progress Report to the International Joint Commission, November 1984**

Great Lakes Water Quality Board

Follow this and additional works at: [https://scholar.uwindsor.ca/ijcarchive](https://scholar.uwindsor.ca/ijcarchive)

**Recommended Citation**


This IR is brought to you for free and open access by the International Joint Commission at Scholarship at UWindsor. It has been accepted for inclusion in International Joint Commission (IJC) Digital Archive by an authorized administrator of Scholarship at UWindsor. For more information, please contact [scholarship@uwindsor.ca](mailto:scholarship@uwindsor.ca).
INTERIM PROGRESS REPORT
TO THE
INTERNATIONAL JOINT COMMISSION

GREAT LAKES WATER QUALITY BOARD
NOVEMBER 1984
International Joint Commission
United States and Canada

Commissioners:

Transmitted herewith is the 1984 Progress Report of the Great Lakes Water Quality Board.

This report covers the activities of the Board and its working committees and groups from November 1983 through October 1984.

Respectfully,

J.D. Kingham
Chairman
Canadian Section

V.V. Adamkus
Chairman
United States Section

November 1984
# TABLE OF CONTENTS

## ACTIVITIES

<table>
<thead>
<tr>
<th>Activity</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Meetings</td>
<td>1</td>
</tr>
<tr>
<td>2. Operation of the Board</td>
<td>1</td>
</tr>
<tr>
<td>3. Annual Reports</td>
<td>3</td>
</tr>
<tr>
<td>4. Toxic Substances</td>
<td>4</td>
</tr>
<tr>
<td>5. Surveillance and Monitoring</td>
<td>5</td>
</tr>
<tr>
<td>6. Areas of Concern</td>
<td>6</td>
</tr>
<tr>
<td>7. Phosphorus</td>
<td>8</td>
</tr>
<tr>
<td>8. Municipal and Industrial Point Sources</td>
<td>8</td>
</tr>
<tr>
<td>9. Dredging</td>
<td>9</td>
</tr>
</tbody>
</table>

## ATTACHMENTS

<table>
<thead>
<tr>
<th>Attachment</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Rationale for and Status of Surveillance Plans for the Great Lakes and Connecting Channels.</td>
<td>15</td>
</tr>
<tr>
<td>3. Criteria and Guidelines for Identifying and Reporting on &quot;Areas of Concern&quot;.</td>
<td>23</td>
</tr>
<tr>
<td>4. Preliminary Review of the Class &quot;B&quot; Areas of Concern.</td>
<td>25</td>
</tr>
<tr>
<td>5. Terms of Reference and Proposed Membership for a Nonpoint Source Subcommittee of the Water Quality Programs Committee.</td>
<td>35</td>
</tr>
<tr>
<td>6. Great Lakes Point Source Data Needs.</td>
<td>37</td>
</tr>
</tbody>
</table>

## WATER QUALITY BOARD MEMBERSHIP

Page 43
ACTIVITIES

1. Meetings

The Board held 4 meetings, January 18-19, 1984; March 30, 1984; June 26, 1984; and October 12, 1984, in the period covered by this report.

2. Operation of the Board

During this period the following changes in the Board's membership have taken place:

Dr. James Kingham, Environment Canada, Ontario Region, was appointed Canadian Co-Chairman of the Board replacing Mr. Howard Ferguson.

Dr. David Villeneuve, Health and Welfare Canada, has been appointed replacing Mr. J.R. Hickman of the same agency.

The Board has proposed several changes in its committee structure (Figure 1). These changes are briefly described below:

Under the Surveillance Work Group, seven lake and connecting channel task forces have been established to develop surveillance plans and provide a mechanism for collecting and reporting surveillance and monitoring information for the Board's reports on Great Lakes water quality.

A Coordinating Committee for the Assessment of Chemicals in the Great Lakes Ecosystem has been formed to coordinate the collection and dissemination of information needed by the Toxic Substances Committee, Surveillance Work
Group, Human Health Effects Committee, and Aquatic Ecosystem Objectives Committee in order to assess the hazard involved from chemicals identified in the Great Lakes ecosystem. The Coordinating Committee replaces the Priority Lists Task Force which was never formally approved by the Commission.

Rather than having a specific Task Force of the Toxic Substances Committee attempt to prioritize chemicals of concern in the Great Lakes ecosystem, the approach now being used is to have existing committees assess the hazard of chemicals identified in the Great Lakes from their perspective: human health, aquatic ecosystem and surveillance needs, etc.. The Coordinating Committee's primary role is to coordinate these activities and facilitate the transfer of information and data needed by the groups in conducting their assessments.

A Nonpoint Source Subcommittee has been proposed to assist the Nonpoint Source Coordinators, see Item No. 7.

3. Annual Reports

The 1983 Report on Great Lakes Water Quality was submitted to the Commission in November 1983.

As requested by the Commission, the Board will submit its next major Report on Great Lakes Water Quality in April 1985 with formal presentation of the report at the Third Biennial Meeting on Great Lakes Water Quality scheduled to be held June 24-27, 1985 in Kingston, Ontario.

The report will focus on four major issues affecting Great Lakes water quality: a perspective on the problem of toxic substances and management strategies for their control; surveillance and monitoring requirements; the Areas of Concern; and, the status of phosphorus control programs. A proposed outline for the Board's 1985 Report is included as Attachment No. 1. The 1985 Report will not provide detailed information on all aspects of the Agreement as in the past, but rather, will focus on the four issues noted above and the Board's recommendations with respect to these issues.
4. **Toxic Substances**

The Board is aware that the major concern for the Great Lakes today is the presence of toxic substances in the water, fish, and wildlife. The public is continually being informed of findings of new substances in the lakes and are warned against eating some Great Lakes fish. However, declines of some residues, such as certain organochlorine substances, have been observed in fish and avian tissue reflecting controls on these substances and these will continue to be monitored closely. Some previously identified problems, e.g., PCBs, DDT, Hg and mirex, continue.

Additional chemicals continue to be identified in all compartments of the Great Lakes. However, it is apparent that the ability to detect the presence of substances in the environment has greatly exceeded the ability to establish their significance and estimate the hazard, if any, which they pose.

The Board is developing an inventory of chemicals which have been identified in the Great Lakes and, through its various Committees, is collating the available information on the characteristics (toxicity, mutagenicity, carcinogenicity, etc.), use and production, and environmental fate of these chemicals. Utilizing this information, the committees (Human Health Effects Committee, Aquatic Ecosystem Objectives Committee, Toxic Substances Committee, and Surveillance Work Group) will attempt to evaluate the potential hazard that these chemicals pose to human health and the aquatic ecosystem. Information and research needs are also being identified. It is anticipated that the Board will be in a position to provide the Commission with a list of chemicals identified in the Great Lakes ecosystem as part of the Board's 1985 Report. The Water Quality Board has initiated a preliminary assessment of those chemicals where sufficient information exists to make hazard assessments, those chemicals for which additional information (use, characteristics, toxicity or exposure) should be developed, and those chemicals which do not appear to be of immediate concern.
5. Surveillance and Monitoring

A major activity of the Board, through its Surveillance Work Group, has been the development of surveillance and monitoring plans for each of the Great Lakes and connecting channels. These plans provide the basis for a coordinated surveillance and monitoring program in accordance with Annex II of the Great Lakes Water Quality Agreement which, if implemented, will provide the information needed to assess compliance with pollution control requirements, progress toward achievement of the Objectives of the Agreement and to measure local and whole lake response to control measures, and to identify emerging problems in the Great Lakes System.

The rationale for and status of the surveillance plans are described in Attachment No. 2. The draft plans represent an elaboration of the original Great Lakes International Surveillance Plans (GLISP), reflecting greater emphasis on toxic substances and embracing a more integrative and holistic ecosystem approach. The plans are currently being reviewed, both internal and external of the Board, to ensure scientific validity and pertinence to the Great Lakes and to the Agreement. The revised plans will be presented to the Board at its 64th Meeting in January, 1985.

In addition to providing the rationale for the Great Lakes surveillance plans, Attachment No. 2 identifies several concerns (i.e., quality assurance, data access and manipulation, and data interpretation and reporting) which the Water Quality Board wishes to bring to the attention of the Commission with regard to: 1) facilitating the coordination of surveillance activities; 2) strengthening linkages with administration of remedial programs; 3) ensuring that high quality data is produced; and 4) ensuring effective implementation of the plans. The Board has especially focused on the quality assurance issue this year. Environment Canada and the U.S. EPA, on the recommendation of the Board, have agreed to fund a position of Great Lakes Quality Assurance Coordinator who will have the responsibility for developing and monitoring the implementation of a quality assurance program for environmental measurements carried out by institutions that support the 1978 Great Lakes Water Quality Agreement.
The jurisdictions are developing Remedial Action Plans for each of the Areas of Concern within the Great Lakes System. Among other things, these Remedial Action Plans will describe the surveillance and monitoring activities necessary to track the effectiveness of remedial actions taken to restore uses in each Area of Concern. These surveillance and monitoring activities should be incorporated in the surveillance plans for the various lakes and connecting channels.

6. Areas of Concern

The Water Quality Board has been frustrated by the lack of progress or its inability to demonstrate progress in resolving the problems identified as Areas of Concern in the Great Lakes System. The Board will continue to place a top priority on resolution of this issue.

In 1981 the Board identified 18 Class "A" and 21 Class "B" Areas of Concern in the Great Lakes ecosystem.

In its 1983 Report the Water Quality Board provided the Commission with a review of the progress in cleanup of the 18 Class "A" Areas of Concern which were identified in 1981 and evaluated in 1982. Those 18 locales contain some of the most serious and long standing water quality problems in the Great Lakes.

This year the Board has been collecting any new environmental data and updated remedial measures information on the 21 Class "B" Areas of Concern which were also identified in 1981. The problems in the Class "B" areas are generally not considered as serious as those in the Class "A" areas. However, the designation of Areas of Concern has been based on relatively imprecise criteria. Qualifiers such as "significant" environmental degradation and demonstration of "severe" impairment of beneficial uses are contained in the guidelines which the Board has used for designating Class "A" Areas of Concern. The use of such criteria was relatively easy in the designation of the more obvious pollution effects in the Great Lakes. For example, sediments in one Class "A" Area of Concern, the Waukegan Harbor are so heavily contaminated with PCBs that they would be classified as a 'hazardous waste' if they are removed by dredging. Contaminated sediments in other areas may be
contributing to the body burden of contaminants such as PCB, Hg and DDT in fish and other aquatic organisms, but it is not clear whether such sediments are the major or even a significant source of contamination.

The initial responsibility for identifying Areas of Concern currently lies with the Great Lakes jurisdictions. Through the Water Quality Board, agencies are asked to identify Areas of Concern in their jurisdiction. The first consideration in determining whether a site should be designated as an Area of Concern is if one or more Agreement objectives, water quality criteria or jurisdictional water quality standards are exceeded. The available environmental data on sediment, biota and water were then reviewed with regard to the number of parameters exceeded, the period of time exceedances have occurred, the magnitude of ambient levels compared to objectives, and the amount and age of the data. This review led to a classification of the areas into "A" or "B". The severity of the problem in terms of uses impacted, the nature of causes (current or historic), and transboundary implications were then considered. The final decision on identifying the 18 Class "A" and 21 Class "B" Areas of Concern was based on a considerable degree of professional judgement and subjective analysis.

The Board's Programs Committee has developed criteria which the Board believes can be used to provide a more objective basis for designating Areas of Concern in the Great Lakes ecosystem. There are many other areas for which we need to maintain a watch and evaluate the effects of pollution control or identify potential problems before they develop into Areas of Concern.

The Programs Committee is also considering specific guidelines, including definitions of terms which can be used as the basis for evaluating the problems in the various Areas of Concern and assessing the adequacy of remedial programs for cleaning them up. The proposed criteria and guidelines are described in Attachment No. 3.

Considering the lack of specific criteria for Areas of Concern, the Board has decided to provide the Commission with some preliminary observations and conclusions on the status of Great Lakes pollution control programs in the Class "B" areas based on its preliminary review of the information submitted by the jurisdictions (Attachment No. 4). The Board will review all of the
Areas of Concern in accordance with the new criteria and will provide a comprehensive report on this review as part of the Board's 1985 Report on Great Lakes Water Quality.

7. Phosphorus

The Parties are proceeding with preparation of phosphorus load reduction plans to achieve the phosphorus target loads for Lake Erie and Lake Ontario pursuant to the Phosphorus Load Reduction Supplement to Annex 3 of the 1978 Great Lakes Water Quality Agreement.

The estimate of the further phosphorus load reduction required to achieve the target load for Lake Ontario is being reviewed and may be revised by the Parties.

It is anticipated that the Parties will table their detailed phosphorus load reduction plans with the Commission in April 1985, as specified in the Annex 3 Supplement.

The Water Quality Board agreed to the establishment of a Nonpoint Source Subcommittee under the Water Quality Programs Committee. The general charge to the Subcommittee is to assess the extent of nonpoint source pollution in the Great Lakes basin and recommend programs for its control. Terms of Reference and proposed membership for this subcommittee are provided in Attachment No. 5. The Subcommittee will also be available to assist the Board in a review of the phosphorus load reduction plans which are expected to focus on nonpoint source control to achieve the required reductions.

8. Municipal and Industrial Point Sources

Since 1973, the Water Quality Board has monitored and reported on the development and implementation of programs and other measures to abate, control, and prevent pollution of the Great Lakes system from municipal and industrial sources. In 1981, 1982, and 1983 the Board reported on the pulp and paper industry, the petroleum refining industry, and municipal wastewater treatment, respectively. Significant progress has been reported in terms of
reductions of loadings of conventional pollutants, such as BOD, suspended solids, oil and grease, heavy metals, and some toxic chemicals such as cyanide.

Computerized data bases are being developed by the Parties to provide the Board and the Commission with a complete inventory of municipal and industrial wastewater treatment facilities in the Great Lakes basin, their pollution abatement requirements, and available information on the amounts and characteristics of their discharges. The specific point source information which the Board believes should be provided by the Parties is described in Attachment No. 6. These data should be made available to the IJC Great Lakes Regional Office in a computerized form to facilitate the preparation of summaries and analyses of the data as required by the Board. One of the principal uses of the data base will be to develop estimates of the annual municipal and industrial point source loadings of phosphorus to the Great Lakes.

Procedures are being developed to ensure that the data provided in these inventories is correct in terms of that which is reported to the jurisdictions. It is recognized that the data are collected by the jurisdictions for their pollution control programs. In most cases the data reported on flow rates and effluent characteristics are "self-monitoring" data provided to the regulatory agencies by the dischargers. At this time the Board is relying on data quality assurance programs in the various jurisdictions for assurance that these data are correct and of acceptable quality. As noted in Section 5 of this report, the Board has recently authorized the appointment of a Quality Assurance Coordinator to encourage the submission to the Board of acceptable quality data and promote coordination between point source monitoring and environmental surveillance activities in the Great Lakes basin.

9. Dredging

In January 1982, the Dredging Subcommittee produced "Guidelines and Register for the Evaluation of Great Lakes Dredging Projects", which supports the site-specific approach to the environmental review of dredging projects and provides guidelines for use in such a review. These guidelines have been
recommended by the Board and the Commission and are being used by the Great Lakes jurisdictions.

Bioassessment of the sediments in areas where dredging is required was suggested as part of the site by specific evaluation procedures. However, standard or comparable procedures for such assessments are not available. The Dredging Subcommittee, through comparative studies of the sediments from two Great Lakes harbors and a workshop on bioassessment techniques, is developing recommendations for their use in evaluating the potential effects of dredging and open water dredge spoil disposal on biota.

The Dredging Subcommittee also maintains a register of dredging projects in the Great Lakes. It is proposed to publish a summary report on dredging activities carried out for the period 1979-1984.
**ATTACHMENTS**

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale for and Status of Surveillance Plans for the Great Lakes and Connecting Channels.</td>
<td>15</td>
</tr>
<tr>
<td>Criteria and Guidelines for Identifying and Reporting on &quot;Areas of Concern&quot;.</td>
<td>23</td>
</tr>
<tr>
<td>Preliminary Review of the Class &quot;B&quot; Areas of Concern.</td>
<td>25</td>
</tr>
<tr>
<td>Terms of Reference and Proposed Membership for a Nonpoint Source Subcommittee of the Water Quality Programs Committee.</td>
<td>35</td>
</tr>
<tr>
<td>Great Lakes Point Source Data Needs.</td>
<td>37</td>
</tr>
</tbody>
</table>
Preface

List of Tables and Figures

Introduction

- Focus of Report is on the major problem facing the Great Lakes; Toxic Substances. It will also include reports on: Areas of Concern, Phosphorus, and Surveillance.

Recommendations

- Toxic Substances
- Areas of Concern, including the new criteria/system
- Phosphorus
- Surveillance

1. Toxic Substances

   Statement of the Problem:

   This section discusses the current knowledge of toxic chemicals in the Great Lakes including: toxic chemicals in fish, in-place toxic chemicals, sources (known and unknown), and magnitude of number of chemicals of toxic quality in the environment.

   Current Programs:

   This section describes the programs of Parties to control the release of toxic chemicals, the warning systems (fish advisories), and the removal of in-place toxic chemicals. This section will also discuss the activities of the Coordinating Committee for the Assessment of Chemicals in the Great Lakes Ecosystem.

   Research and Surveillance Needs:

   This section describes the on-going and needed additional research and surveillance related to toxic chemicals in the Great Lakes.

   Human Health:

   This section describes what is the current and needed programs that deal with human health impacts of toxic chemicals in the Great Lakes.
2. Areas of Concern

- Background of the Areas of Concern Concept:

This section describes the history of the Areas of Concern, including the evolution of Class "A" and "B" areas. This section will also have a summary of the Class "B" inventory recently completed by the IJC staff.

- Description of the New Criteria:

This section explains in detail the new criteria that will be used to deal with Areas of Concern. It will describe the new criteria as the rational next step to dealing with the Areas of Concern.

- Listing and Classification of the Areas of Concern:

Using the new criteria, this section will describe each Area of Concern according to its relative significance and progress in the development of Remedial Action Plans for restoring uses.

3. Phosphorus

- Background:

This section will review the problem of phosphorus in the Great Lakes and describe programs being implemented in accordance with Annex 3 to control phosphorus inputs.

- Status:

This section will report on the progress, in terms of load reductions achieved, as well as the remaining problems and targeted reductions. Observed impacts of phosphorus load reductions in terms of in-lake phosphorus concentrations and other eutrophication indices will also be reported.

- The Programs:

This section will give a report on the point and non-point programs underway and plans to deal with the remaining problems related to phosphorus control.

4. Surveillance

- Description of the Surveillance Program:

This will be the overview and strategy of the surveillance programs for the Great Lakes. It will describe the reason that the various lake plans are different and what common threads exist. It also will discuss the Parties' ability to implement the plans as recommended.
Summary of the Lake Plans:

This will be a brief description of the plans for surveillance of each Lake.

Summary of Lake Status:

This will be a brief discussion of the status of each of the Great Lakes with a more detailed summary of the status of Lakes Huron and Erie based on the intensive survey reports.

5. Agreement Progress

- Point source compliance
- Non-point source pollution
- Pollution from shipping activities
- Dredging
- Discharges from onshore and offshore facilities
- Hazardous polluting substances
- Airborne pollutants
- Objectives, standards and limited use zones

These sections will be brief. Reporting existing information on these topics. (Perhaps page each).

Membership List

Glossary

6. Appendices.

- The Appendices will be identified as necessary and as agreed upon by the Water Quality Board.
RATIONALE FOR DEVELOPMENT OF THE PLANS

Great Lakes monitoring and surveillance activities have a long history of being fragmented and discontinuous, whereby two federal governments, eight states, and two provinces have variously conducted pertinent programs. In an effort to provide for better coordination and continuity, the Great Lakes International Surveillance Plan (GLISP) was prepared in the late 1970's under the auspices of the Great Lakes Water Quality Agreement of 1972 (and renewed and revised in 1978) between Canada and the United States.

The GLISP called for both an annual surveillance and monitoring program on each lake and connecting channel, and a periodic intensive component which would focus on a particular lake. In practice, except for annual compliance monitoring of water quality objectives, the intensive surveys have received the most emphasis. Because of the large sizes and generally long water retention times of the lakes, long-term changes in water quality occur slowly; therefore, programs under GLISP were to follow a nine-year cycle of intensive activity on each lake. The purpose of the intensive survey was to provide a comprehensive integrated state-of-the-lake assessment. The intensive survey being completed this year on Lake Superior represents completion of the first cycle.

Since the development of GLISP, the review of accumulated data has identified a need to modify the surveillance strategies in order to more effectively address current Great Lakes water quality issues and problems. This need for modification also reflects changes in program emphasis toward toxic substances, especially accumulation in sediment and fish, and in the thinking of the Water Quality Board and the International Joint Commission communities as a whole towards surveillance (i.e., that surveillance and monitoring must embrace the ecosystem approach). Accordingly, the Board established seven lake and connecting channel task forces in spring 1983 and charged them, among other things, to revise GLISP by designing a scientifically defensible surveillance plan which, in its professional judgement, is necessary and sufficient to meet the requirements of the 1978 Canada-United States Great Lakes Water Quality Agreement.

The seven task forces (one each for the five Great Lakes and one each for the upper and lower connecting channels) were charged with developing and reviewing, on an annual basis, design details of an international surveillance plan for their respective portion of the Great Lakes. Members were selected by the Surveillance Work Group to serve because of their professional expertise and experience. They were specifically challenged to develop scientifically defensible plans unencumbered by present programs, affiliation, or financial considerations. Although the Surveillance Work Group provided a communication link among the task forces, it did not structure their activities or directions; instead, free and creative input to the plans was encouraged.
STATUS OF THE DRAFT PLANS

Drafts of all the plans have been completed to date except for Lake Superior and the Niagara River.

The Lake Superior Task Force recommends completing its plan following completion of its intensive survey report. It expects to rely heavily upon the results of the intensive survey in developing its plan. The plan is scheduled for completion in 1985.

Similarly, in order to avoid duplication, development of the plan for the Niagara River was deferred, pending completion and release of the report of the Niagara River Toxics Committee. Using that report as a basis, the Niagara & St. Lawrence Rivers Task Force will prepare a plan for the Niagara River. The plan will be completed by March, 1985.

REVIEW OF THE PLANS

The Surveillance Work Group and its task forces have recommended that the plans be reviewed, internal and external of the Water Quality Board, to assure their scientific integrity and ability to meet surveillance and monitoring requirements under the Great Lakes Water Quality Agreement. The review is being conducted by major components across all of the plans. For example, individuals with expertise in contaminants will be asked to review each of the plans with specific focus on the contaminants sections. The reviewers are being requested to examine the plans for: 1) scientific validity; 2) pertinence to the Great Lakes and the Water Quality Agreement; 3) adequacy of treatment of components within each plan; and 4) adequacy of treatment of components among plans. External reviewers consist of scientists within the Great Lakes research community and elsewhere in Canada and the United States. Internal review was initiated following the Board's 63rd meeting; at least three sets of plans sent to each Water Quality Board member for review within their respective agency.

The timetable for review is as follows:

- October 12. Draft Plans presented to WQB discussion and submission for agency review.
- November 30. Deadline to receive external review and agency comments.
- January 16-17, 1985. Submission of revised Plans to the Water Quality Board.
GENERAL HIGHLIGHTS OF THE PLANS

The International Joint Commission, the Great Lakes Fishery Commission, and the 12 associated state, provincial, and federal Great Lakes resource agencies are committed to the ecosystem approach for the resolution of water quality and other major Great Lakes issues. This means that surveillance must become holistic. The ideal product from such a holistic program in the Great Lakes is a coherent annual "snapshot" which is an accurate gauge of the health of the system.

The ecosystem approach requires a change, more so in focus than in methodology. No major change is anticipated in the basic sampling and analysis techniques except that more biology is included in these plans in comparison to the original GLISP. What is required is coordination at the planning, implementation, and reporting levels in order to link appropriate surveillance components. This will entail selection of common sampling sites, sampling schedules, and data collection targets, and will also include compatible data recording and storage. The summarization process will also require use of common due dates and use of standard terms to link water quality and the status of the ecosystem. The objective has been to make surveillance programs more effective in an ecosystem sense, not to enlarge them.

At the outset, these Plans represent an attempt to integrate the necessary components, with the aim to achieve greatly improved data quality and comparability. The first requirement for the ongoing program is that plans be established to complete this process of linking the components from water quality programs through the various levels of the food chain. Historical data series should not be abandoned, simply to satisfy the need for coordination (although this could happen in some cases), and ways must be found to phase over to an ecosystem perspective with minimal loss of comparability with past data. The second requirement is creation of an evaluation process which will measure progress towards the ideal program. The third requirement is some assurance of program continuity.

With these goals in mind, the Plans contain the following highlights which are departures or improvements upon the original GLISP.

- Towards an ecosystem approach (i.e., more integrative and holistic, including a better balance of physical, chemical, and biological considerations).
- More emphasis on the connecting channels as discrete resources.
- Generic components when warranted (e.g., atmospheric monitoring common to the entire Basin).
- Individualistic components when warranted (e.g., habitat monitoring, biological community structure monitoring, etc., of specific concern in certain lakes or connecting channels).
Annual planning and implementation instead of periodic, intensive surveys.

- More detailed planning and up-front quality assurance.

- Improved accountability and coordination.

In contrast to the original GLISP, these Plans are dynamic and expect to be reviewed annually and updated as necessary. The Board is aware that some components are not as comprehensively developed as others. It is hoped that some improvements can be accomplished through the review process currently underway. Other improvements will occur as the plans move from concept toward implementation and through the annual updating process as new scientific information is accrued.

Moreover, the Board will undertake specific initiatives, as necessary, to institute required improvements in monitoring and surveillance activities. For example, the Board's Surveillance Work Group has already identified the need to more comprehensively address monitoring and surveillance in Areas of Concern and, consequently, is organizing a workshop on this matter. Similarly, the Board encourages dialogue with other organizations, such as the Council of Great Lakes Environmental Administrators, with interests and concerns related to monitoring and surveillance. Currently, the Board is maintaining communication with the Council concerning its proposed program on atmospheric loading of toxic chemicals to the Great Lakes.

SPECIFIC HIGHLIGHTS OF THE PLANS

Lake Ontario

The draft plan for Lake Ontario is the most detailed and comprehensive of the various lake plans. Task Force members, based largely on experience gained from the Niagara River Toxics Committee, considered that more detailed and "up-front" planning improved the potential for implementation, quality assurance, compatibility and accountability. The plan addresses the major issues of: 1) human health; 2) aquatic ecosystem status, including contaminants, eutrophication, habitat conditions and structure of the biotic community; 3) Areas of Concern; and 4) surveillance-related research requirements. The plan calls for a better balance between water chemistry and biological considerations, attempting to embrace the ecosystem approach.

Lake Erie

Because of intensive municipal and industrial land use in the Lake Erie basin, the nearshore component of the monitoring and surveillance plan is most comprehensively developed. The focus is on tributary and point source loading. The task force recommends a greater use of water intakes as sampling stations in monitoring and surveillance activities. It also suggests that there is insufficient information available to design an adequate monitoring and surveillance program in Lake Erie's many Areas of Concern. Consequently, the Lake Erie Task Force has been the major impetus behind the Surveillance Work Group's effort towards an Areas of Concern Monitoring Workshop.
Lake Huron

The Lake Huron plan was favorably influenced by experiences gained during the 1980 intensive survey. Based on analyses of the open lake intensive survey, recommendations were made on numbers of cruises and numbers of stations necessary to implement an effective long-term monitoring program. The plan is organized by: 1) inputs; 2) outputs; 3) areas of effect, including open lake, nearshore, Areas of Concern and wildlife; 4) quality control; and 5) surveillance-related research needs. Although not as detailed as the Lake Ontario plan, the Lake Huron plan is comprehensive with a summary of measurements and the media in which they are to be made for each operational component. The Straits of Mackinac is being addressed as part of the Lake Huron plan.

Lake Michigan

The Lake Michigan plan is organized by the following operational components: 1) tributaries; 2) point sources; 3) water intakes; 4) open lake; 5) wildlife; 6) atmospheric deposition; 7) Areas of Concern; and 8) indirect measures of water quality. The plan also addresses surveillance-related research and quality assurance. The plan is the least detailed of the draft plans, since the task force has considered separation of the overall plan into a planning document (currently available) and an implementation document (to be prepared).

The Upper Connecting Channels

The Upper Connecting Channels include the St. Marys, St. Clair and Detroit Rivers and Lake St. Clair. In contrast to the original GLISP, the task force considered these waterways as distinct entities rather than as tributaries to lakes. Separate plans have been developed for each of the waterways. The plans focus heavily on toxic contaminants but also include ecosystem quality, especially habitat evaluation. The plans establish a long-term framework for comprehensive monitoring and surveillance activities. The binational study on the Upper Connecting Channels will focus resources, thereby enabling implementation of many of the elements of the plan. The task force recommends that the binational study could most profitably focus its efforts on toxic contaminants in general and specifically on combined sewer overflows and their contribution to toxic contamination and eutrophication.

St. Lawrence River

The St. Lawrence River plan is in many ways similar to the Lake Ontario plan, albeit with necessary focus on riverine features.

CRITICAL ISSUES AFFECTING SUCCESSFUL IMPLEMENTATION OF THE LAKES AND CONNECTING CHANNELS SURVEILLANCE PLANS

Great Lakes surveillance and monitoring involves planning, coordination and implementation. The Great Lakes International Surveillance Plan (GLISP) primarily addressed planning and there was little follow through on coordination and implementation.
Many individuals involved in Great Lakes monitoring and surveillance activities have pointed to the lack of "up-front" coordination as the major shortcoming of GLISP. Monitoring and surveillance programs in the Great Lakes are fragmented among many jurisdictions and organizations and this situation is likely to remain little changed. Consequently, coordination during the planning phase provided by the Surveillance Work Group and its Task Forces should be carried through the implementation phase in order to truly improve monitoring and surveillance programs in the Great Lakes.

The Board's Surveillance Work Group and its Task Forces believe that planning and coordination are indeed within their mandates. Coordination goes beyond planning toward implementation, and the Agreement is quite clear that implementation is a Party responsibility. However, under Article IX and Annex II of the Agreement, the Commission is given some coordination responsibility. If surveillance and monitoring (Annex II) are not compatible, then it is exceedingly difficult for the Commission to obtain the information (Article IX) it requires for its reports, reviews, and recommendations. Therefore, the Water Quality Board, with supporting documentation from its committees, has an obligation to tender advice on both relevant planning and coordination issues to the Commission which, in turn, can tender advice and recommendations to the Parties and the Great Lakes jurisdictions.

The Surveillance Work Group and its Task Forces have deliberated extensively on the respective roles of the IJC and the Parties in coordination of Great Lakes monitoring and surveillance programs. Recognizing that implementation is a Party responsibility, there are the following key issues requiring an IJC/Parties cooperative effort in coordination and oversight:

- Quality Assurance Coordination
- Data Access and Organization
- Data Interpretation and Reporting

Quality Assurance Coordination

The Board considers quality assurance from a broad perspective, encompassing field, laboratory, and data storage activities. Moreover, the Board recognizes that, in order to improve surveillance and monitoring activities commensurate with the letter and spirit of the Agreement, the mechanism for coordination and oversight of quality assurance should be in place before the activities called for in the Surveillance Plans go forward.

The primary responsibility for quality assurance at the working level lies, of course, with various agencies but, to ensure that the level of quality assurance recommended by the Lake and Connecting Channels Task Forces is maintained, a full-time Quality Assurance Coordinator is essential. Memories of the restraints and quality assurance difficulties on the Niagara River Toxics Project are quite clear. To avoid such problems in the future, Environment Canada and the U.S. EPA, on the recommendation of the Board, has agreed to fund the position of Quality Assurance Coordinator. The position will initially be funded for two years, whereupon a reassessment of the position and consideration for continuation will occur. Details, including a position description, are currently being developed.
Data Access and Organization

A crucial factor in the successful development and conduct of the Surveillance Plans is the proper management of the data and information which result from the monitoring and surveillance activities. The Board has the responsibility, not to transmit data, but to provide advice and information to the Commission. Consequently, the Great Lakes Regional Office in behalf of Board activities, should have improved capabilities in accessing, handling and manipulating data for the purpose of developing information to meet the requirements of the Agreement. There is a variety of data base management systems that the Regional Office staff and the IJC Boards should be able to access in a timely manner. There are also many software packages available for processing these data for summarization and display. Such support options are currently being explored in behalf of the Board. In the meantime, the Board has previously recommended to the Commission that the Regional Office position, formerly held by Mr. David Dolan, should be filled and the position description should strongly reflect a data accessing and manipulative function.

Data Interpretation and Reporting

Describing the enhancement and restoration of water quality within the Great Lakes Basin Ecosystem, as defined under Article I (Great Lakes Water Quality Agreement, 1978), requires the synthesis of many separate reports and data bases provided by the participating agencies in the course of meeting their individual mandates. The summation of these separate information sources initiate the process of producing synoptic reports which are sought by the Water Quality Board for reporting purposes. It is the process of melding project completion reports and data summaries into intralake synoptic reports that allow interlake and global comparisons to be made. The ability to do these comparative analyses puts our collective problems and efforts to resolve them into perspective.

The synoptic process requires specialists adept in viewing a broader picture. While this expertise may exist at the agency level, there is seldom time or manpower available to exercise it without a specific terms of reference (e.g., PLUARG, ULRG, IFYGL, Project Hypo). Subsequently, the Regional Office staff has been frequently called upon to produce these synoptic reports, often in association with a selected agency staff member, but often without such help. Invariably, the individuals involved have had other concurrent work assignments and the time to generate reports has been inordinately long.

As the demand for reporting in the framework of the ecosystem perspective increases, as it already has, the demand for Regional Office staff has likewise increased. Thus far the demand has been partially met, but not without sacrifices. If the Water Quality Board is to continue to improve the scope and quality of its reports to the International Joint Commission, then the mechanisms for the production of these reports must be expanded to meet the need. There are several ways to meet this need, which include expanding data accessing ability within the Regional Office with personnel and equipment (outlined above), and developing a Report Writing Team.
To improve the quality of reports and their timely appearance, the concept of a Report Writing Team is being considered in order to produce the output (e.g., synoptic lake reports and the Appendix B surveillance synthesis) from Great Lakes monitoring and surveillance activities for the Water Quality Board. The Report Writing Team could consist of IJC staff, the Quality Assurance Coordinator and special assignments (i.e., short-term secondments or release time from current duties and responsibilities) of pertinent agency personnel.
The Great Lakes represent an important natural resource, providing benefits in the form of water supply, recreation, power, commerce, and fishing to approximately seven million Canadians and twenty-six million Americans. The United States and Canada, by their 1978 Agreement on Great Lakes Water Quality, adopted an ecosystem approach to the restoration and enhancement of the Great Lakes System.

The Agreement goals of restoration and enhancement are based upon protection of the most sensitive use or uses of the waters of the Great Lakes System. Areas of Concern are identified as those locations where the Agreement objectives or jurisdictional standards, criteria, or guidelines to protect uses are exceeded and remedial measures are necessary to restore the most sensitive uses of the lakes or their tributaries which carry pollutants directly affecting the lakes. There may be other tributary waters which may have problems of local concern to the jurisdictions and which could affect the boundary waters. Where these are significant, they should be reported by the jurisdictions but will not be classified as Areas of Concern.

Each Area of Concern, both known and identified by new surveillance information, can be described in relation to the following sequence where:

1. causative factors are unknown and there is no investigative program underway to identify causes.

2. causative factors are unknown and an investigative program is underway to identify causes.

3. causative factors known, but Remedial Action Plan not developed, and remedial measures not fully implemented.

4. causative factors known and Remedial Action Plan developed, but remedial measures not fully implemented.

5. causative factors known, Remedial Action Plan developed, and all remedial measures identified in Remedial Action Plan have been implemented.

6. confirmation that uses have been restored and future deletion as an Area of Concern.

In Item (5) the effectiveness of remedial measures should be evaluated within a reasonable period of time (say three years) to determine whether or not they are sufficient to restore beneficial uses in the Area of Concern. If not, it will be necessary for the responsible jurisdiction to determine
additional remedial measures which will need to be implemented or 2) indicate the level of environmental quality expected in the Area of Concern should further remedial actions not be adopted.

Remedial Action Plans should be developed with a goal of restoring uses. The plans, presently under preparation by the jurisdictions, should include the following:

- Definition of the environmental problem from surveillance information.
- Geographic extent of the area affected (including detailed maps).
- Identification of the media affected (water, sediment, biota).
- Indication of the beneficial uses which are impaired.
- Description of the causes of the problems including identification of all known sources of pollutants involved.
- Remedial measures proposed to resolve the problems and restore beneficial uses.
- Schedule for implementation and completion of remedial measures.
- Identification of jurisdiction and agencies responsible for implementing and regulating remedial measures.
- Process for evaluating remedial program implementation and effectiveness.
- Description of surveillance and monitoring to track effectiveness of the program and eventual confirmation of restoration of uses.

Recommendation:

The Water Quality Board believes that the above noted criteria provide a sound basis for identifying and reporting on Areas of Concern. The Board expects to receive from the jurisdictions their evaluation of all existing Areas of Concern in light of the revised criteria for inclusion in the upcoming 1985 Report on Great Lakes Water Quality. The jurisdictions are expected to provide a schedule for completion of Remedial Action Plans. It is expected that many Remedial Action Plans will be completed by April 1985 and where they are completed they should be reported to the Board at that time. The Board believes that all Remedial Action Plans should be completed within the next two years.
evaluation of the significance of toxic substances in the Areas of Concern,

- consideration of the uncertainties related to remedial measures such as dredging of in-place pollutants, and the eventual response of the environment to the remedial measures,

- priority for dealing with demonstrated problems, and

- progress of assessment and remedial action plans.

The Board will apply the new criteria and guidelines for evaluating progress, or the lack thereof, of remedial programs to correct problems in both the Class "A" and "B" Areas of Concern and a complete report will be presented to the IJC in June, 1985.

In addition to the original 39 areas, other potential Areas of Concern are being identified based on new surveillance information or consideration of upstream tributary problems which could impact the Great Lakes. To date, these include, the Kalamazoo River, Torch Lake, and Deer Lake-Carp Creek-Carp River in Michigan; the Grand River at Fairport in Ohio; and, the lake sediments in the vicinity of Port Colburn in Ontario. It is expected that the jurisdictions will include these areas in their review of Areas of Concern for the Board's 1985 Report on Great Lakes Water Quality.

In the meantime, the Board has made some preliminary observations on the environmental problems, their causes and status of remedial measures, in the original Class "B" Areas of Concern listed below:

**Lake Superior Basin**
- St. Louis River, Minnesota
- Thunder Bay, Ontario
- Nipigon Bay, Ontario
- Jackfish Bay, Ontario
- Peninsula Harbour, Ontario

**Lake Huron Basin**
- Spanish River Mouth, Ontario
- Penetang Bay to Sturgeon Bay, Ontario
- Collingwood, Ontario

**Lake Michigan Basin**
- Manistique River, Michigan
- Menominee River, Michigan-Wisconsin
- Sheboygan, Wisconsin
- Muskegon Lake, Michigan
- White Lake, Montague, Michigan

**Lake Erie Basin**
- Clinton River, Michigan
- Wheatley Harbour, Ontario

**Lake Ontario Basin**
- Eighteen Mile Creek, New York
- Rochester Embayment, New York
- Oswego River, New York
- Toronto Waterfront, Ontario
- Port Hope, Ontario
- Bay of Quinte, Ontario
ENVIRONMENTAL PROBLEMS

The predominant problems in eight of the 21 Class "B" Areas of Concern are associated with toxic substances while the remaining 13 areas have both toxic and conventional pollution problems.

Generally, improving environmental conditions were found in the Class "B" Areas of Concern as a result of abatement measures taken to date. In certain areas, however, the nature of the problem has changed. For example, in the St. Louis River in Minnesota, improved water quality has encouraged fish to move into once seriously polluted areas only to become contaminated with chemical materials arising from previously polluted sediments. In the Toronto Waterfront area, changing use practices, including the habitation by large populations of wildfowl, is believed to be in part responsible for variable water quality conditions which may limit the usefulness of these waters for recreational purposes. The matter is under investigation and efforts are being made to accelerate other measures such as combined sewer control programs.

a) Toxic Substances

In all of the Class "B" Areas of Concern, exceedance of one or more toxic substances (e.g. heavy metals, organics) guideline or objective for the protection of aquatic life, human health, and/or for the open water disposal of dredged spoils has been reported. Some Areas of Concern exhibit periodic exceedances of the objectives/guidelines, as opposed to chronic, which possibly attests to improving conditions. Exceedances of objectives/guidelines related to only toxic substances and not conventional pollutants were reported in the following areas: the Manistique River, Menominee River, and Sheboygan—Wisconsin in the United States; and the Spanish River mouth and Port Hope in Canada.

The most recurring exceedance of objectives or guidelines relate to those developed for the protection of human health. Fish consumption advisories are in effect in 18 of the 21 Class "B" Areas of Concern; exceptions being the Clinton River, and White and Muskegon Lakes. Where such advisories exist they may also apply beyond the Area of Concern and relate to a larger part of a lake or channel and not necessarily be associated with the local area identified. In 13 Areas of Concern, the fish consumption advisories have been issued primarily because of contamination by PCBs and in 15 others because of mercury contamination. Fish contaminated with mirex, 2,3,7,8 TCDD, and DDT have also been reported for some of the Class "B" Areas of Concern. It should be noted that all contaminants of concern may not be included in an advisory because it may be decided that existing advisories are adequate to protect users from newly identified contaminants.

While high PCB and mercury levels are found throughout the Great Lakes, fish contaminated with mirex or DDT tend to be more lake specific. Mirex and 2,3,7,8-TCDD are predominantly found in the Lake Ontario Areas of Concern. DDT has been found in the fish samples taken from the Areas of Concern in Lakes Ontario and Michigan.
b) Conventional Pollution

Exceedances of water quality objectives/guidelines for conventional pollutants continue to be observed in 14 Areas of Concern even following adoption of remedial measures. The most recurring conventional pollutant exceedances are high coliform bacteria levels which often lead to beach closings, and exceedance of nutrients and dissolved oxygen objectives/guidelines which may indicate a potential for eutrophic conditions.

Coliform objectives are exceeded at Thunder Bay, Nipigon Bay, Jackfish Bay, Peninsula Harbour, Pentang Bay-Sturgeon Bay, Wheatley Harbour, and intermittently in Toronto Waterfront, and the Bay of Quinte in Ontario, and Clinton River in Michigan. Phosphorus enrichment is a problem at Muskegon and White Lakes in Michigan, and Thunder Bay, Penetang Bay-Sturgeon Bay, Collingwood Harbour, Toronto Waterfront, and the Bay of Quinte in Ontario. Low dissolved oxygen levels are observed at Nipigon Bay and Wheatley Harbour in Ontario.

CAUSES AND REMEDIAL MEASURES

Municipal and industrial discharges have historically been the major source of pollutant loadings to the Great Lakes. Since the early 1970s, the major emphasis of remedial programs has been on the control and subsequent reduction of pollutant inputs to the Great Lakes from these sources. These programs have been effective in reducing loadings of both conventional pollutants (e.g. nutrients, bacteria, and oxygen consuming materials) and to some extent toxic substances (e.g. heavy metals, organics, and phenols) to the Class "B" Areas of Concern. Most point sources are generally in compliance with their current discharge effluent requirements. In Areas of Concern where municipal and industrial activity is intense, the need for additional or more restrictive discharge requirements is under evaluation. In addition, as the point sources of pollution come under increasing control, nonpoint sources (e.g. agricultural and urban drainage, waste disposal and industrial sites, and combined sewer overflows) are becoming more important contributors of pollutant loadings in many of the Areas of Concern and may become the most significant factor to be considered in achieving environmental goals in these areas.

In some Areas of Concern, past practices or former waste disposal and industrial sites, and previously uncontrolled municipal or industrial point sources are responsible for the pollution of water and sediments which continue to affect aquatic life. Since the environment is generally slow in responding to abatement measures, improvement in water quality may not yet be apparent, and if it is, the local sediment and biota may still be contaminated. For example, high mercury levels observed in the Lake Superior Areas of Concern are generally attributable to the past use of mercury based slimicides by the pulp and paper industry and past discharges from chlor-alkali plants. Such discharges have resulted in the current problem of "in-place pollutants". The sediments in 20 of the 21 Class "B" Areas of Concern are moderately to heavily contaminated, mainly with toxic substances. In some cases, the contaminated sediments may be contributing to a problem in an Area of Concern.
a) Point Sources

i) Municipal

The construction of new municipal wastewater treatment systems and improvements to older facilities have generally decreased conventional pollutant loadings in the Class "B" Areas of Concern. In Canada, for example, phosphorus removal facilities have recently been installed at the municipal wastewater treatment plants at Penetanguishene, Midland, Port McNicoll, and Victoria Harbour. On the United States side, recent upgrading and construction of municipal wastewater treatment plants in the Lake Ontario basin Class "B" areas have resulted in most plants complying with phosphorus discharge limits. In both countries, the majority of the larger municipal point sources in the Class "B" Areas of Concern are in compliance with jurisdictional effluent discharge limits.

Activities presently underway in the Canadian Class "B" areas to improve municipal wastewater treatment include the construction of secondary treatment facilities for the Village of Wheatley, Collingwood Township, and Thunder Bay. Scheduled completion dates are respectively, March 1985, 1986, and the end of 1984. At the Picton and Napanee plants (Bay of Quinte), the cause of phosphorus effluent exceedances are under investigation and the subsequent completion of remedial measures are scheduled for December 1984 and December 1985, respectively. The largest municipal wastewater treatment project underway in the Class "B" Areas of Concern is the five year $130,000,000 Capital Works Program for expanding and upgrading the Toronto Main plant, including improving sludge handling and disposal capabilities.

In the United States, three major municipal projects underway in Class "B" areas include the construction of facilities for the City of Mt. Clemens (Clinton River) by April 1988, resumption of construction at the Menominee (MI) plant, depending upon funding, with an expected completion date of 1987, and the installation of phosphorus removal facilities or construction of facilities for several municipalities within the Oswego River basin between 1984-86.

The Board finds that municipal point source remedial measures have been initiated in all 15 Areas of Concern where these sources had been identified as contributing to conventional pollutant problems. These measures will significantly reduce the pollutant loadings in these areas. However, in three cases, the environment is expected to respond only slowly to the abatement measures because of limited exchange of local waters with the rest of the lake. This situation occurs at Penetang-Sturgeon Bay, Collingwood Harbour, and Wheatley Harbour.

It is expected that all major municipal dischargers will have implemented measures adequate for the control of conventional pollutants by the late 1980s. The major effort in the United States is turning to pretreatment of industrial wastes entering municipal sewer systems. Where pretreatment programs for industrial waste control have only recently been adopted, delayed response of the lakes to these measures may be anticipated.
Industrial point source dischargers have been identified as major contributors to problems in 13 of the Class "B" areas but generally are now in compliance with permitted discharge effluent levels. However, it must be recognized that discharge limits do not necessarily address toxic substances, and much remains to be done in reviewing the impact of these discharges in the Areas of Concern. In five of the Areas of Concern, remedial measures have been completed to correct past pollution problems associated with industrial point source discharges. These areas include the St. Louis, Manistique, Menominee, Sheboygan, and Oswego Rivers in the United States. A new control order was issued to American Can at Peninsula Harbour that requires an abatement program to ensure compliance with BOD, suspended solids, and toxicity requirements by 1989. In the case of the Spanish River, Eighteen Mile Creek, Wheatley Harbour, and Bay of Quinte, reassessment of conditions is required to determine response to recently installed industrial pollution abatement facilities.

The Pulp and Paper Facility Program in Canada has been instrumental in the modernization of plant production and pollution abatement facilities that have led to subsequent improvements in effluent quality. Possible further measures to address any lingering problems with phenols and bacteria are being considered or negotiated for the pulp and paper mills at Thunder Bay, and Domtar Packaging at Nipigon Bay, and Kimberly Clark of Canada Limited at Jackfish Bay.

Despite some uncertainties with control of toxic substances, it is expected that most of the major industrial point source discharges in the Class "B" Areas of Concern will have implemented measures to attain compliance with their effluent requirements by the late 1980s.

b) Nonpoint Sources

With increasing control of point sources, nonpoint sources are becoming relatively more important contributors to pollution problems. In 14 Class "B" areas, nonpoint sources such as waste disposal and industrial sites, combined sewer overflows, and/or urban and agricultural drainage have or currently are contributing to identified pollution problems.

i) Waste Disposal and Industrial Sites

Waste disposal and industrial sites have in the past and in some cases continue to contribute seepage or other discharge of toxic substances in six of the Class "B" Areas of Concern. In the U.S. these include the Inter-Lake Iron and U.S. Steel Corporation facilities in the St. Louis area (PAHs and possibly heavy metals), the Ansul Corporation old waste disposal site in the Menominee River area (arsenic), Tecumseh Products Die Castings site in the Sheboygan River area (PCBs); and in Canada, Eldorado Nuclear in the Port Hope area (radionuclides) and the Domtar Chemical Wood Preserving Division lumber yard in the Bay of Quinte area (PCPs). In all cases remedial measures have been initiated to assess or control the problems identified with these sites, some of which are no longer in use. Remedial actions taken in specific cases are described below.
Removal of contaminated materials from the Ansul Corporation pesticide waste disposal site and the Tecumseh Products Die Castings site were completed in the late 1970s and 1981 respectively. Contaminated soils were removed from the Domtar Chemical Wood Preserving Division site in 1980 and in late 1983 an activated carbon treatment system was installed to facilitate removal of PCPs from the cooling waters and lumber yard drainage. Contingency spills from the uranium refinery at Eldorado Nuclear Ltd. are expected to be minimal since relocation of some of the operations and changes in the manufacturing process have been completed. Activities underway include the restoration of groundwater quality at the Ansul Corporation and Hooker Chemical sites, and the initiation of investigative studies at the Inter-Lake Iron site and U.S. Steel Corporation facilities for determining both the extent of contamination and feasibility of clean up.

In three other Class "B" Areas of Concern, waste disposal and industrial sites have the potential of contributing toxic substances. These include the Pollution Abatement Service hazardous waste site for PCBs in the Oswego River area, Cordova Chemical Company for various toxic organics in the Muskegon Lake area, and Liquid Disposal Incorporated site for toxics in the Clinton River area. Remedial measures have been initiated at both the Pollution Abatement Service and the Liquid Disposal Incorporated sites. None have thus far been proposed for the Cordova Chemical Company site. All three should be kept under observation.

11) Combined Sewer Overflows and Urban Drainage

Combined sewer overflows and urban runoff are reported to be contributing to pollution problems in eight of the Class "B" Areas of Concern. Progress is being made at controlling these sources of pollution in four areas.

The most ambitious program currently underway for controlling combined sewer overflows is at Rochester, New York where projects totalling $92.3 million are nearing completion, and an additional $80 million has been committed to the ten-year West Side Tunnel System Project.

Separation of combined sewers in the City of Toronto is an ongoing program that has been underway for some time. Increased funding to accelerate the program in 1984 and other improvements to the new trunk sewer system, are expected to substantially improve bacteriological conditions for the beaches of the Toronto Waterfront and reduce phosphorus loadings.

Other remedial actions being directed at urban nonpoint sources of pollution include an investigation of combined sewer overflows in the Eighteen Mile Creek area, and the reconstruction of sanitary sewers and installation of storm sewers for the Town of Penetanguishene (Penetang-Sturgeon Bay) which have been ongoing since 1970.

Remedial actions have not been planned for the control of combined sewer overflows or urban runoff in the Clinton River, Oswego River, Muskegon Lake, and White Lake watersheds. Until appropriate measures are initiated, urban nonpoint sources will continue to be contributors of pollutants to these basins.
iii) Agricultural Land Runoff

Agricultural land runoff is considered a relatively minor source of pollution in the Class "B" Areas of Concern. Regardless, remedial measures to control agricultural pollution inputs have not been initiated nor are even proposed in the four Areas of Concern affected - Muskegon and White Lakes in Michigan, and Wheatley Harbour and Bay of Quinte in Ontario. Indications are that more stringent control of traditional point sources and possibly urban nonpoint pollution control will produce the necessary improvements in environmental quality.

c) In-Place Pollutants

Probably the most common water quality problem in the Class "B" Areas of Concern is in-place pollutants. Sediments in 20 of the 21 Class "B" Areas of Concern (exception being Penetang-Sturgeon Bay) are moderately to heavily contaminated, mainly with toxic substances. In some cases the contaminated sediments have led to disruption of the aquatic community and contributed to high contaminant levels in other environmental media. Where dredging for navigation is required, it is often necessary to place restrictions on dredging-related activities. For some Areas of Concern, the only objectives/guidelines exceeded pertain to contaminated sediment destined for dredging and open water disposal of the spoils. Where such situations arise, special precautions with disposal must be taken since the contaminated sediments may have to be treated as hazardous wastes.

The major cause of high contaminant levels in sediment are past waste disposal and treatment practices. In all of the Areas of Concern, however, continuing contamination from existing point and nonpoint sources may still be occurring. In rare cases, occasional accidental spills are believed partially responsible for the pollution of sediments. Further analysis is needed in most of the Class "B" areas to determine whether in-place pollutants are historic or being replenished and, if so, sources should be identified. In three Class "B" Areas of Concern - Collingwood Harbour, Wheatley Harbour, and Rochester Embayment - studies have been initiated to identify the sources of the contamination.

Since the management of contaminated sediments often entails expenditures of many millions of dollars, ample justification is needed to proceed with the preferred management strategy. Adequate evidence of impaired water quality or high contaminant residue levels in biota attributable to in-place pollutants, does not exist in many Areas of Concern and remedial measures have not as yet been undertaken in these areas. As was observed in reviewing the Class "A" Areas of Concern, little is known of the bioavailability of chemical compounds in sediment. The dearth of knowledge is further compounded by the fact that bioavailability would vary from one area to the next depending upon the local chemical, physical, and biological processes. Consequently, the relative significance of in-place pollutants to high contaminant residue levels observed in fish is often unclear.

The Governments of Canada and the United States, and the Great Lakes jurisdictions continue to develop investigations for assessing the significance of in-place pollutants. Priority attention is generally being
given to the Class "A" Areas of Concern, but also include certain high priority areas that were classified as "B". The Province of Ontario expects to conclude its analysis of these problems in 1985 which will include development of recommendations for further remedial work where warranted.

In some of the Class "B" Areas of Concern, the best management alternative may be no action. Natural processes could be relied upon to decrease the sediment contaminant concentrations to acceptable levels. Both the degree and rate of improvement, however, would vary from one area to the next depending on local chemical, physical, and biological processes. Isolation of contaminated sediments from aquatic biota, for example, will occur if the uncontaminated sediments delivered to an Area of Concern by tributary flow covers the contaminated sediment faster than the diffusion rate of the contaminants into the overlying uncontaminated water. The contaminated sediments may also be translocated or purged from a given Area of Concern. Conversely, any form of agitation such as the dredging of the spoils, could temporarily increase the extent and severity of the already existent pollution problems.

At Thunder Bay, Wheatley Harbour, and the Toronto Waterfront areas, where dredging is necessary to keep the shipping lanes open, confined disposal of contaminated dredged spoils is utilized. This is necessary given restrictions on the open water disposal of contaminated sediments. There is also some concern about the environmental effects of the residual chemical compounds that may be released in dredging and disposal operations. The Board sponsored a workshop in Ann Arbor, Michigan, on September 11-12, 1984 that examined the applicability of using four different bioassessment techniques for evaluating impacts on biota from the initial dredging stage to final disposal of the contaminated sediments. Sediments from Toledo and Toronto Harbours were used. The findings of the workshop and detailed proceedings will be available in early 1985.

Environmentally sound methods of managing contaminated sediments are being examined in the Sheboygan River, Rochester Embayment, and Port Hope Areas of Concern. At Sheboygan, a plan is being formulated to reduce the impact of contaminated sediment on aquatic biota while maintaining navigation. An abatement strategy is being developed for the Rochester Embayment area following a detailed definition of the in-place pollution problem and identification of sources. For Port Hope, alternative management approaches have been proposed and are undergoing review.

Given the complex nature of the problem, the Great Lakes Science Advisory Board was requested to further examine the in-place pollution issue particularly with respect to the Areas of Concern in the Great Lakes Basin. In response, a workshop on "The Ecological Effects of In-Situ Sediment Contaminants" was held in Wales, August 19-24, 1984. The specific topics discussed included:

1. the physical, chemical, and biological processes involved in the transfer, cycling, and movement of contaminants;

2. impact of sediment mediated contaminants on aquatic organisms;
3. methods of assessing bioavailability and impact assessments including measurements of system recovery both chemical and biological;

4. assessment of socio-economic ramifications; and

5. remedial options.

A summary of findings and detailed proceedings of this workshop should be available in early 1985.

CONCLUSIONS

1. Based on a preliminary review of the available environmental data and remedial measures information, the Board concludes that some progress is being made in alleviating the environmental problems encountered in the Class "B" Areas of Concern. Conventional pollutant loadings (e.g. nutrients, bacteria, and oxygen-consuming materials) are generally decreasing as a result of municipal and industrial point source controls, and attention is shifting to control of toxic substances which often contribute persistent effects in sediment and biota where wastewaters with these constituents are discharged into water systems. In all of the Class "B" Areas of Concern, levels of one or more toxic substances have been found which exceed an objective or guideline for the protection of aquatic life or human health, or for the open water disposal of dredged spoils. The contamination of sports fish in areas such as Penetang Bay and the Bay of Quinte, however, may reflect a lakewide effect rather than a local source.

2. The most recurring problem is that of in-place pollutants. Sediments in 20 of the 21 Class "B" Areas of Concern are moderately to heavily contaminated, mainly with toxic substances. Although in-place pollutants are primarily attributed to past waste treatment and disposal practices, existing sources could be contributing to the pollution levels. Such sources need to be clearly identified for each Area of Concern and the magnitude of contribution determined. The relative significance of in-place pollutants to the high contaminant residue levels observed in fish or the water column is also often unclear since little is known of the bioavailability of chemical compounds in sediments. The significance of in-place pollutant contributions (bioavailability) to the Areas of Concern needs to be assessed.

3. The Water Quality Board needs and is developing new criteria for identifying and classifying Areas of Concern and guidelines for assessing the adequacy of existing or proposed remedial measures for resolving environmental problems and restoring beneficial uses.

4. The Board expects to review Remedial Action Plans, including implementation schedules, under development by the jurisdictions for resolving the residual environmental problems in the Areas of Concern.
BACKGROUND

The Nonpoint Source Subcommittee will provide a needed focus for discussion of nonpoint pollution issues in the Great Lakes basin and will assist the Water Quality Programs Committee and the Water Quality Board in addressing nonpoint sources as a part of a whole systems approach to pollution problems. This would include involvement of interests and agencies which have had relatively little involvement in Agreement activities in the past.

At the IJC Nonpoint Pollution Workshop held in June 1984, participants expressed the need for a vehicle which would provide an opportunity for continuing dialogue on the broad range of nonpoint pollution control issues. It was felt that the June Workshop provided a major contribution in relation to nonpoint phosphorus control related to agriculture but had not met the need to deal with the broad range of urban and rural nonpoint pollution control issues. The proposed Nonpoint Source Subcommittee will assist in fostering the type of information exchange, dialogue, and coordination that the Workshop participants were requesting.

When the Parties complete development of their programs and institutional arrangements for dealing with the nonpoint phosphorus problem there will be a need for work to be done to assist the Water Quality Board to carry out its oversight responsibility including monitoring, surveillance, and evaluation. The Nonpoint Source Subcommittee will provide technical input to the process and will ensure close formal coordination with other subcommittees of the Water Quality Board.

TERMS OF REFERENCE

The purposes of the Subcommittee are to assist the Water Quality Programs Committee and the Water Quality Board: 1) in fulfilling the liaison and coordination functions of the Water Quality Board as cited in Article I(c) of the Terms of Reference of the Great Lakes Water Quality Board; and 2) evaluating the progress of the jurisdictions in controlling nutrients and other pollutants from both urban and rural nonpoint sources to meet the terms of Article VI I(d) and (e) of the Great Lakes Water Quality Agreement of 1978.

The Subcommittee will carry out its responsibilities by:

1. Assessing the extent to which nonpoint sources contribute toxic substances, particularly pesticides, to the Great Lakes and recommending measures to reduce or eliminate these inputs.
2. Providing estimates of the contribution of nonpoint sources of pollution to the areas of concern.

3. Maintaining an awareness of the status, progress, and experience with nonpoint source pollution control programs and fostering information and technology transfer among the Great Lakes jurisdictions.

4. Providing a forum to ensure a comprehensive and coordinated approach to planning and to the resolution of nonpoint source problems.

5. Evaluating the adequacy and effectiveness of nonpoint source pollution control and related programs being implemented in the Great Lakes basin.

6. Reviewing and making recommendations in conjunction with the Surveillance Work Group as to monitoring, modelling, and other data or information needed to assess the extent of nonpoint source pollution and the effectiveness of control programs. Particular emphasis will be given to establishing baseline data requirements, standards for reporting information on programs, and compatible definitions for various remedial practices.

7. Subject to the approval of the Water Quality Programs Committee and the Water Quality Board, establishing task forces of limited duration to assist in the discharge of its responsibilities with respect to specific activities in the Terms of Reference.

8. Preparing annual work plans for the Subcommittee and submitting annual progress reports to the Water Quality Programs Committee.

MEMBERSHIP

The Subcommittee will have a total membership of twelve (12). There will be one (1) American and one (1) Canadian Co-Chairman of the Nonpoint Source Subcommittee appointed by the Water Quality Programs Committee. The other members of the Subcommittee will include six (6) members selected from the various federal, state, and provincial agencies involved in nonpoint sources programs, two (2) members with technical and scientific expertise related to nonpoint source pollution selected from the academic or the private sectors, and two (2) members selected from affected interest groups, such as farm organizations, soil conservation associations, or municipal organizations.

TERM

The Nonpoint Source Subcommittee is hereby established for a term up to December 31, 1988. During 1988 the Nonpoint Source Subcommittee will submit a comprehensive report to the Programs Committee and the Board on the status, operation, and effectiveness of the various nonpoint pollution control programs implemented by the Parties and the Great Lakes States and Province in response to meeting the requirements of the Agreement.
ATTACHMENT NO. 6

GREAT LAKES POINT SOURCE DATA NEEDS

The following identifies the Water Quality Board's information needs with respect to municipal and industrial point source discharges in the Great Lakes basin. The report was developed by a Task Force established by the Programs Committee to consider the following with regard to a Great Lakes point source data base to meet these needs:

- the proposed uses of Great Lakes point source data,
- the specific data and information which are needed for each point source,
- the format in which the data and other information should be provided,
- the date by which all data should be submitted, and
- who should have the responsibility and pay for collecting and processing the data for submission in the required format.

1.0 BASIS FOR COLLECTING AND MAINTAINING GREAT LAKES POINT SOURCE DATA

The fundamental reason for collating data on municipal and industrial point source dischargers to the Great Lakes system, which is collected by the jurisdictions under their regulatory programs, is to provide the Water Quality Board with some of the basic information needed for its reports to the International Joint Commission on Great Lakes water quality. A component of these reports is the Board's assessment of the effectiveness of programs and other measures to abate, control, and prevent pollution of the Great Lakes from point sources and identify any further requirements the Parties need to implement in order to meet their commitments under Article VI - "Programs and Other Measures", Sections 1(a) to (d) of the 1978 Great Lakes Water Quality Agreement. Article VI states that "The Parties shall continue to develop and implement programs and other measures to fulfill the purpose of this Agreement and to meet the General and Specific Objectives. Where present treatment is inadequate to meet the General and Specific Objectives, additional treatment shall be required."

The specific uses for Great Lakes point source data are described in Section 2.0. The data which the Parties, in cooperation with the state and provincial governments, should be required to provide are listed in Section 3.0. The proposed format, schedules and deadlines, and responsibilities for data submission are presented in Sections 4.0, 5.0, and 6.0 respectively.

2.0 USES FOR GREAT LAKES POINT SOURCE DATA

2.1 Determination, for individual municipal and industrial point sources, of compliance with monitoring and effluent restrictions as identified
in NPDES permits, SPDES permits, or Ontario Certificates of Approval or Control Orders; or compliance with Agreement Objectives.

2.2 To facilitate the assessment of the adequacy and extent of implementation of Canadian and United States municipal and industrial pollution abatement programs by providing a basic information source for use by the Water Quality Board’s committees, and task forces, in carrying out pollution control program reviews such as were done for the pulp and paper and petroleum industries, and for municipal sources.

2.3 Determination, on an as required basis, of point source loadings to the Great Lakes of specific pollutants (particularly for phosphorus as required under Annex 3). Provide a continuous record of pollutant loadings.

2.4 Provision of basic information on point source discharges for use by Lake Task Forces in the development of surveillance programs and for future IJC References.

2.5 Assist in the analysis of the 39 areas of concern identified by the Water Quality Board and identification of other potential areas of concern.

2.6 Identification and inventory of hazardous polluting substances in point source effluent discharges, on an as required basis. Indicate the extent of monitoring for toxic substances in effluents and the possible need for additional monitoring.

2.7 Use by Great Lakes researchers and modellers.

3.0 SPECIFIC DATA AND INFORMATION REQUIRED FOR GREAT LAKES POINT SOURCES

The Great Lakes jurisdictions should identify all municipal and industrial point source dischargers to the Great Lakes system. Information provided for each discharger would include Items 3.1 through 3.7 listed below.

Data on effluent and monitoring requirements, effluent quality and pollutant loadings, and schedule and status of meeting requirements (Items 3.8 to 3.14) should be reported on all significant* discharges of pollutants which could have an impact on the Great Lakes. As a minimum this would include the following:

* Note: A "significant" rating is a subjective characterization by knowledgeable professionals that the discharger has a large actual or potential impact on the ecology of the receiving waters, especially on the health of the persons using the water. The rating will be subjective because it will vary with the size of the discharger, the presence of other dischargers, the assimilative capacity of the receiving water, and the parameter(s) of concern.
a) All point sources of all parameters that contribute to problems identified in the "Areas of Concern".

b) All identified point sources of persistent toxic substances and all point sources of radioactive materials.

c) All municipal and industrial point sources discharging more than 3 kg/d of total phosphorus.

Specific data and information which should be available for each point source include:

3.1 Name and address of discharger.

3.2 Indication of type or category of source of wastewater being discharged, such as the Standard Industrial Classification (SIC) Code.

3.3 Permanent identification number (NPDES permit number, facility number, or some other reference number).

3.4 Geographic location of discharge points (latitude and longitude) or UTM.

3.5 The design hydraulic capacity of each individual wastewater treatment system providing treatment prior to discharge.

3.6 Receiving water name, including identification of major and minor basins.

3.7 Stream reach code or other stream identifier.

3.8 Loading and/or effluent concentration requirements as specified in NPDES permit, pollution control order, or other jurisdictional requirement.

3.9 Flow rates of discharge should be reported on a "no less than" monthly average basis by individual pipes which are monitored as specified in NPDES permit, pollution control order, or other jurisdictional requirement.

3.10 Discharge monitoring results should be reported on a "no less" than monthly average basis for all parameters regulated in 3.8, above or, if less frequently monitored, as specified in NPDES permit, pollution control order, or other jurisdictional requirements.

Note: The extent to which total basin loadings of some conventional pollutants, other than phosphorus, need to be calculated from a general point source data base is often questioned. All parameters are not universally monitored. Also, total basin loadings, calculated by summarizing individual calculated loadings for many parameters (BOD, ammonia, ether solubles, cyanide, hydrogen sulphide, TKN, etc.) are often almost meaningless because the contaminants are subject to
oxidation and reduction, etc. In addition, some sources of conventional which may be reported are very remote from the lakes themselves (in some cases 40 to 50 miles) and under almost no circumstances would reported loadings ever gain access to the Great Lakes.

It is recommended that only "significant" loadings, more than 10 kg per day, be reported for conventional parameters such as BOD and suspended solids.

3.11 Number and type of samples from which average values are calculated.

3.12 Schedules or dates for meeting effluent quality requirements.

3.13 Monitoring requirements detailing frequency of sample collection and type of sample (grab, composite).

3.14 The results of any special studies or other sampling data from the significant Great Lakes point source dischargers, with special emphasis on toxic substances, may also be reported.

4.0 FORMAT FOR DATA

The point source data should be provided in a format which permits ready analysis in a Commission identified computer systems. The Great Lakes agencies should cooperate in development of computer software programs to facilitate data transfer to the IJC designated computer system.

5.0 SCHEDULES AND DEADLINES FOR SUBMISSION

Effluent quality and pollutant loading data should be provided on a "Water-Year" basis (October 1 to September 30). All data for a given water year should be made available to the IJC Great Lakes Regional Office no later than June 1 of the next calendar year.

6.0 RESPONSIBILITIES FOR DATA MANAGEMENT

The Parties to the Agreement, through U.S. EPA and Environment Canada, are responsible for ensuring that the IJC Regional Office has access to the required data, in an acceptable format, by the deadline.

7.0 DISCUSSION OF "COMPLIANCE"

Federal, state, and provincial water pollution control agencies have a variety of definitions and bases for determining "compliance" of point source dischargers with regulatory requirements. The Task Force discussed some of the difficulties encountered when attempting to compare the effectiveness of remedial programs given the distinct nature of various jurisdictional requirements.

Some of the variables which make it difficult to compare jurisdictional programs include:
1. basis for establishing effluent requirements,
2. analytical techniques used,
3. specific parameters measured,
4. methods of flow measurement, and
5. method of calculation of loadings ("net" or "gross" basis).

The Great Lakes Water Quality Agreement requires that "water quality standards and other regulatory requirements of the Parties shall be consistent with the achievement of the General and Specific Objectives. The Parties shall also use their best efforts to ensure that water quality standards and other regulatory requirements of the State and Provincial Governments shall similarly be consistent with the achievement of these Objectives". The Task Force believes that an attempt should be made to determine whether or not existing water quality standards and other regulatory requirements of the Great Lakes jurisdictions are consistent with and adequate for achievement of the Agreement Objectives. Comparisons of jurisdictional programs could then be made on the basis of the extent to which dischargers are meeting their jurisdictional requirements.

Another approach is to develop specific criteria or effluent guidelines which are considered adequate to meet the Agreement Objectives. These criteria, such as minimum levels of treatment or specific effluent requirements, could be incorporated in the Agreement and used to determine "compliance" of individual wastewater treatment facilities in meeting the requirements of the Great Lakes Water Quality Agreement.

8.0 CONCLUSIONS

8.1 Computerized data bases currently exist, or are being developed in the Great Lakes jurisdictions, which contain much of the point source information and data required by the Water Quality Board and the Commission.

8.2 There is no need for a single centralized Great Lakes point source data base, provided the two Parties have information systems which contain the data needed, and these data are made available in a suitable form for use by the Commission and the Water Quality Board.

9.0 RECOMMENDATIONS

9.1 The Great Lakes jurisdictions ensure that the point source information and data requirements identified in this report are collected, and maintained in their data management systems, for all their municipal and industrial dischargers within the Great Lakes System.

9.2 The Parties, in consultation with the IJC, continue to develop and maintain computer programs to facilitate access to the point source data identified in this report.
9.3 The IJC ensure that the Great Lakes Regional Office has the capability to access both the U.S. and Canadian point source data bases and has the necessary resources to support any computer programming and computer time necessary for data retrieval and preparation of summary reports to meet the needs of the Commission, the Water Quality Board and Science Advisory Boards and their subgroups, and the public.

9.4 The Water Quality Board has requested its Programs Committee to consider the question of "compliance" and either establish the adequacy of jurisdictional water quality standards and other regulatory requirements to achieve the objectives of the Agreement or propose criteria or effluent guidelines which could be used as a basis for assessing the adequacy of municipal and industrial point source remedial programs.

10.0 MEMBERS OF TASK FORCE ON GREAT LAKES POINT SOURCE DATA

Members

S. Llewellyn, Environment Canada
S. Salbach, Ontario Ministry of the Environment
P. Horvatin, U.S. EPA, GLNPO
P. Mader, Minnesota Pollution Control Agency

Secretary

W. R. Drynan, IJC Great Lakes Regional Office
GREAT LAKES WATER QUALITY BOARD

CANADIAN MEMBERS

Dr. J. D. Kingham (Co-Chairman)
Regional Director General
Ontario Region
Environment Canada
55 St. Clair Avenue, East, 7th Floor
Toronto, Ontario M4T 1M2

Mr. E. T. Wagner
Regional Director
Inland Waters Directorate
Ontario Region
Environment Canada
867 Lakeshore Road, P.O. Box 5050
Burlington, Ontario L7R 4A6

Dr. David C. Villeneuve
Acting Chief
Environmental & Occupational
Toxicology Division
Health Protection Branch
Dept. of National Health & Welfare
Environmental Health Centre
Tunney's Pasture
Ottawa, Ontario K1A 0L2

Mr. Patrick 3. Chamut
Director General
Ontario Region
Pacific & Fresh Water Fisheries
Fisheries & Oceans
3050 Harvester Road
Burlington, Ontario L7N 3J1

Mr. Nelson E. Ball
Regional Director, Ontario
Regional Development &
International Affairs Bureau
Agriculture Canada
102 Bloor Street West, Ste. 420
Toronto, Ontario M5S 1M8

FOR ONTARIO

Mr. William A. Steggles
Environmental & Technical Advisor
to the Deputy Minister
Ont. Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

Dr. Douglas P. Dodge
Supervisor
Environmental Dynamics Section
Fisheries Branch, Room 4422
Ontario Ministry of Natural Resources
Whitney Block, Queen's Park
99 Wellesley St. West
Toronto, Ontario M7A 1W3

Mr. Kenneth J. Richards
Policy Officer
Secretariat for Resources Development
Whitney Block, Queen's Park
Toronto, Ontario M7A 1A2

FOR QUEBEC

Mr. Jean A. Roy
Director General
of Inventories and Research
Environment-Quebec
2360 Chemin Ste-Foy
Quebec City, Quebec G1V 4H2

5/84
GREAT LAKES WATER QUALITY BOARD

UNITED STATES MEMBERS

Mr. Valdas V. Adamkus (Co-Chairman)
Regional Administrator
U.S. Environmental Protection Agency
230 South Dearborn St.
Chicago, Illinois 60604

Mr. Peter C. Myers, Chief
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 2890, Room 5105A
Washington, D.C. 20013

WISCONSIN

Mr. Lyman F. Wible
Administrator
Division of Environmental Standards
Wisconsin Dept. of Natural Resources
P.O. Box 7921
Madison, Wisconsin 53707

MINNESOTA

Mr. Lovell E. Richie
Senior Executive Officer
Minnesota Pollution Control Agency
1935 W. County Road B2
Roseville, Minnesota 55113

INDIANA

Mr. Patrick W. Berger
Office of the Assistant
Commissioner for Environ. Health
Indiana State Board of Health
1330 West Michigan Street
P.O. Box 1964
Indianapolis, Indiana 46206

OHIO

Mr. Robert H. Maynard
Director
Ohio Environmental Protection Agency
P.O. Box 1049
361 East Broad Street
Columbus, Ohio 43216

PENNSYLVANIA

Mr. William A. Cook (Appt. pending)
Pennsylvania Dept. of Environmental Resources
P.O. Box 2063
3rd & Locust Streets
Fulton Bank Building, 9th Floor
Harrisburg, PA 17120

ILLINOIS

Mr. Eugene F. Seebald
Manager
Division of Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

NEW YORK

Mr. Daniel M. Barolo, Director
Division of Water
N.Y. State Dept. of Environmental Conservation
50 Wolf Road
Albany, New York 12233

MICHIGAN

Mr. William D. Marks
Assistant Deputy Director
Environmental Protection Bureau
Michigan Dept. of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Secretariat Responsibilities

Dr. W. Ronald Dryman
Senior Engineer
Great Lakes Regional Office
International Joint Commission
100 Ouellette Avenue, 8th Floor
Windsor, Ontario N9A 6T3