

INTERNATIONAL JOIN COMMISSION

CANADA AND UNITED STATES

**REPORT ON
GREAT LAKES WATER QUALITY
FOR 1972**

INTERNATIONAL JOINT COMMISSION
CANADA AND UNITED STATES

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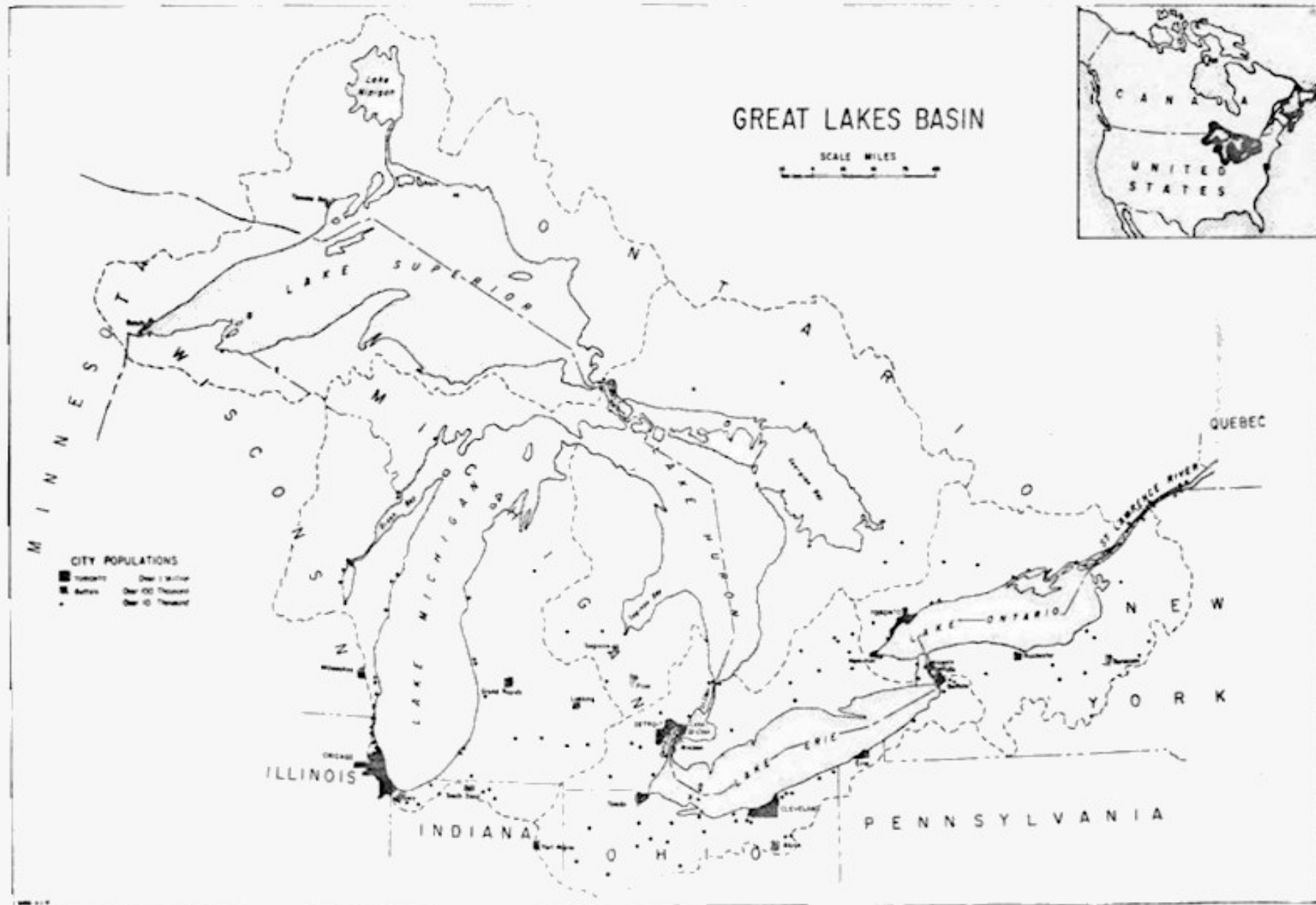



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SUMMARY

This is the first Annual Report of the International Joint Commission pursuant to the Great Lakes Water Quality Agreement between the United States and Canada signed on April 15, 1972. The Commission's report takes cognizance of significant developments through mid 1973, but is based for the most part on the data available in the April 1973 report of the Great Lakes Water Quality Board.

The Board's report, in turn, is based on detailed information from the various state, provincial and federal jurisdictions on their water quality programs and actions and on the observed water quality at the end of 1972. The Board's report is a comprehensive, general assessment of current conditions, but does not include comparison of all specific conditions with those of prior years. Proper assessment of conditions and progress requires a definite schedule of the remedial measures necessary to achieve the objectives of the Agreement and comparison of current water quality with the specific water quality objectives agreed to. Such assessment and comparison will be possible only when the Commission's new Great Lakes Regional Office is adequately funded and staffed to support the Board's activities.

As a result of extensive legislative and administrative action in both countries, much of it of recent origin, the tempo of activities to obtain satisfactory water quality in the Great Lakes has increased appreciably. All jurisdictions now have standards and programs that, if properly implemented, should result in attainment of the objectives of the Agreement but, the extent to which programs and other measures completed or in process of implementation by the target date of December 31, 1975, is not yet determinable.

Meanwhile, it appears to the Commission that further degradation of the water quality of the Great Lakes may have already been slowed down in some respects, but there is not yet available any scientific basis to support a claim for improvement except in local areas or on some parameters, such as in phosphorous loadings.

At this time, the Commission's conclusions and recommendations are concerned primarily with the governmental actions urgently needed to enable the Commission and the various jurisdictions in each country to carry out their responsibilities as contemplated by the Agreement.

The Commission urges timely, positive action by the Governments on the problems outlined in this report to assure that the momentum thus far achieved is increased rather than diminished or lost.

PROCEDURAL ACTIVITIES PURSUANT TO THE AGREEMENT

Water Quality Board

As required by the Agreement, the Commission, in consultation with the Governments concerned, established a Great Lakes Water Quality Board with representation from each of the two Federal Governments and from each Provincial and State Government. The co-chairmen, Dr. A.T. Prince of Environment Canada and Mr. Francis T. Mayo of the U.S. Environmental Protection Agency, were appointed on May 10, 1972. Arrangements were completed by July 13, 1972, for three additional members from the Government of Canada, four from the Ontario Provincial Government, one from Quebec, and one from each of the eight Great Lakes States.

The Water Quality Board held its first meeting on July 19, 1972, and met with the Commission the next day at which time the Commission issued its formal directive outlining the duties of the Board. Through June 1973, the Board held six formal meetings and organized the necessary work groups for its several areas of responsibility. Voluminous data on water quality, waste loadings and current and prospective remedial programs were obtained from the numerous sources involved. These data were summarized and evaluated

by the Board in its first Annual Report of 315 pages submitted to the Commission in April 1973. The Board's report is being transmitted to the Governments with this report of the Commission.

The Board prepared special reports on polychlorinated biphenyls (PCB's), dated January 4, 1973, and on phosphorous loadings for the Upper Lakes, dated March 22, 1973. Action on these reports is discussed later under "Remedial Measures The relationships between the Water Quality Board, the Research Advisory Board, the Upper Lakes Reference Group, and the Land Drainage Reference Group are discussed under those headings.

Research Advisory Board

After consultation with the Governments concerned, the Commission in August 1972, appointed as co-chairmen of the Great Lakes Research Advisory Board, Dr. S.M. Greenfield of the U.S. Environmental Protection Agency and Mr. J.P. Bruce of the Canada Centre for Inland Waters. After additional consultation to ensure representation from appropriate Federal State and Provincial Government agencies and from others involved in Great Lakes research, including the academic, scientific and industrial communities and the general public as called for in the Agreement, the Commission appointed on November 10, 1972, fifteen additional members. The complete Board consists of seventeen members -- eight from each country serving terms of one, two or three years and, ex-officio, the President of the

International Association for Great Lakes Research, who is Canadian or American in alternate years.

The Research Advisory Board held its initial meeting on November 10, 1972, with representatives of the Commission and its staff in attendance. Two additional meetings have been held. The Board reported its program, progress and budgetary requirements at the Commission's April 1973 meeting. With the Commission's concurrence, the Board has established seven standing committees to meet the need for the advice of specialists on such topics as sampling and measurement methods, eutrophication, waste water treatment, the scientific basis for water quality criteria, health aspects, social aspects, and lake dynamics. Close coordination between the Research Advisory Board and the Water Quality Board is maintained by cross-representation at meetings and exchange of minutes.

IJC Regional Office and Annual Budget

The Agreement authorized the Commission to establish a Regional Office in the Great Lakes Basin and called for submission of an annual budget to the two Governments for their approval. After consultation with the Governments, the Commission in September 1972, proposed Windsor, Ontario for the location of the Regional Office, proposed a staffing schedule worked out with the advice of a management consultant, and submitted a joint budget for funding requirements for the U.S. fiscal year 1974 and the Canadian fiscal year 1973-1974. In November 1972, the Canadian Government approved the location, the staffing,

and the budget. In January 1973, the U.S. Government informed the Commission that the authorization of staff and budget proposals for the U.S. would be cut back significantly. The reduced U.S. proposals for staff authorization and funding for FY 1974 have not yet been acted upon by Congress.

Under these circumstances, the Commission has been without authority to proceed with the full staffing required for FY 1974 and has encountered serious difficulties in accomplishing even limited staffing. In Canada, authority and funds are available but the necessity to conform to mandatory requirements for organizational approval, job descriptions and hiring procedures has delayed implementation which is not in prospect until later in 1973.

In the United States, staffing to the limited extent authorized has been delayed by security clearance requirements. This requirement has recently been removed and the lack of authority and funds for staff is being partially overcome by obtaining temporary details of U.S. Environmental Protection Agency personnel to the IJC Windsor Office. This stop-gap arrangement cannot be continued indefinitely.

Nevertheless, despite all difficulties, a Regional Office Director, Charles G. Gunnerson, from the United States, was appointed in March 1973, an Associate Director, Kenneth A. Oakley from Canada, was appointed in May, and the Regional Office was formally opened on May 9, 1973. The Regional Office assisted in the preparation of this first Annual Report of the Commission.

Dredging Work Group

The Agreement provides that the Commission appoint a working group, which is to submit a report to the two Governments by April 15, 1974, on existing dredging practices, programs, laws and regulations, and recommendations for compatible programs governing the disposal of polluted dredged spoil in open water. The Commission established such a group on November 9, 1972, and has been advised that the group expects to complete the required report by the target date.

Upper Lakes and Land Drainage References

In Annexes to the Agreement, the two Governments agreed on references to the Commission to study and report on pollution problems of Lake Huron and Lake Superior and to study and report on pollution in the Great Lakes System from agriculture, forestry and other land use activities.

In October 1972, the Commission appointed the Upper Lakes Reference Group and the Land Drainage Reference Group to investigate and report on these subjects under the supervision of the Great Lakes Water Quality Board. The Commission held initial hearings to obtain information and comments on these subjects at Thunder Bay, Ontario, and Duluth, Minnesota, in early December 1972; at Bay City, Michigan, Cleveland, Ohio, and Rochester, New York, in early January 1973; and at Sault Ste. Marie, Ontario, London, Ontario, and

Toronto, Ontario, in late January 1973. While the total attendance at these hearings was not large, there was sufficient representation from the various interests concerned with the subjects to provide the Commission and the Reference Groups with useful initial information.

Study plans for the two references, prepared by the Reference Groups, were submitted by the Water Quality Board to the Commission in early April 1973, and were approved by the Commission in April 1973 for the Upper Lakes, and in July 1973 for land drainage. Work is now proceeding in accordance with the approved study plans.

REMEDIAL MEASURES

Provisions of the Agreement

Article V of the Agreement provides that "programs and other measures directed toward the achievement of the water quality objectives shall be developed and implemented as soon as practicable in accordance with legislation in the two countries. Unless otherwise agreed, such programs and other measures shall be either completed or in process of implementation by December 31, 1975.

Scope of Remedial Measures Required

In its 1970 report on the Lower Lakes (Lake Erie, Lake Ontario and the International Section of the St. Lawrence River), the Commission presented the following estimates of the cost of the major programs required to meet the water quality objectives in the Lower Lakes:

Estimated costs in millions of 1968 dollars

	Municipal Waste Treatment	Industrial Waste Treatment	Phosphorous Removal (Mun. & Ind.)	Totals
United States	630	478	265	1,373
Canada	145	26	40	211
TOTALS	775	504	305	1,584

These estimates were the best available approximations at that time. They may be used as a partial baseline for judging progress on remedial measures at this time only in the light of several limitations. First, the estimates do not include costs of dealing with storm runoff, agricultural and other land drainage, vessel wastes, thermal discharges and dredge spoil for which complete programs have not yet been developed. Second, construction costs have risen approximately six percent annually since 1968. Third, the estimates do not include allowance for remedial measures for the Upper Lakes. These will be developed during the course of the Upper Lakes Reference studies. Upper Lakes costs are expected to be appreciably less than costs for the Lower Lakes. Fourth, definite schedules are not yet available for many programs of remedial measures.

The Commission and its Boards are moving to eliminate these deficiencies as soon as possible. In the meantime, the status of remedial measures is discussed herein in the light of data now available.

General Status of Remedial Measures

In general, there are in existence enabling laws, grant or loan policies, licensing or control requirements and other procedures designed to meet the obligations of the Agreement ultimately. However, as will be discussed later, a satisfactory data base does not yet exist to support a judgment as to the extent the obligations will be fully met by the target date of December 31, 1975.

In the United States, the major enabling legislation is the Water Pollution Control Act, as amended through 1972. This requires Federal review and approval of State water quality standards and of programs to meet those standards. Such standards and programs have been approved for all Great Lakes States in major respects. The Act originally provided for Federal grants for municipal waste treatment ranging from 30% to 55% of total cost, depending on the extent of State assistance provided. The Act, as amended in 1972, now provides for 75% Federal grants, which may or may not be supplemented by State assistance.

In Canada, Federal assistance to municipalities has been available since 1960 in the form of Central Mortgage and Housing Corporation (CMHC) loans of up to two-thirds of eligible project value. If the project is completed by CMHC deadline, 25 percent of the CMHC loan is forgiven. For the Lower Great Lakes, the Canada-Ontario cost sharing agreement became effective on January 1, 1971. It makes available, up to December 31, 1975, \$167 million of CMHC funds and \$95 million of Ontario Treasury funds for the construction of waste treatment plants, trunk sewers and sewage pumping stations.

The Canada-Ontario cost sharing agreement also provides for Federal assumption of all costs for nutrient removal. For the Upper Great Lakes, pending amendment of the Canada-Ontario agreement, financing is under the CMHC formula on a project-by-project basis. For all lakes, Ontario may provide up to 15% subsidy for regional facilities designed to serve more than one municipality and may provide up to 75% assistance for small municipalities when costs of adequate treatment would exceed reasonable home-owner charges.

In both countries there is authority to subject both municipalities and industries to legal proceedings to obtain compliance with adopted standards. Standards in both countries consistent with the objectives of the Canada-United States Agreement. The status of programs under the foregoing major enabling acts and other authorities in each country are discussed by specific categories below.

Municipal Waste Treatment

This major segment of the total pollution control program, constituting roughly half of the total required to meet the provisions of Article X of the Agreement, is now being funded at levels which, if continued in Canada and slightly increased in the U.S., would indicate that the necessary programs and other measures will be either completed or in the process of implementation by December 31, 1975. While there was doubt at the close of 1972 that the U. S. funding schedule was adequate, the U. S Environmental Protection Agency announced in June 1973, the approval of grants totalling \$276.5 million for 29 projects in the Great Lakes Basin. This included \$47.4 million for Niagara Falls, New York, \$24 million for Cleveland, Ohio, and \$80 million Detroit, Michigan, which are key U. S. metropolitan areas contributing substantial waste loads to the lakes. Since the signing of the Agreement on April 15, 1972, Federal grants totalling \$403.4 million have been approved for 107 Great Lakes projects total cost, including State and municipal costs, for these approved projects is estimated at \$627 million, an amount that is a major portion of the total required for municipal waste treatment in the U. S. The Commission also notes with satisfaction that EPA recently announced a grant policy designed to ensure compliance with the Agreement. Future grants in Great Lakes States

will require a certification that a project is entitled to priority under a State priority system which will assure conformance with the provisions of the United States-Canada Agreement.

In Canada, an accelerated program for the collection and treatment of municipal wastes coincided with the Commission's inquiry into pollution of the Lower Lakes. Capital expenditures on all municipal sewage works in the Great Lakes Basin during the period 1965-1972 inclusive amounted to \$1284 million. Under the Canada-Ontario cost sharing agreement capital expenditures for the Lower Lakes on trunk sewers and treatment plants will exceed \$180 million by the end of 1973. This represents about three-quarters of the facilities required to meet the Canadian commitments set out in the Great Lakes Water Quality Agreement. The remaining municipal trunk sewers and treatment plants are expected to be in operation by the end of 1975.

Since the Canada-United States Agreement was signed 16 new municipal treatment plants were placed into operation. Extension and improvements have been completed at 18 others. These include a secondary treatment at Hamilton and further expansion at Toronto's secondary treatment plant. Progress has also been made at all other major sources of municipal pollution in Canada.

In both countries, programs for practical solution of the problem of overflow from combined storm and sanitary sewers are essentially in a research and development stage, but meanwhile combined sewers have been banned for new construction in several jurisdictions.

Industrial Waste Treatment

The Commission's 1970 estimates of program costs for the Lower Lakes indicate that needed programs for industrial waste treatment for all the Great Lakes may be of an order of magnitude nearly as great as those for municipal waste treatment.

In the United States, industrial wastes are subject to the Federal and State receiving water standards adopted pursuant to the Federal Water Pollution Control Act and since 1972 are subject to effluent limitations through operation of the National Pollutant Discharge Elimination System (NPDES) permit program. In Ontario, all industries are required to obtain a certificate of approval for their treatment works. The Province recently promulgated regulations curtailing deep well disposal of liquid industrial wastes and requiring surface treatment.

Complete and consistent data are not yet available to the Commission on the scope of and progress on industrial waste treatment programs. In the United States, it is known that the enforcement agencies have found plans and progress sufficiently deficient to warrant court action in relatively few cases. In Canada about \$30 million has been committed since April 15, 1972, for some 120 industrial waste treatment projects through the Great Lakes Basin.

Although both countries have programs to control the discharge of mercury and heavy metals, concentrations above those recommended for safeguarding human health continue to be found in fish taken from the St. Clair River, Lake St. Clair, western Lake Erie, and the International Section of the St. Lawrence River. In each of these areas, certain species of fish - such as trout, salmon, walleyes, etc. - have been banned from commercial sales. Known sources of mercury and heavy metals appear to have been corrected, but additional surveillance work is required to isolate other presently unknown sources of heavy metals. The continuing presence of mercury may also indicate that effects of past discharges will persist and contribute to the problem for some time into the future.

PCBs and DDT in salmonoid species of fish in Lake Michigan and the PCBs in fish from Saginaw Bay area of Lake Huron have been detected at sufficiently high levels of concentration to result in a ban on their sale commercially or to draw warnings from health agencies about their consumption.

Since 1970, sales of PCBs have been generally restricted by the sole North American manufacturer for use as insulating oils in transformers and capacitors in enclosed areas where a fire hazard may exist'. As a result of the Water Quality Board's special report of January 4, 1971, on PCBs and the Commission's recommendations to Governments thereon, close surveillance is being maintained on the known remaining limited uses of PCBs. Currently, emphasis is being placed on the monitoring in the aquatic environment and assessment of low level losses from industrial and municipal sewage systems.

At the present time, thermal discharge problems are restricted to local areas and appear to have little impact on the lakes generally. The same may be said for radioactive contamination. However, projections for the future growth of steam generating plants fired by fossil fuels and nuclear processes are a cause for major concern for their ultimate impact on water quality -- both from thermal pollution and potential for radioactive spills. At present, controls are in effect on thermal discharges and for the prevention of accidental radioactive spills in all jurisdictions. However, considerable additional effort is needed to determine the environmental impact and health hazards of these types of discharges including the development of effluent requirements needed to achieve the water quality objectives. Consultations are now in progress between the United States and Canada on these matters.

In summary, many available indicators of progress on industrial waste treatment are positive rather than negative, although much more remains to be done to achieve satisfactory water quality. More specific assessment of all industrial waste control programs including those for heavy metals, persistent organic contaminants, thermal discharges and radioactive materials will be reported when the resources in funds and manpower made available to the Commission will permit.

Eutrophication

The Canada-United States Agreement provides for specific programs to control phosphorous in recognition of the Commission's 1970 conclusions and recommendations as to the key status of that element in the control of eutrophication in the Lower Lakes. As a result

of a special report by the Water Quality Board, dated March 22, 1973, the Commission recently recommended tentative schedules for reductions of phosphorous loadings in the Upper Lakes which are now under consideration by the two Governments. The tentative schedule would be subject to modification as the Upper Lakes Reference studies proceed. The Commission at this time reaffirms its 1970 conclusions and recommendations as to the key role of phosphorous reduction in the control of eutrophication.

Both countries have initiated vigorous programs to provide for phosphorous removal at waste treatment plants. In addition Ohio has a crash program for phosphorous removal at major treatment plants by December 1973, and Indiana, Michigan, and New York have legislated to restrict the phosphorous in detergents. Canada has limited the phosphorous content of detergents by requiring that the phosphorous content, when expressed as phosphorous pentoxide (P_2O_5), be limited to 5%. This compares with the 16 to 38% content of most commercial detergents previously available.

With respect to the Agreement's specific schedule of reductions of phosphorous loadings to the Lower Lakes by years, calculations of loadings based on observations in the Detroit River area, a major source, indicate that the reductions for Lake Erie and Lake Ontario for the first year were 11,000 and 3,000 tons respectively compared with scheduled reductions of 5,300 and 900 tons respectively. Phosphorous removal facilities at 144 plants in the Canadian portion of the Great Lakes Basin will be operational by the end of 1973. This includes all plants in the Lake Erie portion of the basin. Future reports will present more complete and improved calculations of the reductions of phosphorous loadings as compared with approved

schedules as well as observations as to the effect of such reductions on the control of eutrophication.

Control of Pollution from Land Use Activities

The Agreement calls for measures for abatement and control of pollution from agricultural, forestry and other land use activities, including pest controls, animal husbandry operations, disposal of liquid and solid wastes and inputs of nutrients and sediments from the land.

There is enabling legislation covering these activities in most jurisdictions of both countries, but much of it is so recent that action programs for the most part are either just beginning to be implemented or are still under study and development. The initiation of the Commission's Reference Group studies on this subject was reported in the previous section of this report

Control of Pollution from Shipping Activities

The Agreement provides for programs and compatible regulations for vessel design, construction and operation to prevent harmful discharges of oil and hazardous substances. Each country has issued Federal regulations on this subject and each is currently reviewing them for compatibility. Additional regulations are being considered but final action on them is being deferred to permit consideration of the results of the scheduled October 1973 meeting

of the Inter-governmental Maritime Consultative Organization (IMCO), a specialized agency of the United Nations.

The Agreement also provides for adoption by each country of compatible regulations to control vessel waste discharges by April 15, 1973. This target date was not met. The key issue is the no-discharge approach versus a treated-waste discharge approach. In the United States, Federal and State agencies are agreeable on the no-discharge approach, but not on the timing of its implementation. Some States are already enforcing no- discharge regulations and other States are believed prepared to do so. The EPA standards now in process of implementation by the Coast Guard, provide for a no-discharge requirement for all vessels, commercial and recreational, but would provide grace periods of two years for new vessels and five years for existing vessels. In Canada, Ontario has been enforcing a no-discharge requirement for pleasure craft since 1966 and extensive shore pump-out facilities for such craft have been developed, but further assessment of the problem of pump-out facilities for commercial vessels appears necessary before agreement can be reached within Canada or between the United States and Canada.

A third provision of the Agreement calls for development of compatible regulations through studies to be coordinated by the U. S. Coast Guard and the Canadian Ministry of Transport, to abate and control pollution from all sources related to shipping. The Commission has been advised generally of the extent to which studies specified in the Agreement are underway, but as yet there have been no results requiring a report thereon to the Commission

Control of Pollution from Dredging Activities

Pending receipt of the report due April 15, 1974, from the working group, which has been appointed as called for in the Agreement, the Commission has received information indicating considerable activity in both countries to minimize adverse environmental effects in the disposal of dredged material.

Hazardous Polluting Substances

The Agreement provides for three specific tasks concerning hazardous polluting substances. These are: development of programs and compatible regulations for prevention of such discharges; joint contingency plans for use in event of a discharge; and consultation by April 15, 1973, to develop an Annex to the Agreement identifying hazardous pollution substances and amounts thereof considered harmful.

In the United States, pursuant to the 1972 amendments of the Federal Water Quality Act, "Spill Prevention Containment and Counter-Measure Plans" are now a requirement for certain specified facilities under a permit program now being administered by EPA, but designed to be turned over to the states. A more comprehensive program is being developed. Some states have prevention programs underway. In Canada, prevention has to date been an adjunct to- contingency planning at both Federal and Provincial levels. The "Joint United States-Canadian Oil and Hazardous Materials Contingency Plan for the Great Lakes Region" adopted on June 10, 1971, has been increasingly effective and is currently being maintained

as required by the Agreement. Meanwhile, an improved joint contingency plan, modeled on the 1971 plan, is nearing completion and adoption by the two countries. It will replace 1971 plan and the separate plans of Ontario and those states which have had contingency plans in operation.

Consultation between the two countries to develop an Annex to the Agreement identifying substances and amounts thereof considered hazardous is underway with a prospective target date adoption in late 1973.

PROGRESS TOWARDS MEETING WATER QUALITY OBJECTIVES

Amount and Nature of Data Available

The information available to the Commission and the Board for appraisal of the progress being made in achieving satisfactory water quality in the Great Lakes in 1972 consists primarily of the results of the monitoring programs of the various jurisdictions in each country. As pointed out by the Water Quality Board in its report, such data, while extensive, are not yet fully coordinated and therefore not necessarily consistent with respect to frequency and method of measurement, spatial coverage, number and kinds of parameters and methods of reporting and analysis. Furthermore, the data obtainable this year did not include data for prior years that would enable quantitative measurement of progress for all areas and for all parameters necessary to appraise water quality scientifically and accurately.

Finally, definite schedules for programs and other measures directed towards achievement of the water quality objectives are now being developed. Adequate evaluation will be possible in the future when definite schedules are available and when complete and consistent data are obtainable for both the beginning and end of a reporting period. Evaluation of such data, in turn, will be possible only when the Commission particularly its Regional Office,

is sufficiently funded and staffed to provide the Board and the various monitoring jurisdictions with the guidance and assistance necessary for coordinated monitoring and evaluation.

General Progress to Date

On the basis of the available information, it appears to the Commission that further degradation of water quality in the Great Lakes may now have been slowed down in some respects. However, there is not yet available a scientific basis to indicate in precise terms the extent of improvement, except for some parameters and for some areas. For example, the Water Quality Board has reported reductions in phosphorous concentrations in the Detroit River between 1971 and 1972 and has calculated reductions of phosphate loadings to Lakes Erie and Ontario during 1972 of 11,000 and 3,000 tons, respectively.

These calculated reductions are in compliance with the schedule contained in the Agreement. Future reports of the Board and Commission will contain specific information of this type for all water quality parameters and for all of the Great Lakes and their connecting channels. Meanwhile, the Commission presents the following summary statements of water quality conditions in the several sections of the Great Lakes System.

Upper Lakes

Lakes Superior, Michigan and Huron were found to be of good quality in their central and deeper portions. However severe local problems continued to impinge on water uses, particularly at Silver Bay, Minnesota; Thunder Bay and Georgian Ontario; Green Bay, Wisconsin; the Chicago-Calumet areas in Illinois; and Saginaw Bay, Michigan. EPA's recent disclosures of minute asbestos-like fibers in the drinking water drawn from Lake Superior in the Duluth area is a cause of immediate concern its possible effects on human health.

While it appears that the waters in the Mackinac Straits the water quality objectives, the Commission notes with concern that DDT and PCB levels found in salmon, trout, and certain other species in Lake Michigan have remained sufficiently high as to preclude their sale commercially. The Saginaw River is a major source of PCB's to Lake Huron.

Lake Erie

Lake Erie continues to be plagued by eutrophication or cultural over-enrichment by nutrients and remains the most polluted of all the Great Lakes. The western basin continues to be eutrophic despite good progress on reduction of nutrients. The central basin continues to have periods of oxygen depletion. Mercury levels in walleyes and white bass prevented their being marketed commercially. Local areas of noncompliance with water quality objectives were noted all along the U.S. shore from Toledo, Ohio on the west, to Buffalo, New York, at the eastern end of the Lake. The lower Detroit River and the Cleveland area continue to be major

sources of pollutants to Lake Erie, especially for phosphorous, phenols, iron and coliforms.

Lake Ontario

The water quality of Lake Ontario continues to be seriously impaired by the outflow of the Niagara River which contributes major loads of phosphorous and total dissolved solids. Serious local water quality problems exist from Niagara to Hamilton, Ontario and near Rochester, New York.

Connecting Channels

Waste discharges into the Connecting Channels of the Great Lakes from municipal and industrial sources continue to impair water quality. They cause intermittent problems with floating oils and scum, discoloration, solids, and lingering localized pollution from phenols, bacteria and other pollutants. Locations of continuing concern include the St. Marys River downstream from the pulp and steel mills at Sault Ste. Marie, Ontario, the St Clair and Detroit Rivers downstream from the large population and heavily industrialized centers along these rivers, notably the industrial complexes in the Sarnia and Detroit areas. Similar problems occur in the Niagara River in the heavily industrialized Buffalo-Niagara Falls, New York area.

It should be noted that major grants for treatment works in certain key areas have only recently been made (e.g., Detroit, \$80 million and Niagara Falls, *New York*, \$47.4 million). When these new works and other municipal and industrial treatment facilities already

scheduled come into operation there will be significant improvement in water quality in the Connecting Channels.

CONCLUSIONS AND RECOMMENDATIONS

Staffing and Funding

COMMISSION CONCLUDES that it will not be able to discharge fully its assigned responsibilities under the Agreement until the two Governments provide adequate and timely support. Canada has committed staff authorization and funds as recommended by the Commission, but Canada's mandatory procedures for hiring have delayed Regional Office staffing thus far. The United States has provided insufficient staff authorization and funding for complete and effective Commission and Board activity to date and for FY 1974. These circumstances have caused target dates to be missed on some activities and have seriously impaired the capability of the Commission and its Boards to report progress and make recommendations at this time.

COMMISSION RECOMMENDS that the United States, as a matter of urgency, increase its levels of staff authorization and funding to those jointly recommended by the Commission and accepted by Canada. The Commission also recommends that Canada consider exceptional measures to reduce the time required to conform to the hiring procedures required under its Public Service Commission Regulations.

Municipal Waste Treatment Programs

THE COMMISSION CONCLUDES that the Canada-Ontario Agreement municipal waste treatment will, if funded as scheduled, result in meeting the obligations of the Agreement insofar as municipal sources in Canada are concerned. In the United States, allotments made in June 1973 and the priority policy for future allotments indicate that the U.S. obligations of the Agreement may be met insofar as municipalities are concerned, but only if allotments somewhat larger than those of 1973 are made in the next two years.

THE COMMISSION RECOMMENDS that each Government take the necessary steps to assure the necessary funding of municipal waste treatment programs for timely construction of the municipal waste treatment plants needed to achieve the water quality objectives.

Industrial Waste Treatment

THE COMMISSION CONCLUDES that some available indicators of progress are positive rather than negative but much more remains to be done to achieve satisfactory water quality.

THE COMMISSION RECOMMENDS that each Government accelerate the enforcement of industrial waste treatment programs and other measures needed to achieve the water quality objectives.

Eutrophication

THE COMMISSION CONCLUDES that the limitations on phosphorous in detergents in Canada and in some states and the vigorous programs for phosphorous elimination at treatment plants in both countries have already resulted in reduction in phosphorous loadings to the Lower Lakes that meet the schedule contained in the April 1972 Agreement. The Commission reaffirms its 1970 conclusions as to the key role of phosphorous in reducing eutrophication and further concludes that limitation of the phosphorous content in detergents provides quick and significant reductions in phosphorous loadings.

THE COMMISSION RECOMMENDS that each Government continue to take steps to adhere to the schedule of reduction of phosphorous loadings for the Lower Lakes in the Agreement, adopt a tentative schedule of reductions for the Upper Lakes as previously recommended by the Commission and that the United States adopt regulations limiting the phosphorous content of detergents.

Control of Vessel Wastes

THE COMMISSION CONCLUDES that the provision of adequate receiving (pump-out) facilities for wastes from pleasure craft in those states of the United States, which do not yet have them, and for wastes from commercial vessels in both countries is the key to adoption by Governments of compatible regulations for which the Agreement specified a target date of April 15, 1973. This date was not met.

THE COMMISSION RECOMMENDS that the responsible Federal, Provincial and State agencies formulate programs to ensure the prompt provision of adequate receiving (pump-out) facilities for both pleasure craft and commercial vessels and that agreement by the Governments on compatible regulations based on a no- discharge policy from all vessels be reached by December 31, 1973.

Improvement in Water Quality to Date

On the basis of the limited quantitative evaluation possible thus far, supplemented by subjective judgment on all information available, THE COMMISSION CONCLUDES that further degradation of the water quality of the Great Lakes may have now been slowed down in some respects but there is not yet a scientific basis to permit a conclusion as to the extent of improvement except in local areas or on some parameters, such as reduction in phosphorous loadings.

THE COMMISSION RECOMMENDS timely action by the Governments on the foregoing recommendations and on other problems noted in this report in order to assure that the Commission, its Boards and the several jurisdictions in each country are able to discharge their responsibilities under the Agreement.