Second Interim Report on the Pollution of Lake Erie, Lake Ontario, and the International Section of the St. Lawrence River

International Joint Commission

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SECOND INTERIM REPORT
ON THE
POLLUTION OF
LAKE ERIE, LAKE ONTARIO,
AND THE INTERNATIONAL SECTION
OF THE
ST. LAWRENCE RIVER

AUGUST 1968
SECOND INTERIM REPORT ON THE POLLUTION OF

LAKE ERIE    LAKE ONTARIO

AND

THE INTERNATIONAL SECTION OF THE

ST. LAWRENCE RIVER

AUGUST 1968
On August 7, 1968 the respective Chairmen of the Canadian and United States Sections of the International Joint Commission wrote to the Secretary of State for External Affairs for the Government of Canada, and the Secretary of State for the Government of the United States as follows:

On October 7, 1964 the Governments of Canada and the United States requested the International Joint Commission to investigate and report upon the extent, causes, locations and effects of pollution in the waters of Lake Erie, Lake Ontario and the International Section of the St Lawrence River and to recommend the most practicable remedial measures which might be considered necessary. The text of the reference is attached hereto.

The Commission, in a first interim report dated December 1965, of which a copy is attached, informed the two Governments of the then known conditions in Lakes Erie and Ontario and the more significant sources of pollution. That report outlined the
three phases of the Commission's integrated programme for its investigation. The first phase involved short-term concentrated studies designed to secure factual information on the Lakes and the extent and origins of pollution; the second and third phases, being undertaken concurrently with the first involved detailed continuing studies and research on the physical, chemical and biological conditions.

Since the first interim report, the two technical advisory boards established by the Commission to conduct the detailed studies have made important progress. These boards are presently assembling and evaluating data collected during the first phase of the investigation.

The Commission is aware of the active concern of the two Governments and the wide public interest and anxiety concerning the water quality of the Great Lakes. For this reason, the Commission recently directed its boards to prepare and submit a report outlining the steps taken since 1965 by the responsible authorities for the reduction of pollution in Lake Erie, Lake Ontario and the International Section of the St Lawrence River. In order to keep the two Governments currently informed of the progress made in implementing remedial measures on both sides of the boundary, the Commission agreed on July 29
that the resultant second interim report of the Commission's boards as revised and dated June 1968 should be transmitted to the two Governments. Accordingly a copy is attached hereto.

This most recent report of our boards indicates that considerable progress is being made in both countries toward improvement of the situation. Nevertheless, a great deal still remains to be done.

It is expected that the boards' report on the first phase of the investigation will be submitted to the Commission in 1969.

The Commission, after consideration of this report will make it available to appropriate officials and interested individuals as a basis for public hearings. These hearings will be held at several locations in both countries to give all those interested in the quality of the waters of Lake Erie, Lake Ontario and the International Section of the St Lawrence River an opportunity to comment thereon and to convey additional information to the Commission.

Finally, the Commission will report to the Governments of Canada and the United States as soon as practicable after the public hearings.
TEXT OF IJC REFERENCE

On October 7, 1964, the Secretary of State for External Affairs, for the Government of Canada, and the Secretary of State, for the Government of the United States, sent the following Reference to the International Joint Commission through identical letters addressed respectively to the Canadian and United States Sections of the Commission:

I have the honour to inform you that the Governments of the United States and Canada have been informed that the waters of Lake Erie, Lake Ontario and the international section of the St Lawrence River are being polluted by sewage and industrial waste discharged into these waters. Having in mind the provision of Article IV of the Boundary Waters Treaty signed January 11, 1909, that boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other side, the two Governments have agreed upon a joint Reference of the matter to the International Joint Commission, pursuant to the provisions of Article IX of said Treaty. The Commission is requested to inquire into and to report to the two Governments upon the following questions:

(1) Are the waters of Lake Erie, Lake Ontario, and the international section of the St Lawrence River being polluted on either side of the boundary to an extent which is causing or is likely to cause injury to health or property on the other side of the boundary?

(2) If the foregoing question is answered in the affirmative, to what extent, by what causes, and in what localities in such pollution taking place?

(3) If the Commission should find that pollution of the character just referred to is taking place, what remedial measures would, in its judgement, be most practicable from the economic, sanitary and other points of view and what would be the probable cost thereof?
In the conduct of its investigation and otherwise in the performance of its duties under this reference, the Commission may utilize the services of engineers and other specially qualified personnel of the technical agencies of Canada and the United States and will so far as possible make use of information and technical data heretofore acquired or which may become available during the course of the investigation.

The two Governments are also agreed on the desirability of extending this Reference to other boundary waters of the Great Lakes Basin at an appropriate time. The Commission is requested to advise the Governments when, in its opinion, such action is desirable.

The Commission should submit its report and recommendations to the two Governments as soon as practicable.
In the course of the investigations and operations

of the Commission on the status of women, it has been found that the Commission may intervene in the matter of sex discrimination in

social, economic, and political life. The United Nations will not be allowed to

permit the failure of national governments to comply with its recommendations.

The Commission must act upon the following recommendations to the governments:

1. To give the governments of the United Nations an assurance that the

women of the world are equal in their natural, social, and economic rights,

2. To prohibit any discrimination in the treatment of women,

3. To accord to women the right to vote,

4. To give women the right to own property,

5. To give women the right to work,

6. To give women the right to education,

7. To give women the right to medical care,

8. To give women the right to adequate nutrition,

9. To give women the right to social security,

10. To give women the right to participate in public life.

In the course of the investigations, it was found that

the women of the world had no voice in the affairs of the countries in which

they lived. What principles, in their individual capacities and in what

circumstances, do they hold to the women of the world?
SECOND INTERIM REPORT
TO THE
INTERNATIONAL JOINT COMMISSION

JUNE 1968
SECOND INTERIM REPORT TO THE INTERNATIONAL JOINT COMMISSION ON THE POLLUTION OF LAKE ERIE, LAKE ONTARIO, AND THE INTERNATIONAL SECTION OF THE ST. LAWRENCE RIVER

BY THE WATER POLLUTION BOARDS

JUNE 1968
June 17, 1968.

International Joint Commission,
United States and Canada.

Gentlemen:

In response to the request made by the Commission during its biennial meeting held in Ottawa on October 4, 1967, the water pollution boards have prepared their second interim report on the pollution of Lake Erie, Lake Ontario and the international section of the St. Lawrence River.

This report, dated June, 1968, reiterates the conclusions made in the first interim report presented to the Commission in September, 1965, and notes the achievements in pollution abatement since that time.

Respectively submitted,

Canada

[Signature]
E.A. Watkinson
(Co-Chairman)

United States

[Signature]
H.W. Poston
(Co-Chairman)
INTERNATIONAL BOARD FOR EMERGENCY WATER
INFRASTRUCTURE CARETAKERS - 10TH ANNUAL MEETING
PORTLAND, OR

June 17, 1969

[Signatures]

[Signatures]
INTRODUCTION

This is the second interim report of the International Lake Erie Water Pollution Board and the International Lake Ontario - St. Lawrence River Water Pollution Board to the International Joint Commission on pollution of the waters of Lakes Erie and Ontario and the international section of the St. Lawrence River. This report is in response to a request of the Commission of October 4, 1967, which stated:

"...request the Board to prepare and submit a summary report as soon as convenient, upon steps taken by those concerned since the Commission's Interim Report to Governments in 1965 for reduction of pollution in the waters under reference, together with any further comments that can be made upon information so far assembled in relation to the long range problem and any conclusions that can be drawn and recommendations proposed on special aspects such as oil pollution."

The Boards' primary mission was established in a directive from the Commission on December 2, 1964, to carry out necessary investigations and studies and to advise the Commission

(a) whether the waters under reference are being polluted on either side of the international boundary to an extent which is causing or likely to cause injury to health or property on the other side of the boundary;

(b) the extent, causes and locality of pollution sources;

(c) practicable remedial measures and their probable costs.

The two technical advisory boards established by the Commission under the terms of this reference, are presently involved in assembling data and other materials which will make up a summary report to the Commission scheduled for completion in the spring of 1969. Barring any unforeseen circumstances which would change such plans, the work is progressing on schedule.
SUMMARY AND CONCLUSIONS

1. Although there has been noticeable progress on both sides of the boundary in developing remedial programs, pollution and advancing eutrophication are still problems in areas of Lake Erie. Such pollution is still causing or is likely to cause injury to property and persons on the other side of the boundary.

2. Similar conditions are continuing to develop in Lake Ontario and the international section of the St. Lawrence River.

3. The technical boards recognize that there are current problems on the waters under reference, which remain to be solved. These are the problems of:

   (i) unsightly floating and settleable solids;

   (ii) oils from industrial spills, vessels, as well as potential shipping disasters such as the Torrey Canyon, or serious pollution from oil and gas explorations; the latter two being problems which have not as yet occurred on the Great Lakes but for which emergency procedures should be established;

   (iii) taste and odor producing substances;

   (iv) sludge deposits including silt;

   (v) high coliform densities near urban areas;

   (vi) objectionable algal accumulations on shorelines;

   (vii) the annual fish kill of millions of alewives, which subsequently litter the beaches causing property damage and creating a potential health hazard;

   (viii) the problem of refuse dumped either on the water's edge or directly into it.

The technical boards also recognize that eutrophication is an urgent problem, but appreciate that it does not have a simple solution. The arrestment and reversal of the
eutrophication phenomenon, if they can in fact be accomplished, will come only through intensive research into the mechanisms of eutrophication and must be considered long range problems. Some degree of relief of the present rate of eutrophication however can be expected to be achieved by nutrient control in municipal and industrial discharges.

Other future problems which the technical boards must and will keep apprised of, include:

(i) Thermal pollution from fossil fuel, and nuclear thermal power plants. It is estimated that the greatest increase in water withdrawals on the United States side of the Great Lakes will be for thermal-electric power, and by 2020, the demand will have increased nine-fold. It has also been projected that nuclear power generation in the United States will increase from only 1% today to 25% between the years 1980 and 2000.

(ii) The increased use of nuclear fuels will require the disposal of greater amounts of radioactive wastes.

(iii) Pesticides and non-point sources of pollution, such as agricultural and urban runoff are also problems which will have to be vigorously attacked in the years ahead.

4. The technical boards are well aware of the effects on the reference waters that may result through oil discharges from a variety of sources. However, since this matter is currently under active study, the boards are not prepared at this time to present definite conclusions with respect to measures that may be required to deal with the problem. This aspect will be fully covered in the 1969 report on these reference waters.

5. Other conclusions and recommendations made in the September 1965 interim report can be generally applied to the present conditions.
ACHIEVEMENTS

In order that the Commission may be fully informed concerning progress in developing remedial programs, the following information is presented. The recommendations of the 1965 interim report are reproduced in italics, either in full or in abstracted form, followed immediately by a summary of the achievements to date.

1. Municipal wastes discharged to Lake Erie and its tributaries should be given secondary treatment or treatment of such nature as to effect the maximum reduction of BOD and phosphates as well as other deleterious substances.

Enforcement conferences have been held in the United States under provisions of the Federal Water Pollution Control Act concerning the matter of pollution in the Detroit River, Lake Erie and its tributaries, and involving as participants, the Federal Water Pollution Control Administration, and the States of Michigan, Indiana, Ohio, Pennsylvania and New York.

Federal, and state authorities and industry have reached agreements on sources of pollution, remedial measures to be instituted and time schedules for their implementation.

The abatement schedules established provide for secondary treatment of all U.S. municipal waste discharges in the Lake Erie Basin not now providing secondary treatment, by 1972.

Though conferees did not agree upon the amount of phosphate reduction required, they did agree in principle that it would be desirable to have effected the maximum phosphate removal consistent with practicable technology.

The subject of phosphate removals is under active investigation and practicable methods for the removal of phosphates are being field tested on full-scale plants.

In addition the Secretary of the Interior has established a joint government-industry task force to investigate possible controls of eutrophication and to search for possible phosphate substitutes to be used in detergents.

In the Lake Ontario Basin, the State of New York's intensified enforcement program initiated in September, 1965, is now showing positive results. Virtually all municipalities not already having secondary treatment facilities, have taken steps towards providing these facilities, as required by State-wide policy.

In June, 1967, the O.W.R.C. announced its Province-wide policy guidelines for water use and water quality control.
These established the protection of beneficial uses as the controlling factor in determining waste treatment requirements for municipalities and industries. Accordingly, municipal wastes discharged directly to the Great Lakes require primary treatment and disinfection in all cases, with secondary or other treatment where the need is demonstrated.

Also, it should be noted that all of the States in the Great Lakes Basin have submitted, for approval by the Secretary of Interior, water quality standards for Interstate waters. Standards for the States of New York, Ohio, Indiana and Michigan have been approved, those for the State of Pennsylvania are under review. Included with the standards are plans of implementation to maintain present high quality waters and to improve low quality waters.

2. Industrial plants improve practices for the segregation and treatment of wastes to effect maximum reductions of pollutants.

All discharges of industrial wastes from U.S. sources into Lake Erie, and its tributaries, are to be in compliance with the recommendations of the enforcement conference (viz. secondary treatment or its equivalent) by January 1, 1970. Ontario industries discharging to the Lake Erie Basin are proceeding to meet the requirements of the Ontario Water Resources Commission.

In the Lake Ontario Basin, the State of New York and the Province of Ontario are continuing enforcement programs which will result in adequate treatment, in keeping with proposed boundary water quality objectives, being developed by the technical boards for the Lakes.

3. Water Pollution Control Agencies should undertake action to insure that industrial plants discharging wastes into waters of Lake Erie and its tributaries within their respective jurisdictions institute programs of sampling their effluents to provide necessary information about waste outputs. Such sampling shall be conducted at such locations and with such frequency as to yield statistically reliable values of all waste outputs and to show their variations.

The States of Michigan, Indiana, Ohio, Pennsylvania and New York agreed, at the Lake Erie Enforcement Conference, to institute additional programs of wastes sampling of industrial effluents, from plants in their jurisdiction which discharge to Lake Erie or its tributaries, and where such programs are not already being carried out.
The O.W.R.C. has, since its inception, maintained a regulatory industrial waste program consisting of an inventory of the industrial waste discharges to the Great Lakes; regular investigations of all industrial sources of water pollution and assessment of the degree of compliance with pollution abatement requirements; technical assistance to municipalities and industries for the control of wastes from existing and new industrial locations; and review and approval of proposed waste treatment facilities.

4. Programs should be developed to prevent accidental spills of waste materials to Lake Erie and its tributaries. In-plant surveys with the purpose of preventing accidents are recommended.

The States are developing programs to prevent accidental spills of waste materials to Lake Erie and its tributaries. In-plant surveys have been made in many plants, and recommendations made concerning in-plant changes to prevent such spills. Many of these have already been effected.

The O.W.R.C. maintains a surveillance system for the prevention of accidental spills. This includes in-plant inspection, aerial and vessel surveillance and the operation of robot monitoring systems for continuous water quality analysis.

5. Unusual increases in waste output and accidental spills be reported immediately to the appropriate agency.

Unusual increases in waste output and accidental spills are reported as a routine procedure to the appropriate State agency. For example, the "Waste Registration Outlet Law" of the State of New York requires that periodic reports be submitted to the Commissioner of Health containing data pertaining to the quality and quantity of the effluent waste discharge from all outlets. In addition waste discharge permits issued in New York State require the reporting of unusual increases in waste output or accidental spills to the state regulatory agency.

Arrangements are in effect between the Ontario Water Resources Commission and the U.S. pollution control agencies for reporting on a routine basis unusual increases in waste output and accidental spills.
6. **Water pollution surveillance stations should be established at appropriate locations on Lake Erie and its tributaries.**

The Federal Water Pollution Control Administration has established water pollution surveillance stations on all of the major tributaries of Lakes Erie and Ontario, in the United States.

In the State of New York, stream pollution surveillance stations exist on all boundary waters and tributaries to such waters as part of a State-wide water quality surveillance network established in 1964. The program includes manual and automatic monitoring stations. Automatic monitoring stations are planned for 1968 in the Niagara and Genesee Rivers with additional stations contemplated at a later date in other boundary waters and tributaries.

The State of Pennsylvania has established a chemical and bacteriological laboratory in the City of Erie to facilitate stream and lake surveillance.

The Ontario Water Resources Commission established in 1965, and maintains a water quality monitoring program on Western Lake Erie and Detroit – St. Clair River systems. In 1966, this program was extended to include all Great Lakes waters affected by waste sources from Ontario. The monitoring program on the tributary streams begun in 1964 was intensified in 1966 to provide a more complete record of water quality. Studies were also carried out on sections of the tributary streams to determine water use and the wastewater loading limitations acceptable under low flow and summer conditions.

The Federal Governments of both countries have established deep water surveillance stations in both Lakes Erie and Ontario.

7. **Disposal of garbage, trash, and other deleterious refuse in Lake Erie or its tributaries be prohibited and existing dumps along river banks and shores of the lake should be removed.**

At the Lake Erie Enforcement Conference, the States unanimously agreed to the recommendation that the disposal of garbage, trash, and other deleterious refuse in Lake Erie or its tributaries be prohibited and existing dumps along river banks and shores of the lake be removed.
In New York State refuse disposal is controlled under Part 19 of the State Sanitary Code which regulates the location and operation of dumps. In addition, the State program provides 100 percent grants for community areawide study and solutions of solid waste disposal. Applications for grants have been submitted by the counties located in the basin.

The Pennsylvania Department of Health conducted a survey of existing dumps in the Pennsylvania portion of the basin in a joint survey with the U.S. Public Health Service and the Erie County Department of Health. Nineteen sites were visited, and of these, nine were found to be contributing to the pollution of tributaries of Lake Erie. Recommendations were made to close five sites and convert four sites into satisfactory landfill operations. The landfill operations in Erie County are being kept under close surveillance to insure that water pollution from sanitary landfills is prevented or abated.

The Ontario Public Health Act was amended in 1967 to provide tighter control over transport and disposal of solid wastes. This includes the requirement for approval and licensing of disposal sites.

8. Attention should be given by representatives of Federal, State, Provincial and local agencies responsible for agricultural, highway and community development programs for the purpose of developing and supporting satisfactory programs for the control of runoff which deleteriously affects water quality in Lake Erie.

The conferees at the Lake Erie Enforcement Conference agreed to meet with representatives of Federal, State and local officials responsible for agricultural, highway and community development programs in order that runoffs resulting from such development which might have deleterious effects on water quality in Lake Erie, be controlled.

In New York State these problems are being considered in Multi-Purpose Water Resources Planning Studies. The Erie-Niagara Planning and Development Board is studying soil erosion, sedimentation, land use and treatment. The task groups responsible for these studies include representatives from local, State and Federal agencies.
Ontario's Conservation Authorities have worked with the Department of Agriculture on a number of soil conservation and land use projects. These have included: demonstrations of improved land management practices applied to gully control, farm pond construction, reforestation and pasture improvement, land judging competitions, assistance to landowners to build grass waterways and farm drainage systems, and stream bank erosion control.

The various aspects of sediment transport and soil erosion were reviewed at the Ontario Pollution Control Conference, December, 1967.

In addition, the Lake Erie Enforcement Conference agreed that combined storm and sanitary sewers would be prohibited in all newly developed urban areas, and eliminated in existing areas wherever feasible.

An example is the City of Erie which is the only municipality in the Pennsylvania portion of the Lake Erie Basin that contributes significant discharges from overflows from combined sewers. The City has begun a program of separating storm and sanitary sewers in re-development areas. Separation has been completed in one 12-block area and a second project is under design. A program has also been completed whereby all major discharges from industry to the City's storm sewer system have been abated.

9. That the disposal of material from future dredging operations be in carefully selected enclosed areas. Such areas could either be used for extending the shore into the lakes, or in enclosed areas offshore, but not near water intakes or beaches. Such disposal areas should be so selected, when possible, that they might have some useful purpose after the enclosed area is filled.

Studies of the pollutional effect of dredging operations are being actively carried out by the U.S. Corps of Engineers, the Federal Water Pollution Control Administration and State Agencies. Full scale studies were begun in 1967. A preliminary report on these investigations is expected early in 1968.

In addition, the State of New York has a regulatory responsibility under their Stream Protection Law, Chapter 955, Laws of 1965, which requires a person who disturbs a stream bed, (including excavation or fill in navigable waters) to obtain a permit from the Water Resources Commission.
The O.W.R.C. is revising its inventory of dredging operations and will continue to observe such operations to ensure that water quality in adjacent areas is not adversely affected.

10. Uniform regulations be developed and enforced by the Federal, State and Provincial Governments concerning the discharge of refuse and wastes from pleasure craft and commercial vessels.

Legislation and rules and regulations to control sewage discharges from pleasure craft and other vessels in boundary waters have been enacted by the Province of Ontario and the States of Michigan, New York, and Ohio.

The Commonwealth of Pennsylvania is developing regulations pertaining to wastes from boats.

Also, regulations are being drafted by the Department of Transport (Canada) to control the discharge of wastes from vessels operating in Canadian waters.

A bill, Boat Pollution (S.2525), was introduced into the United States Congress in 1967, which would require the Secretary of the Interior to set standards on sewage, ballast, bilge, litter, etc., discharged from vessels in navigable waters. The proposed legislation also provides enforcement powers.

Some of the problems that must be resolved pertaining to wastes from pleasure craft include a lack of suitable treatment units, the movement of boats from one jurisdiction into another having different requirements, and effective enforcement. A committee of the technical boards has been set up to investigate these problems and to make recommendations to the boards at their next meetings.

11. To provide needed supporting and basic information for overall boundary water studies, it is further recommended that both the United States and Canadian Governments encourage and support research and related activities:

(1) To better establish the mechanisms by which eutrophication occur and the most efficient and effective means of retarding this phenomenon and preventing of minimizing its effects on the many legitimate water uses in Lake Erie.
(2) To adopt, at the outset, an overall concept of continuous and long-term research investigations, surveillance and time dependent studies on Lake Erie and Lake Ontario and the St. Lawrence River to make up the deficiencies in scientific data and provide the basis for future judgements.

(3) To institute similar studies on new methods of the control and treatment of wastes in urban areas, and the assessment of potential dangers and controls on the use of fertilizers, pesticides and herbicides in rural and forested areas.

(4) To eventually expand these studies to include all the Great Lakes and adjoining watersheds.

(5) To introduce the methods, practices and theories of oceanography, to determine the physical processes of circulation, mixing and diffusion which determine the distribution of lake pollutants.

(6) To establish continuous and long-term studies on problems of chemical lake aging, sedimentation, biology and eutrophication of the lakes.

In March of 1966, these Boards presented to the International Joint Commission a document entitled "Outline of Proposed Program of Investigations, Surveys and Studies to the International Joint Commission, March 1966, Lake Erie - Lake Ontario and International Section of the St. Lawrence River".

This report summarized the proposed short-term, and continuing studies (long-term) of the Boards, and designated lead roles to be assumed by various agencies. This proposal was accepted by the International Joint Commission, and field studies proposed therein commenced immediately thereafter.

Short-term studies were designed to acquire factual data on pollutants, nutrients and other aspects of the existing problem in order that practical remedial measures to
abate pollution could be developed, and these measures, and the general conditions in Lake Erie, Lake Ontario and the international section of the St. Lawrence River reported to the International Joint Commission in 1969.

Continuing studies were proposed to run concurrently with short-term investigations and were to include an intensive examination of lake circulation; mixing and diffusion; long-term chemical and biological changes, physical features, and the relative significance of pollutants; parameters for water quality; effectiveness of remedial measures; potential effects from fertilizers, pesticides and herbicides; and generally the whole problem of eutrophication.

Much of the original assessment work has already been done by the Great Lakes Illinois River Basin Project Officers of the Department of the Interior located at Rochester, N.Y. and Cleveland, Ohio and by the water pollution control agencies in the States of New York, Pennsylvania, Ohio, Indiana and Michigan. Their contribution to the short-term studies is really a continuation of on-going studies. In addition, the U.S. Army Corps of Engineers has carried out water characteristic studies under their Lake Survey Program in 1966 and is preparing a report on their findings.

The contribution of the Canadian Federal Government has been a co-ordinated effort by the Department of Energy, Mines and Resources, the Department of National Health and Welfare, and the Fisheries Research Board. These studies were to supplement information already collected by F.W.P.C.A. In 1966, eleven water quality cruises were carried out in Lake Ontario and one in Lake Erie. As a part of their long-term studies, the Department of Energy, Mines and Resources also carried out seven cruises to examine geophysical characteristics of Lake Ontario. Preliminary studies of the upper lakes are proposed for 1968.

In addition, the Great Lakes Institute of the University of Toronto, under contract to the Department of Energy, Mines and Resources carried out water quality studies in Lake Ontario during the winter months.

In 1967 eight water quality cruises were carried out on Lake Erie, and eleven in Lake Ontario. In addition, physical and geological cruises were carried out for long-term variables.

Also, as a part of their short-term studies, the Department of National Health and Welfare has, for the past
three years, carried out intensive water quality studies in the Bay of Quinte of Lake Ontario, and the international section of the St. Lawrence River.

Long-term research plans have been developed for the Great Lakes by federal agencies of the Canadian Government. The Canada Centre for Inland Waters has been established by the Department of Energy, Mines and Resources at the western end of Lake Ontario, in Burlington, Ontario. This centre is presently housed in a vast trailer complex at the site of the permanent research buildings. Permanent facilities will have space available for co-operative research with universities and other federal departments.

The Fisheries Research Board of Canada has established their Freshwater Institute in Winnipeg, Manitoba. Part of their research effort will be directed toward a better understanding of the processes of eutrophication, and how the phenomenon applies to the Great Lakes. A program of artificially enriching small lakes in their natural condition is presently being developed.

The Department of National Health and Welfare has developed facilities in the new Environmental Health Centre in Ottawa, and a new Regional Laboratory in Kingston, Ontario, and is programming its research to attack health related problems on the Great Lakes, notably microbiological studies, and the levels of toxicants which can be tolerated under Great Lakes conditions.

The O.W.R.C. has, over the past three years, developed a long-term surveillance program encompassing all the Great Lakes and Interconnecting Channel waters influenced by waste discharges and drainage from Ontario. This work is carried out by laboratory equipped vessels and is geared to determine the bacteriological, biological, chemical and physical characteristics of these waters. Special emphasis is placed on intensive use areas such as the Interconnecting Channels and harbour areas. Information on waste assimilation, water and waste mixing and dispersion characteristics and water quality trends forms the basis for long-term planning of water use and water quality control programs to meet the needs of present and future development.

An advisory committee on pollution was formed in Ontario by Order in Council dated October 27th, 1966. Since its formation, technical subcommittees on industrial wastes, pesticides, herbicides and fertilizers, radioactivity and refuse disposal have been established to co-ordinate departmental and agency programs, foster technical and economic
research and act as liaison committee to assist in Federal-Provincial consultations. The Ontario Herbicides Committee, made up of representatives of the Departments of Agriculture, Health and the O.W.R.C., maintains a watch on the application in Ontario of all types of herbicides. The commercial applicators are licensed and constant surveillance is maintained over the use of these chemicals. The opening of the Ontario Pesticide Laboratory at the University of Guelph in 1967 has furthered this work.

The O.W.R.C. has, for the past eleven years, carried out pollution abatement programs on the Great Lakes waters affected by activities within the drainage basins in Ontario. In connection with this work, surveys of lake waters affected by drainage and waste sources in Ontario were extended in 1966 and 1967 to include Lake Huron and Lake Superior, respectively.

Oceanographic techniques applicable to the Great Lakes were commenced in 1965 to develop information on the physical, chemical and biological processes determining the distribution of lake pollutants. Definition of mathematical models for waste sources describing waste decay and transport pattern based on local current, temperature and chemical quality characteristics is under active development.

The various aspects of nutrient removal, productivity of eutrophic waters and land use related to nutrient contribution are being investigated by the O.W.R.C. under its water resources management program.

The Federal Water Pollution Control Administration, in its research facilities located across the United States, is continuing its studies aimed at a better understanding of pollution control problems. Major efforts are presently being directed toward the phosphate removal problem, and the control of pollution from combined sewer systems.

Demonstration grants have been awarded to municipalities and regional governments in the United States in support of full-scale projects designed to alleviate current problems. For example, the City of Milwaukee, Wisconsin, is trying to solve the critical combined sewers problem with a $1.5 million Federal grant. A 3.8 million gallon underground retention tank has been designed to trap storm water overflows and retain them for future treatment when treatment facilities are not overtaxed.
12. The data centers should be established on both sides of the border to facilitate exchange, processing, and distribution of data and information for existing and future studies.

Data centers have been established on both sides of the border.

All water quality data collected by Canadian federal agencies have been stored in the Canadian Oceanographic Data Centre. Meteorological data collected by the Department of Transport are incorporated with data of that department's Meteorological Branch.

Data collected by the U.S. Department of the Interior's Federal Water Pollution Control Administration have been stored in their Storet system.

The Bureau of Commercial Fisheries is storing some data in the National Oceanographic Data Center facilities, and some of its own format in its own facilities. The U.S. Lake Survey (Corps of Engineers) is proposing to store data in a Great Lakes Data Center using Storet.

The Ontario Water Resources Commission, in 1966, developed its own data storage system which is a modification of Storet. This system will be expanded in the future to be compatible with systems used by Canadian and U.S. federal and state agencies.

The Great Lakes Institute of the University of Toronto is storing its Great Lakes data in the Canadian Oceanographic Data Centre. The University of Michigan has its own system, as does the University of Wisconsin.

Punch card, or magnetic tape data records can be exchanged but the receiving agency or data centre must develop its own program to compile data in a form suitable for its own computer facilities.

The need for data exchange prompted the Conference of State Sanitary Engineers (attended by representatives of the States of New York and Pennsylvania) to establish a Joint Committee on Water Quality Management Data. The purpose of the Committee is to develop uniform procedures for the storage, collection, and processing of data to facilitate exchange of such data among interested agencies. Other participants include the Association of the State and Interstate Water Pollution
Control Administrators, U.S. Army Corps of Engineers, Federal Water Pollution Control Administration, U.S. Soil Conservation Service, U.S. Public Health Service, and the U.S. Geological Survey. The activities of this Committee resulted in the establishment of a workshop by the Upper Mississippi and Great Lakes Board of State Sanitary Engineers. This workshop has been attended by representatives of the Ontario Water Resources Commission. These activities will assist in the efficient exchange of water quality information among agencies concerned with the waters of the Great Lakes.