POLLUTION IN THE GREAT LAKES BASIN FROM LAND USE ACTIVITIES

SUMMARY

INTERNATIONAL JOINT COMMISSION

MARCH 1980

EXECUTIVE SUMMARY

INTRODUCTION

The conversion of land over many decades from its natural covering of mostly forest to more intensive uses such as urban development and agricultural crops has been a major factor in the degradation of water and other components of the Great Lakes ecosystem. Pollution from man's activities on the land ("nonpoint" pollution) continues to increase as a result of population growth and technological change. Nonpoint pollution differs from that of industrial plants and municipal sewage treatment plants (point sources) in that the former results from a large number of diffuse sources often producing individually small, but cumulatively significant, quantities of pollution.

The Governments of Canada and the United States requested, in a Reference dated April 1972, that the International Joint Commission study and make recommendations on the extent and cause of pollution from land use activities, and on possible remedies. This Report is written in response to that request. The basic questions asked by the Governments were: are the boundary waters of the Great Lakes System being polluted by land drainage from land use activities? If such pollution is occurring, by what causes, to what extent, and where is the pollution taking place? What remedial measures would be most practicable to deal with such pollution, and what would be their probable cost? The Commission was also asked to assess the adequacy of existing programs and control measures for addressing nonpoint pollution.

To assist the Commission in answering the Reference, a binational group of scientists and other specialists, the Pollution from Land Use Activities Reference Group (PLUARG), was formed. The desire for widespread citizen input to the PLUARG program led the Reference Group to initiate a new approach in public participation. Nine public consultation panels in the United States and eight in Ontario were established to discuss the environmental, social and economic aspects of the study, and to present their resulting views and recommendations thereof. As well, the panels had the opportunity to review the PLUARG report and provide comments prior to its being completed. Additional public input was available directly to the Commission through public hearings held both before and after the study.

The information received through this process and subsequent reports forms the basis for the Commission's considerations, conclusions and recommendations.

POLLUTION FROM LAND USE ACTIVITIES

The Commission agrees, in general, with the study finding that the Great Lakes are being polluted from land drainage sources. Such pollution occurs most seriously from land areas of intensive agricultural and urban use. The most significant pollutants from these sources are phosphorus, sediments, a number of industrial organic compounds and pesticides, and some heavy metals.

Phosphorus is of concern in the Great Lakes ecosystem because it is the principal controlling factor in eutrophication, which can cause severe water quality degradation. While phosphorus enters the lake from natural sources, phosphorus loadings have been increased in recent decades by man's activities to levels which are of environmental concern. Land use activities contribute from a third to a half of the total phosphorus loads to the various lakes. The highest loadings are associated with the most heavily polluted lakes, Erie and Ontario. The movement of phosphorus downstream from one lake to another, and deposition of phosphorus from the atmosphere are also significant sources in some lakes.

Cropland was the major source of nonpoint loads, especially in areas characterized by high density row crops and fine-grained (clay) soils, notably northeastern Ohio, southwestern Ontario and southern Wisconsin, and where insufficient attention is paid to soil conservation and drainage practices. Nutrient runoff from feedlots and other livestock operations can contribute significantly to total phosphorus loads, especially in central-southern Ontario and southern Wisconsin. Another agricultural source of phosphorus pollution, particularly affecting local areas, is improper or excessive fertilizer application including the spreading of manure in winter. A large proportion of the nonpoint phosphorus loads, especially to Lakes Ontario and Erie, comes from urban areas due to their extensive impervious surface areas, rapid runoff characteristics and large quantities of loose phosphorus-laden soil particles. The highest phosphorus contributions per unit of surface area are from lands undergoing construction. Private non-sewered waste disposal systems and, except for Lake Superior, forestry operations over large areas and atmospheric inputs, all contribute phosphorus, but are not overall large components of total phosphorus loads to the various lakes. Other land uses contribute minimal quantities of phosphorus to the Great Lakes.

The Commission has reviewed questions concerning current total phosphorus loads and proposed target loads in order to assist the Governments in determining the quantities by which phosphorus loadings should be reduced to achieve desired water quality conditions in the lakes, and the appropriate strategies for meeting these goals. The Commission has concluded tentatively that the phosphorus loads contained in Table 5 of this Report represent the best estimate available of current loads, and that they should be used as a basis for developing phosphorus control strategies. With respect to target loads, the Commission has concluded (pending a further report from its Task Force on Phosphorus Management Strategy) that those outlined in Annex 3 of the 1978 Great Lakes Water Quality Agreement are generally valid goals for phosphorus reduction programs, although the adequacy of the target loads for Lake Erie and Saginaw Bay for reaching the objectives expressed in the Agreement is questioned. A number of scientific questions relevant to ultimate phosphorus control strategies remain to be resolved, including the relative biological availability of phosphorus from various sources and the variability of loads and effects on the lakes, both over time and between the nearshore and open water areas.

Pollution by toxic and hazardous substances from land drainage is an equal if not greater concern in the Great Lakes Basin ecosystem. Approximately 2,800 chemicals, including 2,200 organic compounds, are being produced or used in the Great Lakes Basin. About 400 organic compounds have been identified in the Great Lakes ecosystem including many of the compounds in the above inventory.

Residual levels of persistent pesticide compounds, specifically DDT, aldrin-dieldrin and chlordane, continue to appear in Great Lakes biota, although their use in the basin has been banned or severely restricted in recent years.

Unacceptable levels of industrial organic compounds, heavy metals and other trace elements are also present in the waters of the Great Lakes. Lakes Ontario and Erie sediments, particularly those adjacent to large urban areas, are highly contaminated with PCBs. These compounds represent an environmental hazard because they are exceptionally stable and bioaccumulate readily through the food chain in fish and birds, and have been detected in human beings. While they have been used in the basin for over 40 years, steps to ban their use were taken only recently. Hexachlorobenzene and Mirex are two additional hazardous organic compounds that pose environmental and health problems.

While a number of heavy metals and trace elements were identified as present or potential pollutants of the Great Lakes System, mercury and lead were identified as being of greatest concern. Various point source discharges of mercury have contaminanted the sediments and fish of Lake St. Clair. Subsequent control of these sources has produced encouraging declines of mercury to the extent that reopening of the Lake St. Clair commercial fishery is being considered. Substantial inputs of lead from nonpoint sources such as automobile exhausts have produced measurable lead concentrations in lake sediments. While concentrations of lead in Great Lakes fish are below the currently acceptable guidelines, further studies of its potential for methylation to a more toxic organic form may lead to revised guidelines.

The input of sediments to the Great Lakes is most often associated with siltation and its effects on drinking water limitations, aesthetics, fish spawning grounds and navigation. Sediments also function both as pollutant carriers and pollutant traps. Because as many as 11 million metric tons of sediments from agricultural, urban and forested lands reach the lakes each year, they play a significant role in transporting phosphorus, metals, and other pollutants to the lakes; on the other hand, they can also bind toxic and other pollutants to the sediment particles, thereby removing the pollutants from the water itself. The nature of the sediment-associated pollutants and the conditions in the water are important factors in this regard.

In addition to the wide array of toxic and hazardous materials that reach the lakes from land drainage sources, many pollutants are transported to the lakes via the atmosphere. Recent investigations, including those carried out by PLUARG, indicate that substantial amounts of phosphorus, PCBs and other pollutants are carried to the lakes in this manner. While acid rain so far has had little direct effect on the Great Lakes because of their high buffering capacity (which counteracts the acidity), effects on vegetation and small lakes in the basin with low buffering capacities have been significant, especially in upstate New York and the Canadian Shield area of Ontario. To the extent that these inland lakes drain into the Great Lakes, continued high acidity in precipitation may ultimately produce measurable effects on at least some components of the Great Lakes ecosystem.

The disposal of hazardous or toxic liquid and solid wastes, generated by the intense industrial activity in the Great Lakes Basin, is a matter of urgent and immediate concern. With the recent

appreciation of the magnitude of the environmental and health problems associated with the disposal of these wastes, it is being realized that adequate treatment and disposal regulations and facilities do not exist, and that insufficient concern has been directed at methods to reduce the generation of pollutants and to dispose of such wastes. The Commission is also aware that many inactive but potentially dangerous waste disposal sites exist throughout the basin. The problem of hazardous waste management requires immediate attention.

COMPREHENSIVE MANAGEMENT STRATEGY

The Commission believes that remedial measures required to deal with these and other pollution problems should be identified and implemented within a comprehensive management strategy. A framework is required for ensuring comprehensive, consistent and equitable action across the Great Lakes Basin. There are various components to the recommended framework, which is an expansion of the concept proposed by PLUARG. As a starting point, there is value in adopting a basin-wide, long term perspective which includes taking account of the impacts of all of man's activities on the natural and socio-economic systems of the Great Lakes Basin. This concept has become known as the "Ecosystem Approach". With nonpoint pollution, perhaps more than other types, seemingly simple management decisions with respect to the many diffuse sources may have complex ramifications that, if not taken into account, could have unintended consequences or even result in the failure of the program concerned. It is within this perspective that the Commission outlines a tiered system of developing management strategies, plans and specific remedies at all levels of jurisdiction. Development and implementation of such a framework, however, should not delay immediately needed remedial measures.

At the international level th re is a need for a clear understanding, using Article VI of the Great Lakes Water Quality Agreement as a basis, concerning the goals and general nature of programs required to deal with nonpoint pollution. Within this mechanism, each country should ensure the development and/or strengthening of interjurisdictional coordinating mechansims that can result in comprehensive, effective action by the relevant jurisdictions. The third level of coordination required is between the various agencies within each jurisidiction. The myriad of policies and programs both within and beyond the environmental policy area, but affecting the actions of corporations and individuals contributing to nonpoint pollution, has generally not been well coordinated or even necessarily consistent. Resulting gaps and conflicts in policies and programs, as well as funding and manpower constraints, can be minimized by developing a more cooperative approach to government. This goal would be fostered by a strong mechanism for interagency coordination and by reaching clear understandings on agency roles and responsibilities. The institutional basis for such coordination exists in all jurisdictions, but needs to be strengthened and formalized. Established institutions might well be used for this process and for the implementation of programs. While their more effective use may be desirable, this should not inhibit the establishment of new mechanisms if necessary.

Within such an institutional environment, but not waiting for it to come about before any action is taken, the jurisdictions should develop management plans with particular reference to nonpoint pollution. Priorities should be established for major remedial measures, with highest priority given to areas in the drainage basins of the lakes and lake segments having the worst water

quality (Lakes Erie and Ontario, Saginaw Bay and southern Lake Huron), and within those areas to the potential contributing areas identified in this Report, especially the hydrologically active areas therein.

On the other hand, certain environmentally sound or "best management" practices should be encouraged, or in some cases required, throughout the basin. These are generally low-cost measures, such as certain soil conservation practices that, in addition to their environmental value, could result in a direct economic advantage, at least in the long term. Thus, these measures would, if widely adopted, assist in controlling nonpoint pollution, without bringing an undue or inequitable burden to bear on any group of land owners or other individuals.

While the Commission generally endorses the "pollutor-pays-principle", it believes that there is a basis for some exceptions with respect to small farming operations, which are often marginally viable but which form an important part of our two nations' social and economic fabrics, and local municipalities.

With major site-specific measures, the cost-effectiveness of all alternative remedies should be assessed in order to select the best approach both within and between sites. The Commission notes the paucity of data and even meaningful measurement criteria with respect to the socio-economic benefits and costs of controlling--or failing to control--pollution in the Great Lakes, particularly nonpoint pollution. There is a recommendation, therefore, that Governments initiate a program to assess the social and economic implications of pollution control concurrently with the development of management strategies.

In the review of specific legislative and administrative changes that might be required to implement remedial programs, the jurisdictions should consider three additional elements:

- The value of using and improving on voluntary programs where practical, rather than relying on regulations, should be recognized. In order for this approach to be successful, however, a greater effort will be necessary to develop an informed public through both general education and technical assistance. The Commission provides a broad outline of the needs in this area. In some cases, however, regulation will still be required. Three specific examples identified in this Report are the prohibition of the winter spreading of manure on frozen ground, the regulation of sediment runoff from urban areas under construction, and the regulation of industrial waste management.

- Adequate legislation and mechanisms for implementing pollution control measures cannot be effective if sufficient funding and manpower are not provided. The failure to appropriate sufficient funds or manpower has been a common problem in environmental programs throughout the basin's jurisdictions.

- While basic control and coordination should be maintained and strengthened at the senior levels of government, there is considerable merit in delegating a large degree of implementation responsibility and management planning to the local level. The

provision of guidance and technical/financial assistance will, however, be required. Appropriate mechanisms for such partnership appear to exist in the Conservation Authorities in Canada, and the Section 208 planning agencies as well as Soil and Water Conservation Districts in the United States.

Finally, with respect to the Management Framework, there will be a need for further water quality monitoring, and a review of the overall strategy, jurisdictional management plans and the effectiveness of remedial programs.

SPECIFIC RECOMMENDED REMEDIAL PROGRAMS

The Commission reviewed the applicability of several specific remedial measures. While these measures should be considered within the context of the proposed management strategy, their implementation need not await the full development of this strategy.

For phosphorus control, PLUARG reviewed various scenarios and concluded that the implementation of a 0.5 mg/L effluent limitation on major municipal treatment plants was the most cost-effective measure of those considered for meeting the target loads. With this effluent limitation, nonpoint pollution programs of varying intensity would also be required to meet the target loads for lakes Erie and Ontario, Saginaw Bay and southern Lake Huron. The incremental cost of further reductions in conventional treatment plant effluents to 0.3 mg/L is high, being comparable to some of the most expensive agricultural phosphorus reduction programs. The Commission believes that the PLUARG estimates of cost-effectiveness for nonpoint remedial measures establish a firm basis for developing remedial strategies for pollution from land use activities. It does not consider it possible at the present time, however, to make a recommendation on controlling municipal treatment plant effluents to a level of 0.5 mg/L. A further review of its feasibility throughout the basin and of alternative measures is required. The Commission's Task Force on Phosphorus Management Strategies is expected to address this issue on its Final Report and thereby provide the basis for further Commission recommendations.

A number of agricultural measures deserve the attention of Governments in developing management plans for both broad and site-specific remedial programs. These measures include the encouragement of sound soil conservation practices, which will usually be of minimal cost and may even yield benefits to individual farmers, but which will require a clear demonstration of need, as well as technical assistance. More intensive and expensive soil conservation measures are required in certain hydrologically active areas with fine-grained soils. Financial incentives may also be required. Fertilizer application should be the subject of an effective training and information program to back up the technical services now available. The registration process for the manufacture and marketing of fertilizers should take environmental criteria into account. Winter spreading of manure on frozen ground should be prohibited, environmentally sound storage measures encouraged, and provision made for financial aid to affected farmers if necessary. The application of sewage sludge and effluents on land requires increased attention.

Livestock operations may require regulatory action (large operations are already covered under NPDES in the United States) if measures cannot be developed to encourage the implementation of strict voluntary guidelines. Existing programs of this nature should be reviewed to ensure their adequacy with respect to control of water pollution.

In the urban areas, greater attention should be paid to the water quality aspects of erosion and stormwater runoff control. Systems for their control, using natural drainage characteristics where possible, should be required in the designing of urban developments. As these concepts have not been widely recognized, there will be need for further education, technical assistance and financial incentives to local level planners and decision makers. Sediment control from new urban areas under construction, on the other hand, should be required by regulation, with the costs incorporated into overall development costs. Governments should also ensure that further urban expansion does not add to the problem of combined sewer overflows.

In older, developed urban areas, the only practicable measures for immediate implementation may be reduction at the source of pollutants that can be carried to the lakes in storm runoff. These measures include street cleaning, public education to reduce spills and intentional disposal of toxic and oil-based substances, and even the control of air pollution. Incentives for encouraging the use of non-leaded gasoline should be considered.

Hazardous waste disposal, particularly concerns relating to the identification, transport and disposal of hazardous industrial wastes, is a major concern. Emerging programs of the various jurisdictions are described in this Report, with a view to giving guidance on some shortcomings and strengths of the various programs to date. The Commission recommends that Governments conduct a complete inventory of waste disposal sites in the basin, a determination of their capabilities for handling such wastes, and the adequacy of their regulation; that every effort be made to reduce the generation of such wastes, to identify and secure abandoned sites and to establish safe disposal sites that can be acceptable to the public; and that governments establish a compatible manifest system among all jurisdictions within and beyond the Great Lakes Basin.

Various measures for preventing pollution from land drainage sources having mainly local impact are suggested. These measures include proper design, location and maintenance of private waste disposal systems. Government control over forestry practices and mineral extraction operations is generally adequate, but may be inhibited by funding and manpower shortages.

Three special considerations relevant to the Reference, but not strictly part of it, are noted by the Commission. As much of the pollution of the Great Lakes results from a waste of resources, a greater and continuing attention should be directed to developing a conservation ethic among individuals, municipalities and industry. Specific regard should be given to such measures as recycling, resource recovery, and conservation in the content and use of products. Secondly, there is environmental and social value in preserving prime agricultural lands, since more marginal lands when farmed tend to produce increased pollution runoff. Thirdly, land use planning and regulation should recognize the values of wetland areas, both as buffers between developed lands and the lakes, and as important biological habitats in their own right.

Finally, the Commission has noted a number of subject areas requiring further research. The pursuit of such further work should not prevent or divert attention from the early implementation of nonpoint pollution control actions. Rather, the Commission suggests the concurrent initiation of additional studies to refine the management strategies being implemented.

RECOMMENDATIONS

The Reference Group made a number of recommendations to the Commission concerning nonpoint pollution in the Great Lakes Basin ecosystem. These recommendations are included in the Executive Summary of the report of the Reference Group, attached as Appendix III of this Report.

Based on consideration of the Reference Group's report and recommendations, the information gained from the efforts of the public panels organized by the Reference Group and from the Commission's public hearings, and in response to the Reference dated April 17, 1972, from the Governments of the United States and Canada,

THE INTERNATIONAL JOINT COMMISSION RECOMMENDS THAT:

1. The Governments of Canada and the United States, in partnership with the state and provincial governments, and local jurisdictions where relevant, undertake to develop a comprehensive strategy of pollution control for the Great Lakes which would be specifically directed at but not restricted to nonpoint pollution. The Commission further recommends that such a strategy have sufficient flexibility to permit individual jurisdictions to maintain their resource and land management prerogatives to the extent that they are consistent with the Great Lakes Water Quality Agreement of 1978.This flexibility should also ensure that the strategy can be responsive to future scientific, technological and socio-economic developments concerning the pollution control.

2. Ongoing and priority programs be pursued without awaiting complete development of the comprehensive management strategy.

3. As part of the management strategy, governments develop and implement remedial plans for achieving reductions in nonpoint pollution from priority areas. These priority areas should be selected on the basis of the most severe whole-lake and nearshore water quality problems, present land use activities and areas with a high potential or demonstrated ability to contribute pollutants, especially hydrologically active areas. Such areas are identified in Figures 1-3 of this Report. In accordance with the ecosystem concept, selection of remedial programs should also include consideration of the principle of non-degradation of higher quality waters (further to the Commission's Report on Water Quality of the Upper Great Lakes), impacts on other environmental components including plankton, fish stocks and wildlife, occurrence of severe local problems (especially the nearshore areas and tributary mouths), and the impacts to be realized in downstream lakes in the Great Lakes System via connecting channels.

4. Governments implement low cost but generally beneficial measures throughout the Basin. Thus, certain measures to reduce pollutant loadings, to at least PLUARG "Level 1" rural and

urban control measures, be applied throughout the Basin without regard for the criteria suggested above for establishing priorities.

5. Nonpoint source pollution control not be considered in isolation of point source pollution or the relative cost-effectiveness of further control thereof. The economic and social impacts of remedial programs in individual areas should be considered in the development of such programs and efforts should be made to include elements in the program which would alleviate such undesirable side effects. All alternatives for controlling specific pollutants, and their local, regional and national implications, should be considered consistent with the ecosystem concept, including the full range of all relevant point, nonpoint and source-reduction controls and alternate practicable technologies for achieving these controls. The Governments initiate a program of assessment of the social and economic implications of nonpoint and point source pollution control.

6. Jurisdictions, in formulating their management plans, recognize and consider the need for strengthening coordination within and between jurisdictions in developing and implementing required remedial programs. Senior levels of government, as relevant within each country, assume broad overview and basic control and monitoring of nonpoint pollution control measures, centered in a lead agency or coordinating mechanism, while recognizing that effective implementation of such measures will be done at least in part at the local level; and review existing legislative and administrative measures to ensure the adequacy of nonpoint pollution control programs and sufficient coordination.

7. In this regard, governments consider the utilization of such existing mechanisms as:

   a) at the Canadian federal level, the coordinating and environmental review roles of Environment. Canada;
   b) at the United States federal level, a coordinating mechanism to focus the concerns of agencies whose programs are related to Great Lakes water quality;
   c) at the Canadian provincial level, the systematic use of the Planning Act and the Environmental Assessment Act;
   d) at the United States state level, the Section 208 agencies and the environmental or "little-NEPA" agencies.

   These mechanisms could, if strengthened, provide the needed coordination of environmental perspectives in other policy areas such as development and energy programs. While existing programs would be used where possible and appropriate, new or revised programs should also be developed where necessary to address nonpoint pollution problems.

8. Governments use and accentuate voluntary mechanisms and approaches where possible in implementing pollution control programs. Since public interest in, and acceptance and support of, such programs are of paramount importance, Governments ensure adequate environmental information, education and technical support is supplied to the public, and that provisions are made for their involvement.

9. For certain measures that are universally desirable, but for which voluntary compliance is not likely, governments adopt regulations in order to ensure their consistent and equitable implementation. Specific measures identified by the Commission requiring regulation are: prohibit winter spreading of manure on frozen ground, with financial assistance to farmers who incur expenses by doing so; regulate sediment runoff from urban areas under construction; and regulate industrial waste management to prevent environmental contamination. Other regulatory measures should be considered to deal with nonpoint pollution problems when voluntary approaches are found inadequate.

10. Governments assure that adequate financial support for small scale agricultural operations and local municipalities is provided to adequately address the nonpoint pollution problems outlined in this Report, and governments also assure that relevant agencies be given sufficient technical and manpower support to address these problems.

11. In recognizing the need for an informed public, the Governments institute a general environmental education program. The program should be designed to make the public aware of existing local pollution problems, as well as providing for public input into the solutions to such problems. Local civic and environmental groups should be used to the extent possible. Further, government officials at all levels should be made familiar both with ecosystem management in general, and nonpoint pollution in particular, and with the agencies which address such problems. In addition, remedial program managers and field personnel should be given all necessary technical information and skills necessary to properly implement their specific remedial programs or tasks. Finally, efforts should be made to provide environmental education and information at the public school levels.

12. As a follow-up to any management framework or strategy, the Governments establish some mechanism to review and evaluate the overall success of the various management plans. This evaluation should include a general review of the adequacy of all state, provincial and federal management plans; an enhanced continuous monitoring program within the surveillance program developed under the 1978 Great Lakes Water Quality Agreement, including nearshore, rivermouth and tributary monitoring to evaluate the effects of the various remedial programs in place or planned; and a determination of the ability of the overall management strategy to adequately fulfill the provisions of Article VI of the Agreement.

13. Governments implement the pollution control measures presented in Chapter VI of this Report to the maximum extent possible, to address the specific identified pollution problems regarding soil erosion, fertilizer application and control of runoff from livestock operations in agricultural areas; street sweeping and combined sewer systems in urban areas; and erosion control in construction areas, described in detail in pages 77-86 of this Report. The Conservation Authorities in Canada and the Soil Conservation Service in the United States could play a major role in these functions.

14. Governments urgently bring hazardous waste disposal priorities under control. To this end, governments:

a) prepare a complete inventory of operating and abandoned waste disposal sites in the Basin, including the nature and quantities of waste handled where possible;
b) determine the adequacy of such sites, and any proposed sites, to properly and safely handle hazardous wastes and implement necessary measures to correct any deficiencies found;
c) conduct a comprehensive review of all existing legislative and regulatory mechanisms and make alterations where necessary to assure the safe transportation and disposal of hazardous wastes in the Basin;
d) establish a compatible manifest system for hazardous wastes between all jurisdictions within and beyond the Basin;
e) because siting of hazardous waste facilities depends in part on public acceptance of such sites, efforts be made to demonstrate that safe disposal sites are technically possible, or that associated risks can be held to a minimum;
f) in addition, embark on a long term effort to reduce or eliminate pollutants at their sources, including increased resource recovery efforts and alterations in the manufacturing process.

15. The production, sale, transport or use of persistent synthetic organic compounds with known highly toxic effects whose use will result in their entry into the environment be prohibited.

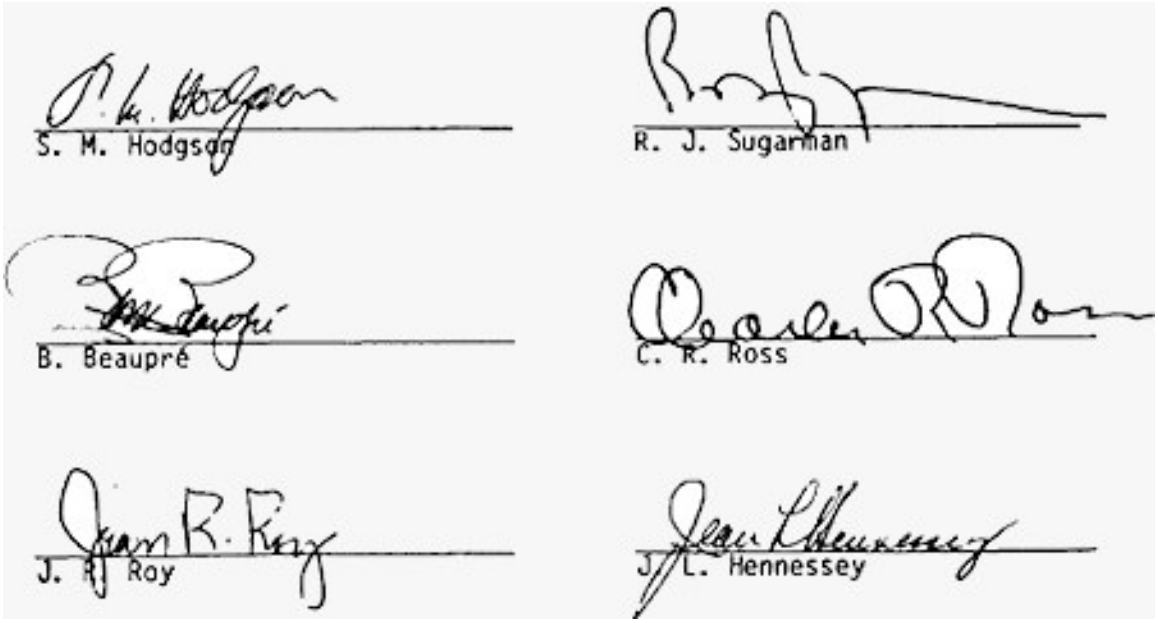
16. Governments continue to enhance efforts to find innovative and effective means of encouraging resource conservation, recovery and recycling efforts.

17. Governments recognize the values of preserving prime agricultural and wetland areas in the Basin.

18. With regard to phosphorus control, and pending the final report on the Commission's Phosphorus Management Strategies Task Force, the Governments accept the 1976 phosphorus load estimates presented in Table 5 of this report as the best estimates of "present" loads. Further, the proposed phosphorus target loads in the 1978 Great Lakes Water Quality Agreement should be taken as valid minimum goals for phosphorus control programs. The Commission has pointed out that recent work and interpretation of the Agreement indicates that lower target loads may be indicated for Lake Erie and Saginaw Bay if more restrictive interpretation of the phosphorus control goals, as outlined in this Report, are adopted. In view of uncertainty concerning appropriate phosphorus management strategies, Governments exercise caution when approving municipal sewage projects to ensure that such projects would not inhibit later upgrading to accommodate *new* phosphorus management strategies that may be considered following the Commission's further report on this matter.

INTERNATIONAL JOINT COMMISSION

Signed this seventh day of February 1980, as the Commission's response to the Reference from the Governments of Canada and the United States, dated April 15, 1972, on the question of pollution of the boundary waters of the Great Lakes System from land use activities.



APPENDIX I
Terms of Reference

TERMS OF REFERENCE

Text of Reference to the International Joint Commission to Study Pollution in the Great Lakes System from Agriculture, Forestry and other Land use Activities

I have the honour to inform you that the Governments of the United States of America and Canada, pursuant to Article IX of the Boundary Waters Treaty of 1909, have agreed to request the International Joint Commission to conduct a study of pollution of the boundary waters of the Great Lakes System from agricultural, forestry and other land use activities, in the light of provision of Article IV of the Treaty which provides that the boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health and property on the other side, and in the light also of the Great Lakes Water Quality Agreement signed on this date.

The Commission is requested to enquire into and report to the two Governments upon the following questions:

(1) Are the boundary waters of the Great Lakes System being polluted by land drainage (including ground and surface runoff and sediments) from agriculture, forestry, urban and industrial land development, recreational and park land development, utility and transportation systems and natural sources?

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

(3) If the Commission should find that pollution of the character just referred to is taking place, what remedial measure would, in its judgement, be most practicable and what would be the probable cost thereof?

The Commission is requested to consider the adequacy of existing programs and control measures, and the need for improvements thereto, relating to:

(a) inputs of nutrients, pest control products, sediments, and other pollutants from the sources referred to above;

(b) land use;

(c) land fills, land dumping, and deep well disposal practices;

(d) confined livestock feeding operations and other animal husbandry operations; and

(e) pollution from other agricultural, forestry and land use sources.

In carrying out its study, the Commission should identify deficiencies in technology and recommend actions for their correction.

The Commission should submit its report and recommendations to the two Governments as soon as possible and should submit reports from time to time on the progress of its investigation.

In the conduct of its investigation and otherwise in the performance of its duties under this reference, the Commission may utilize the services of qualified persons and other resources made available by the concerned agencies in Canada and the United States and should as far as possible make use of information and technical data heretofore acquired or which may become available during the course of the investigation, including information and data acquired by the Commission in the course of its investigations and surveillance activities conducted on the lower Great Lakes and in the connecting channels.

In conducting its investigation, the Commission should utilize the services of the international board structure pro-vided for in Article VII of the Great Lakes Water Quality Agreement.