PROTOCOL AMENDING THE 1978 AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES WATER QUALITY, AS AMENDED ON OCTOBER 16, 1983

The Government of the United States of America and the Government of Canada,

REAFFIRMING their commitment to achieving the purpose and objectives of the 1978 Agreement between the United States of America and Canada on Great Lakes Water Quality, as amended on October 16, 1983;

HAVING developed and implemented cooperative programs and measures to achieve such purpose and objectives;

RECOGNIZING the need for strengthened efforts to address the continuing contamination of the Great Lakes Basin Ecosystem, particularly by persistent toxic substances;

ACKNOWLEDGING that many of these toxic substances enter the Great Lakes System from air, from ground water infiltration, from sediments in the Lakes and from the runoff of non-point sources;

AWARE that further research and program development is now required to enable effective actions to be taken to address the continuing contamination of the Great Lakes;

DETERMINED to improve management processes for achieving Agreement objectives and to demonstrate firm leadership in the implementation of control measures;

Have agreed as follows:

AGREEMENT BETWEEN CANADA AND THE UNITED STATES OF AMERICA ON GREAT LAKES QUALITY, 1978

The Government of Canada and the Government of the United States of America,

HAVING in 1972 and 1978 entered into Agreements on Great Lakes Water Quality;

REAFFIRMING their determination to restore and enhance water quality in the Great Lakes System;

CONTINUING to be concerned about the impairment of water quality on each side of the boundary to an extent that is causing injury to health and property on the other side, as described by the International Joint Commission;

REAFFIRMING their intent to prevent further pollution of the Great Lakes Basin Ecosystem owing to continuing population growth, resource development and increasing use of water;

REAFFIRMING in a spirit of friendship and cooperation the rights and obligations of both countries under the Boundary Waters Treaty, signed on January 11, 1909, and in particular their obligation not to pollute boundary waters;

CONTINUING to recognize that right of each country in the use of the Great Lakes waters;

HAVING decided that the Great Lakes Water Quality Agreements of 1972 and 1978 and subsequent reports of the International Joint Commission provide a sound basis for new and more effective cooperative actions to restore and enhance water quality in the Great Lakes Basin Ecosystem;

RECOGNIZING that restoration and enhancement of the boundary waters cannot be achieved independently of other parts of the Great Lakes Basin Ecosystem with which these waters interact;

CONCLUDING that the best means to preserve the aquatic ecosystem and achieve improved water quality throughout the Great Lakes System is by adopting common objectives, developing and implementing cooperative programs and other measures, and assigning special responsibilities and functions to the International Joint Commission;

Have agreed as follows:

ARTICLE 1 - DEFINITIONS
As used in this Agreement:

(a) "Agreement" means the present Agreement as distinguished from the Great Lakes Water Quality Agreement of April 15, 1972;
(b) "Annex" means any of the Annexes to this Agreement, each of which is attached to and forms and integral part of this Agreement;
(c) "Boundary waters of the Great Lakes System" or "boundary waters" means boundary waters, as defined in the Boundary Waters Treaty, that are within the Great Lakes System;
(d) "Boundary Waters Treaty" means the Treaty between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada, signed at Washington on January 11, 1909;
(e) "Compatible regulations" means regulations no less restrictive than the agreed principles set out in this Agreement;
(f) "General Objectives" are broad descriptions of water quality conditions consistent with the protection of the beneficial uses and the level of environmental quality which the Parties desire to secure and which will provide overall water management guidance;
(g) "Great Lakes Basin Ecosystem" means the interacting components of air, land, water and living organisms, including humans, within the drainage basin of the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States;

(h) "Great Lakes System" means all of the streams river, lakes and other bodies of water that are within the drainage basin on the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States;
(i) "Harmful quantity" means any quantity of a substance that if discharged into receiving water would be inconsistent with the achievement of the General and Specific Objectives;
(j) "Hazardous polluting substance" means any element or compound identified by the Parties which, if discharged in any quantity into or upon receiving waters or adjoining shorelines, would present an imminent and substantial danger to public health or welfare; for this purpose, "public health or welfare" encompasses all factors affecting the health and welfare of humans including but not limited to human health, and conservation and protection of flora and fauna, public and private property, shorelines and beaches;
(k) "International Joint Commission" or "Commission" means the International Joint Commission established by the Boundary Waters Treaty;
(l) "Monitoring" means a scientifically designed system of continuing standardized measurements and observations and the evaluation thereof;
(m) "Objectives" means the General Objectives adopted pursuant to Article III and the Specific Objectives adopted pursuant to Article IV of this Agreement;
(n) "Parties" means the Government of Canada and the Government of the United States of America;
(o) "Phosphorus" means the element phosphorus present as a constituent of various organic and inorganic complexes and compounds;
(p) "Research" means development, interpretation and demonstration of advanced scientific knowledge for the resolution of issues but does not include monitoring and surveillance of water or air quality;
(q) "Science Advisory Board" means the Great Lakes Science Advisory Board of the International Joint Commission established pursuant to Article VIII of this Agreement;
(r) "Specific Objectives" means the concentration or quantity of a substance or level of effect that the Parties agree, after investigation, to recognize as a maximum or minimum desired limit for a defined body of water or portion thereof, taking into account the beneficial uses or level of environmental quality which the Parties desire to secure and protect;
(s) "State and Provincial Governments" means the Governments of the States of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Wisconsin, and the Commonwealth of Pennsylvania, and the Government of the Province of Ontario;
(t) "Surveillance" means specific observations and measurements relative to control or management;
(u) "Terms of Reference" means the Terms of Reference for the Joint Institutions and the Great Lakes Regional Office established pursuant to this Agreement, which are attached to and form an integral part of this Agreement;
(v) "Toxic substance" means a substance which can cause death, disease, behavioural abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or which can become poisonous after concentration in the food chain or in combination with other substances;
(w) "Tributary waters of the Great Lakes System" or "tributary waters" means all the waters within the Great Lakes System that are not boundary waters;
(x) "Water Quality Board" means the Great Lakes Water Quality Board of the International Joint Commission established pursuant to Article VIII of this Agreement.

ARTICLE II - PURPOSE

The purpose of the Parties is to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem. In order to achieve this purpose, the Parties agree to make a maximum effort to develop programs, practices and technology necessary for a better

understanding of the Great Lakes Basin Ecosystem and to eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes System.

Consistent with the provisions of this Agreement, it is the policy of the Parties that:

(a) The discharge of toxic substances in toxic amounts be prohibited and the discharge of any or all persistent toxic substances be virtually eliminated;
(b) Financial assistance to construct publicly owned waste treatment works be provided by a combination of local, state, provincial, and federal participation; and
(c) Coordinated planning processes and best management practices be developed and implemented by the respective jurisdictions to ensure adequate control of all sources of pollutants.

ARTICLE III - GENERAL OBJECTIVES

The Parties adopt the following General Objectives for the Great Lakes System. These waters should be:

(a) Free from substances that directly or indirectly enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl;
(b) Free from floating materials such as debris, oil, scum, and other immiscible substances resulting from human activities in amounts that are unsightly or deleterious;
(c) Free from materials and heat directly or indirectly entering the water as a result of human activity that alone, or in combination with other materials, will produce colour, odour, taste, or other conditions in such a degree as to interfere with beneficial uses;
(d) Free from materials and heat directly or indirectly entering the water as a result of human activity that alone, or in combination with other materials, will produce conditions that are toxic or harmful to human, animal, or aquatic life; and
(e) Free from nutrients directly or indirectly entering the waters as a result of human activity in amounts that create growths of aquatic life that interfere with beneficial uses.

ARTICLE IV - SPECIFIC OBJECTIVES

1. The Parties adopt the Specific Objectives for the boundary waters of the Great Lakes System as set forth in Annex 1, subject to the following: (a) The Specific Objectives adopted pursuant to this Article represent the minimum levels of water quality desired in the boundary waters of the Great Lakes System and are not intended to preclude the establishment of more stringent requirements.
(b) The determination of the achievement of Specific Objectives shall be based on statistically valid sampling data.
(c) Notwithstanding the adoption of Specific Objectives, all reasonable and practicable measures shall be taken to maintain or improve the existing water quality in those areas of the boundary waters of the Great Lakes System where such water quality is better than that prescribed by the Specific Objectives, and in those areas having outstanding natural resource value.

(d) The responsible regulatory agencies shall not consider flow augmentation as a substitute for adequate treatment to meet the Specific Objectives.
(e) The Parties recognize that in certain areas of inshore waters natural phenomena exist which, despite the best efforts of the Parties, will prevent the achievement of some of the Specific Objectives. As early as possible, these areas should be identified explicitly by the appropriate jurisdictions and reported to the International Joint Commission.
(f) The Parties recognize that there are areas in the boundary waters of the Great Lakes System where, due to human activity, one or more of the General or Specific Objectives of the Agreement are not being met. Pending virtual elimination of the persistent toxic substances in the Great Lakes System, the Parties, in cooperation with the State and Provincial Governments and the Commission, shall identify and work toward the elimination of: (i) Areas of Concern pursuant to Annex 2;
(ii) Critical Pollutants pursuant to Annex 2; and
(iii) Point Source Impact Zones pursuant to Annex 2.

2. The Specific Objectives for the boundary waters of the Great Lakes System or for particular portions thereof shall be kept under review by the Parties and the International Joint Commission, which shall make appropriate recommendations.
3. The Parties shall consult on: (a) The establishment of Specific Objectives to protect beneficial uses from the combined effects of pollutants; and
(b) The control of pollutant loading rates for each lake basin to protect the integrity of the ecosystem over the long term.

ARTICLE V - STANDARDS, OTHER REGULATORY REQUIREMENTS, AND RESEARCH

1. Water quality standards and other regulatory requirements of the Parties shall be consistent with the achievement of the General and Specific Objectives. The Parties shall use their best efforts to ensure that water quality standards and other regulatory requirements of the State and Provincial Government shall similarly be consistent with the achievement of these Objectives. Flow augmentation shall not be considered as a substitute for adequate treatment to meet water quality standards or other regulatory requirements.
2. The Parties shall use their best efforts to ensure that: (a) The principal research funding agencies in both countries orient the research programs of their organizations in response to research priorities identified by the Science Advisory Board and recommended by the Commission;
(b) Mechanisms be developed for appropriate cost-effective international cooperation; and
(c) Research priorities are undertaken in accordance with Annex 17.

ARTICLE VI - PROGRAMS AND OTHER MEASURES

1. The Parties, in cooperation with State and Provincial Governments, shall continue to develop and implement programs and other measures to fulfil the purpose of this Agreement and to meet the General and Specific Objectives. Where present treatment is inadequate to meet the General and Specific Objectives, additional treatment shall be required. The programs and measures shall include the following: (a) Pollution from Municipal Sources. Programs for the abatement, control and prevention of municipal discharges and urban drainage into the Great Lakes System. These programs

shall be completed and in operation as soon as practicable, and in the case of municipal sewage treatment facilities no later than December 31, 1982. These programs shall include: (i) Construction and operation of waste treatment facilities in all municipalities having sewer systems to provide levels of treatment consistent with the achievement of phosphorus requirements and the General and Specific Objectives, taking into account the effects of waste from other sources;
(ii) Provision of financial resources to ensure prompt construction of needed facilities;
(iii) Establishment of requirements for construction and operating standards for facilities;
(iv) Establishment of pre-treatment requirements for all industrial plants discharging waste into publicly owned treatment works where such industrial wastes are not amenable to adequate treatment or removal using conventional municipal treatment processes;
(v) Development and implementation of practical programs for reducing pollution from storm, sanitary, and combined sewer discharges; and
(vi) Establishment of effective enforcement programs to ensure that the above pollution abatement requirements are fully met;

(b) Pollution from Industrial Sources. Programs for the abatement, control and prevention of pollution from industrial sources entering the Great Lakes System. These programs shall be completed and in operation as soon as practicable and in any case no later than December 31, 1983, and shall include: (i) Establishment of water treatment or control requirements expressed as effluent limitations (concentrations and/or loading limits for specific pollutants where possible) for all industrial plants, including power generating facilities, to provide levels of treatment or reduction or elimination of inputs of substances and effects consistent with the achievement of the General and Specific Objectives and other control requirements, taking into account the effects of waste from other sources;
(ii) Requirements for the substantial elimination of discharges into the Great Lakes System of persistent toxic substances;
(iii) Requirements for control of thermal discharges;
(iv) Measures to control the discharges of radioactive materials into the Great Lakes System;
(v) Requirements to minimize adverse environmental impacts of water intakes;
(vi) Development and implementation of programs to meet industrial pre-treatment requirements as specified under sub-paragraph (a) (iv) above; and
(vii) Establishment of effective enforcement programs to ensure the above pollution abatement requirements are fully met;

(c) Inventory of Pollution Abatement Requirements. Preparation of an inventory of pollution abatement requirements for all municipal and industrial facilities discharging into the Great Lakes System in order to gauge progress toward the earliest practicable completion and operation of the programs listed in sub-paragraphs (a) and (b) above. This inventory, prepared and revised annually, shall include compliance schedules and status of compliance with monitoring and effluent restrictions, and shall be made available to the International Joint Commission and to the public. In the initial preparation of this inventory, priority shall be given to the problem areas previously identified by the Water Quality Board;
(d) Eutrophication. Programs and measures for the reduction and control of inputs of phosphorus and other nutrients, in accordance with the provisions of Annex 3
(e) Pollution from Agriculture, Forestry, and Other Land Use Activities. Measures for the abatement and control of pollution from agriculture, forestry and other land use activities including: (i) Measures for the control of pest control products used in the Great Lakes Basin to ensure that pest control products likely to have long term deleterious effects on the quality of water or its biota be used only as authorized by the responsible regulatory agencies; that inventories of pest control products used in the Great Lakes Basin be established and maintained by appropriate agencies; and that research and educational programs be strengthened to facilitate integration of cultural, biological and chemical pest control techniques;
(ii) Measures for the abatement and control of pollution from animal husbandry operations, including encouragement to appropriate agencies to adopt policies and regulations regarding utilization of animal wastes, and site selection and disposal of liquid and solid wastes, and to strengthen educational

and technical assistance programs to enable farmers to establish waste utilization, handling and disposal systems;
(iii) Measures governing the hauling and disposal of liquid and solid wastes, including encouragement to appropriate regulatory agencies to ensure proper location, design and regulation governing land disposal, and to ensure sufficient, adequately trained technical and administrative capability to review plans and to supervise and monitor systems for application of wastes on land;
(iv) Measures to review and supervise road salting practices and salt storage to ensure optimum use of salt and all-weather protection of salt stores in consideration of long-term environmental impact;
(v) Measures to control soil losses from urban and suburban as well as rural areas;
(vi) Measures to encourage and facilitate improvements in land use planning and management programs to take account of impacts on Great Lakes water quality;
(vii) Other advisory programs and measures to abate and control inputs of nutrients, toxic substances and sediments from agricultural, forestry and other land use activities;
(viii) Consideration of future recommendations from the International Joint Commission based on the Pollution from Land Use Activities Reference; and
(ix) Conduct further non-point source programs in accordance with Annex 13;

(f) Pollution from Shipping Activities. Measures for the abatement and control of pollution from shipping sources, including: (i) Programs and compatible regulations to prevent discharges of harmful quantities of oil and hazardous polluting substances, in accordance with Annex 4;
(ii) Compatible regulations for the control of discharges of vessel wastes, in accordance with Annex 5;
(iii) Such compatible regulations to abate and control pollution from shipping sources as may be deemed desirable in the light of continuing reviews and studies to be undertaken in accordance with Annex 6;
(iv) Programs and any necessary compatible regulations in accordance with Annexes 4 and 5, for the safe and efficient handling of shipboard generated wastes, including oil, hazardous polluting substances, garbage, waste water and sewage, and for their subsequent disposal, including the type and quantity of reception facilities and, if applicable, treatment standards; and
(v) Establishment by the Canadian Coast Guard and the United States Coast Guard of a coordinated system for aerial and surface surveillance for the purpose of enforcement of regulations and the early identification, abatement and clean-up of spills of oil, hazardous polluting substances, or other pollution;

(g) Pollution from Dredging Activities. Measures for the abatement and control of pollution from all dredging activities, including the development of criteria for the identification of polluted sediments and compatible programs for disposal of polluted dredged material, in accordance with Annex 7. Pending the development of compatible criteria and programs, dredging operations shall be conducted in a manner that will minimize adverse effects on the environment;
(h) Pollution from Onshore and Offshore Facilities. Measures for the abatement and control of pollution from onshore and offshore facilities, including programs and compatible regulations for the prevention of discharges of harmful quantities of oil and hazardous polluting substances, in accordance with Annex 8;
(i) Contingency Plan. Maintenance of a joint contingency plan for use in the event of a discharge or the imminent threat of a discharge of oil or hazardous polluting substances, in accordance with Annex 9;
(j) Hazardous Polluting Substances. Implementation of Annex 10 concerning hazardous polluting substances. The Parties shall further consult from time to time for the purpose of revising the list of hazardous polluting substances and of identifying harmful quantities of these substances;
(k) Persistent Toxic Substances. Measures for the control of inputs of persistent toxic substances including control programs for their production, use, distribution and disposal, in accordance with Annex 12;
(l) Airborne Toxic Substances. Programs to identify pollutant sources and relative source contribution, including the more accurate definition of wet and dry deposition rates, for those substances which may have significant adverse effects on environmental quality including the indirect effects of impairment of tributary water quality through atmospheric deposition in drainage basins. In cases where

significant contributions to Great Lakes pollution from atmospheric sources are identified, the Parties agree to consult on appropriate remedial programs. The Parties shall conduct such programs in accordance with Annex 15;
(m) Surveillance and Monitoring. Implementation of a coordinated surveillance and monitoring program in the Great Lakes System, in accordance with Annex 11, to assess compliance with pollution control requirements and achievement of the Objectives, to provide information for measuring local and whole lake response to control measures, and to identify emerging problems.
(n) Remedial Action Plans. Measures to ensure the development and implementation of Remedial Action Plans for Areas of Concern pursuant to Annex 2;
(o) Lakewide Management Plans. Measures to ensure the development and implementation of Lakewide Management Plans to address Critical Pollutants pursuant to Annex 2.
(p) Pollution from Contaminated Sediments. Measures for the abatement and control of pollution from all contaminated sediments, including the development of chemical and biological criteria for assessing the significance of the relative contamination arising from the sediments and compatible programs for remedial action for polluted sediments in accordance with Annex 14; and
(q) Pollution from Contaminated Groundwater and Subsurface Sources. Programs for the assessment and control of contaminated groundwater and subsurface sources entering the boundary waters of the Great Lakes System pursuant to Annex 16.

2. The Parties shall develop and implement such additional programs as they jointly decide are necessary and desirable to fulfil the purpose of this Agreement and to meet the General and Specific Objectives.The Parties shall develop and implement such additional programs as they jointly decide are necessary and desirable to fulfil the purpose of this Agreement and to meet the General and Specific Objectives.

ARTICLE VII - POWERS, RESPONSIBILITIES AND FUNCTIONS OF THE INTERNATIONAL JOINT COMMISSION

1. The International Joint Commission shall assist in the implementation of this Agreement. Accordingly, the Commission is hereby given, by a Reference pursuant to Article IX of the Boundary Waters Treaty, the following responsibilities: (a) Collation, analysis and dissemination of data and information supplied by the Parties and State and Provincial Governments relating to the quality of the boundary waters of the Great Lakes System and to pollution that enters the boundary waters from tributary waters and other sources;
(b) Collection, analysis and dissemination of data and information concerning the General and Specific Objectives and the operation and effectiveness of the programs and other measures established pursuant to this Agreement;
(c) Tendering of advice and recommendations to the Parties and to the State and Provincial Governments on problems of and matters related to the quality of the boundary waters of the Great Lakes System including specific recommendations concerning the General and Specific Objectives, legislation, standards and other regulatory requirements, programs and other measures, and intergovernmental agreements relating to the quality of these waters;
(d) Tendering of advice and recommendations to the Parties in connection with matters covered under the Annexes to this Agreement;
(e) Provision of assistance in the coordination of the joint activities envisaged by this Agreement;
(f) Provision of assistance in and advice on matters related to research in the Great Lakes Basin Ecosystem, including identification of objectives for research activities, tendering of advice and recommendations concerning research to the Parties and to the State and Provincial Governments, and dissemination of information concerning research to interested persons and agencies;
(g) Investigations of such subjects related to the Great Lakes Basin Ecosystem as the Parties may from time to time refer to it.

2. In the discharge of its responsibilities under this Reference, the Commission may exercise all of the powers conferred upon it by the Boundary Waters Treaty and by any legislation passed pursuant thereto including the power to conduct public hearings and to compel the testimony of witnesses and the production of documents.
3. The Commission shall make a full report to the Parties and to the State and Provincial Governments no less frequently than biennially concerning progress toward the achievement of the General and Specific Objectives including, as appropriate, matters related to Annexes to this Agreement. This report shall include an assessment of the effectiveness of the programs and other measures undertaken pursuant to this Agreement, and advice and recommendations. In alternate years, the Commission may submit a summary report. The Commission may at any time make special reports to the Parties, to the State and Provincial Governments and to the public concerning any problem of water quality in the Great Lakes System.
4. The Commission may in its discretion publish any report, statement or other document prepared by it in the discharge of its functions under this Reference.
5. The Commission shall have authority to verify independently the data and other information submitted by the Parties and by the State and Provincial Governments through such tests or other means as appear appropriate to it, consistent with the Boundary Waters Treaty and with applicable legislation.
6. The Commission shall carry out its responsibilities under the Reference utilizing principally the services of the Water Quality Board and the Science Advisory Board established under Article VIII of this Agreement. The Commission shall also ensure liaison and coordination between the institutions established under this Agreement and other institutions which may address concerns relevant to the Great Lakes Basin Ecosystem, including both those within its purview, such as those Boards related to the Great Lakes levels and air pollution matters, and other international bodies as appropriate.

ARTICLE VIII - JOINT INSTITUTIONS AND REGIONAL OFFICE

1. To assist the International Joint Commission in the exercise of the powers and responsibilities assigned to it under this Agreement, there shall be two Boards: (a) A Great Lakes Water Quality Board which shall be the principal advisor to the Commission. The Board shall be composed of an equal number of members from Canada and the United States, including representatives from the Parties and each of the State and Provincial Governments; and
(b) A Great Lakes Science Advisory Board shall provide advice on research to the Commission and to the Water Quality Board. The Board shall further provide advice on scientific matters referred to it by the Commission, or by the Water Quality Board in consultation with the Commission. The Science Advisory Board shall consist of managers of Great Lakes research programs and recognized experts on Great Lakes water quality problems and related fields.

2. The members of the Water Quality Board and the Science Advisory Board shall be appointed by the Commission after consultation with the appropriate government or governments concerned. The functions of the Boards shall be as specified in the terms of Reference appended to this Agreement.
3. To provide administrative support and technical assistance to the two Boards, and to provide information service for the programs, including public hearings, undertaken by the International Joint Commission and by the Boards, there shall be a Great Lakes Regional Office of the International Joint Commission. Specific duties and organization of the Office shall be as specified in the Terms of Reference appended to this Agreement.
4. The Commission shall submit an annual budget of anticipated expenses to be incurred in carrying out its responsibilities under this Agreement to the Parties for approval. Each Party shall seek funds to pay one-half of the annual budget so approved, but neither Party shall be under an obligation to pay a larger amount than the other toward this budget.

ARTICLE IX - SUBMISSION AND EXCHANGE OF INFORMATION

1. The International Joint Commission shall be given at its request any data or other information relating to water quality in the Great Lakes System in accordance with procedures established by the Commission.
2. The Commission shall make available to the Parties and to the State and Provincial Governments upon request all data or other information furnished to it in accordance with the Article.
3. Each Party shall make available to the other at its request any data or other information in its control relating to water quality in the Great Lakes System.
4. Notwithstanding any other provision of this Agreement, the Commission shall not release without the consent of the owner any information identified as proprietary information under the law of the place where such information has been acquired.

ARTICLE X - CONSULTATION AND REVIEW

1. Following the receipt of each report submitted to the Parties by the International Joint Commission in accordance with paragraph 3 of Article VII of this Agreement, the Parties shall consult on the recommendations contained in such report and shall consider such action as may be appropriate, including: (a) The modification of existing Objectives and the adoption of new Objectives;
(b) The modification or improvement of programs and joint measures; and
(c) The amendment of this Agreement or any Annex thereto.

Additional consultations may be held at the request of either Party on any matter arising out of the implementation of this Agreement.
2. When a Party becomes aware of a special pollution problem that is of joint concern and requires an immediate response, it shall notify and consult the other Party forthwith about appropriate remedial action.
3. The Parties, in cooperation with State and Provincial Governments, shall meet twice a year to coordinate their respective work plans with regard to the implementation of this Agreement and to evaluate progress made.
4. The Parties shall conduct a comprehensive review of the operation and effectiveness of this Agreement following every third biennial report of the Commission required under Article VII of this Agreement.

ARTICLE XI - IMPLEMENTATION

1. The obligations undertaken in this Agreement shall be subject to the appropriation of funds in accordance with the constitutional procedures of the Parties.

2. The Parties commit themselves to seek: (a) The appropriation of funds required to implement this Agreement, including the funds needed to develop and implement the programs and other measures provided for in Article VI of this Agreement, and the funds required by the International Joint Commission to carry out its responsibilities effectively;
(b) The enactment of any additional legislation that may be necessary in order to implement the programs and other measures provided for in Article VI of this Agreement; and
(c) The cooperation of the State and Provincial Governments in all matters relating to this Agreement.

ARTICLE XII - EXISTING RIGHTS AND OBLIGATIONS

Nothing in this Agreement shall be deemed to diminish the rights and obligations of the Parties as set forth in the Boundary Waters Treaty.

ARTICLE XIII - AMENDMENT

1. This Agreement, the Annexes, and the Terms of Reference may be amended by agreement of the Parties. The Annexes may also be amended as provided therein, subject to the requirement that such amendments shall be within the scope of this Agreement. All such amendments to the Annexes shall be confirmed by an exchange of notes or letters between the Parties through diplomatic channels which shall specify the effective date or dates of such amendments.
2. All amendments to this Agreement, the Annexes, and the Terms of Reference shall be communicated promptly to the International Joint Commission.

ARTICLE XIV - ENTRY INTO FORCE AND TERMINATION

This Agreement shall enter into force upon signature by the duly authorized representatives of the Parties, and shall remain in force for a period of five years and thereafter until terminated upon twelve months' notice given in writing by one of the Parties to the other.

ARTICLE XV - SUPERSESSION

This Agreement supersedes the Great Lakes Water Quality Agreement of April 15, 1972, and shall be referred to as the "Great Lakes Water Quality Agreement of 1978".

IN WITNESS WHEREOF the undersigned representatives, duly authorized by their respective Governments, have signed this Agreement.

DONE in duplicate at Ottawa in the English and French languages, both versions being equally authentic, this 22nd day of November 1978.

EN FOI DE QUOI, les représentants soussignées, dûment autorisés par leur Gouvernement respectif, ont signé le présent Accord.

FAIT en double exemplaire à Ottawa en français et en anglais, chaque version faisant également foi, ce 22e jour de novembre 1978.

ANNEX 1 - SPECIFIC OBJECTIVES

These Objectives are based on available information on cause/effect relationships between pollutants and receptors to protect the recognized most sensitive use in all waters. These Objectives may be amended, or new Objectives may be added, by mutual consent of the Parties.

I. CHEMICAL
A. Persistent Toxic Substances 1. Organic (a) Pesticides Aldrin/Dieldrin
The sum of the concentration of aldrin and dieldrin in water should not exceed 0.001 micrograms per litre. The sum of concentrations of aldrin and dieldrin in the edible portion of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.
Chlordane
The concentration of chlordane in water should not exceed 0.06 micrograms per litre for the protection of aquatic life.
DDT and Metabolites
The sum of the concentrations of DDT and its metabolites in water should not exceed 0.003 micrograms per litre. The sum of the concentrations of DDT and its metabolites in whole fish should not exceed 1.0 microgram per gram (wet weight basis) for the protection of fish-consuming aquatic birds.
Endrin
The concentration of endrin in water should not exceed 0.002 micrograms per litre. The concentration of endrin in the edible portion of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.
Heptachlor/Heptachlor Epoxide
The sum of the concentrations of heptachlor and heptachlor epoxide in water should not exceed 0.001 micrograms per litre. The sum of concentrations of heptachlor and heptachlor epoxide in edible portions of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.
Lindane
The concentration of lindane in water should not exceed 0.01 micrograms per litre for the protection of aquatic life. The concentration of lindane in edible portions of fish should not exceed 0.3 micrograms per gram (wet weight basis) for the protection of human consumers of fish.
Methoxychlor
The concentration of methoxychlor in water should not exceed 0.04 micrograms per litre for the protection of aquatic life.
Mirex
For the protection of aquatic organisms and fish-consuming birds and animals, mirex and its degradation products should be substantially absent from water and aquatic organisms. Substantially

absent here means less than detection levels as determined by the best scientific methodology available.

Toxaphene

The concentration of toxaphene in water should not exceed 0.008 micrograms per litre for the protection of aquatic life.

(b) Other Compounds Phthalic Acid Esters

The concentration of dibutyl phthalate and di (2-ethylhexyl) phthalate in water should not exceed 4.0 micrograms per litre and 0.6 micrograms per litre, respectively, for the protection of aquatic life. Other phthalic acid esters should not exceed 0.2 micrograms per litre in waters for the protection of aquatic life.

Polychlorinated Biphenyls (PCBs)

The concentration of total polychlorinated biphenyls in fish tissues (whole fish, calculated on a wet weight basis), should not exceed 0.1 micrograms per gram for the protection of birds and animals which consume fish.

Unspecific Organic Compounds

For other organic contaminants, for which Specific Objectives have not been defined, but which can be demonstrated to be persistent and are likely to be toxic, the concentrations of such compounds in water or aquatic organisms should be substantially absent, i.e., less than detection levels as determined by the best scientific methodology available.

2. Inorganic (a) Metals Arsenic

The concentrations of total arsenic in an unfiltered water sample should not exceed 50 micrograms per litre to protect raw waters for public water supplies.

Cadmium

The concentration of total cadmium in an unfiltered water sample should not exceed 0.2 micrograms per litre to protect aquatic life.

Chromium

The concentration of total chromium in an unfiltered water sample should not exceed 50 micrograms per litre to protect raw waters of public water supplies.

Copper

The concentration of total copper in an unfiltered water sample should not exceed 5 micrograms per litre to protect aquatic life.

Iron

The concentration of total iron in an unfiltered water sample should not exceed 300 micrograms per litre to protect aquatic life.

Lead

The concentration of total lead in an unfiltered water sample should not exceed 10 micrograms per litre in Lake Superior, 20 micrograms per litre in Lake Huron and 25 micrograms per litre in all remaining Great Lakes to protect aquatic life.

Mercury

The concentration of total mercury in a filtered water sample should not exceed 0.2 micrograms per litre nor should the concentration of total mercury in whole fish exceed 0.5 micrograms per gram (wet weight basis) to protect aquatic life and fish-consuming birds.

Nickel

The concentration of total nickel in an unfiltered water sample should not exceed 25 micrograms per litre to protect aquatic life.

Selenium

The concentration of total selenium in an unfiltered water sample should not exceed 10 micrograms per litre to protect the raw water for public water supplies.

Zinc

The concentration of total zinc in an unfiltered water sample should not exceed 30 micrograms per litre to protect aquatic life.

(b) Other Inorganic Substances Fluoride
The concentration of total fluoride in an unfiltered water sample should not exceed 1200 micrograms per litre to protect raw water for public water supplies.
Total Dissolved Solids
In Lake Erie, Lake Ontario and the International Section of the St. Lawrence River, the level of total dissolved solids should not exceed 200 milligrams per litre. In the St. Clair River, Lake St. Clair, the Detroit River and the Niagara River, the level should be consistent with maintaining the levels of total dissolved solids in Lake Erie and Lake Ontario not to exceed 200 milligrams per litre. In the remaining boundary waters, pending further study, the level of total dissolved solids should not exceed present levels.

B. Non-Persistent Toxic Substances 1. Organic Substances (a) Pesticides Diazinon
The concentration of diazinon in an unfiltered water sample should not exceed 0.08 micrograms per litre for the protection of aquatic life.
Guthion
The concentration of guthion in an unfiltered water sample should not exceed 0.005 micrograms per litre for the protection of aquatic life.
Parathion
The concentration of parathion in an unfiltered water sample should not exceed 0.008 micrograms per litre for the protection of aquatic life.
Other Pesticides
The concentration of unspecified, non-persistent pesticides should not exceed 0.05 of the median lethal concentration on a 96-hour test for any sensitive local species.

(b) Other substances Unspecified Non-Persistent Toxic Substances and Complex Effluents
Unspecified non-persistent toxic substances and complex effluents of municipal, industrial or other origin should not be present in concentrations which exceed 0.05 of the median lethal concentration in a 96-hour test for any sensitive local species to protect aquatic life.
Oil and Petrochemicals
Oil and petrochemicals should not be present in concentrations that: (i) can be detected as visible film, sheen or discoloration on the surface;
(ii) can be detected by odour;
(iii) can cause tainting of edible aquatic organisms; and
(iv) can form deposits on shorelines and bottom sediments that are detectable by sight or odour, or are deleterious to resident aquatic organisms.

2. Inorganic Substances Ammonia
The concentration of un-ionized ammonia (NH_3) should not exceed 20 micrograms per litre for the protection of aquatic life. Concentrations of total ammonia should not exceed 500 micrograms per litre for the protection of public water supplies.
Hydrogen Sulfide
The concentration of undissociated hydrogen sulfide should not exceed 2.0 micrograms per litre to protect aquatic life.

C. Other Substances 1. Dissolved oxygen
In the connecting channels and in the upper waters of the Lakes, the dissolved oxygen level should not be less than 6.0 milligrams per litre at any time; in hypolimnetic waters, it should be not less than necessary for the support of fishlife, particularly cold water species.
2. pH

Values of pH should not be outside the range of 6.5 to 9.0, nor should discharge change the pH at the boundary of a limited use zone more than 0.5 units from that of the ambient waters.

3. Nutrients

Phosphorus

The concentration should be limited to the extend necessary to prevent nuisance growths of algae, weeds and slimes that are or may become injurious to any beneficial water use. (Specific phosphorus control requirements are set out in Annex 3.)

4. Tainting Substances (a) Raw public water supply sources should be essentially free from objectionable taste and odour for aesthetic reasons.

(b) Levels of phenolic compounds should not exceed 1.0 microgram per litre in public water supplies to protect against taste and odour in domestic water.

(c) Substances entering the water as the result of human activity that cause tainting of edible aquatic organisms should not be present in concentrations which will lower the acceptability of these organisms as determined by organoleptic tests.

II. PHYSICAL

A. Asbestos

Asbestos should be kept at the lowest practical level and in any event should be controlled to the extent necessary to prevent harmful effects on human health.

B. Temperature

There should be no change in temperature that would adversely affect any local or general use of the waters.

C. Settleable and Suspended Solids, and Light Transmission

For the protection of aquatic life, waters should be free from substances attributable to municipal, industrial or other discharges resulting from human activity that will settle to form putrescent or otherwise objectionable sludge deposits or that will alter the value of Secchi disc depth by more than 10 per cent.

III. MICROBIOLOGICAL

Waters used for body contact recreation activities should be substantially free from bacteria, fungi, or viruses that may produce enteric disorders or eye, ear, nose, throat and skin infections or other human diseases and infections.

IV. RADIOLOGICAL

The level of radioactivity in waters outside of any defined source control area should not result in a TED50 (total equivalent dose integrated over 50 years as calculated in accordance with the methodology established by the International Commission on Radiological Protection) greater than 1 millirem to the whole body from a daily ingestion of 2.2 litres of lake water for one year. For dose commitments between 1 and 5 millirem at the periphery of the source control area, source investigation and corrective action are recommended if releases are not as low as reasonably achievable. For dose commitments greater than 5 millirem, the responsible regulatory authorities shall determine appropriate corrective action.

SPECIFIC OBJECTIVES - SUPPLEMENT TO ANNEX 1

1. General Principles (a) Interim Objectives for Persistent Toxic Substances
Consistent with the policy stated in paragraph (a) of Article II and Paragraph 2 of Annex 12 that the discharge of any or all persistent toxic substances be virtually eliminated, the Specific Objectives set out in Annex 1 for such substances are adopted as interim objectives.
(b) Detention Levels
As used in this Annex, "absent" means that the substances are not detectable when analyzed using the best available technology, which may include biological indicators. Detection levels will be subject to change as technology improves and new levels are adopted.

2. Specific Objectives Review Process (a) The Parties, in consultation with State and Provincial Governments, shall consult on or before July 1, 1988, and at least once every two years thereafter for the purpose of considering the adoption of proposals by the Parties, State and Provincial Governments or recommendations of the Commission to: (i) establish or modify Specific Objectives under Annex 1; and
(ii) establish action levels under Annex 12.

The Parties, in cooperation with State and Provincial Governments, shall ensure that the public is consulted in the development and adoption of the Specific Objectives.
(b) In proposing a substance for a new Specific Objective, the Parties, State and Provincial Governments or the Commission shall be guided by, but not limited to, the lists prepared by the Parties under paragraph (c), below, identifying substances that are present or potentially present within the water, sediment or aquatic biota of the Great Lakes System and are believed, singly or in synergistic or additive combination with another substance, to have acute or chronic toxic effects on aquatic, animal or human life.
(c) The Parties, on or before December 31, 1988, shall compile and maintain three lists of substances as follows: (i) List No. 1 shall consist of all substances (1) believed to be present within the water, sediment or aquatic biota of the Great Lakes System and (2) believed, singly or in synergistic or additive combination with another substance,to have acute or chronic toxic effects on aquatic, animal or human life.
(ii) List No. 2 shall consist of all substances (1) believed to be present within the water, sediment or aquatic biota of the Great Lakes System and (2) believed, singly, or in synergistic or additive combination with another substance to have the potential to cause acute or chronic toxic effects on aquatic, animal or human life.
(iii) List No. 3 shall consist of all substances (1) believed to have the potential of being discharged into the Great Lakes System and (2) believed, singly or in synergistic or additive combination with another substance, to have acute or chronic toxic effects on aquatic, animal or human life.

In compiling such lists, the Parties shall employ all data available, including that resulting from activities undertaken pursuant to Annex 12.
(d) Determinations regarding whether a substance, singly or in synergistic or additive combinations with another substance, has actual or potential acute or chronic effects or whether a substance has the potential of being discharged into the Great Lakes System according to paragraph (c) above, shall be made using standard methods agreed to by the Parties in consultation with State and Provincial Governments by April 1988.

3. Lake Ecosystem Objectives. Consistent with the purpose of this Agreement to maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem, the Parties, in consultation with State and Provincial Governments, agree to develop the following ecosystem objectives for the boundary waters of the Great Lakes System, or portions thereof, and for Lake Michigan: (a) Lake Superior

The Lake should be maintained as a balanced and stable oligotrophic ecosystem with lake trout as the top aquatic predator of a cold-water community and the Pontoporeia hoyi as a key organism in a food chain; and
(b) Other Great Lakes
Ecosystem Objectives shall be developed as the state of knowledge permits for the rest of the boundary of the Great Lakes System, or portions thereof, and for Lake Michigan.

ANNEX 2 - REMEDIAL ACTION PLANS AND LAKEWIDE MANAGEMENT PLANS

1. Definitions. As used in this Annex: (a) "Area of Concern" means a geographic area that fails to meet the General or Specific Objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life.
(b) "Critical Pollutants" means substances that persist at levels that, singly or in synergistic or additive combination, are causing, or are likely to cause, impairment of beneficial uses despite past application of regulatory controls due to their: (i) presence in open lake waters;
(ii) ability to cause or contribute to a failure to meet Agreement objectives through their recognized threat to human health and aquatic life; or
(iii) ability to bioaccumulate.

(c) "Impairment of beneficial use(s)" means a change in the chemical, physical or biological integrity of the Great Lakes System sufficient to cause any of the following: (i) restrictions on fish and wildlife consumption;
(ii) tainting of fish and wildlife flavour;
(iii) degradation of fish wildlife populations;
(iv) fish tumors or other deformities;
(v) bird or animal deformities or reproduction problems;
(vi) degradation of benthos;
(vii) restrictions on dredging activities;
(viii) eutrophication or undesirable algae;
(ix) restrictions on drinking water consumption, or taste and odour problems
(x) beach closings;
(xi) degradation of aesthetics;
(xii) added costs to agriculture or industry;
(xiii) degradation of phytoplankton and zooplankton populations; and
(xiv) loss of fish and wildlife habitat.

(d) "Point Source Impact Zone" is defined as an area of water contiguous to a point source where the water quality does not comply with the General and Specific Objectives of this Agreement.

2. General Principles (a) Remedial Action Plans and Lakewide Management Plans shall embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in Areas of Concern or in open lake waters.
(b) Such Plans shall provide a continuing historical record of the assessment of Areas of Concern or Critical Pollutants, proposed remedial actions and their method of implementation, as well as changes in environmental conditions that result from such actions, including significant milestones in restoring beneficial uses to Areas of Concern or open lake waters. They are to serve as an important step toward virtual elimination of persistent toxic substances and toward restoring and maintaining the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem.
(c) The Parties, State and Provincial Governments, and the Commission have identified Areas of Concern and the development of the of Remedial Action Plans for them has begun. Furthermore, the

Parties and State and Provincial Governments have begun developing lakewide strategies for Lakes Ontario and Michigan. By incorporating an Annex for Remedial Action Plans and Lakewide Management Plans in this Agreement, the Parties intend to endorse and build upon these existing efforts.
(d) Point source impact zones exist in the vicinity of some point source discharges. Pending the achievement of the virtual elimination of persistent toxic substances, the size of such zones shall be reduced to the maximum extent possible by the best available technology so as to limit the effects of toxic substances in the vicinity of these discharges. These zones shall not be acutely toxic to aquatic species, nor shall their recognition be considered a substitute for adequate treatment or control of discharges at their sources.
(e) The Parties, in cooperation with State and Provincial Governments, shall ensure that the public is consulted in all actions undertaken pursuant to this Annex.

3. Designation of Areas of Concern. The Parties, in cooperation with State and Provincial Governments and the Commission, shall designate geographic Areas of Concern. The Commission, in its evaluation role, shall review progress in addressing Areas of Concern, and recommend additional Areas of Concern for designation by each Party.
4. Remedial Action Plans for Areas of Concern (a) The Parties shall cooperate with State and Provincial Governments to ensure that Remedial Action Plans are developed and implemented for Areas of Concern. Each plan shall include: (i) a definition and detailed description of the environmental problem in the Areas of Concern, including a definition of the beneficial uses that are impaired, the degree of impairment and the geographic extent of such impairment;
(ii) a definition of the causes of the use impairment, including a description of all known sources of pollutants involved and an evaluation of other possible sources;
(iii) an evaluation of remedial measures in place;
(iv) an evaluation of alternative additional measures to restore beneficial uses;
(v) a selection of additional remedial measures to restore beneficial uses and a schedule for their implementation;
(vi) an identification of the persons or agencies responsible for implementation of remedial measures;
(vii) a process for evaluating remedial measure implementation and effectiveness; and
(viii) a description of surveillance and monitoring processes to track the effectiveness of remedial measures and the eventual confirmation of the restoration of uses.

(b) The Parties, in cooperation with State and Provincial Governments, shall ensure that affected State and Provincial Governments not now covered by this Agreement will be involved in the development of such plans and consulted on their implementation.
(c) The Parties shall cooperate with State and Provincial Governments to classify Areas of Concern by their stage of restoration progressing from the definition of the problems and causes, through the selection of remedial measures, to the implementation of remedial programs, the monitoring of recovery, and, when identified beneficial uses are no longer impaired and the area restored, the removal of its designation as an Area of Concern.
(d) The Remedial Action Plans shall be submitted to the Commission for review and comment at three stages: (i) when a definition of the problem has been completed under sub-paragraphs 4 (a) (i) and (ii);
(ii) when remedial and regulatory measures are selected under sub-paragraphs 4 (a)(iii), (iv),(v) and (vi); and
(iii) when monitoring indicates that identified beneficial uses have been restored under sub-paragraphs 4(a) (vii) and (viii).

5. Designation of Critical Pollutants for the Development of Lakewide Management Plans. The Parties, in cooperation with State and Provincial Governments and the Commission, shall designate Critical Pollutants for the boundary waters of the Great Lakes System or for a portion thereof. The Commission, in its evaluative role, shall review progress in addressing Critical Pollutants and recommend additional Critical Pollutants for designation by the Parties. Substances on List No. 1 under Annex 1 Supplement shall be considered for designation as Critical Pollutants.

6. Lakewide Management Plans for Critical Pollutants (a) The Parties, in consultation with State and Provincial Governments, shall develop and implement Lakewide Management Plans for open lake waters, except for Lake Michigan where the Government of the United States of America shall have that responsibility. Such Plans shall be designed to reduce loadings of Critical Pollutants in order to restore beneficial uses, Lakewide Management Plans shall not allow increases in pollutant loadings in areas where Specific Objectives are not exceeded.
Such Plans shall include: (i) a definition of the threat to human health or aquatic life posed by Critical Pollutants, singly or in synergistic or additive combinations with another substance, including their contribution to the impairment of beneficial uses;
(ii) an evaluation of information available on concentration, sources, and pathways of the Critical Pollutants in the Great Lakes System, including all information on loadings of the Critical Pollutants from all sources, and an estimation of total loadings of the Critical Pollutants by modelling or other identified methods;
(iii) steps to be taken pursuant to Article VI of this Agreement to develop the information necessary to determine the schedule of load reduction of Critical Pollutants that would result in meeting Agreement Objectives, including steps to develop the necessary standard approached and agreed procedures;
(iv) a determination of load reduction of Critical Pollutants necessary to meet Agreement Objectives;
(v) an evaluation of remedial measures presently in place, and alternative additional measures that could be applied to decrease loadings of Critical Pollutants;
(vi) identification of the additional remedial measures that are need to achieve the reduction of loadings and to eliminate the contribution to impairment of beneficial uses from Critical Pollutants, including an implementation schedule;
(vii) identification of the persons or agencies responsible for implementation of the remedial measures in question;
(viii) a process for evaluating remedial measure implementation and effectiveness;
(ix) a description of surveillance and monitoring to track the effectiveness of the remedial measures and the eventual elimination of the contribution to impairments of beneficial uses from the Critical Pollutants;
(x) a process for recognizing the absence of a Critical Pollutant in open lake waters.

(b) The Parties shall classify efforts to reduce Critical Pollutants by their stages of elimination progressing from the definition of the problem, through the selection of remedial measures, to the implementation of remedial programs, the monitoring of recovery, and the removal of designation as a Critical Pollutant when it is no longer likely to cause, singly or in synergistic or additive combination with another substance, impairment of identified beneficial uses.
(c) Lakewide Management Plans shall be submitted to the Commission for review and comment at four stages; (i) When a definition of the problem has been completed under sub-paragraphs 6 (a)(i), (ii) and (iii);
(ii) When the schedule of load reductions is determined under paragraph 6(a) (i), (ii) and (iii);
(iii) When remedial measures are selected under sub-paragraph 6 (a)(v), (vi) and (vii); and
(iv) When monitoring indicates that the contribution of the Critical Pollutants to impairment of identified beneficial uses has been eliminated under sub-paragraphs 6(a)(viii) and (ix)

7. Reporting Progress (a) Point Source Impact Zones that are associated with direct significant discharges of industrial and municipal wastes shall be identified delineated and reported to the Commission beginning September 30, 1989. They shall be reviewed biennially and their limits revised to achieve the maximum possible reduction in size and effect in accordance with improvements in waste treatment technology and consistent with the policy of virtual elimination of persistent toxic substances.
(b) The Parties shall report, by December 31, 1988, and biennially thereafter, to the Commission on the progress in developing and implementing the Remedial Action Plans and Lakewide Management Plans and in restoring beneficial uses. Information from these reports shall be included in the Commission's biennial report under paragraph 3 of Article VII.

ANNEX 3 - CONTROL OF PHOSPHORUS

1. The purpose of the following programs is to minimize eutrophication problems and to prevent degradation with regard to phosphorus in the boundary waters of the Great Lakes System. The Goals of phosphorus control are: (a) Restoration of year-round aerobic conditions in the bottom waters of the Central Basin of Lake Erie;
(b) Substantial reduction in the present levels of algal biomass to a level below that of a nuisance condition in Lake Erie;
(c) Reduction in present levels of algal biomass to below that of a nuisance condition in Lake Ontario unleading the International Section of the St. Lawrence River;
(d) Maintenance of the oligotrophic state and relative algal biomass of Lakes Superior and Huron;
(e) Substantial elimination of algal nuisance growths in Lake Michigan to restore it to oligotrophic state; and
(f) The elimination of algal nuisance in bays and in other areas wherever they occur.

2. The following programs shall be developed and implemented to reduce input of phosphorus to the Great Lakes: (a) Construction and operation of municipal waste treatment facilities in all plants discharging more than one million gallons per day to achieve, where necessary to meet the loading allocation be developed pursuant to paragraph 3 below, or to meet local conditions, whichever are more stringent, effluent concentration of 1.0 milligram per litre total phosphorus maximum for plants in the basins of Lakes Superior, Michigan, and Huron, and of 0.5 milligram per litre total phosphorus maximum for plants in the basins of Lakes Ontario and Erie.
(b) Regulation of phosphorus introduction from industrial discharges to the maximum practicable extent.
(c) Reduction to the maximum extent practicable of phosphorus introduced from diffuse sources into Lakes Superior, Michigan, and Huron; and the reduction by 30 per cent of phosphorus introduced from diffuse sources into Lakes Ontario and Erie, where necessary to meet the loading allocations to be developed pursuant to paragraph 3 below, or to meet local conditions, whichever is more stringent.
(d) Reduction of phosphorus in household detergents to 0.5 per cent by weight where necessary to meet the loading allocation to be developed pursuant to paragraph 3 below, or to meet local conditions, whichever are more stringent.
(e) Maintenance of a viable research program to seek maximum efficiency and effectiveness in the control of phosphorus introductions into the Great Lakes.

3. The following table establishes phosphorus loads for the base year (1976) and future phosphorus loads. The Parties, in cooperation with the State and Provincial Governments, shall within eighteen months after the date of entry into force of this Agreement confirm the future phosphorus loads, and based on these establish load allocations and compliance schedules, taking into account the recommendations of the International Joint Commission arising from the Pollution from Land Use Activities Reference. Until such loading allocations and compliance schedules are established, the Parties agree to maintain the programs and other measures specified in Annex 2 of the Great Lakes Water Quality Agreement of 1972.

Basin 1976 Phosphorus
Load in Metric Tonnes
Per Year Future

Phosphorus Load
in Metric Tonnes
Per Year
Lake Superior 3600 3400*
Lake Michigan 6700 5600*
Main Lake Huron 3000 2800
Georgian Bay 630 600*
North Channel 550 520*
Saginaw Bay 870 440*
Lake Erie 20000 11000**
Lake Ontario 11000 7000**

* These loadings would result if all municipal plants over one million gallons per day achieved an effluent of 1 milligram per litre of phosphorus.

** These loadings are required to meet the goals stated in paragraph 1 above.

PHOSPHORUS LOAD REDUCTION SUPPLEMENT TO ANNEX 3 OF THE 1978 AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES WATER QUALITY

1. The purpose of this Supplement is to outline measures to fulfill the commitments undertaken pursuant to paragraph 3 of Annex 3 of the 1978 Great Lakes Water Quality Agreement which requires that:

"... The Parties, in cooperation with the State and Provincial Governments, shall within eighteen months after the date of entry into force of this Agreement confirm the future phosphorus loads, and based on these establish load allocations and compliance schedules, taking into account the recommendations of the International Joint Commission arising from the Pollution from Land Use Activities Reference ..."
Phosphorus Target Loads
2. Table 1 establishes the recommended phosphorus target loads which represent planning guides for the Parties. Table 1 replaces the table contained in paragraph 3 of Annex 3 of the 1978 Great Lakes Water Quality Agreement (GLWQA).

Table 1

BASIN Phosphorus
Target Loads
(metric tonnes per year)
Lake Superior (See Section 3(b))
Lake Michigan "
Main Lake Huron "
Georgian Bay "
North Channel "
Saginaw Bay 440 (Note 1)

Lake Erie 11000 (Note 2)
Lake Ontario 7000 (Note 2)

Note 1 Target load designed to alleviate drinking water taste and odour problems.
Note 2 Target loads proposed to meet ecosystem objectives in Annex 3. The allocation of the phosphorus target loads between the two countries shall be consistent with the equal rights of both Parties in the use of their boundary waters.

3. Phosphorus Load Reductions (a) Lower Lakes:
Table 2 summarizes the estimated phosphorus loading that will be discharged to the Lower Lakes basins when all municipal waste treatment facilities over one million gallons per day achieve compliance with the one milligram per litre (1 mg/1) effluent concentration (on a monthly average basis) as required by Article VI, 1(a) of the 1978 GLWQA. The table also shows the further reductions required to meet the Phosphorus Target Loads.

Table 2 - Phosphorus Load Reduction Targets - metric tonnes per year

Basin Estimated
Loadings
at 1 mg/l
(Note 1) Phosphorus
Target
Load Estimates
of Further
Reductions
Required
Lake Erie 13,000 11,000 2,000
Lake Ontario 7,430 7,000 430

Note 1 Estimated loading when all municipal waste treatment facilities over one million gallons/day achieve 1 mg/1 phosphorus effluent target levels.

(b) Upper Lakes:
Load reductions for the Upper Lakes will be accomplished by achieving the 1 mg/1 phosphorus effluent concentration (on a monthly average) at municipal waste treatment facilities discharging more than one million gallons per day. The Parties further agree to maintain the present oligotrophic state of the open waters and relative algal biomass of Lakes Superior and Huron. In addition, the United States agrees to undertake efforts to achieve the substantial elimination of algal nuisance growths in Lake Michigan. Further measures will be implemented as required for Saginaw Bay, various localized nearshore problem areas and Green Bay.
(c) Table 3 presents the distribution of further reductions in phosphorus loading required for Lake Erie (in metric tonnes/year) in order to achieve the estimated target loads. These figures will be used by the Parties in the development of detailed plans for achieving further phosphorus reductions as described in 4(a) and (b) below.

Table 3 - Allocation of reductions to meet target loads for Lake Erie as shown in Table 1

CANADA U.S. TOTAL
300 1700 2000

(d) For Lake Ontario, the Parties, in cooperation and full consultation with State and Provincial Governments, agree to review the measures to achieve further phosphorus reductions in this Basin and will, within one year, meet to allocate the further phosphorus reductions between the parties. Plans to achieve the required reductions set out in Table 2 will be developed using these figures in accordance with procedures described in 4(a) and (b) below.

4. Phosphorus Load Reduction Plans (a) Phosphorus load reduction plans will be developed and implemented by the Parties in cooperation and full consultation with State and Provincial governments to achieve the phosphorus reductions for Lake Erie and Ontario described in Table 2. The plans will include phosphorus control programs and other measures as outlined in Section 5 and will describe any additional measures which will be undertaken to evaluate and review progress in achieving the phosphorus load reductions. A staged approach, incorporating target dates for achieving further reductions, will be included in the plans to provide the Parties and State and Provincial governments with a framework for implementing and evaluating the effectiveness of controls.
(b) These detailed plans shall be tabled by the Parties with the International Joint Commission 18 months after agreement on this Supplement to Annex 3. The Parties will provide the Commission with progress reports and annual updates of these plans.

5. Programs and Other Measures
The following phosphorus control programs and measures will be developed and implemented by the Parties in cooperation and full consultation with State and Provincial governments to achieve the required reductions in accordance with the plans developed pursuant to Section 4. The Parties recognize that the responsibility for the control on nonpoint sources is shared between the Parties and the State and Provincial governments. (a) Municipal Waste Treatment Facilities (i) Priority will be given to the continuation and intensification of efforts to ensure that municipal waste treatment facilities discharging more that one million gallons per day achieve an effluent concentration of 1 mg/1 total phosphorus on a monthly average.
(ii) Where necessary, consideration will be given to operating facilities capable of greater phosphorus reduction at higher level of phosphorus removal than that required in 5(a)(i).
(iii) Where necessary, municipal waste treatment facilities designed, built, expanded or modified after October 1, 1983 should allow for later modification to provide for greater removal of phosphorus than that required under 5 (a)(i).

(b) Detergent Phosphorus Limitation
Priority will be given to continuing efforts to limit phosphorus in household detergents.
(c) Industrial Discharges
Reasonable and practical measures will be undertaken to control industrial sources of phosphorus.
(d) Nonpoint Source Programs and Measures
Priority management areas will be identified and designated for application of urban and agricultural programs and measures which include: (i) Urban drainage management control programs where feasible consisting of level 1 measures throughout the Great Lakes Basin; and level 2 measures where necessary to achieve reductions or where local environmental conditions dictate (Note 1); and
(ii) Agricultural nonpoint source management programs where feasible consisting of level 1 measures throughout the Basin and level 2 measures where necessary to achieve reductions of where local environmental conditions dictate (Note 1).

Note 1:

Level 1 nonpoint source control options include:
Agricultural: adoption of management practices such as: animal husbandry control measures, crop residue management, conservation tillage, no-till, winter cover-crops, crop rotation, strip cropping, vegetated buffer strips along stream and ditch banks, and improved fertilizer management practices.
Urban: adoption of management practices such as: erosion controls, use of natural storage capacities and street cleaning.
Level 2 nonpoint source controls include Level 1 plus:
Agricultural: adoption of intensive practices such as: contour plowing, contour strip cropping, contour diversions, tile outlet-terraces, flow control structures, grassed waterways, sedimentation basins and livestock manure storage facilities.
Urban: adoption of practices such as: artificial detention and sedimentation of stormwater and runoff and reduction of phosphorus in combined sewer overflows.
(e) Research
Pursuant to the provisions of paragraph 2(e) of Annex 3, the Parties will make special efforts to assure that their research activities will be responsive to the Programs and Other Measures described herein.
(f) Monitoring and Surveillance
The Parties will develop and implement surveillance and monitoring measures to determine the progress of Phosphorus Load Reduction Plans for the Lower Lakes as called for under Section 4 above, and to evaluate efforts taken by the Parties to reduce phosphorus in the Great Lakes Basin. These measures will include an inventory of areas treated, watershed modelling and improved measurement of tributary loadings to the Lower Lakes for the purpose of providing improved nonpoint source loading estimates and the monitoring of mass loadings to the Upper Lakes to maintain or improve the environmental conditions described in Section 3(b).

6. Review
The Parties shall meet no later than December 31, 1988, to review the effectiveness of the programs and measures described herein, and any remaining load reduction measures required to achieve the target loads.

ANNEX 4 - DISCHARGES OF OIL AND HAZARDOUS POLLUTING SUBSTANCES FROM VESSELS

1. Definition. As used in this Annex:

(a) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting or dumping; it does not include unavoidable direct discharges of oil from a properly functioning vessel engine;
(b) "Harmful quantity of oil" means any quantity of oil that, if discharged from a ship that is stationary into clear calm water on a clear day, would produce a film or a sheen upon, or discolouration of, the surface of the water or adjoining shoreline, or that would cause a sludge or emission to be deposited beneath the surface of the water or upon the adjoining shoreline;
(c) "Oil" means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, oil sludge, oil refuse, oil mixed with ballast or bilge water and oil mixed with wastes other than dredged material;
(d) "Tanker" means any vessel designed for the carriage of liquid cargo in bulk; and
(e) "Vessel" means any ship, barge or other floating craft, where or not self-propelled.

2. General Principles. Compatible regulation shall be adopted for the prevention of discharges into the Great Lakes System of harmful quantities of oil and hazardous polluting substances from vessels in accordance with the following principles;

(a) The discharge of a harmful quantity of oil or hazardous polluting substance, including any such quantities as may be contained in ballast water,shall be prohibited and made subject to appropriate penalties; and
(b) As soon as any person in charge has knowledge of any discharge, or probable discharge, of harmful quantities of oil or hazardous polluting substances, immediate notice of such discharge shall be given to the appropriate agency in the jurisdiction where the discharge occurs; failure to give this notice shall be made subject to appropriate penalties.

3. Oil. The programs and measures to be adopted for the prevention of discharges of harmful quantities of oil shall include;

(a) Compatible regulations for design, construction, and operation of vessels based on the following principles.
(i) Each vessel shall have a suitable means of containing on board cargo oil spills caused by loading or unloading operations;
(ii) Each vessel shall have a suitable means of containing on board fuel oils spills caused by loading or unloading operations, including those from tank vents and overflow pipes;
(iii) Each vessel shall have the capability of retaining on board oily wastes accumulated during vessel operation;
(iv) Each vessel shall be capable of off-loading retained oily wastes to a reception facility;
(v) Each vessel shall be provided with a means for rapidly and safely stopping the flow of cargo or fuel oil during loading, unloading or bunkering operations in the event of an emergency;
(vi) Each vessel shall be provided with suitable lighting to adequately illuminate all cargo and fuel oil handling areas if the loading, unloading or bunkering operations occur at night;
(vii) Hose assemblies used on board vessels for oil loading, unloading, or bunkering shall be suitably designed, identified, and inspected to minimize the possibility of failure; and
(viii) Oil loading, unloading, and bunkering systems shall be suitably designed, identified, and inspected to minimize the possibility of failure; and

(b) Programs to ensure that merchant vessel personnel are trained in all functions involved in the use, handling, and stowage of oil and in procedures for abatement of oil pollution.

4. Hazardous Polluting Substances. The programs and measures to be adopted for the prevention of discharges of harmful quantities of hazardous polluting substances carried as cargo shall include:

(a) Compatible regulations for the design, construction, and operation of vessels using as a guide the standards developed by the International Maritime Organizations (IM0), including the following additional requirements:
(i) Each vessel shall have a suitable means of containing on board spills caused by loading or unloading operations;
(ii) Each vessel shall have a capability of retaining on board wastes accumulated during vessel operation;
(iii) Each vessel shall be capable of off-loading wastes retained to a reception facility;

(iv) Each vessel shall be provided with a means for rapidly and safely stopping the flow during loading or unloading operations int he event of an emergency; and
(v) Each vessel shall be provided with suitable lighting to adequately illuminate all cargo handling areas if the loading or unloading operations occur at night;

(b) Identification of vessels carrying cargoes of hazardous polluting substances in bulk, containers, and package form, and of all such cargoes;
(c) Identification in vessel manifests of all hazardous polluting substances;
(d) Carriage and storage arrangements of all hazardous polluting substances in packaged form using as a guide the International Maritime Dangerous Goods Code; and
(e) Programs to ensure that merchant vessel personnel are trained in all functions involving the use, handling, and stowage of hazardous polluting substances; the abatement of pollution from such substances; and the hazards associated with the handling of such substances.

5. Additional Measures. Both Parties, in cooperation with State and Provincial Governments shall take, as appropriate, action to ensure the provision of adequate facilities for the reception, treatment, and subsequent disposal of oil and hazardous polluting substances wastes from all vessels.

ANNEX 5 - DISCHARGES OF VESSEL WASTES

1. Definitions. As used in this Annex:

(a) "Discharge" includes, but is not limited to, any spilling, leaking, pumping, emitting, and dumping;
(b) "Garbage" means all kinds of victual, domestic, and operational wastes, excluding fresh fish and parts thereof generated during the normal operation of the ship and liable to be disposed of continually or periodically;
(c) "Sewage" means human or animal waste generated on board ship and includes wastes from water closets, urinals, or a hospital facility;
(d) "Vessel" means any ship, barge or other floating craft, whether or not self-propelled; and
(e) "Waste water" means water in combination with other substances, including ballast water and water used for washing cargo holds, but excluding water in combination with oil, hazardous polluting substances, or sewage.

2. General Principles. Compatible regulations shall be adopted governing the discharge into the Great Lakes System of garbage, sewage, and waste water from vessels in accordance with the following principles:

(a) The discharge of garbage shall be prohibited and made subject to appropriate penalties;
(b) The discharge of waste water in harmful amounts or concentrations shall be prohibited and made subject to appropriate penalties; and
(c) Every vessel operating in these waters that is provided with toilet facilities shall be equipped with a device or devices to contain, incinerate, or treat sewage to an adequate degree; appropriate penalties shall be provided for failure to comply with the regulation.

3. Critical Use Areas. Critical use areas of the Great Lakes System may be designate where the discharge of waste water or sewage shall be limited of prohibited.

4. The Parties, in cooperation with State and Provincial Governments, shall establish regulation to control the discharge of sewage from pleasure craft of other classes of vessels operating in the Great Lakes System or designated areas thereof.

5. Additional Measures. The Parties shall take, as appropriate, action to ensure the provision of adequate facilities for the reception, treatment, and subsequent disposal of garbage, waste water, and sewage from all vessels.

ANNEX 6 - REVIEW OF POLLUTION FROM SHIPPING SOURCES

1. Review. The Canadian Coast Guard and the United States Coast Guard shall continue to review services, systems, programs, recommendations, standards and regulations relating to shipping activities for the purpose of maintaining or improving Great Lakes water quality. The reviews shall include:

(a) Review of vessel equipment, vessel manning, and navigation practices or procedures, and of aids to navigation and vessel traffic management, for the purpose of precluding casualties which may be deleterious to water quality;
(b) Review of practices and procedures regarding waste water and their deleterious effect on water quality, including, as required, studies to determine if live fish or invertebrates in ballast water discharges into the Great Lakes System constitute a threat to the System;
(c) Review of practices and procedures, as well as current technology for the treatment of vessel sewage;
(d) Review of current practices and procedures regarding the prevention of pollution from the loading, or unloading, or on board transfer of cargo; and
(e) Review of international ship safety, pollution prevention and civil liability conventions and standards developed by the International Maritime Organization to determine their applicability in the boundary waters of the Great Lakes System

2. Consultation. Representatives of the Canadian Coast Guard and the United States Coast Guard, and other interested agencies, shall meet at least annually to consider Annexes 4, 5, 6, 8 and 9 of this Agreement. A report of this annual consultation shall be furnished to the International Joint Commission prior to its annual meeting on Great Lakes water quality. The purpose of the consultation shall be to:

(a) Provide an interchange of information with respect to continuing reviews, ongoing studies, and areas of concern;
(b) Identify and determine the relative importance of problems requiring further study; and
(c) Apportion responsibility, as between the Canadian Coast Guard and the United States Coast Guard, for the studies, or portions thereof, which were identified in subparagraph 2(b) above.

3. Studies. Where a review identifies additional areas for improvement, the Canadian Coast Guard and the United States Coast Guard, and other interested agencies, will undertake a study to establish improved procedures for the abatement and control of pollution from shipping sources, and will:

(a) Develop a brief study description which will include the nature of the perceived problem, procedures to quantify the problem, alternative solutions to the problem, procedures to determine the best alternative, and an estimated completion date;
(b) Transmit study descriptions to the International Joint Commission and other interested agencies:
(c) Transmit the study, or a brief summary of its conclusions, to the International Joint Commission and other interested agencies; and
(d) Transmit a brief status report to the International Joint Commission and other interested agencies if the study is not completed by the estimated completion date.

4. Responsibility. Responsibility for the coordination of the review, consultation, and studies is assigned to the Canadian Coast Guard and the United States Coast Guard.

ANNEX 7 - DREDGING

1. There shall be established, under the auspices of the Water Quality Board, a Subcommittee on Dredging. The Subcommittee shall:

(a) Review the existing practices in both countries relating to dredging activities, as well as the previous work done by the International Working Group on Dredging, with the objective of developing, within one year of the date of entry into force of this Agreement, compatible guidelines and criteria for dredging activities in the boundary waters of the Great Lakes System;
(b) Maintain a register of significant dredging projects being undertaken in the Great Lakes System with information to allow for the assessment of the environmental effects of the projects. The register shall include pertinent statistics to allow for the assessment of pollution loadings from dredged materials to the Great Lakes System;
(c) Encourage the exchange of information relating to developments of dredging technology and environmental research.

2. The Subcommittee shall identify specific criteria for the classification of polluted sediments of designated areas of intensive and continuing dredging activities within the Great Lakes System. Pending development of criteria and guidelines by the Subcommittee, and their acceptance of the Parties, the Parties shall continue to apply the criteria now in use by the regulatory authorities; however, neither party shall be precluded from applying standards more stringent than those now in use.

3. The Parties shall continue to direct particular attention to the identification and preservation of significant wetland areas in the Great Lakes Basin Ecosystem which are threatened by dredging and disposal activities.

4. The Parties shall encourage research and investigate advances in dredging technology and the pathways, fate and effects of nutrients and contaminants of dredged materials.

5. The Subcommittee shall undertake any other activities as the Water Quality Board may direct.

ANNEX 8 - DISCHARGES FROM ONSHORE AND OFFSHORE FACILITIES

1. Definitions. As used in this Annex:

(a) "Discharge" means the introduction of polluting substances into receiving waters and includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting or dumping; it does not include continuous effluent discharges from municipal or industrial treatment facilities;
(b) "Harmful quantity of oil" means any quantity of oil that, if discharged into clear calm waters on a clear day, would produce a film or sheen upon, or discoloration of the surface of the water or adjoining shoreline, or that would cause a sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shoreline;
(c) "Facility" includes motor vehicles, rolling stock, pipelines, and any other facility that is used or capable of being used for the purpose of processing, producing, storing, disposing. transferring or transporting oil or hazardous polluting substances, but excludes vessels;
(d) "Offshore facility" means any facility of any kind located in, on or under any water;
(e) "Onshore facility" means any facility of any kind located in, on or under, any land other than submerged land;
(f) "Oil" means oil of any kind or in any form, include, but not limited to petroleum, fuel oil, oil sludge, oil refuse, and oil mixed with wastes, but does not include constituents of dredged spoil.

2. Principles. Regulations shall be adopted for the prevention of discharges into the Great Lakes System of harmful quantities of oil and hazardous polluting substances from onshore and offshore facilities in accordance with the following principles:

(a) Discharges of harmful quantities of oil or hazardous polluting substances shall be prohibited and made subject to appropriate penalties;
(b) As soon as any person in charge has knowledge of any discharge of harmful quantities of oil or hazardous polluting substances, immediate notice of such discharge shall be given to the appropriate agency in the jurisdiction where the discharge occurs; failure to give this notice shall be made subject to appropriate penalties.

3. Programs and Measures. The programs and measures to be adopted shall include the following:

(a) Review of the design, construction, and location of both existing and new facilities for their adequacy to prevent the discharge of oil or hazardous polluting substances;
(b) Review of the operation, maintenance and inspection procedures of facilities for their adequacy to prevent the discharge of oil or hazardous polluting substances;
(c) Development and implementation of regulations and personnel training programs to ensure the safe use and handling of oil or hazardous polluting substances;
(d) Programs to ensure that at each facility plans and provisions are made and equipment provided to stop rapidly and safely, contain, and clean up discharges of oil or hazardous polluting substances; and
(e) Compatible regulations and other programs for the identification and placarding of containers, vehicles and other facilities containing, carrying, or handling oil or hazardous polluting substances; and where appropriate notification to appropriate agencies of vehicle movements, maintenance of a registry, and identification in manifests of such substances to be carried.

4. Implementation.

(a) Each Party shall submit a report to the International Joint Commission outlining its programs and measures, existing or proposed, for the implementation of this Annex within six months of the date of entry into force of this Agreement.
(b) The report shall outline programs and measures, existing or proposed, for each of the following types of onshore and offshore facilities: (i) land transportation including rail and road modes;
(ii) pipelines on land and submerged under water;
(iii) offshore drilling rigs and wells;
(iv) storage facilities both onshore and offshore; and
(v) wharves and terminals with trestle or underwater pipeway connections to land and offshore island type structures and buoys used for the handling of oil and hazardous polluting substances.

(c) The report shall outline programs and measures, existing or proposed, for any other type of onshore or offshore facility.
(d) Upon receipt of the reports, the Commission , in consultation with the Parties, shall review the programs and measures outlined for adequacy and compatibility and, if necessary, make recommendation to rectify any such inadequacy or incompatibility it finds.

ANNEX 9 - JOINT CONTINGENCY PLAN

1. The Plan. Annex one (CANUSLAK) of the Canada-United States Joint Marine Contingency Plan, as amended or reviewed, shall be maintained in force for the Great Lakes. The Canadian Coast Guard and the United States Coast Guard shall, in cooperation with other affected parties, identify and provide detailed Supplements for areas of high risk and of particular concern in augmentation of CANUSLAK. It shall be the responsibility of the United States Coast Guard and the Canadian Coast Guard to coordinate and to maintain the Plan and the Supplements appended thereto.

2. Purpose. The purpose of the Plan is to provide for coordinated and integrated response to pollution incidents in the Great Lakes System by responsible federal, state, provincial and local agencies. the Plan supplements the national, provincial and regional plans of the Parties.

3. Pollution Incidents..

(a) A pollution incident is a discharge, or an imminent threat of discharge of oil, hazardous polluting substance or other substance or other substance of such magnitude or significance as to require immediate response to contain, clean up, and dispose of the material
(b) The objectives of the Plan in pollution incidents are:
(i) To develop appropriate preparedness measures and effective systems for discovery and reporting the existence of a pollution incident within the area covered by the Plan;
(ii) To institute prompt measures to restrict the further spread of the pollutant; and
(iii) To provide adequate cleanup response to pollution incidents.

4. Funding. The costs of operations of both Parties under the Plan shall be borne by the Party in whose waters the pollution incident occurred, unless otherwise agreed.

5. Amendment. The Canadian Coast Guard and the United States Coast Guard are empowered to amend the Plan subject to the requirement that such amendments shall be consistent with the purpose and objectives of this Annex.

ANNEX 10 - HAZARDOUS POLLUTING SUBSTANCES

1. The Parties shall:

(a) Maintain a list, to be known as Appendix 1 of the Annex (hereinafter referred to as Appendix 1), of the substances know to have toxic effects on aquatic and animal life and a risk of being discharged to the Great Lakes System;
(b) Maintain a list, to be known as Appendix 2 of this Annex (hereinafter referred to as Appendix 2), of substances potentially having such effects and such a risk of discharge, and to give priority to the examination of these substances for possible transfer to Appendix 1;
(c) Ensure that these lists are continually revised in the light of growing scientific knowledge; and
(d) Develop and implement programs and measures to minimize or eliminate the risk of release of hazardous polluting substances to the Great Lakes System.

2. Hazardous polluting substances to be listed in Appendix 1 shall be determined in accordance with the following procedures:

(a) Selection of all hazardous substances for listing in Appendix 1 shall be based upon documented toxicological and discharge potential data which have been evaluated by the Parties and deemed to be mutually acceptable.
(b) Revisions to Appendix 1 may be made by mutual consent of the Parties and shall be treated as amendments to this Annex for the purposes of Article XIII of this Agreement.
(c) Using the agreed selection criteria, either Party may recommend at any time a substance to be added to the list in Appendix 1. Such substance need not previously have been listed in Appendix 2. The Party receiving the recommendation will have 60 days to review the associated documentation and either reject the proposed substance or accept the substance pending completion of appropriate procedural or domestic regulatory requirements. Cause for rejection must be documented and submitted to the initiating Party and may be the basis for any further negotiations.

3. The criteria to be applied to the selection of substances as candidates for listing in Appendix 1 are:

(a) Acute toxicological effects, as determined by whether the substance is lethal to:
(i) One-half of a test population of aquatic animals in 96 hours or less at a concentration of 500 milligrams per litre or less; or
(ii) One-half of a test population of animals in 14 days or less when administered in a single oral dose equal to or less than 50 milligrams per kilogram of body weight; or
(iii) One-half of a test population of animals in 14 days or less when dermally exposed to an amount equal to or less that 200 milligrams per kilogram body weight for 24 hours; or

(iv) One-half of a test population of animals in 14 days or less when exposed to a vapour concentration equal to or less than 20 cubic centimetres per cubic meter in air for one hour; or
(v) Aquatic flora as measured by a maximum specific growth rate or total yield of biomass which is 50 per cent lower than a control culture over 14 days in medium at concentrations equal to or less than 100 milligrams per litre.

(b) Risk of discharge into the Great Lakes System, as determined by:
(i) Gathering information on the history of discharges or accidents;
(ii) Assessing the modal risks during transport and determining the use and distribution patterns;
(iii) Identifying quantities manufactured or imported.

4. Potentially hazardous polluting substances to be listed in Appendix 2 of this Annex shall be determined in accordance with the following procedures:

(a) Either Party may add new substances to Appendix 2 by notifying the other in writing that the substance is considered to be a potential hazard because of documented information concerning aquatic toxicity mammalian and other vertebrate toxicity, phytotoxicity, persistence, bio-accumulation, mutagenicity, teratogenicity, carcinogenicity, environmental translocation or because of documented information on risk of discharge to the environment. The documentation of the potential hazard and the selected criteria upon which it is based will also be submitted.
(b) Removal of substances from Appendix 2 shall be by mutual consent of the Parties.
(c) The Parties shall give priority to the examination of substances listed in Appendix 2 for possible transfer to Appendix 1.

5. Programs and measures to control the risk of pollution from transport, storage, handling and disposal of hazardous polluting substances are contained in Annexes 4 and 8; and

6. In addition to the lists of hazardous polluting substances described in Appendices 1 and 2 to this Annex, practice and procedures consistent with the general principles of this Agreement shall be applied to those substances categorized as marine pollutants by the International Maritime Organization.

APPENDIX 1 - HAZARDOUS POLLUTING SUBSTANCES

Acetaldehyde Acetic Acid Acetic Anhydride
Acetone Cyanohydrin Acetyl Bromide Acetyl Chloride
Acrolein Acrylonitrile Aldrin
Allyl Alcohol Allyl Chloride Aluminum Sulfate
Ammonia Ammonium Acetate Ammonium Benzoate
Ammonium Bicarbonate Ammonium Bichromate Ammonium Bifluoride
Ammonium Bisulfite Ammonium Carbamate Ammonium Carbonate

Ammonium Chloride Ammonium Chromate Ammonium Citrate, Dibasic
Ammonium Fluoborate Ammonium Fluoride Ammonium Hydroxide
Ammonium Oxalate Ammonium Silicofluoride Ammonium Sulfamate
Ammonium Sulfide Ammonium Sulfite Ammonium Tartrate
Ammonium Thicoyanate Ammonium Thiosulfate Amyl Acetate
Aniline Antimony Pentachloride Antimony Potassium Tartrate
Antimony Tribromide Antimony Trichloride Antimony Trifluoride
Antimony Trioxide Arsenic Disulfide Arsenic Pentoxide
Arsenic Trichloride Arsenic Trioxide Arsenic Trisulphide
Barium Cyanide Benzene Benzoic Acid
Benzonitrile Benzoyl Chloride Benzyl Chloride
Beryllium Chloride Beryllium Fluoride Beryllium Nitrate
Butyl Acetate Butylamine Butyric Acid
Cadmium Acetate Cadmium Bromide Cadmium Chloride
Calcium Arsenate Calcium Arsenite Calcium Carbide
Calcium Chromate Calcium Cyanide Calcium Dodecylbenzenesulfonate
Calcium Hydroxide Calcium Hypochlorite Calcium Oxide
Captan Carbaryl Carbon Disulfide
Chlordane Chlorine Chlorobenzene
Chloroform Chlorosulfonic Acid Chlorpyrifos
Chromic Acetate Chromic Acid Chromic Sulfate
Chromous Chloride Cobaltous Bromide Cobaltous Foremate
Cobaltous Sulfamate Coumaphos Cresol
Cupric Acetate Cupric Acetoarsenite Cupric Chloride
Cupric Nitrate Cupric Oxalate Cupric Sulfate
Cupric Sulfate, Ammoniated Cupric Tartrate Cyanogen Chloride
Cyclohexane 2, 4-D Acid 2, 4-D Esters
Dalapon DDT Diazinon
Dicamba Dichlobenil Dichlone
Dichlorvos Dieldrin Diethylamine
Dimethylamine Dinitrobenzene (mixed) Dinitrophenol
Diquat Disulfoton Diuron
Dedocylbenzenesulfonic Acid Endosulfan Endrin
Ethion Ethylbenzene Ethylenediamine
EDTA Ferric Ammonium Citrate Ferric Ammonium Oxalate
Ferric Chloride Ferric Fluoride Ferric Nitrate
Ferric Sulfate Ferrous Ammonium Sulfate Ferrous Chloride
Ferrous Sulfate Formaldehyde Formic Acid
Fumaric Acid Furfural Guthion
Heptachlor Hydrochloric Acid Hydrofluoric Acid
Hydrogen Cyanide Isoprene Isopropanolamine Dodecylbenzenesulfonate
Kelthane Lead Acetate Lead Arsenate
Lead Chloride Lead Fluoborate Lead Fluoride
Lead Iodide Lead Nitrate Lead Stearate
Lead Sulfate Lead Sulfide Lead Thiocyanate
Lindane Lithium Chromate Malathion
Maleic Acid Maleic Anhydride Mercuric Cyanide
Mercuric Nitrate Mercuric Sulfate Mercuric Thiocyanate
Mercurous Nitrate Methoxychlor Methyl Mercaptan
Methyl Methacrylate Methyl Parathion Mevinphos
Mexacarbate Monoethylamine Monomethylamine
Naled Naphthalene Naphtenic Acid
Nickel Ammonium Sulfate Nickel Chloride Nickel Hydroxide
Nickel Nitrate Nickel Sulfate Nitric Acid
Nitrobenzene Nitrogen Dioxide Nitrophenol (mixed)

Paraformaldehyde Parathion Pentachlorophenol
Phenol Phosgene Phosphoric Acid
Phosphorous Phosphorus Oxychloride Phosphorus Pentasulfide
Phosphorus Trichloride Polychlorinated Biphenyls Potassium Arsenate
Potassium Arsenite Potassium Bichromate Potassium Chromate
Potassium Cyanide Potassium Hydroxide Potassium Permanganate
Propionic Acid Propionic Anhydride Pyrethrins
Quinoline Resorcinol Selenium Oxide
Sodium Sodium Arsenate Sodium Arsenite
Sodium Bichromate Sodium Bifluoride Sodium Bisulfite
Sodium Chromate Sodium Cyanide Sodium Dodecylbenzenesulfonate
Sodium Fluoride Sodium Hydrosulfide Sodium Hydroxide
Sodium Hypochlorite Sodium Methylate Sodium Nitrite
Sodium Phosphate, Dibasic Sodium Phosphate, Tribasic Sodium Selenite
Strontium Chromate Strychnine Styrene
Sulfuric Acid Sulfur Monochloride 2,4,5-T Acid
2,4,5-7 Esters TDE Tetraethyl Lead
Tetraethyl Pyrophosphate Toluene Toxaphene
Trichlorfon Trichlorophenol Triethanolamine Dodecylbenzenesulfonate
Triethylamine Thrimethylamine Uranyl Acetate
Uranyl Nitrate Vanadium Pentoxide Vanadyl Sulfate
Vinyl Acetate Xylene (mixed) Xylenol
Zinc Acetate Zinc Ammonium Chloride Zinc Borate
Zinc Bromide Zinc Charbonate Zinc Chloride
Zinc Cyanide Zinc Fluoride Zinc Formate
Zinc Hydrosulfite Zinc Nitrate Zinc Phenolsulfonate
Zinc Phosphide Zinc Silicofluoride Zinc Sulfate
Zirconium Nitrate Zirconium Potassium Fluoride Zirconium Sulfate
Zirconium Tetrachloride

APPENDIX 2 - POTENTIAL HAZARDOUS POLLUTING SUBSTANCES

Acridine Allethrin Aluminum Fluoride
Aluminum Nitrate Ammonium Bromide Ammonium Hypophosphite
Ammonium Iodide Ammonium Pentaborate Ammonium Persulfate
Antimony Pentafluoride Antimycin A Arsenic Acid
Barhan Benfluralin Bensulide
Benzene Hexachloride Beryllium Sulfate Butifos
Cadmium Cadmium Cyanide Cadmium Nitrate
Captafol Carbophenothion Chlorflurazole
Chlorothion Chlorpropham Chromic Chloride
Chromium Chromyl Chloride Cobaltous Fluoride
Copper Crotoxyphos Cupric Carbonate
Cupric Citrate Cupric Formate Cupric Glycinate
Cupric Lactate Cupric Paraamino Benzoate Cupric Salicylate
Cupric Subacetate Cuprous Bromide Demeton
Dibutyl Phthalate Dicapthon 2,4-Dinitrochlorobenzene
p-Dinitrocresol Dinocap Dinoseb
Dioxathion Dodine EPN
Gold Trichloride Hexachlorophene Hydrogen Sulfide
m-Hydroxybenzoic Acid p-Hydroxybenzoic Acid Hydroxylamine
2-Hydroxyphenazine-1-Carboxylic Acid Lactonitrile Lead Tetraacetate

Lead Thiosulfate Lead Tungstate Lithium Bichromate
Malachite Green Manganese Chloride, Anhydrous MCPA
Mercuric Acetate Mercuric Chloride Mercury
Metam-Sodium p-Methylamino-Phenol 2-Methyl-Napthoquinone
Neburon Nickel Formate Phenylmercuric Acetate
n-Phenyl Naphthylamine Phorate Phosphamidon
Picloram Potassium Azide Potassium Cuprocyanide
Potassium Ferricyanide Propyl Alcohol Pyridyl Mercuric Acetate
Rotenone Silver Silver Nitrate
Silver Sulfate Sodium Azide Sodium 2-Chlorotoluene-5-Sulfonate
Sodium Pentachlorophenate Sodium Phosphate, Monobasic Sodium Sulfide
Stannous Fluoride Strontium Nitrate Sulfoxide
Temephos Thallium Thionazin
1,2,4-Trichlorobenzene Uranium Peroxide Uranyl Sulfate
Zinc Bichromate Zinc Potassium Chromate Zirconium Acetate
Zirconium Oxychloride

ANNEX 11 - SURVEILLANCE AND MONITORING

1. Surveillance and monitoring activities shall be undertaken for the following purposes: (a) Compliance. To assess the degree to which jurisdictional control requirements are being met.
(b) Achievement of General and Specific Objectives. To provide definitive information on the location, severity, areal or volume extent, frequency and duration of non-achievement of the Objectives, as a basis for determining the need for more stringent control requirements.
(c) Evaluation of Water Quality Trends. To provide information for measuring local and whole lake response to control measures using trend analysis and cause/effect relationships, and to provide information which will assist in the development and application of predictive techniques for assessing impact of new developments and pollution sources. The results of water quality evaluations will be used for: (i) assessing the effectiveness of remedial and preventative measures and identifying the need for the improved pollution control;
(ii) assessing enforcement and management strategies; and
(iii) identifying the need for further technology development and research activities.

(d) Identification of Emerging Problems. To determine the presence of new or hitherto detected problems in the Great Lakes Basin Ecosystem, leading to the development and implementation of appropriate pollution control measures.
(e) Annex 2 Programs. To support the development of Remedial Action Plans for Areas of Concern and Lakewide Management Plans for Critical Pollutants pursuant to Annex 2.

2. A joint surveillance and monitoring program necessary to ensure the attainment of the foregoing purposes shall be developed and implemented among the Parties and the State and Provincial Governments. The Great Lakes International Surveillance Plan contained in the Water Quality Board Annual Report of 1975 and revised in subsequent reports shall serve as a model for the development of the joint surveillance and monitoring program.
3. The program shall include baseline data collection, sample analysis, evaluation and quality assurance programs (including standard sampling and analytical methodology, inter-laboratory comparisons, and compatible data management) to allow assessment of the following:(a) Inputs from tributaries, point source discharges, atmosphere, and connecting channels;
(b) Whole lake data including that for nearshore areas (such as harbours and embayments, general shoreline and cladophora growth areas), open waters of the Lakes, fish contaminants, and wildlife contaminants;
(c) Overflows including connecting channels, water intakes and outlets;

(d) Total pollutant loadings to, storage and transformation within, and export from the Great Lakes System;
(e) The adequacy of proposed load reductions and schedules contained in Lakewide Management Plans; and
(f) Contributions of various exposure media to the overall human intake of toxic substances in the Great Lakes Basin Ecosystem.

4. Development of Ecosystem Health Indicators for the Great Lakes. The Parties agree to develop ecosystem health indicators to assist in evaluating the achievement of the specific objectives for the ecosystem pursuant to Annex 1: (a) with respect to Lake Superior, lake trout and the crustacean Pontoporeia hoyi shall be used as indicators: Lake Trout
- productivity greater than 0.38 kilograms/hectare;
- stable, self-producing stocks;
- free from contaminants at concentrations that adversely affect the trout themselves or the quality of the harvested products.
Pontoporeia hoyi
- the abundance of the crustacean, Pontoporeia hoyi, maintained throughout the entire lake at present levels of 220-320/(metres)2 (depths less than 100 metres) and 30-160/(metres)2 (depths greater than 100 metres); and

(b) with respect to the rest of the boundary waters of the Great Lakes System or portions thereof, and for Lake Michigan, the indicators are to be developed.

ANNEX 12 - PERSISTENT TOXIC SUBSTANCES

1. Definitions. As used in this Annex: (a) "Persistent toxic substance" means any toxic substance with a half-life in water of greater than eight weeks;
(b) "Half-life" means the time required for the concentration of a substance to diminish to one-half of its original value in a lake or water body;
(c) "Early warning system" means a procedure to anticipate future environmental contaminants (i.e., substances having an adverse effect on human health or the environment) and to set priorities for environmental research, monitoring and regulatory action.

2. General Principles. (a) Regulatory strategies for controlling or preventing the input of persistent toxic substances to the Great Lakes System shall be adopted in accordance with the following principles: (i) The intent of programs specified in this Annex is to virtually eliminate the input of persistent toxic substances in order to protect human health and to ensure the continued health and productivity of living aquatic resources and human use thereof;
(ii) The philosophy adopted for control of inputs of persistent toxic substances shall be zero discharge; and
(iii) The reduction in the generation of contaminants, particularly persistent toxic substances, either through the reduction of the total volume or quantity of waste or through the reduction of the toxicity of waste, or both, shall, wherever possible, be encouraged.

(b) The Parties shall take all reasonable and practical measures to rehabilitate those portions of the Great Lakes System adversely affected by persistent toxic substances.

3. Programs. The Parties in cooperation with the State and Provincial Governments, shall develop and adopt the following programs and measures for the elimination of discharges of persistent toxic substances: (a) Identification of raw materials, processes, products, by-products, waste sources and emissions involving persistent toxic substances, and quantitative data on the substances, together with

recommendations on handling, use and disposition. Every effort shall be made to complete this inventory by January, 1982;
(b) Establishment of close coordination between air, water and solid waste programs in order to assess the total input of toxic substances to the Great Lakes System and to define comprehensive, integrated controls;
(c) Joint programs for disposal of hazardous materials to ensure that these materials such as pesticides, contaminated petroleum products, contaminated sludge and dredge spoils and industrial wastes are properly transported and disposed of. Every effort shall be made to implement these programs by 1980.

4. Monitoring. Monitoring and research programs in support of the Great Lakes International Surveillance Plan should be established at a level sufficient to identify: (a) Temporal and spatial trends in concentration of persistent toxic substances such as PCB, mirex, DDT, mercury and dieldrin, and of there substances known to be present in biota and sediment of the Great Lakes System;
(b) The impact of persistent toxic substances on the health of humans and the quality and health of living aquatic systems;
(c) The sources of input of persistent toxic substances; and
(d) The presence of previously unidentified persistent toxic substances.

5. Early Warning System. An early warning system consisting of, but not restricted to, the following elements shall be established to anticipate future toxic substances problems: (a) Development and use of structure-activity correlations to predict environmental characteristics of chemicals;
(b) Compilation and review of trends in the production, import, and use of chemicals;
(c) Review of the results of environmental testing on new chemicals;
(d) Toxicological research on chemicals, and review of research conducted in other countries;
(e) Maintenance of a biological tissue bank and sediment to permit retroactive analysis to establish trends over time;
(f) Monitoring to characterize the presence and significance of chemical residues in the environment;
(g) Development and use of mathematical models to predict consequences of various loading rates of different chemicals;
(h) Development of a data bank for storage of information on physical/chemical properties, toxicology, use and quantities in commerce of known and suspected persistent toxic substances;
(i) Development of data necessary to evaluate the loadings of critical pollutants or other polluting substances identified in the boundary waters of the Great Lakes System; and
(j) Further development and use of reproduction, physiological and biochemical measures in wildlife, fish and humans as health effects indicators and the establishment of a data base for storage, retrieval and interpretation of the data.

6. Human Health. The Parties shall establish action levels to protect human health based on multimedia exposure and the interactive effects of toxic substances.
7. Research. Research should be intensified to determine the pathways, fate and effects of toxic substances aimed at the protection of human health, fishery resources and wildlife of the Great Lakes Basin Ecosystem. In particular, research should be conducted to determine: (a) The significance of effects of persistent toxic substances on human health and aquatic life;
(b) Interactive effects of residues of toxic substances on aquatic life, wildlife, and human health; and
(c) Approaches to calculation of acceptable loading rates for persistent toxic substances, especially those which,in part, are naturally occurring.

8. Reporting. The Parties shall report, by December 31, 1988 and biennially thereafter, on the progress of programs and measures to reduce the generation of contaminants in accordance with the principle in sub-paragraph 2 (a) (iii) above.

ANNEX 13 - POLLUTION FROM NON-POINT SOURCES

1. Purpose. This Annex further delineates programs and measures for the abatement and reduction on non-point sources of pollution from land-use activities. These include efforts to further reduce non-point source inputs of phosphorus, sediments, toxic substances and microbiological contaminants contained in drainage from urban and rural land, including waste disposal sites, in the Great Lakes System.
2. Implementation. The Parties, in conjunction with State and Provincial Governments, shall: (a) identify land-based activities contribution to water quality problems described in Remedial Action Plans for Areas of Concern, or in Lakewide Management Plans including, but not limited to, phosphorus and Critical Pollutants; and
(b) develop and implement watershed management plans, consistent with the objectives and schedules for individual Remedial Action Plans or Lakewide Management Plans, on priority hydrologic units to reduce non-point source inputs. Such watershed plans shall include a description of priority areas, intergovernmental agreements, implementation schedules, and programs and other measures to fulfill the purpose of this Annex and the General and Specific Objectives of this Agreement. Such measures shall include provisions for regulation of non-point sources of pollution.

3. Wetlands and their Preservation. Significant wetland areas in the Great Lakes System that are threatened by urban and agricultural development and waste disposal activities should be identified, preserved and, where necessary, rehabilitated.
4. Surveillance, Surveys and Demonstration Projects. Programs and projects shall be implemented in order to determine: (a) non-point source pollutants inputs to and outputs from rivers and shoreline areas sufficient to estimate loadings to the boundary waters of the Great Lakes System; and
(b) the extent of change in land-use and land management practices that significantly affect water quality for the purpose of tracking implementation of remedial measures and estimating associated changes in loadings to the Lakes.

Demonstration projects of remedial programs on pilot urban and rural watersheds shall be encouraged to advance knowledge and enhance information and education services, including extension services, where applicable.
5. The Parties shall report by December 31, 1988 and biennially thereafter, to the Commission on progress in developing specific watershed management plans and implementing programs and measures to control non-point sources of pollution.

ANNEX 14 - CONTAMINATED SEDIMENT

1. Objectives. The Parties shall, in cooperation with State and Provincial Governments, identify the nature and extent of sediment pollution of the Great Lakes System. Based on these findings, they shall develop methods to evaluate both the impact of polluted sediments on the Great Lakes System, and the technological capabilities of programs to remedy such pollution. Information obtained through research and studies pursuant to this Annex shall be used to guide the development of Remedial Action Plans and Lakewide Management Plans pursuant to Annex 2, but shall not be used to forestall the implementation of remedial measures already under way. Dredging for the purpose of navigation is addressed in Annex 7.
2. Research and Studies. (a) General. The Parties, in cooperation with State and Provincial Governments, shall exchange information relating to the mapping, assessment and management of contaminated sediments in the Great Lakes System.
(b) Surveillance Programs. The Parties, in cooperation with State and Provincial Governments shall:
(i) evaluate, on or before December 31, 1988 and biennially thereafter, existing methods for quantifying the transfer of contaminants and nutrients to and from bottom sediments for use in determining the impact of polluted sediments on the Great Lakes Basin Ecosystem;

(ii) review practices in both countries regarding the classification of contaminated sediments and establish compatible criteria for the classification of sediment quality;
(iii) develop common methods to quantify the transfer of contaminants and nutrients to and from bottom sediments. Such methods shall be used to determine the impact of polluted sediment of the Great Lakes System. As a first step, biological indicators shall be developed to determine accumulation rates in biota from polluted bottom sediments; and
(iv) develop a standard approach and agreed procedures for the management of contaminated sediments by December 31, 1988.

(c) Technology Programs (i) The Parties shall, on or before December 31, 1988 and biennially thereafter, in cooperation with State and Provincial Governments, evaluate existing technologies for the management of contaminated sediments such as isolation, capping, in-place decontamination and removal of polluted bottom sediment.
(ii) The Parties, in cooperation with State and Provincial Governments shall design and implement demonstration projects for the management of polluted bottom sediment at selected Areas of Concern identified pursuant to Annex 2. The design shall be based on the evaluation(s) made pursuant to sub-paragraph (i) above, the Parties shall meet by June 20, 1988 and jointly design a demonstration program and implementation schedule and report progress biennially thereafter.

3. Long-Term Measures. The Parties, in cooperation with State and Provincial Governments, shall also ensure that measures are adopted for the management of contaminated sediment respecting: (a) the construction and the long-term maintenance of disposal facilities; and
(b) the use of contaminated sediment in the creation of land.

4. Reporting. The Parties shall report their progress in implementing this Annex to the Commission biennially, commencing with a report no later than December 31, 1988.

ANNEX 15 - AIRBORNE TOXIC SUBSTANCES

1. Purpose. The Parties, in cooperation with State and Provincial Governments, shall conduct research, surveillance and monitoring and implement pollution control measures for the purpose of reducing atmospheric deposition of toxic substances, particularly persistent toxic substances, to the Great Lakes Basin Ecosystem.
2. Research. Research activities shall be conducted to determine pathways, fate and effects of such toxic substances for the protection of the Great Lakes System. In particular, research shall be conducted to: (a) understand the processes of wet and dry deposition and those associated with the vapor exchange of toxic substances;
(b) understand the effects of persistent toxic substances, singly or in synergistic or additive combination with other substances, through aquatic exposure routes on the health of humans and the quality and health of aquatic life where a significant source of these substances is the atmosphere, in accordance with sub-paragraph 4(b) of Annex 12; and
(c) develop models of the intermediate and long-range movement and transformation of toxic substances to determine; (i) the significance of atmospheric loadings to the Great Lakes System relative to other pathways; and
(ii) the sources of such substances from outside the Great Lakes System.

3. Surveillance and Monitoring. The Parties shall: (a) establish, as part of the Great Lakes International Surveillance Plan (GLISP) instituted under Annex 11, an Integrated Atmospheric Deposition Network in accordance with paragraph 4 below;

(b) identify, by means of this Network, toxic substances and, in particular, persistent toxic substances, appearing on List No. 1 described in Annex 1, of those designated as Critical Pollutants pursuant to Annex 2 and their significant sources in accordance with sub-paragraph 4(c) of Annex 12, and to track their movements; and
(c) utilize this Network in order to: (i) determine atmospheric loadings of toxic substances to the Great Lakes System by quantifying the total and net atmospheric input of these same contaminants, pursuant to sub-paragraph 3(a) of Annex 11;
(ii) define the temporal and spatial trends in the atmospheric deposition of such toxic substances in accordance with sub-paragraph 4(a) of Annex 12; and
(iii) develop Remedial Action Plans and Lakewide Management Plans pursuant to Annex 2.

4. Components of the Integrated Atmospheric Deposition Network. The Parties shall confer on or before October 1, 1988, regarding; (a) the identity of the toxic substances to be monitored;
(b) the number of monitoring and surveillance stations;
(c) the locations of such stations;
(d) the equipment at such stations;
(e) quality control and quality assurance procedures; and
(f) a schedule for the construction and commencement of the operation of the stations.

5. Pollution Control Measures. (a) The Parties, in cooperation with State and Provincial Governments, shall develop, adopt and implement measures for the control of the sources of emissions of toxic substances and the elimination of the sources of emissions of persistent toxic substances in cases where atmospheric deposition of these substances, singly or in synergistic or additive combination with other substances, significantly contributes to pollution of the Great Lakes System. Where such contributions arise from sources beyond the jurisdiction of the Parties, the Parties shall notify the responsible jurisdiction and the Commission of the problem and seek a suitable response.
(b) The Parties shall also assess and encourage the development of pollution control technologies and alternative products to reduce the effect of airborne toxic substances on the Great Lakes System.

6. Reporting. The Parties shall report their progress in implementing this Annex to the Commission biennially, commencing with a report no later than December 31, 1988.

ANNEX 16 - POLLUTION FROM CONTAMINATED GROUNDWATER

The Parties, in cooperation with State and Provincial Governments, shall coordinate existing program to control contaminated groundwater affecting the boundary waters of the Great Lakes System. For this purpose, the Parties shall; (i) identify existing and potential sources of contaminated groundwater affecting the Great Lakes;
(ii) map hydrogeological conditions in the vicinity of existing and potential sources of contaminated groundwater;
(iii) develop a standard approach and agreed procedures for sampling and analysis of contaminants in groundwater in order to: (1) assess and characterize the degree and extent of contamination; and (2) estimate the loadings of contaminants from groundwater to the Lakes to support the development of Remedial Action Plans and Lakewide Management Plans pursuant to Annex 2;
(iv) control the sources of contamination of groundwater and the contaminated groundwater itself, when the problem has been identified; and
(v) report progress on implementing this Annex to the Commission biennially, commencing with a report no later than December 31, 1988.

ANNEX 17 - RESEARCH AND DEVELOPMENT

1. Purpose. This Annex delineates research need to support the achievement of the goals of this Agreement.
2. Implementation. The Parties, in cooperation with State and Provincial Governments, shall conduct research in order to: (a) determine the mass transfer of pollutants between the Great Lakes Basin Ecosystem components of water, sediments, air, land and biota, and the processes controlling the transfer of pollutants across the interfaces between these components in accordance with Annexes 13, 14, 15 and 16;
(b) develop load reduction models for pollutants in the Great Lakes System in accordance with the research requirements of Annexes 2, 11, 12 and 13;
(c) determine the physical and transformational processes affecting the delivery of pollutants by tributaries to the Great Lakes in accordance with Annexes 2, 11, 12 and 13;
(d) determine cause-effect inter-relationships of productivity and ecotoxicity, and identify future research needs in accordance with Annexes 11, 12, 13 and 15;
(e) determine the relationship of contaminated sediments on ecosystem health, in accordance with the research needs of Annexes 2, 12 and 14;
(f) determine pollutant exchanges between the Areas of Concern and the open lakes including cause-effect inter-relationships among nutrients, productivity, sediments, pollutants, biota and ecosystem health, and to develop in-situ chemical, physical and biological remedial options in accordance with Annexes 2, 12, 14 and sub-paragraph 1(f) of Annex 3;
(g) determine the aquatic effects of varying lake levels in relation to pollution sources, particularly respecting the conservation of wetlands and the fate and effects of pollutants in the Great Lakes Basin Ecosystem in accordance with Annexes 2, 11, 12, 13, 15 and 16;
(h) determine the ecotoxicity and toxicity effects of pollutants in the development of water quality objectives in accordance with Annex 1;
(i) determine the impact of water quality and the introduction of non-native species on fish and wildlife populations and habitats in order to develop feasible options for their recovery, restoration or enhancement in accordance with sub-paragraph 1(a) of Article IV and Annexes 1, 2, 11 and 12;
(j) encourage the development of control technologies for treatment of municipal and industrial effluents, atmospheric emissions and the disposal of wastes, including wastes deposited in landfills;
(k) develop action levels for contamination that incorporate multi-media exposures and the interactive effects of chemicals; and
(l) develop approaches to population-based studies to determine the long-term, low-level effects of toxic substances on human health.

TERMS OF REFERENCE FOR THE JOINT INSTITUTIONS AND THE GREAT LAKES REGIONAL OFFICE

1. Great Lakes Water Quality Board (a) This Board shall be the principal advisor to the International Joint Commission with regard to the exercise of all the function, powers and responsibilities (other than those functions and responsibilities of the Science Advisory Board pursuant to paragraph 2 of these Terms of Reference) assigned to the Commission under this Agreement. In addition, the Board shall carry out such other functions, related to the water quality of the boundary waters of the Great Lakes System, as the Commission may request from time to time.
(b) The Water Quality Board, at the direction of the Commission, shall: (i) Make recommendations on the development and implementation of programs to achieve the purpose of this Agreement;
(ii) Assemble and evaluate information evolving from such programs;

(iii) Identify deficiencies in the scope and funding of such programs and evaluate the adequacy and compatibility of results;
(iv) Examine the appropriateness of such programs in light of present and future socio-economic imperatives; and
(v) Advise the Commission on the progress and effectiveness of such programs and submit appropriate recommendations.

(c) The Water Quality Board, on behalf of the Commission, shall undertake liaison and coordination between the institutions established under this Agreement and other institutions and jurisdictions which may address concerns relevant to the Great Lakes Basin Ecosystem so as to ensure a comprehensive and coordinated approach to planning and to the resolution of problems, both current and anticipated.
(d) The Water Quality Board shall report to the Commission periodically as appropriate, or as required by the Commission, on all aspects relating to the operation and effectiveness of this Agreement.

2. Great Lakes Science Advisory Board (a) This Board shall be the scientific advisor to the Commission and the Water Quality Board.
(b) The Science Advisory Board shall be responsible for developing recommendations on all matters related to research and the development of scientific knowledge pertinent to the identification, evaluation and resolution of current and anticipated problems related to Great Lakes water quality.
(c) To effect these responsibilities the Science Advisory Board shall; (i) Review scientific information in order to: a. examine the impact and adequacy of research and the reliability of research results, and ensure the dissemination of such results;
b. identify additional research requirements;
c. identify specific research programs for which international cooperation is desirable; and

(ii) Advise jurisdictions of relevant research needs, solicit their involvement and promote coordination.

(d) The Science Advisory Board shall seek analyses, assessments and recommendations from other scientific, professional, academic, governmental or intergovernmental relevant to Great Lakes Basin Ecosystem research.
(e) The Science Advisory Board shall report to the Commission and the Water Quality Board periodically as appropriate, or as required by the Commission, on all matters of a scientific or research nature relating to the operation and effectiveness of this Agreement.

3. The Great Lakes Regional Office (a) This Office, located in Windsor, Ontario, shall assist the Commission and the two Boards in the discharge of the functions specified in subparagraph (b) below.
(b) The Office shall perform the following functions: (i) Provide administrative support and technical assistance for the Water Quality Board and the Science Advisory Board and their sub-organizations, to assist the Boards in discharging effectively the responsibilities, duties and functions assigned to them.
(ii) Provide a public information service for the programs, including public hearings, undertaken by the Commission and its Boards.

(c) The Office shall be headed by a Director who shall be appointed by the Commission in consultation with the Parties and with the Co-Chairmen of the Boards. The position of Director shall alternate between a Canadian citizen and a United States citizen. The term of office for the Director shall be determined in the review referred to in subparagraph (d) below.
(d) The Parties, mindful of the need to staff the Great Lakes Regional Office to carry out the functions assigned the Commission by this Agreement, shall, within six months from the date of entry into force of this Agreement, complete a review of the staffing of the Office. This review shall be conducted by the Parties based upon recommendations of the Commission after consultation with the Co-Chairmen of the Boards. Subsequent review may be requested by either Party, or recommended by the Commission, in order to ensure that the staffing of the Regional Office is maintained at a level and character commensurate with its assigned functions.

(e) Consistent with the responsibilities assigned to the Commission, and under the general supervision of the Water Quality Board, the Director shall be responsible for the management of the Regional Office and its staff in carrying out the functions described herein.
(f) The Co-Chairmen of the Boards, in consultation with the Director, will determine the activities which they wish the Office to carry out on behalf of, or in support of the Boards, within the current capability of the Office and its staff. The Director is responsible to the Co-Chairmen of each Board for activities carried out on behalf of, or in support of such Board, by the Office or individual staff members.
(g) The Commission, in consultation with the Director, will determine the public information activities to be carried out on behalf of the Commission by the Regional Office.
(h) The Director shall be responsible for preparing an annual budget to carry out the functions of the Boards and the Regional Office for submission jointly by the two Boards to the Commission for approval and procurement of resources.

Revised: January 18, 1997