

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

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

REAFFIRMING their commitment to achieving the
purpose and objectives of the 1978 Agreement between
Canada and the United States of America 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 the 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:

Article I

The preamble of the Agreement is amended by:

- (a) modifying the first preambular paragraph to read:
"Having in 1972 and 1978 entered into Agreements on
Great Lakes Water Quality;"
- (b) modifying the seventh preambular paragraph to read:
"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 ..."

Article II

Article I of the Agreement is amended by:

- (a) replacing the word "man" with the word "humans" in
paragraph (g).
- (b) replacing the word "man" with the word "human" in
paragraph (j).

- (c) adding the words "interpretation and" before the word "demonstration" and replacing the phrase "and other research activities" with the phrase "of advanced scientific knowledge for the resolution of issues" in paragraph (p).

Article III

Article IV of the Agreement is amended by deleting the existing paragraph (f) and replacing it with the following:

- "(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 persistent toxic substances in the Great Lakes System, the Parties, in cooperation with 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."

Article IV

Article V of the Agreement is amended by adding a new sub-paragraph (c) to paragraph 2 as follows:

- "(c) research priorities are undertaken in accordance with Annex 17."

Article V

Article VI of the Agreement is amended by:

- (a) adding the following phrase after the word "Parties" in the first sentence of paragraph 1:
 - ", in cooperation with State and Provincial Governments,";
- (b) adding a new sub-paragraph (ix) to paragraph 1(e) as follows:
 - "(ix) Conduct further non-point source programs in accordance with Annex 13.";
- (c) replacing the word "Pollutants" in the heading of sub-paragraph 1(1) with the words "Toxic Substances" and adding a new sentence to the end of the sub-paragraph as follows:

"The Parties shall conduct such programs in accordance with Annex 15.";

- (d) adding a new sub-paragraph (n) to paragraph 1 as follows:

"(n) Remedial Action Plans. Measures to ensure the development and implementation of Remedial Action Plans for Areas of Concern pursuant to Annex 2;"

- (e) adding a new sub-paragraph (o) to paragraph 1 as follows:

"(o) Lakewide Management Plans. Measures to ensure the development and implementation of Lakewide Management Plans to address Critical Pollutants pursuant to Annex 2;"

- (f) adding a new sub-paragraph (p) to paragraph 1 as follows:

"(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"; and

- (g) adding a new sub-paragraph (q) to paragraph 1 as follows:

"(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."

Article VI

Article X of the Agreement is amended by:

- (a) adding a new paragraph 3 as follows:

"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."

- (b) renumbering the existing paragraph 3 as paragraph 4, and deleting the word "the" before the phrase "third biennial report" and replacing it with the word "every".

Article VII

Annex 1 of the Agreement is amended by adding to it a new Supplement entitled "Specific Objectives Supplement" as follows:

"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) Detection 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 co-operation 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 combination 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 the 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."

Article VIII

Annex 2 of the Agreement is amended by deleting the existing Annex entitled "Limited Use Zones" and replacing it with a new Annex 2 entitled "Remedial Action Plans and Lakewide Management Plans" as follows:

"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 and 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 odor problems;

"(x) beach closings;

"(xi) degradation of aesthetics;

"(xii) added costs to agriculture or industry;

"(xiii) degradation of phytoplankton and zooplankton populations;

"(xiv) loss of fish and wildlife habitat; and

"(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 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 co-operation 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 evaluative 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 Area 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 co-operate 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 combination with another substance, including their contribution to the impairment of beneficial uses;
- "(ii) an evaluation of information available on concentrations, 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 modeling 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 reductions of Critical Pollutants that would result in meeting Agreement objectives, including steps to develop the necessary standard approaches and agreed procedures;
- "(iv) a determination of load reductions 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 needed 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 sub-paragraph 6 (a) (iv);

"(iii) When remedial measures are selected under sub-paragraphs 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."

Article IX

The Supplement to Annex 3 of the Agreement is amended by deleting the current figures for "Lake Ontario" in sub-paragraph 3(a) of Table 2 and replacing them with the following:

"TABLE 2.

PHOSPHORUS LOAD REDUCTION TARGETS

- metric tonnes per year

<u>Basin</u>	<u>Estimated Loadings at 1 mg/l (Note 1)</u>	<u>Phosphorus Target Load</u>	<u>Estimates of Further Reductions Required</u>
Lake Ontario	7,430	7,000	430"

Article X

Annex 4 of the Agreement is amended by:

- (a) inserting the phrase ",including any such quantities as may be contained in ballast water," between the words "substance" and "shall" in sub-paragraph 2(a);
- (b) inserting the phrase ", or probable discharge," between the words "discharge" and "of harmful substance" in sub-paragraph 2(b);
- (c) replacing the phrase "the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk as established through the Inter-Governmental Maritime Consultative Organizations (IMCO), including the following requirements:" with the phrase "the standards developed by the International Maritime Organization (IMO), including the following additional requirements:" in sub-paragraph 4(a);
- (d) replacing the existing sub-paragraph 4(d) with the following:

"carriage and storage arrangements of all hazardous polluting substances in packaged form, using as a guide the International Maritime Dangerous Goods Code."; and
- (e) inserting the phrase ",in cooperation with State and Provincial Governments" between the words "Parties" and "shall" in paragraph 5.

Article XI

Annex 5 of the Agreement is amended by:

- (a) replacing the existing sub-paragraph 2(b) with the following:

"The discharge of waste water in harmful amounts or concentrations shall be prohibited and made subject to appropriate penalties; and";

and

- (b) deleting the existing paragraph 4 and replacing it with the following:

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

Article XII

Annex 6 of the Agreement is amended by:

- (a) adding the following phrase to sub-paragraph 1(b):

", 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;"

- (b) adding a new sub-paragraph 1(e) as follows:

"(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."

and,

- (c) replacing the phrase "this Annex" with the phrase "Annexes 4, 5, 6, 8 and 9 of this Agreement" in paragraph 2.

Article XIII

Annex 9 of the Agreement is amended by:

- (a) replacing the first sentence of paragraph 1 with the following:

"Annex One (CANUSLAK) of the Canada-United States Joint Marine Contingency Plan, as amended or revised, shall be maintained in force for the Great Lakes."; and

- (b) by replacing the phrase "to the Plan" with the word "thereto" in the last sentence of paragraph 1.

Article XIV

Annex 10 of the Agreement is amended by adding a new paragraph 6, as follows:

"In addition to the lists of hazardous polluting substances described in appendices 1 and 2 to this Annex, practices 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."

Article XV

Annex 11 of the Agreement is amended by:

(a) adding the following new sub-paragraph to paragraph 1:

"(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";

(b) adding the following new sub-paragraphs to paragraph 3:

"(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 Basic Ecosystem"; and

(c) adding a new paragraph 4 as follows:

"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."

Article XVI

Annex 12 of the Agreement is amended by:

- (a) deleting the word "man's" and replacing it with the word "human" in sub-paragraph 2(a)(i);
- (b) adding a new sub-paragraph 2(a)(iii) as follows:

"(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.";
- (c) adding new sub-paragraphs 5(i) and 5(j) as follows:

"(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 reproductive, 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.";
- (d) replacing the existing paragraph 6 with the following:

"The Parties shall establish action levels to protect human health based on multimedia exposure and the interactive effects of toxic substances."; and
- (e) adding a new paragraph 8 as follows:

"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."

Article XVII

The Agreement is amended by adding a new Annex 13 entitled "Pollution from Non-Point Sources" as follows:

"ANNEX 13

POLLUTION FROM NON-POINT SOURCES"

"1. Purpose. This Annex further delineates programs and measures for the abatement and reduction of 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 State and Provincial Governments, shall:

- "(a) identify land-based activities contributing 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 pollutant 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."

Article XVIII

The Agreement is amended by adding a new Annex 14 entitled "Contaminated Sediment" as follows:

"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 sediment 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 sediment 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 on 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 co-operation 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 subparagraph (i) above. The Parties shall meet by June 30, 1988 to 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."

Article XIX

The Agreement is amended by adding a new Annex 15 entitled "Airborne Toxic Substances" as follows:

"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, or 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 effects 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."

Article XX

The Agreement is amended by adding a new Annex 16 entitled "Pollution from Contaminated Ground Water" as follows:

"ANNEX 16

POLLUTION FROM CONTAMINATED GROUNDWATER"

"The Parties, in cooperation with State and Provincial Governments, shall coordinate existing programs 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."

Article XXI

The Agreement is amended by adding a new Annex 17 entitled "Research and Development" as follows:

"ANNEX 17

RESEARCH AND DEVELOPMENT"

"1. Purpose. This Annex delineates research needs 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 in 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."

Article XXII

This Protocol shall enter into force on the date of its signature.