New and Revised Specific Water Quality Objectives Proposed for the 1972 Agreement between the United States and Canada on Great Lakes Water Quality: Summary Version

Great Lakes Water Quality Board

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PROPOSED NEW AND REVISED WATER QUALITY OBJECTIVES

TO THE
INTERNATIONAL JOINT COMMISSION
BY THE
GREAT LAKES WATER QUALITY BOARD
NEW AND REVISED
SPECIFIC WATER QUALITY OBJECTIVES
PROPOSED FOR THE
1972 AGREEMENT BETWEEN
THE UNITED STATES AND CANADA
ON GREAT LAKES WATER QUALITY
BY THE
GREAT LAKES WATER QUALITY BOARD

[Summary Version]

INTERNATIONAL JOINT COMMISSION
UNITED STATES AND CANADA
SEPTEMBER 1976
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INTRODUCTION

Water quality objectives are a statement of the goals of the 1972 Great Lakes Water Quality Agreement. Canada and the United States, concerned about the grave deterioration of water quality of the Great Lakes, agreed that the best means to achieve improved water quality in the Great Lakes System is through the adoption of common objectives, the development and implementation of cooperative programs and other measures, and the assignment of special responsibilities and functions to the International Joint Commission.

Canada and Ontario have agreed that the specific water quality objectives of the Agreement shall be the least stringent target used by them in establishing water quality standards or other regulatory requirements for the boundary waters of the Great Lakes System. The states in the Great Lakes Basin generally consider the Agreement's specific water quality objectives in establishing federally approved state water quality standards for the boundary waters within their jurisdiction.

Under Article VI of the Agreement, the International Joint Commission was designated to assist in the implementation of the Agreement. Among the responsibilities given to the Commission was the "Tendering of advice and recommendations to the Parties and to the State and Provincial Governments on problems of the quality of the boundary waters of the Great Lakes System, including specific recommendations concerning the water quality objectives...". Further, the Commission was directed to establish a Great Lakes Water Quality Board to assist it and serve as principal advisor to the Commission with regard to the exercise of the powers and responsibilities (other than assistance in the coordination of research) assigned to it under the Agreement.

The Water Quality Board formed a Water Quality Objectives Subcommittee to assess the adequacy of the objectives in the Agreement and develop new or revised objectives. This Subcommittee, assisted by the Research Advisory Board's Standing Committee on the Scientific Basis for Water Quality Criteria, has been developing specific water quality objectives for a range of parameters, which if not exceeded will protect the most sensitive beneficial use of the boundary waters. However, it is recognized that there must be thorough public discussions on the social and economic implications, and the desirability of attempting to secure and protect all the waters of the Great Lakes for the most sensitive beneficial use.

In its 1974 and 1975 Annual Reports to the Commission the Great Lakes Water Quality Board recommended new and revised specific water quality objectives.
The Commission now has the responsibility of recommending to the Governments whether or not the objectives recommended to it by the Water Quality Board should be incorporated into the Agreement. Prior to making such recommendations the Commission desires to have the benefit of public comment on the objectives. This document is designed to outline to interested groups and individuals the specific water quality objectives that are being proposed.

Before the Water Quality Objectives Subcommittee could develop new water quality objectives it was necessary to agree upon a definition of water quality "objectives" and a framework or philosophy for their establishment and use. This conceptual framework is summarized in Section II of this report.

It should be recognized that the Agreement signed in 1972 contained general objectives and a limited number of specific water quality objectives. For ease of reference, the existing general and specific water quality objectives in the Agreement (Article II, Article III and Annex I) are reproduced in Section III. Although the Agreement calls for radioactivity this is currently being reviewed by the Canadian and United States Governments and will be considered by the International Joint Commission at a later date.

Section IV presents a proposed reorganization of Annex I of the Agreement listing all the existing and proposed new or revised specific water quality objectives.

The recommended new or revised objectives are specified in Section V. Recommendations are also presented for changes in the wording of the Agreement to clarify the ideas presented therein and to reinforce the intent of the Agreement to "maintain or enhance" existing water quality where it is better than that described by the objectives.

In addition to the new objectives which have been recommended by the Board, the Water Quality Objectives Subcommittee has developed objectives for several other parameters, which are still under review by the Board. These are listed in Section VI along with a list of parameters which will be considered in the near future.

This document only gives the new or revised specific objectives recommended to the Commission by the Board and does not include the scientific arguments used in their development. A more complete report including the "rationales" for all the recommended objectives as presented in Appendix "A" of the 1974 and 1975 Annual Reports of the Water Quality Board may be obtained from:

International Joint Commission  
Great Lakes Regional Office  
100 Ouellette Avenue  
WINDSOR, Ontario N9A 6T3  

Telephone: United States (313) 963-9041  
Canada (519) 256-7821  

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II

APPROACH TO THE ESTABLISHMENT
AND USE OF WATER QUALITY OBJECTIVES

What are the Objectives?

Article IV of the 1909 Boundary Waters Treaty between the United States and Canada states, among other things, that "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property of the other". The 1972 Great Lakes Water Quality Agreement is a specific application of this principle. Articles II and III of the 1972 Agreement set out the general objectives and some specific objectives to be met to ensure that pollution of the boundary waters does not occur. Articles IV, V and X described standards and other regulatory requirements, remedial programs and other measures to be implemented to meet the objectives.

In order to develop additional specific water quality objectives it was first necessary to agree upon a general framework or philosophy as a basis for developing the objectives. This framework and philosophy was published in the Water Quality Board's 1974 Annual Report and its Appendix "A". It is presented here to provide the necessary background for a comprehensive understanding of the proposed objectives and their intended use.

Water Quality Criteria and Objectives

Water quality objectives describe a minimum quality of water which, by protecting the most critical use, will provide for any specific use of the water. These objectives are to be achieved by remedial programs in all waters of the Great Lakes System used for various purposes, such as for drinking water, recreational activities, as fish habitat, and industrial and agricultural uses. However, the Agreement recognized that adjacent to sewer outfalls and other effluent discharges, relatively small mixing zones, in which water is not used for beneficial purposes, should be delineated. In these mixing zones the objectives would not be met. In addition, the Agreement recognized that some "localized areas", such as harbours, will take a long time to be restored to good water quality due largely to non-controllable sources of pollution. Governments around the lakes were to designate such mixing zones and other areas under agreed guidelines, and none of these were to extend across the international border.

In developing specific water quality objectives, the philosophy of protecting the most sensitive use was employed. In most cases, the objectives are recommended to protect aquatic life. Protection
of public water supply is employed next in frequency. Aesthetic and/or recreational uses are most sensitive for a few parameters.

Local biota and local natural or ambient water quality characteristics can result in a different response than that assumed in the establishment of a particular objective. The objective may be more restrictive than necessary or conversely, meeting the general and specific objectives may not guarantee protection of uses.

Water quality criteria on which the proposed objectives are based were drawn from a bank of information which is constantly being updated. As new studies are completed they add to this information bank. Because new data and information may lead to modified recommendations, the objectives are subject to continual review.

An inadequate scientific data base exists to permit the establishment of numerical objectives for certain non-persistent toxic substances and complex wastes. To provide a reasonable degree of protection from the potential effects of such substances and discharges, criteria are recommended by which an objective can be developed for local situations. These criteria recommend that the local jurisdiction conduct specified bioassay tests on the most sensitive and important local aquatic species, and apply an appropriate application factor to toxicity data so derived. Such criteria may be termed procedural objectives.

Numerical objectives for metals were established with the knowledge that natural conditions might cause some areas of the lakes to be out of compliance. The objectives were determined on the basis of total metal concentrations and not upon the concentration of the most toxic form of the metal. At present, there is insufficient data to enable the setting of objectives on the basis of a toxic metal species. Research into the toxicity-speciation problem is needed, as well as the development of routine analytical techniques for surveillance purposes to identify metal species.

**Protection of Public Health**

The objectives are intended to protect the Great Lakes waters as a raw public water supply which will produce a safe, clear, potable and aesthetically pleasing water after treatment. It is not intended to provide protection of Great Lakes waters for domestic use without treatment and objectives have not been designed to protect for untreated domestic use.

The minimum level of water treatment prior to human consumption includes coagulation, sedimentation, filtration and disinfection. Often a numerical objective specified for a contaminant to protect raw public water supplies is the same as an established drinking water standard because:

1) information is inadequate on the effect of the defined treatment process on contaminant removal; or
2) the defined treatment process in inconsistent in contaminant removal; or
3) the defined treatment process is ineffective in contaminant removal.

Mixing Zones

The Agreement describes a mixing zone as an area within which specific water quality objectives shall not apply. Since specific water quality objectives describe the minimum quality of water which will provide for and protect any designated use, it follows that a mixing zone represents encroachment on useable waters in most cases and implies a loss of use or a loss of value; in essence some form of trade off.

In its present form the Agreement restricts mixing zones to the "vicinity" of outfalls, urges keeping localized areas to a "minimum" and establishes a non-degradation philosophy of taking "reasonable and practicable measures" to maintain or enhance water quality where it is better than the prescribed objectives. These definitions are not considered by the Board to be adequate to prevent excessive areas of the Great Lakes from remaining in non-compliance or to prevent excessive areas of exceptionally high quality from being downgraded in the future.

To further encourage consistency in management by the various enforcement agencies, guidelines for mixing zones have been developed. These were based upon principles of good water management and include descriptions of desirable conditions within, and desirable locations for, these zones.

Each objective alone should provide protection from the effects of that specific condition; however, the safety factor is very small for some conditions and unknown for others. It cannot be assumed that when two or more minimum conditions as defined by specific numerical objectives occur simultaneously that protection for each of the uses is assured. Antagonistic, additive or synergistic effects may occur. Considering the infinite combinations of water quality characteristics, it will never be possible to predict all of the effects of these combinations even for adult organisms, much less for their life history stages and processes. However, the proposed objectives are based on the best scientific knowledge presently available.

Specific water quality objectives are to be met at the periphery of mixing zones and therefore water quality outside the mixing zone should at all times meet the objectives.

Non-Degradation

In those areas where water quality is better than that proposed by the objectives, the Agreement calls for "all reasonable and practicable measures" to prevent degradation in these high quality waters. Carrying this nondegradation philosophy a step further, it is proposed that the countries also recognize and provide for the potential for enhancement. This small alteration in approach encourages further improvement, particularly in the open water areas of the lakes.
Federal, State and Provincial jurisdictions have the authority to adopt a more aggressive non-degradation policy than that currently provided. To encourage such policies, the assumed framework included the concept of jurisdictionally designated areas which have outstanding natural resource value and existing water quality better than the objectives within which the existing water quality should be maintained or further enhanced.
EXISTING WATER QUALITY OBJECTIVES
1972 GREAT LAKES WATER QUALITY AGREEMENT

**Article II**  -  GENERAL WATER QUALITY OBJECTIVES

**Article III**  -  SPECIFIC WATER QUALITY OBJECTIVES

**Annex 1**  -  SPECIFIC WATER QUALITY OBJECTIVES
ARTICLE II

GREAT LAKES WATER QUALITY OBJECTIVES

The following general water quality objectives for the boundary waters of the Great Lakes System are adopted. These waters should be:

(a) Free from substances that 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 debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or deleterious;

(c) Free from materials entering the waters as a result of human activity producing colour, odour or other conditions in such a degree as to create a nuisance;

(d) Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life;

(e) Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae.

ARTICLE III

SPECIFIC WATER QUALITY OBJECTIVES


2. The specific water quality objectives may be modified and additional specific water quality objectives for the boundary waters of the Great Lakes System or for particular sections thereof may be adopted by the Parties in accordance with the provisions of Articles IX and XII of this Agreement.
3. The specific water quality objectives adopted pursuant to this Article represent the minimum desired levels of water quality in the boundary waters of the Great Lakes System and are not intended to preclude the establishment of more stringent requirements.

4. Notwithstanding the adoption of specific water quality objectives, all reasonable and practicable measures shall be taken to maintain the levels of water quality existing at the date of entry into force of this Agreement in those areas of the boundary waters of the Great Lakes System where such levels exceed the specific water quality objectives.

ANNEX 1

SPECIFIC WATER QUALITY OBJECTIVES

1. Specific Objectives. The specific water quality objectives for the boundary waters of the Great Lakes System are as follows:

   (a) **Microbiology.** The geometric mean of not less than five samples taken over not more than a thirty-day period should not exceed 1,000/100 millilitres total coliforms, nor 200/100 millilitres fecal coliforms. 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.

   (b) **Dissolved Oxygen.** In the Connecting Channels and in the upper waters of the Lakes, the dissolved oxygen level should be not 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.

   (c) **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 at 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.

(d) Taste and Odour. Phenols and other objectionable taste and odour producing substances should be substantially absent.

(e) pH. Values should not be outside the range of 6.7 to 8.5.

(f) Iron (Fe). Levels should not exceed 0.3 milligrams per litre.

(g) Phosphorus (P). Concentrations should be limited to the extent necessary to prevent nuisance growths of algae, weeds and slimes that are or may become injurious to any beneficial water use.

(h) Radioactivity. Radioactivity should be kept at the lowest practicable levels and in any event should be controlled to the extent necessary to prevent harmful effects on health.

2. Interim Objectives. Until objectives for particular substances and effects in the classes described in this paragraph are further refined, the objectives for them are as follows:

(a) Temperature. There should be no change that would adversely affect any local or general use of these waters.

(b) Mercury and Other Toxic Heavy Metals. The aquatic environment should be free from substances attributable to municipal, industrial or other discharges in concentrations that are toxic or harmful to human, animal or aquatic life.

(c) Persistent Organic Contaminants. Persistent pest control products and other persistent organic contaminants that are toxic or harmful to human, animal or aquatic life should be substantially absent in the waters.

(d) Settleable and Suspended Materials. Waters should be free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl.
3. Non-degradation. Notwithstanding the adoption of specific water quality objectives, all reasonable and practicable measures shall be taken in accordance with paragraph 4 of Article III of the Agreement to maintain the levels of water quality existing at the date of entry into force of the Agreement in those areas of the boundary waters of the Great Lakes System where such levels exceed the specific water quality objectives.

4. Sampling Data. The Parties agree that the determination of compliance with specific objectives shall be based on statistically valid sampling data.

5. Mixing Zones. The responsible regulatory agencies may designate restricted mixing zones in the vicinity of outfalls within which the specific water quality objectives shall not apply. Mixing zones shall not be considered a substitute for adequate treatment or control of discharges at their source.

6. Localized Areas. There will be other restricted, localized areas, such as harbours, where existing conditions such as land drainage and land use will prevent the objectives from being met at least over the short term; such areas, however, should be identified specifically and as early as possible by the responsible regulatory agencies and should be kept to a minimum. Pollution from such areas shall not contribute to the violation of the water quality objectives in the waters of the other Party. The International Joint Commission shall be notified of the identification of such localized areas, in accordance with Article VIII.

7. Consultation. The Parties agree to consult within one year from the date of entry into force of the Agreement, for the purpose of considering:

(a) Specific water quality objectives for the following substances:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Specific Water Quality Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>Copper</td>
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<tr>
<td>Arsenic</td>
<td>Cyanide</td>
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<tr>
<td>Barium</td>
<td>Fluoride</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Lead</td>
</tr>
<tr>
<td>Chloride</td>
<td>Mercury</td>
</tr>
<tr>
<td>Chromium</td>
<td>Nickel</td>
</tr>
</tbody>
</table>

Organic chemicals

Oil

Phenols

Selenium

Sulphate

Zinc
Refined objectives for radioactivity and temperature; for radioactivity the objective shall be considered in the light of the recommendations of the International Commission on Radiation Protection.

8. Amendment.

(a) The objectives adopted herein shall be kept under review and may be amended by mutual agreement of the Parties.

(b) Whenever the International Joint Commission, acting pursuant to Article VI of the Agreement, shall recommend the establishment of new or modified specific water quality objectives, this Annex shall be amended in accordance with such recommendation on the receipt by the Commission of a letter from each Party indicating its agreement with the recommendation.
NEW AND REVISED
SPECIFIC WATER QUALITY OBJECTIVES
RECOMMENDED FOR ADOPTION

BY THE
GREAT LAKES WATER QUALITY BOARD
<table>
<thead>
<tr>
<th>PESTICIDES (PERSISTENT)</th>
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</thead>
<tbody>
<tr>
<td><strong>Aldrin/Dieldrin</strong></td>
</tr>
<tr>
<td>The sum of the concentrations of aldrin and dieldrin in water should not exceed the recommended quantification limit of 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 for the protection of human consumers of fish.</td>
</tr>
<tr>
<td><strong>Note:</strong> Based on U.S. Food and Drug Administration guidelines.</td>
</tr>
<tr>
<td><strong>Chlordane</strong></td>
</tr>
<tr>
<td>The concentration of chlordane in water should not exceed 0.06 micrograms per litre for the protection of aquatic life.</td>
</tr>
<tr>
<td><strong>DDT and Metabolites</strong></td>
</tr>
<tr>
<td>The sum of the concentrations of DDT and its metabolites in water should not exceed the recommended quantification limit of 0.003 micrograms per litre. The sum of the concentration of DDT and its metabolites in whole fish (wet weight basis) should not exceed 1.0 micrograms per gram for the protection of fish consuming aquatic birds.</td>
</tr>
<tr>
<td><strong>Endrin</strong></td>
</tr>
<tr>
<td>The concentration of endrin in water should not exceed the recommended quantification limit of 0.002 micrograms per litre. The concentration of endrin in the edible portion of fish should not exceed 0.3 micrograms per gram for the protection of human consumers of fish.</td>
</tr>
<tr>
<td><strong>Note:</strong> Based on U.S. Food and Drug Administration guidelines.</td>
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### SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

#### PESTICIDES (Cont'd)

<table>
<thead>
<tr>
<th>New</th>
<th>Pesticide</th>
<th>Concentration in Water</th>
<th>Concentration in Edible Portions of Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Heptachlor</td>
<td>The sum of the concentrations of heptachlor and heptachlor epoxide in water should not exceed the recommended quantification limit of 0.001 micrograms per litre. The sum of the concentrations of heptachlor and heptachlor epoxide in edible portions of fish should not exceed 0.3 micrograms per gram for the protection of human consumers of fish.</td>
<td>Note: Based on U.S. Food and Drug Administration guidelines.</td>
</tr>
<tr>
<td>New</td>
<td>Lindane</td>
<td>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 for the protection of human consumers of fish.</td>
<td>Note: Based on U.S. Food and Drug Administration guidelines.</td>
</tr>
<tr>
<td>New</td>
<td>Methoxychlor</td>
<td>The concentration of methoxychlor in water should not exceed 0.04 micrograms per litre for the protection of aquatic life.</td>
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<tr>
<td>New</td>
<td>Toxaphene</td>
<td>The concentration of toxaphene in water should not exceed 0.008 micrograms per litre for the protection of aquatic life.</td>
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</table>
SPEFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

OTHER TOXIC PERSISTENT COMPOUNDS

**Phthalic Acid Esters**
The concentrations of dibutyl phthalate and di(2-ethylhexyl) phthalate in water should not exceed 4.0 micrograms per litre and 0.8 micrograms per litre, respectively, for the protection of aquatic life. Other phthalic acid esters should not exceed the recommended quantification limit of 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 fish consuming birds and animals.

Note:
The detection limit for PCBs in water samples is not low enough to permit setting a water quality objective for concentrations in water. Therefore the proposed objective is based on levels detectable in fish tissue. It is believed that water concentrations less than 0.001 micrograms per litre would be required to preclude significant bioaccumulation of PCBs.

The U.S. Food and Drug Administration has set an administrative guideline of 5 micrograms per gram of PCB as the maximum levels acceptable in the edible portion of fish for human consumption. The Canadian Department of National Health and Welfare has set a similar guideline at 2 micrograms per gram of PCB. The Board is recommending a more stringent objective for the Great Lakes to protect birds and animals whose main diet consist of fish from the lakes.
## SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

### OTHER TOXIC PERSISTENT SUBSTANCES

**NEW** Other Organic Contaminants
For other organic contaminants, the levels of which are not specified but which can be demonstrated to be persistent and are likely to be toxic, it is recommended that the concentrations of such compounds in water or aquatic organisms be limited to the detection level as determined by the best scientific methodology available at the time.

### METALS

**NEW** Arsenic
Concentrations of total arsenic in an unfiltered water sample should not exceed 50 micrograms per litre to protect raw waters for public water supplies.

**NEW** Cadmium
Concentrations of total cadmium in an unfiltered water sample should not exceed 0.2 micrograms per litre to protect aquatic life.

**NEW** Chromium
Concentrations of total chromium in an unfiltered water sample should not exceed 50 micrograms per litre to protect raw waters for public water supplies.

**NEW** Lead
Concentrations 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.
### SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

#### METALS (Cont'd)

**Mercury**
Concentrations 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 as well as fish-consuming birds.

**Selenium**
Concentrations of total selenium in an unfiltered water sample should not exceed 10 micrograms per litre to protect raw water for public water supplies.

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

#### OTHER INORGANICS

**Fluoride**
Concentrations of total fluoride in an unfiltered water sample should not exceed 1.2 milligrams per litre to protect raw waters for public water supplies.
SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

PESTICIDES (NON-PERSISTENT)

NEW General Objective
Concentrations of unspecified, non-persistent pesticides should not exceed 0.05 of the median lethal concentration in a 96-hour test for any sensitive local species.

NEW Diazinon
The concentration of Diazinon in an unfiltered water sample should not exceed 0.08 micrograms per litre for the protection of aquatic life.

OTHER NON-PERSISTENT ORGANIC SUBSTANCES

REVISED
Oil and Petrochemicals
Oil and petrochemicals should not be present in concentrations that:
1) can be detected as visible film, sheen or discolouration on the surface;
2) can be detected by odour;
3) can cause tainting of fish or edible invertebrates;
4) can form deposits on shorelines and bottom sediments that are detectable by sight or odour, or deleterious to resident aquatic organisms.

EXISTING
Oil and Petrochemicals
Oil, Petrochemicals and Immiscible Substances. Waters should be free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges in amounts sufficient to be unsightly or deleterious.
Oil or petrochemicals should not be present in concentrations that:
1) can be detected as visible film, sheen or discolouration on the surface;
2) can be detected by odour;
3) can cause tainting of fish or edible invertebrates;
4) can form deposits on shorelines and bottom sediments that are detectable by sight or odour, or deleterious to resident aquatic organisms.
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 (96-hour LC50) for any sensitive local species to protect aquatic life.

**OTHER SUBSTANCES**

**REVISED**

- **pH**
  
  Values of pH should not be outside the range of 6.5 to 9.0, nor should discharges change the pH at the boundary of the designated mixing zone more than 0.5 units from the ambient.

**EXISTING**

- **pH**
  
  Values should not be outside the range of 6.7 to 8.5.

**REVISED**

- Tainting Substances
  1) Raw public water supply sources should be essentially free from objectionable taste and odour for aesthetic reasons.
  2) Substances entering the waters as a 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.

**EXISTING**

- Taste and Odour
  
  Phenols and other objectionable taste and odour producing substances should be substantially absent.
## SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

### PHYSICAL CHARACTERISTICS

**REVISED**

**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 activity that will settle to form putrescent or otherwise objectionable sludge deposits or that will alter the value of the Secchi disk depth by more than 10 percent.

### EXISTING

**Settleable Suspended Materials**

Waters should be free from substances attributable to municipal, industrial or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl.

### NEW

**Asbestos**

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

### BASIC CONCEPTS

**REVISED**

Non-degradation

Notwithstanding the adoption of specific water quality objectives, all reasonable and practicable measures shall be taken in accordance with paragraph 4 of Article III of the Agreement to maintain the levels of water quality existing at the date of entry into force of the Agreement in those areas of the boundary waters of the Great Lakes System where such water quality is better than that prescribed by the specific water quality objectives.
SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

BASIC CONCEPTS (Cont'd)

EXISTING

Non-degradation
Notwithstanding the adoption of specific water quality objectives, all reasonable and practicable measures shall be taken in accordance with paragraph 4 of Article III of the Agreement to maintain the levels of water quality existing at the date of entry into force of the Agreement in these areas of the boundary waters of the Great Lakes System where such levels exceed the specific water quality objectives.

NEW

Enhancement
In areas designated by the appropriate jurisdiction as having outstanding natural resource value and which have water quality better than prescribed by the specific water quality objectives, that water quality should be maintained or enhanced.

REVISED

Mixing Zones
The responsible regulatory agencies may designate restricted mixing zones in the vicinity of outfalls within which the specific water quality objectives shall not apply. Mixing zones shall not be considered a substitute for adequate treatment or control of discharges at their source.

The following guidelines should be used in the designation of mixing zones.

1. A mixing zone is an area, contiguous to a point source, where exceptions to water quality objectives and conditions otherwise applicable to the receiving waterbody may be granted.

2. Specific water quality objectives and conditions applicable to the receiving waterbody should be met at the boundary of mixing zones.
SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

BASIC CONCEPTS (Cont'd)

3. Limitations on mixing zones should be established by the responsible regulatory agency on a case-by-case basis, where "case" refers to both local considerations and the waterbody as a whole, or segment of the waterbody.

4. Mixing zones, by definition, represent a loss of value.

5. Many of the general water quality objectives should apply to discharge-related materials within mixing zones. The zones should be free of:
   (a) objectionable deposits;
   (b) unsightly or deleterious amounts of flotsam, debris, oil, scum and other floating matter;
   (c) substances producing objectionable colour, odour, taste, or turbidity; and
   (d) substances and conditions or combinations thereof at levels which produce aquatic life in nuisance quantities that interfere with other uses.

6. No conditions within the mixing zone should be permitted which are either (a) rapidly lethal to important aquatic life (conditions which result in sudden fish kills and mortality of organisms passing through the mixing zone); or (b) which cause irreversible responses which could result in detrimental post-exposure effects; or (c) which result in bioconcentration of toxic materials which are harmful to the organism or its consumers.

7. Concentrations of toxic materials at any point in the mixing zone where important species are physically capable of residing should not exceed the 24 to 96-hour LC50.

8. When designing conditions to protect specific organisms it is necessary to know that the organisms would normally inhabit the area within the mixing zone. Zones of passage should be assured either by location or design of conditions within mixing zones. Mixing zones should not form a barrier to migratory routes of aquatic species or interfere with biological communities or populations of important species, to a degree which is damaging to the ecosystem, or diminish other beneficial uses disproportionately.
SPECIFIC WATER QUALITY OBJECTIVES RECOMMENDED FOR ADOPTION

BASIC CONCEPTS (Cont'd)

9. Mixing zones may overlap unless the combined effects exceed the conditions set forth in other guidelines.

10. Municipal and other water supply intakes and recreational areas should not be in mixing zones as a general condition, but local knowledge of the effluent characteristics and the type of discharge associated with the zone could allow such a mixture of uses.

11. Areas of extraordinary value may be designated off-limits for mixing zones.

12. The size, shape and exact location of a mixing zone should be specified so that both the discharger and the regulatory agency know the bounds.

13. Existing biological, chemical, physical and hydrological conditions should be known when considering location of a new mixing zone or limitations on an existing one.

EXISTING

Mixing Zones
The responsible regulatory agencies may designate restricted mixing zones in the vicinity of outfalls within which the specific water quality objectives shall not apply. Mixing zones shall not be considered a substitute for adequate treatment or control of discharges at their source.
NEW AND REVISED
SPECIFIC WATER QUALITY OBJECTIVES
UNDER DEVELOPMENT

BY THE
WATER QUALITY BOARD
AND THE
WATER QUALITY OBJECTIVES SUBCOMMITTEE
The Water Quality Objectives Subcommittee has developed specific water quality objectives for the parameters listed below. At this time the Water Quality Board is reviewing these objectives internally before making any recommendations with respect to them to the Commission.

<table>
<thead>
<tr>
<th>CHEMICAL CHARACTERISTICS</th>
<th>PHYSICAL CHARACTERISTICS</th>
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</thead>
<tbody>
<tr>
<td>Inorganic</td>
<td>Copper</td>
</tr>
<tr>
<td>Copper</td>
<td>Cyanide</td>
</tr>
<tr>
<td>Iron</td>
<td>Guthion</td>
</tr>
<tr>
<td>Nickel</td>
<td>Parathion</td>
</tr>
<tr>
<td>Ammonia</td>
<td>Chlorine</td>
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<tr>
<td>Hydrogen Sulfide</td>
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</tbody>
</table>

| Temperature              |

The Water Quality Objectives Subcommittee will continue its review of the scientific literature for new knowledge on cause/effect relationships which can be used to refine the specific water quality objectives and to develop new water quality objectives. In the immediate future, the Subcommittee plans to consider the parameters listed below, but may not necessarily write objectives for them.

<table>
<thead>
<tr>
<th>CHEMICAL CHARACTERISTICS</th>
<th>PHYSICAL CHARACTERISTICS</th>
<th>BIOLOGICAL CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic</td>
<td>Organic</td>
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<tr>
<td>Manganese</td>
<td>Mirex</td>
<td>Micro-organisms</td>
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<td></td>
<td>Nitrilotriacetic</td>
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<td></td>
<td>Acid</td>
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<tr>
<td>Phosphorus</td>
<td>Organophosphates</td>
<td>Toxicity units</td>
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<tr>
<td>(elemental)</td>
<td>Carbamates</td>
<td>Biological effects</td>
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<td></td>
<td>Phenols</td>
<td>of intakes</td>
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<tr>
<td>Barium</td>
<td>Rotenone</td>
<td>Chlorophyll-a</td>
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<tr>
<td>Boron</td>
<td>Organo-tin compounds</td>
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</tr>
<tr>
<td>Sulphate</td>
<td>Detergents - Surfactants</td>
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</tr>
<tr>
<td>Aluminum</td>
<td>Polynuclear Aromatic</td>
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<tr>
<td>Silver</td>
<td>Hydrocarbons</td>
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</tr>
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<td>Vanadium</td>
<td>3-trifluoromethyl - 4 nitrophenol</td>
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</tr>
<tr>
<td>Thallium</td>
<td>Super saturation</td>
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<td>of dissolved gases</td>
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<td>Pulp mill effluent</td>
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<tr>
<td></td>
<td>- Silicate</td>
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<tr>
<td></td>
<td>- Phosphate</td>
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Further information, including the scientific basis and rationale for each water quality objective, may be obtained from:

INTERNATIONAL JOINT COMMISSION
100 Ouellette Ave.
Windsor, Ont. N9A 6T3