

PROCEDURE B-1-5
PIBS# 3302

DERIVING RECEIVING-WATER
BASED, POINT-SOURCE
EFFLUENT REQUIREMENTS
FOR ONTARIO WATERS

Ministry of Environment and Energy

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INTRODUCTION

This report describes the procedures used by the Ontario Ministry of Environment and Energy (MOEE) to establish receiving-water based effluent requirements for point source discharges to surface waterbodies. The procedures are based on the policies contained in *Water Management - Policies, Guidelines and Provincial Water Quality Objectives* (MOEE, 1994). The Provincial Water Quality Objectives (PWQO) play a major role in the development of effluent limits. Specific PWQO are listed in *Water Management*.

While primary emphasis of this document relates to setting treated effluent discharge limits from point sources of pollution such as industries and sewage treatment plants, it is recognized that other non-point or diffuse sources of pollution - urban, rural and atmospheric, can contribute substantially to water quality degradation and use impairment. Procedures for managing non-point sources of pollution are not addressed in this report.

The implementation procedures described in this report support *Water Management* and provide general direction on a wide range of procedures for determining effluent requirements for Certificates of Approval or other legal documents. The text is not all inclusive, and it is strongly suggested that proponents or their consultants contact the appropriate MOEE Regional Surface Water Assessment staff to determine if additional site specific-conditions would apply to the effluent discharge in question.

Chapter 1

LEGAL FRAMEWORK AND POLICIES

The relevant legislative authority for the control of point source discharges in the Province of Ontario is found in the Environmental Protection Act and the Ontario Water Resources Act. Discharge specifications are contained in Certificates of Approval, Control Orders and other MOEE requirements and directions (collectively known as "legal instruments"). The legal and policy framework for Certificates of Approval is summarized in the following sections.

1.1 LEGAL FRAMEWORK

The legislative authority to issue Certificates of Approval for industrial and municipal point source discharges (collectively known as sewage works) is the Ontario Water Resources Act, Section 53, R.S.O. 1990. Conditions placed in these Certificates of Approval address a number of issues associated with the operation and maintenance of a sewage works. As part of these conditions, effluent requirements are determined and incorporated into the Certificate of Approval along with appropriate non-compliance criteria.

Section 28 of the Ontario Water Resources Act (R.S.O. 1990) states: "Under sections 29, 30, 32 and 33, the quality of water shall be deemed to be impaired if, notwithstanding that the quality of the water is not or may not become impaired, the material discharged or caused or permitted to be discharged or any derivative of such material causes or may cause injury to any person, animal, bird or other living thing as a result of the use or consumption of any plant, fish or other living matter or thing in the water or in the soil in contact with the water". Section 30(1) goes on to stipulate that: "Every person that discharges or causes or permits the discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters is guilty of an offence".

The Ontario Environmental Protection Act provides the legislative authority to limit the discharge of contaminants to the natural environment. Section 14(1) of the Ontario Environmental Protection Act (R.S.O. 1990) states: "Despite any other provision of this Act or the regulations, no person shall discharge a contaminant or cause or permit the discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect". Section 1 (1) of the same Act defines 'adverse effect' as one or more of "(a) impairment of the quality of the natural environment for any use that can be made of it, (b) injury or damage to property or to plant or animal life, (c) harm or material

discomfort to any person, (d) an adverse effect on the health of any person, (e) impairment of the safety of any person, (f) rendering any property or plant or animal life unfit for use by man, (g) loss of enjoyment of normal use of property, and (h) interference with the normal conduct of business".

Discharge requirements also take into account the provisions of the Federal Fisheries Act for which the Ontario Ministry of Natural Resources is the agent in Ontario.

1.2 WATER MANAGEMENT POLICIES

For the development of effluent requirements, the publication *Water Management - Policies, Guidelines and Provincial Water Quality Objectives of the Ministry of Environment and Energy, 1994* (MOEE, 1994) is the primary document used to provide interpretation of the legislation. Surface water quality management is addressed under a series of Surface Water Management Policies and the Provincial Water Quality Objectives.

1.2.1 Provincial Water Quality Objectives

Provincial Water Quality Objectives (PWQO) are numerical and narrative criteria which serve as chemical and physical surrogates of healthy populations of aquatic biota. They represent a satisfactory level of quality for surface waters (i.e. lakes, rivers and streams). These criteria should also be applied to groundwater where it discharges to the surface. The PWQO are set at a level of water quality which is protective of all forms of aquatic life and all aspects of the aquatic life cycles during indefinite exposure to the water. Recreational uses of water are protected by PWQO based on public health and aesthetic considerations. The Provincial Water Quality Objectives are listed in *Ontario's Provincial Water Quality Objectives* (MOEE, 1994c). The procedures used to set PWQO are described in *Ontario's Water Quality Objective Development Process*, (MOE, 1992a).

Provincial Water Quality Objectives are intended to provide guidance in making water quality management decisions such as the designation of the surface waters of the Province which should not be further degraded. They are often used as the starting point in deriving waste effluent requirements included in Certificates of Approval and other instruments issued to regulate effluent discharges. They are used to assess ambient water quality conditions, infer use impairments, assist in assessing spills and monitoring the effectiveness of remedial actions.

1.2.2 Surface Water Quality Goal and Policies

The surface water quality management goal and policies are fully described in *Water Management (1994)*. Fundamentally, they are as follows:

Goal

To ensure that the surface waters of the Province are of a quality which is satisfactory for aquatic life and recreation.

Two policies relate directly to the protection or restoration of satisfactory water quality conditions:

Policy 1

In areas which have water quality better than the Provincial Water Quality Objectives, water quality shall be maintained at or above the Objective.

Policy 2

Water quality which presently does not meet the Provincial Water Quality Objectives shall not be further degraded and all practical measures shall be undertaken to upgrade the water quality to the Objectives.

Two policies relate directly to the management of particularly hazardous substances which, if released to the environment even in small concentrations, may pose a serious threat to aquatic life, wildlife and humans.

Policy 3

Prevent the release, in any concentration, of hazardous substances that have been banned.

Policy 4

Ensure that special measures are taken on a case by case basis to minimize the release of hazardous substances that have not been banned.

When treated point-source effluents are discharged to a waterbody, there may be an area of the receiver contiguous to the discharge point where water quality degradation and use impairment could occur. This area is described as the mixing zone and addressed in Policy 5.

Policy 5

Mixing zones should be as small as possible and not interfere with beneficial uses. Mixing zones are not to be used as an alternative to reasonable and practical treatment.

1.2.3 Other Water Management Policies

The MOEE policy document *Water Management (MOEE. 1994)* also contains a number of policies, guidelines and implementation procedures related to the management of groundwater quality and the management of surface and ground water quantity. It is imperative to understand the inter-relationships of surface and ground water quality management and the important linkages between water quality and water quantity management. Management decisions related to any one of these aspects of water management can have serious implications on the others.

Groundwater Quality

Recognizing that groundwater is a valuable resource in Ontario that supports a variety of uses, the MOEE general policy for groundwater quality management is:

To protect the quality of groundwater for the greatest number of beneficial uses

Specific policies and procedures for the protection of groundwater quality from pollution from regulated and unregulated sources are contained in *Incorporation of the Reasonable Use Concept into the MOEE Groundwater Management Activities and Guidelines for the Resolution of Groundwater Quality Interference Problems*. Both are contained in the *MOEE Manual of Guidelines and Procedures (MOEE. 1994b)* as Guideline B-7 and B-9, respectively.

Surface and Ground Water Quantity Management

The protection and control of water quantity is a key component of Ontario's water management strategy. Water quantity and quality are closely related, inasmuch as the amount of water available and its physical characteristics are an important aspect of water quality. Ground water quantity management is essential for the added reason that ground water is often an important component of streamflow.

Recognizing the many and varied uses of water, the MOEE policy for the management of surface and ground water quantity is:

To ensure the fair sharing, conservation and sustainable development of the surface and ground waters of the province.

This general water quantity management policy is supported by a series of guidelines enunciated in *Water Management (1994)*.

1.2.4 Additional MOEE Guidance

The *MOEE Manual of Guidelines and Procedures (MOEE, 1994b)* contains the following Guidelines which may be considered in the derivation of effluent requirements:

Guideline F-2

Compliance

Guideline F-5

Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters

Guideline F-8

Provision and Operation of Phosphorous Removal Facilities at Municipal, Institutional and Private Sewage Treatment Works

Guideline F-10

Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)

Additional information related to these Guidelines can be found in Appendix B.

Chapter 2

IMPLEMENTATION OF THE WATER MANAGEMENT POLICIES

The design of receiver-based effluent requirements are based directly on the Surface Water Quality Management Policies. Following are implementation details related to these policies.

2.1 AREAS WITH WATER QUALITY BETTER THAN THE OBJECTIVES (Policy 1)

When a new or expanded waste discharge is being proposed for a waterbody where the quality of water is better than the PWQO, there may be potential waste assimilation capacity available for some substances. Although some lowering of water quality may be permitted in these areas, degradation below the Provincial Water Quality Objectives will not be allowed. This will ensure continued protection of aquatic communities and recreational uses. Water resource managers should be aware of special circumstances such as very sensitive or unique ecosystems or other uses that might be affected if a discharge was to be permitted.

2.2 AREAS WITH WATER QUALITY NOT MEETING THE OBJECTIVES (Policy 2)

In areas with water quality not meeting the PWQO for a specific contaminant (Policy 2), no further degradation of water quality will be allowed for that contaminant. All reasonable and practical measures to improve water quality shall be undertaken. Daily, seasonal and annual concentrations and loadings from proposed waste water discharges are evaluated to confirm that they will not violate Policy 2. Expansion of existing discharges to Policy 2 receivers will only be permitted if the concentration and total load of the Policy 2 contaminant to the receiving stream is not increased.

It is recognized that, under certain circumstances, it may not be technically feasible, physically possible or socially desirable to achieve this condition in all water bodies in the Province. Accordingly, where it is clearly demonstrated that all reasonable and practical measures to attain the Provincial Water Quality Objectives have been undertaken but where:

- 1) the Provincial Water Quality Objectives are not attainable because of natural background water quality; or

- 2) the Provincial Water Quality Objectives are not attainable because of irreversible man-induced conditions; or
- 3) to attain or maintain the Provincial Water Quality Objectives would result in substantial and widespread adverse economic and social impact; or
- 4) suitable treatment techniques are not available;

then a deviation from Policy 2 for a specific parameter or parameters may be allowed, subject to the approval of the Ministry of Environment and Energy.

If a deviation is being sought, it must be clearly documented according to the information requirement and procedures described in Appendix C "Guidelines for Handling Requests for Deviations". A deviation must be applied for and approved prior to submitting the application for a Certificate of Approval.

2.3 HAZARDOUS SUBSTANCES

Hazardous substances, acting individually or in combination with other substances, can cause death, disease including cancer, behaviour abnormalities, genetic mutations, physiological malfunctions, malfunctions in reproduction or physical deformities in organisms (plants and animals, including humans) or their offspring. The consequences of contamination of the environment by hazardous substances may also include a loss of valuable species, restrictions on important socio-economic activities or a variety of irreversible ecological changes that threaten future use and enjoyment of the environment. Hazardous substances can occur in nature (e.g. mercury) or can be created by human activity (e.g. PCB). Some have been developed to meet important needs (e.g. DDT) and some are accidental by-products of industrial activities (e.g. dioxins).

Effluent requirements should place special emphasis and directions on the control of hazardous substances. Hazardous substances designated as being particularly dangerous in the natural environment and requiring special attention are included in Tables 1.7 and 1.8 of the publication entitled "*Candidate Substances For Bans, Phase-Outs Or Reductions - Multimedia Revision*" (MOEE, 1993). It should be noted that these listings contain some substances that are of concern, primarily, to the atmosphere and others that are of primary concern to the aquatic environment. Because of their inherently hazardous nature, every effort should be made to prevent the appropriate substances from these lists from gaining release to the environment.

Some designated hazardous substances from Table 1.7 of the *"Candidate Substances For Bans, Phase-Outs Or Reductions - Multimedia Revision"*, described above, have been banned from use. The MOEE policy clearly states that the release, in any concentration, of these banned substances be prevented (MOEE, 1994a). Provincial Water Quality Objectives have been developed for many of the banned hazardous substances, but it must be emphasized that the Objectives are not to be used for the development of new waste loadings for these substances. Rather, they provide a benchmark available to assess the environmental implications of past releases or accidental losses and remediation work.

Specific control procedures for other substances that have been designated as hazardous in Tables 1.7 and 1.8 of *Candidate Substances For Bans, Phase-Outs Or Reductions - Multimedia Revision, 1993* have yet to be formulated pending further technical and socio/economic evaluations. The MOEE policy for these hazardous substances suggests that special measures should be taken on a case by case basis, to minimize their release. From an environmental protection perspective, the application of pollution prevention principles, that is, avoiding the creation of the pollutants in the first place, is far more desirable than reliance on waste treatment. For these hazardous substances it is not appropriate to use the assimilative capacity of receiving waters and mixing zones to assist in establishing effluent limits.

2.4 MIXING ZONES

A mixing zone is defined as an area of water contiguous to a point source or definable non-point source where the water quality does not comply with one or more of the Provincial Water Quality Objectives. A mixing zone is, under no circumstances, to be used as an alternative to reasonable and practical treatment. It must be designed to be as small as possible. It is one factor to be considered in establishing effluent requirements.

The concept of mixing zones recognizes that the release of the aqueous component of adequately-treated municipal and industrial wastes to rivers, streams and lakes does occur. As a general principle, the dilution of such effluents, and thus the use of mixing zones, should be minimized and limited to conventional pollutants. The mixing zone principle does not apply to hazardous substances identified in Tables 1.7 and 1.8 of the MOEE report *Candidate Substances For Bans, Phase-Outs Or Reductions - Multimedia Revision*.

Conditions within a mixing zone must not result in irreversible environmental damage, risk to ecosystem integrity or risk to human health. Mixing zones cannot interfere with other water uses such as drinking water supply or recreation.

Terms and conditions related to a mixing zone will be designated on a case-by-case basis and may be specified in Certificates of Approval, Control Orders, Requirements and Directions, or approvals to proceed under the Environmental Assessment Act.

As effluent loading requirements are based on careful design, so too should mixing zones be carefully planned on a site-specific basis including consideration of water quality, seasonal streamflow and current patterns, physical factors, biotic communities and spawning areas in and adjacent to the mixing zone, nearby water uses such as bathing beaches and drinking water intakes as well as other wastewater discharges.

As general guidance in the design of mixing zones, the following range of concerns must be adequately addressed:

- 1) In order to protect important aquatic communities (fish, invertebrates and plants) in the vicinity of mixing zones, no conditions within the mixing zone will be permitted which:
 - a) are acutely lethal to aquatic life;
 - b) cause irreversible responses which could result in detrimental post-exposure effects;
 - c) result in bioconcentration of toxic materials which are harmful to the organism or its consumer;
 - d) attract organisms to the mixing zones, resulting in a prolonged exposure;
 - e) create a barrier to the migration of fish or other aquatic life.
- 2) To ensure the protection of acceptable aesthetic conditions, mixing zones should not contain:
 - a) materials which form objectionable deposits (e.g. scums, oil or floating debris);
 - b) substances producing objectionable colour, odour, taste or turbidity;
 - c) substances which produce or contribute to the production of objectionable growths of nuisance plants and animals;
 - d) substances that render the mixing zone aesthetically unacceptable.

- 3) Mixing zones should not impinge upon existing municipal and other water supply intakes, bathing beaches or important fish spawning areas. Conversely, new intakes or aquatic recreation areas should not be constructed within the boundaries of existing mixing zones. However, with detailed knowledge of the effluent and receiver characteristics and the resulting conditions within the mixing zone, some mixture of uses might be permissible.
- 4) Mixing zones may overlap unless the combined effects exceed the conditions specified in this section.
- 5) When background water quality conditions at a proposed mixing zone site do not meet one or more of the Provincial Water Quality Objectives, effluent requirements should be established that ensure, at the very least, that background water quality is not further degraded.

2.5 EFFLUENT REQUIREMENTS

Although *Water Management* (1994) does not contain a specific policy related to establishing effluent limits, it does provide general guidance in the form of implementation procedures.

Substances that impair water and sediment quality are a major environmental problem. Many of these substances are toxic to aquatic life such as fish and aquatic invertebrates, in both the water column and sediment. Others are persistent and/or bioaccumulative and can cause food chain effects in fish, wildlife, birds and people who eat fish. Substances such as nutrients, when present in excess, can upset the natural balance of the ecosystem. Still others can impair the use of water by producing, for example, tastes and odours.

Polluting substances enter the water from many sources. Industrial and municipal discharges of wastewater, contaminated runoff from urbanized and agricultural areas, deposition of air pollutants, and lakefilling are all important sources of contaminants. Some of these substances, such as metals, are naturally occurring, and their presence in the water can often be the result of natural processes.

In establishing effluent requirements for discharges to surface waters, the process outlined below should be followed:

- 1) Appropriate site-specific receiving water assessments will be conducted to determine the effluent requirements based on the waste assimilative capacity of the receiver.
- 2) The site-specific effluent requirements, so derived, will be compared, where they exist, to the federal or provincial regulations or guidelines for effluent discharges and the most stringent requirement will be applied.
- 3) The effluent requirements derived from the above procedures, expressed as both waste loadings and/or concentrations, will be incorporated into a Certificate of Approval.
- 4) For existing discharges in areas with water quality worse than the Provincial Water Quality Objectives, the Ministry may develop a pollution control program with each discharger that would meet the effluent requirement determined from the above procedures.

Through the incorporation of receiving-water quality based limits into legally enforceable control documents like a Certificate of Approval, the guidelines for water quality

management become enforced. These limits most commonly are for municipal or industrial point sources, but may also be applied to cooling water, stormwater or other polluting sources.

Chapter 3

DERIVATION OF EFFLUENT REQUIREMENTS

3.1 EFFLUENT LIMITS AND OBJECTIVES

Whether an effluent requirement is based on treatment-technology based or receiving-water based concerns, it may take the form of an effluent limit or an effluent objective, which are described as follows:

3.1.1 Effluent Limits

Effluent Limits are legally enforceable effluent requirements that are based on either achievable treatment technology or scientifically sound data on receiving water quality requirements, that is, the receiving water's waste assimilative capacity based on the Provincial Water Quality Objectives.

3.1.2 Effluent Objectives

Effluent objectives are used where the available data on the parameters to be controlled are insufficient to form the basis for a legally enforceable effluent limit. Violations of an effluent objective normally lead to a requirement for the discharger to undertake a study and report on the causes and impacts of the violations. This provides the basis for a decision by the MOEE on what corrective action is required to lessen effluent impact on the receiver, either through negotiation with the discharger or the issuance of a Control Order.

3.2 CERTIFICATES OF APPROVAL AND OTHER REGULATORY INSTRUMENTS

Many of the older Certificates of Approval for both industrial and municipal point sources approve the installation of effluent treatment systems but do not set effluent requirements or monitoring or reporting requirements. More recent Certificates (and Control Orders) include effluent requirements and usually include monitoring and reporting requirements.

The MOEE presently sets effluent requirements on a discharger-specific basis. A variety of measures are used by the MOEE to apply these requirements, including voluntary programs or guidelines, Control Orders, Certificates of Approval and other MOEE requirements and directions. The MISA effluent limits regulations are designed to set uniform, legally enforceable, sector-specific limits for each direct discharger in specific

industrial sectors. The Ministry will continue to expect industrial dischargers to meet all the existing treatment technology-based numerical requirements (including guidelines) until replaced by the MISA limits regulations.

3.3 EFFLUENT LOADINGS AND CONCENTRATIONS

Many point sources now have requirements set on a loading basis (e.g. kilograms discharged per day) as well as on an effluent concentration (e.g. mg/L) basis. This recognizes that the loadings of pollutants to the environment are as important, if not more so, than effluent concentrations for some toxic contaminants, especially those that persist in the receiving waterbody.

3.4 TYPES OF CONTAMINANTS

In the past, the majority of effluent requirements were set for the traditional indicators of environmental quality (conventional pollutants), including BOD, suspended solids, total phosphorus and kjeldahl nitrogen. While these traditional indicators continue to be used, Certificates of Approval may now also specify effluent requirements for an assortment of toxic contaminants.

3.5 TREATMENT TECHNOLOGY- BASED EFFLUENT REQUIREMENTS

Treatment technology-based effluent requirements are contained in a range of provincial and federal acts, regulations, guidelines and policies. A listing is provided in Appendices A and B of this report.

On a case-by-case basis, MOEE technical staff may apply professional judgement to develop treatment technology-based effluent requirements if no provincial or federal regulations, guidelines or policies exist.

Originally, for industrial point-source discharges, a concentration-based approach was incorporated into provincial effluent requirements on the basis of experience with municipal sewage treatment systems. It was presumed that where industry used the same effluent treatment technology as the municipalities, both effluents should have similar pollutant concentrations. However, many industrial wastewater effluents have different characteristics than municipal wastewaters, and the use of similar effluent treatment systems does not produce similar pollutant concentrations. Subsequently, other guidelines were developed for specific industrial sectors and are based on the state of treatment technology for those sectors at the time of writing the effluent requirement.

Chapter 4

DERIVING RECEIVING-WATER BASED EFFLUENT REQUIREMENTS

4.1 INTRODUCTION

Before any discharger-specific effluent requirements are specified in a Certificate of Approval or other legal instrument, Ministry staff review the impact of the treatment technology-based effluent on the receiving water body.

For contaminants which are not considered to be designated hazardous contaminants, every river, stream or lake has a definable assimilative (self-purification) capacity. Water quality considerations take precedence when contaminant discharges exceed the assimilative capacity of the receiving waters, even if the discharged loadings are within the treatment technology based effluent requirements based on the guidelines, regulations or policies. Receiving-water based effluent requirements also take precedence when ambient levels of toxic contaminants are above acceptable levels. The procedures for determining the receiving-water based effluent requirements are described below.

4.2 APPLICABILITY

Receiving-water based Effluent Requirements are developed within the following policy framework:

"The surface waters of Ontario are put to many uses, and each use has specific water quality requirements. As a general management principle, water quality must be protected, preserved or restored to permit the greatest number of uses, based on the best interests of the people of Ontario" (Water Management, 1994).

To this end, the goal of the Ministry of Environment and Energy is:

"to ensure that the surface waters of the province are of a quality which is satisfactory for aquatic life and recreation" (ibid).

To support this goal, the Ministry's policy further states that:

"... the PWQO are set at a level of water quality which is protective of all forms of aquatic life and all aspects of the aquatic life cycles. The clear intention is to protect all life stages during indefinite exposure to the water" (ibid).

Other key principles for developing receiving water-based Effluent Limits were outlined in earlier sections of this report.

It should be reiterated that the emphasis of the implementation procedures outlined in this report is the control of point source discharges to the surface waters of Ontario. Control of non-point discharges and pollutants from atmospheric deposition are equally important but not addressed in this document.

4.3 RESPONSIBILITY

The discharge proponent is responsible for assessing the assimilative capacity of the receiving water body and to derive from this assessment the receiving-water based effluent requirements. The receiving-water based effluent requirements must be confirmed by staff of MOEE Regional Operations Division. This is done during the Pre-Application Consultation. The Pre-Application Consultation is detailed in MOE reports *Guide for Applying for Approval of Industrial Sewage Works* (MOE, 1992b) and *Guide for Applying for Approval of Municipal and Private Sewage Works* (MOE, 1992c).

4.4 WATER QUANTITY CONSIDERATIONS

In the development of effluent requirements, the first determination made is the flow/assimilative capacity of the receiving-water body. Effluent requirements are established to maintain set dilution ratios based on the flow in the receiving stream or allowed concentrations, after mixing, of selected contaminants in the receiving water body. Separate procedures are outlined for rivers and streams, and lakes and interconnecting channels.

4.4.1 Discharges to Rivers/Streams

For continuous point source discharges, the low flow statistic 7Q20 (the minimum 7 day average flow with a recurrence period of 20 years - i.e. a 5% chance of there being inadequate streamflow to meet the minimum acceptable dilution in any given year) is used as the basic design flow for the receiving stream. This value can be calculated from data collected by the Water Survey of Canada or from publications like the Ontario Ministry of Environment and Energy report *Low Flow Characteristics in Ontario* (MOE, 1989).

For **non-continuous** point source discharges, ideally, the 7Q20 for the specific discharge period is used as the basic design flow for the receiving water body. However, the hydrology of Ontario varies tremendously from region to region and, for this reason, the low-flow statistic used for seasonal discharges often must be determined on a site and condition-specific basis. The quantity and quality of effluent to be discharged, along with physical discharge considerations, makes selection of a single statistical method difficult. Likewise, in rivers which are only suitable for seasonal discharges, the hydrological characteristics of the receiving waters do not lend themselves to a uniform statistical approach. For these reasons, the selection of appropriate seasonal low flow design criteria and the approach used to pro-rate streamflow information from a gauging station to the proposed discharge location is based on the judgement of Ministry staff.

For either continuous or non-continuous discharges, if sufficient streamflow data are not available, one or more seasons of gauging may be required to develop a correlation between the selected location and other gauging location(s) with a long term record.

Special Discharge Situations

Discharges rated proportionally to streamflow may be permitted when assimilative studies indicate the need and when storage or discharge volumes and/or quality can be controlled. Effluent requirements are stipulated to maintain set dilution ratios based on the flow in the receiving stream or allowed concentrations of selected variables (based on stream sensitivity) in the receiver after mixing. *See Derivation of Effluent Criteria for Certificates of MOE* (MOE 1992d). The proponent may be required, as a condition of the Certificate of Approval, to install, maintain and operate a continuous recording streamflow gauge which meets the Water Survey of Canada's national standards as described in *Standard Operations Manuals* (Environment Canada).

Discharges to dry ditches (watercourses that go dry seasonally) may be permitted in some instances. Additional assessments may be required to confirm that the discharge will not impact aquatic life or other water uses downstream where there is a continuously flowing stream (MOE 1992d).

Reserve Capacity

In addition to the guidance above, in some cases, a portion of the assimilative capacity of the river can be reserved in anticipation of future needs.

4.4.2 Discharges to Lakes and Interconnecting Channels

Discharges directly to a shoreline are not acceptable for new or expanded waste water discharges. A shoreline discharge of storm water and/or cooling water may be considered on a case-by-case basis.

In the Great Lakes, initial mixing for discharge diffusers in lakes must have a minimum near field (initial mixing) ratio of 20:1. Specification of additional site-specific conditions (e.g. spawning shoals, beaches, drinking water intakes, minimum depth of submergence and distance offshore, etc.) are based on the professional judgement of MOEE staff.

Proposed discharges to inland lakes are assessed on a case-by-case basis. Proposed phosphorus discharges to inland lakes are assessed using the *Lakeshore Capacity Study: Trophic Status Model* (MOE, 1986).

The impact of a point source discharge to a lake or interconnecting channel can be minimized by optimizing the design and location of the discharge diffuser. Factors affecting the dilution efficiency of the diffuser (e.g. variation in the initial dilution between start-up flows and ultimate flows, buoyant versus non-buoyant plumes, current speeds) are considered in determining the impact of the point source discharge.

4.4.3 Procedures for the Taking and Discharging of Cooling Water

Method of Removal

The design and location of the water intake must be such that entrainment of fish, including larval fish and eggs, and other aquatic life is minimized. Scientific studies must demonstrate to the satisfaction of the MOEE that the intake design and location are optimal for minimizing entrainment. These studies will be required for each intake that will draw in excess of 10 m³/sec. The MOEE reserves the right to require these studies for intakes of lower capacity, particularly for intakes from inland waters.

Method of Disposal

Discharge of waste heat shall be into such areas and locations and in such quantities as may be allowed by the MOEE on a case-by-case basis. The method of discharge shall be such that rapid mixing occurs with the receiving water, thus minimizing the area affected. Scientific studies must demonstrate to the satisfaction of the MOEE that the discharge design and location are optimal for minimizing the area affected by the discharge and the environmental impact of the discharge. These studies will be required for each discharge with a capacity greater than 10 m³/second. The MOEE may require these studies for discharges of lower capacity, particularly for discharges to inland waters. A discharge of

waste heat should not affect the water temperature of any water intake or fish spawning area.

Contaminants in Discharge Water

The use of cooling water for waste disposal shall be minimized. Such waste as may be permitted to be disposed of in this manner shall be at such levels as determined by application on a case-by-case basis to the MOEE. Substances used as biocides in condenser cleaning will only be permitted in the cooling water at residual levels to be approved by the MOEE on a case-by-case basis.

Alternative Cooling Facilities

In those instances where significant effects can be clearly predicted, alternative cooling facilities are to be employed. In those instances where potential harmful effects may arise, but cannot be clearly predicted, generating stations should be initially designed so that alternative cooling facilities can be added at such time as evidence indicates sufficient adverse effects.

Circulation Patterns

The taking and discharge of cooling water and structures built for these purposes shall not alter the local existing circulation patterns such that other water uses, sedimentation, spawning or fishing grounds are adversely affected.

Beneficial Uses

Wherever possible, all or part of the waste heat discharge shall be used in a beneficial way.

4.5 WATER QUALITY CONSIDERATIONS

Another important determination made in developing receiving-water based effluent requirements is background physical, chemical and biological conditions.

Background water quality conditions, where available, are considered in the development of receiving-water based effluent requirements for Certificates of Approval. Although more than one method is used to determine the appropriate background concentration

depending on the MOEE Region involved, the following common factors are considered when selecting an appropriate background value for these assessments:

- number of analyses and period of record;
- variability of the database;
- validity and integrity of the values or record available;
- potential hazard of each contaminant or parameter;
- potential for bioaccumulation of each contaminant.

Seasonal and/or diurnal changes or fluctuations (e.g. temperature, dissolved oxygen, pH) are considered when establishing background conditions. Normally the 75th percentile is used to determine background quality, but with proper justification this value may be modified based on stream sensitivity and the above-mentioned considerations. Further details are contained in *Streamlining the Approval of Discharge Criteria to Surface Water* (MOE 1992e).

Background determinations usually employ the entire database to determine the appropriate value for each variable assessed. Outliers in the data base may be eliminated, but justification for this must be presented. In cases where water chemistry may have changed due to land-use changes or improved control of discharges, the period of record may be reduced to reflect present conditions. Integration of all these variables and the final determination of background water chemistry conditions, involves an element of professional judgement by Ministry staff.

MOEE has a broad range of monitoring databases available to assist in determining background water quality and contaminants of concern. Some of the more important monitoring databases include:

- Provincial Water Quality Monitoring Network
- MISA monitoring data
- Industrial and Municipal Discharger Reports
- Drinking Water Surveillance Program
- Great Lakes investigation and surveillance
- Young-of-the-year fish - contaminants monitoring
- Sports Fish Contaminants Monitoring Program
- Other biomonitoring programs
- Existing site-specific assessments
- Regional studies

Industrial and municipal point source discharges are assessed for the major contaminants identified by the proponent in a waste water characterization study or for those

contaminants expected to be in the effluent based on specific knowledge of the plant process and site-specific conditions of the receiving stream.

At a minimum, all municipal and private domestic sewage discharges are evaluated for the following variables: suspended solids, BOD₅, total phosphorus, ammonia and chlorine residual (MOE, 1992e). Any waste water treatment plant that receives industrial discharges should also have a wastewater characterization study (e.g. metal scans) performed to confirm that there are no additional variables of concern. Where the amount of ammonia discharged is environmentally insignificant compared to the assimilative capacity of the receiving stream, effluent requirements for this contaminant are optional.

Based on the information noted above, Ministry staff determine the contaminants for which Effluent Requirements will be specified.

4.6 ASSESSMENTS PRIOR TO START-UP OR EXPANSION

Prior to submitting an application for approval to discharge or to expand an existing discharge, a receiving water assessment report is required. When only minimal information on receiving water conditions is available, or if there is concern that appropriate protection of the biota may not be achieved, given the available information used to derive the effluent requirements, then additional water quality assessments may be required after start-up or expansion. The assessments may incorporate water quality/quantity, biological and sediment surveys.

Provincial Water Quality Objectives maybe employed prior to start-up or expansion by project proponents to pre-screen proposed discharge locations. In this way, sites can be selected where the environmental impact of the discharge will be minimized.

4.7 SPECIFICATION OF EFFLUENT REQUIREMENTS BASED ON RECEIVING WATER CONDITIONS

Prior to specifying any receiving-water based effluent requirements in a Certificate of Approval, a number of receiving-water related conditions must be established. These are the mixing zone, contaminants of concern, policy status of the receiver (i.e Water quality better than the Objectives or Water quality not meeting the Objectives) and other water uses. These conditions are discussed below:

4.7.1 Mixing Zone Requirements

The size of and water use within mixing zones are considered on a case-by-case basis depending on the local water quality conditions and water use, along with the contaminants of concern in the discharge. The derivation frequently involves the use of site-specific models to determine the extent of mixing zones. In a simple scenario, this is done by applying the Provincial Water Quality Objective at the edge of the mixing zone as the desirable level of water quality. The allowable effluent requirement needed to meet the Provincial Water Quality Objective at the edge of the mixing zone can then be back-calculated. More complicated scenarios require more complex assessments and techniques.

Dischargers are required, where appropriate, to submit a proposed wasteload allocation for the discharge facility based on the entire watershed and the up- and downstream water users (MOE. 1992b; MOE. 1992c). This information is used to assist in defining the allowable mixing zone.

Occasionally, situations arise in which the close proximity of dischargers on a common receiver presents a unique problem for apportioning the assimilative capacity of the receiver and defining the mixing zones. Use of sophisticated modelling techniques such as those documented in the *MISA St. Clair River Pilot Site Investigation* (MOE 1991a) may be necessary in these situations.

4.7.2 Contaminants to be Considered

Based on the chemical use inventories submitted by the proponent with the application for Certificate of Approval (MOE. 1992b; MOE. 1992c) and on MOEE staff knowledge of the contaminants expected in the effluent, a list of contaminants to be controlled is developed.

4.7.3 Existing Receiving Water Quality

The discharge proponent is responsible for collecting background information and determining, during the Pre-application Consultation with staff from MOEE's Regional Operations Division, whether Surface Water Quality Policy 1 or Policy 2 (MOEE, 1994) applies to each of the contaminants on the expected list. MOEE staff will rely upon available MOEE data and site-specific knowledge of the receiving water quality to guide the proponent in this determination. A determination will also be made on the level and type of treatment required beyond that specified by the treatment technology-based requirements. MOEE's Regional Operations Division must confirm the proponents

determination prior to submission of the application for Certificate of Approval (MOE, 1992b; MOE, 1992c).

Ambient Water Quality Better Than the PWQOs (Policy 1)

In a Policy 1 situation, an evaluation is made as to what treatment or other measures are required to maintain water quality at or above the Provincial Water Quality Objectives. Although some lowering of water quality is permissible, violation of the Provincial Water Quality Objectives is not allowed.

Ambient Water Quality Worse than the PWQOs (Policy 2)

In a Policy 2 situation, no further lowering of water quality is permitted, and all practical measures must be undertaken to upgrade water quality.

In exceptional cases described in Section 2.2 of this document, a proponent may make a formal application for a deviation from these requirements using a prescribed format (Appendix C). After review by appropriate MOEE staff, a deviation may be approved by the Ministry.

Other Water Uses

Occasionally, other downstream water uses such as irrigation or drinking water supply are identified. For the few contaminants, where better water quality is required to protect these other beneficial uses in a given location, the appropriate water quality criteria are used to assess the discharge at that location.

Any potential impacts on the ground water aquifer must be reported in the application for Certificate of Approval (MOE 1992f; MOE 1992g). This information is assessed by MOEE staff to determine appropriate requirements.

4.8 SPECIFYING RECEIVING WATER BASED EFFLUENT REQUIREMENTS IN CERTIFICATES OF APPROVAL

This section describes the development of receiving-water based effluent requirements which complement the treatment technology-based effluent requirements.

Once the extent of the mixing zone, the contaminants of concern, background receiving water quality and appropriate water uses are determined, the receiving-water based effluent requirements can be specified for the Certificate of Approval.

4.8.1 Types of Requirements

The following types of receiving-water based effluent requirements may appear in the Certificate of Approval:

Effluent Requirements Based on the Results of the Mixing Zone Evaluations and Policy Assessment

Receiving water based Effluent Requirements are established for contaminants where required. The results of both the mixing zone evaluations and the policy assessment are integrated to set an appropriate effluent requirement. These requirements can be in the form of either an Effluent Limit or Objective.

Whole Effluent Toxicity Requirements

All new or expanded effluent discharges must not be acutely lethal as defined by meeting a 96 hour LC₅₀ whole effluent toxicity test using Rainbow trout and *Daphnia magna*. These requirements can be in the form of either an Effluent Limit or Effluent Objective.

Biological Effluent Requirements Based on the Survival, Health and Diversity of In-situ or Resident Biota

Biological Effluent Requirements are occasionally specified. They are usually specified as Effluent Objectives, and are frequently referred to as Biological Effluent Objectives. In most cases, Biological Effluent Objectives defined in Certificates of Approval require some type of in-stream biological monitoring to be conducted (e.g. benthic enumeration). After start-up, failure to maintain biological conditions, as specified in the Certificate of Approval as an Effluent Objective, requires studies to be done to determine the cause of the change in or loss of aquatic biota. For example, the use of aquatic invertebrate data may provide an indication of the minimum water quality conditions that have occurred in the stream over the life-cycle of the species found. This information may then be used to define the background conditions, which can then be contrasted with the post-discharge condition of the receiving water body.

4.8.2 Some Additional Receiving-Water Based Considerations

Surface Water Quality Management Policy 3 prohibits the discharge of hazardous substances that have been banned and Policy 4 recommends that special measures be taken to minimize the release of hazardous substances that have not been banned. (*Water Management, 1994*)

Inventories of raw materials, products, by-products and wastes of the discharger, the use and fate of all other chemicals used in the process which may contaminate the wastewater, cooling and storm water stream water characteristics, and effluent concentrations for all design parameters, *Effluent Monitoring Priority Pollutants List* (MOE, 1987) substances and parameters for which a regulated limit exists must be submitted with the application for Certificate of Approval. Full details of these requirements are provided in MOE reports referenced in this document as MOE, 1992b and MOE, 1992c. Specification of additional control measures for these substances is left to the judgement of MOEE staff.

Prior to the construction or major upgrading of a STP, a full Class Environmental Assessment must be carried out to evaluate the plant's impact on the environment. Possible alternatives and their impact on the environment are also reviewed. As part of the environmental assessment process, the effluent requirements based on the assimilative capacity of the receiving water are considered. When a decision is made on the results of the environmental assessment, funding requirements and approval to expand must be obtained from the local Municipal Council and the MOEE before detailed design and construction can begin. The effluent concentration and/or loading requirements established during the environmental assessment process are stipulated in the Certificate of Approval.

Discharges to dry ditches (watercourses that go dry seasonally) may be permitted in some instances. In these cases, best available technology and a non-acutely lethal effluent are required. Typical best available treatment technology-based effluent are: BOD₅ 10 mg/L, suspended solids 10 mg/L, total phosphorus 0.3 to 0.5 mg/L, total ammonia 1 to 3 mg/L and chlorine absent (MOE, 1992e). Additional assessments may be required to confirm that the discharge will not impact aquatic life or other water uses downstream where there is continuous stream flow (i.e. the secondary receiver).

Chapter 5

EFFLUENT REQUIREMENTS AND ENFORCEMENT

5.1 EFFLUENT LIMITS

Effluent Limits stipulated in Certificates of Approval and other legal instruments are legally enforceable requirements that are based on either achievable treatment technology or discharger specific ambient water quality requirements (e.g. Provincial Water Quality Objectives).

5.1.1 Assessment of Compliance

All limits (concentrations, loadings and hydraulic flows) on a Certificate of Approval or other legal instrument must be met individually. Non-compliance of either the concentration, loading or hydraulic flow limits stipulated in the Certificate of Approval or other legal instrument is a violation and is grounds for enforcement and prosecution.

The violation of legally enforceable Effluent Limits in Certificates of Approval, Control Orders, and federal and provincial regulations may result in prosecutions.

For municipal point source discharges (STP), those contaminants, for which limits are not specified in a Certificate of Approval, are assessed using the MOEE Treatment Technology Based Policies Related to Municipal Wastewaters (Appendix B).

In the case of industrial point source discharges, there are a number of reasons why a company may be out of compliance. These vary from isolated incidents (for example, breakdowns of equipment, operating or laboratory errors which are either one-time occurrences or are corrected at the time), to basic deficiencies in treatment capability. The former can occur at any time. The latter, however, may result in continuing non-compliance, since equipment changes or modifications are usually required to improve treatment effectiveness, changes which can take considerable time.

For municipal point source discharges (STP), remedial measures are required by MOEE for non-complying STPs in order to improve their performance. Non-compliance may be due to such things as: design and operational problems or abnormal incidents such as industrial spills in the sewerage system.

For point-source discharges, any major plant operational problems or environmental degradation are documented by MOEE Regional field staff in an Occurrence Report.

5.1.2 Definition of Compliance

Effluent Limits only become legally binding when included in control documents. To assist in defining compliance with Effluent Limits, Non-Compliance Criteria are specified. These are narrative requirements which describe sampling frequency, sampling protocol, etc. These are necessary to determine if a violation of an Effluent Limit has taken place. For full details of compliance, see MOEE Guideline F-2, Compliance (MOEE, 1994b).

5.1.3 Abatement

Where appropriate, abatement measures are used to bring about compliance, usually focused directly on the prevention, reduction and elimination of pollution. Specific criteria for judging when abatement actions are appropriate are detailed in the MOEE Guideline F-2, Compliance (MOE, 1994b).

Industrial point source discharges and municipal STPs must undertake abatement action following orders issued by the Ministry. These actions can often take several years to complete, because of the time required for identification of the problem, analysis of remedial options, selection of an option, purchase of equipment, delivery, installation, and start-up. In some cases there may be a "quick fix". Often, however, a combination of process and equipment changes are required.

The MOEE Regional Abatement Offices provide assistance to dischargers in developing action plans which will bring the dischargers into compliance.

5.1.4. Enforcement and Prosecution

As noted previously, for point-source discharges, any major plant operational problems or environmental degradation are documented by MOEE Regional field staff in an Occurrence Report.

Once an Occurrence Report is filed and if further investigation by the Investigations and Enforcement Branch (IEB) of the MOEE is recommended, then the IEB is alerted. Following an investigation, charges may or may not be laid, based on informed judgement. Violation of a requirement does not necessarily mean that charges are laid. An abatement action may be carried out instead.

The MISA program will address the issue of uniform, legally enforceable limits for industrial point sources, initially in the nine major industrial sectors, by setting Effluent Limits and compliance dates.

5.2 EFFLUENT OBJECTIVES

For some situations, the available discharger-specific information may be insufficient to form the basis for a legally enforceable Effluent Limit. In such cases, Effluent Objectives are specified. Rather than serving as a basis for prosecution, violations of an Effluent Objective normally lead to a requirement for the discharger to undertake a study and report on the causes and impacts of the violation. This provides the basis for a decision by the MOEE on what corrective action is required to lessen effluent impact on the receiver, either through negotiation with the discharger or the issuance of a Control Order.

Requirements for Biological Objectives may also be included in a Certificate of Approval where some type of biological monitoring is appropriate. Failure to maintain specified biological conditions or specific criteria usually triggers a requirement for further studies to determine the cause of the change or loss. These types of biological monitoring requirements are normally added to the Certificate of Approval by MOEE Regional staff familiar with the site-specific conditions which may warrant such requirements.

5.3 CONTROL ORDERS

Violation of the Effluent Limits or Effluent Objectives may result in the issuance of a Control Order. This legally enforceable instrument, which defines abatement actions with compliance dates, and which may be issued to any existing plant, are based on Section 7 of The Environmental Protection Act. Legally enforceable Requirement and Direction may also be issued under Section 53 of The Ontario Water Resources Act.

Control Orders and Requirement and Direction may be appealed and the requirements in question do not apply during the appeal period (i.e. the discharger can continue to operate, without improving effluent quality). Since appeals are time consuming and no effluent improvement can be expected to occur during the appeal period, a consensus is often negotiated by the discharger and the MOEE before the control document is issued. This compromise achieves some immediate effluent improvement.

5.4 ASSESSMENTS AFTER PLANT START-UP

An assessment may be required as part of the Certificate of Approval after plant start-up when minimal information was provided with the application for Certificate of Approval, or there is concern that appropriate protection of the receiving water body may not be achieved given the information used to derive the Effluent Requirements. The Certificate of Approval may specify any milestones and/or triggers that may be required (plant closure, forced process upgrade, etc.) for the remediation.

5.5 FOLLOW-UP MONITORING

Both effluent and ambient water quality monitoring requirements may be specified in the Certificate of Approval. Monitoring results are used to determine if protection of the receiving water body is actually being achieved and that the treatment facilities are operating efficiently (as designed or approved).

Chapter 6

GLOSSARY

Assimilative capacity - the limit of a waterbody to transform and/or incorporate substances (e.g. nutrients) by the ecosystem, to the point that water quality does not degrade below a predetermined level.

Background Water Quality - The biological, chemical and/or physical conditions of a water body measured at a point upstream of the influence of the discharge or other pollution source. The establishment of natural background for an altered water body may be based upon a similar unaltered water body or on historical pre-alteration data.

Certificate of Approval (C of A) - A legal document issued, at a proponent's request, by a Designated Director of the Ministry of Environment and Energy under the authority of the Ontario Water Resources Act. C of A's may include effluent requirements and monitoring requirements.

Compliance - A state achieved by adherence to the legislative and regulatory requirements of the Ontario Ministry of Environment and Energy. These requirements cover a wide range of activities, from the prevention, reduction and elimination of pollution, to the obtaining of approvals and licences, to the completion of routine paperwork and the filing of reports.

Contaminant - A substance which, once in the water, may pose a threat to the ecosystem and/or human health, as well as uses such as water supply, recreation, and aesthetic conditions.

Control Order - A document that requires the discharger to take specific action with an associated deadline. It is authorized by statute, binding upon the recipient, and directly enforceable by prosecution.

Conventional Pollutants - Traditional indicators of environmental quality including BOD, nutrients and solids. Materials defined as hazardous substances are not included in this category.

Effluent Limits - legally enforceable effluent requirements that are based on either achievable treatment technology or site-specific receiving water quality requirements (e.g. Provincial Water Quality Objectives).

Effluent Objectives - A form of effluent requirement used where the available data on the parameter to be controlled may be insufficient to form the basis for a legally enforceable Effluent Limit. Violations of an Effluent Objective normally lead to a requirement for the discharger to undertake a study and report on the causes and impacts of the violations. This provides the basis for a decision by the MOEE on what corrective action is required to lessen effluent impact on the receiver, either through negotiation with the discharger or the issuance of a Control Order.

Hazardous Substances - chemicals that are persistent, bioaccumulative and extremely toxic. They including substances which, individually or in combination with other substances, can cause death, disease including cancer, behavioural abnormalities, genetic mutations, physiological malfunctions and/or physical deformities.

Mixing Zone - an area of water contiguous to a point source, where a limited range of exceptions to water quality objectives and conditions, otherwise applicable to the receiving water, may be granted.

Non-Compliance (Effluent) Criteria - narrative requirements which describe sampling frequency, sampling protocol, etc. necessary to determine when a violation of an Effluent Limit or Objective has taken place.

Non-point Source - A non-specific or diffuse source entering the aquatic environment . Commonly, any source that cannot be described as a point source. Usually, this type of source is not amenable to collection and, if necessary, treatment.

Point source - A source of pollution that is discharged to the environment at a specific location. It is quantitatively and qualitatively definable.

Provincial Water Quality Objective - Numerical or narrative criteria representing a desirable level of water quality for the protection of aquatic life and recreation.

Site-specific - Conditions and requirements defined by the unique characteristics of a particular geographical location.

Water Quality Criteria - a designated concentration or characteristic of a constituent or attribute of water based on scientific judgements that, when not exceeded, will protect an organism, a community of organisms, or a prescribed water use with an adequate degree of safety. In Ontario, these are known as Provincial Water Quality Objectives.

Violation - A contravention of any act or regulation administered by the Ministry of Environment and Energy.

Chapter 7

REFERENCES

- Environment Canada.** *Standard Operations Manuals.* Environment Canada, Inland Waters Directorate. Guelph, Ontario.
- MOE. 1986.** *Lakeshore Capacity Study: Trophic Status Model.* Ontario Ministry of the Environment.
- MOE. 1987.** *Development of an Ontario Effluent Monitoring Priority Pollutants List.* Ontario Ministry of the Environment.
- MOE. 1989.** *A Report on Low Flow Characteristics in Ontario.* Prepared by Cumming Cockburn Limited.
- MOE. 1991a.** *St. Clair River MISA Pilot Site Investigation.* Volume II. Parts 1, 2 and 3.
- MOE. 1992a.** *Ontario's Water Quality Objective Development Process.* Ontario Ministry of the Environment, Water Resources Branch.
- MOE. 1992b.** *Guide for Applying for Approval of Industrial Sewage Works.* Ontario Ministry of the Environment, Approvals Branch.
- MOE. 1992c.** *Guide for Applying for Approval of Municipal and Private Sewage Works.* Ontario Ministry of the Environment, Approvals Branch.
- MOE. 1992d.** (Internal document) *Derivation of Effluent Criteria for Certificates of MOE.* Approval for Discharge to Provincial Surface Waters: Regional Water Resources Assessment Review.
- MOE. 1992e.** (Internal document) *Streamlining the Approval of Discharge Criteria to Surface Water.*
- MOEE. 1993.** *Candidate Substances For Bans, Phase-Outs Or Reductions - MultiMedia Revision.* Ministry of Environment and Energy.
- MOEE. 1994.** *Water Management - Policies, Guidelines and Provincial Water Quality Objectives of the Ministry of Environment and Energy.* MOEE.

MOEE. 1994b. *MOEE Manual of Guidelines and Procedures.*

MOEE. 1994c. *Ontario's Provincial Water Quality Objectives.*

APPENDIX A

**TREATMENT TECHNOLOGY-BASED PROVINCIAL
AND FEDERAL REGULATIONS, GUIDELINES AND POLICIES
RELATED TO INDUSTRIAL WASTEWATER**

**MINISTRY POLICIES, REGULATIONS AND GUIDELINES RELATED TO
INDUSTRIAL WASTEWATER**

1. Objectives for the Control of Industrial Waste Discharges in Ontario
2. Minimum Objectives for the Control of Industrial Waste Discharges in Ontario, April, 1982
3. Mineral Industries Information Sheet
4. Guidelines for Environmental Control in the Ontario Mineral Industry, October 1981
5. Aquaculture in Ontario (Fish Farms), 1986, MOE, MNR, MAF
6. Guidelines for the Appraisal of Gravity-Type (API) Oil/Water Separators
7. Guidelines for the Design of Water and Sewage Treatment Works, 1984
8. Water Management - Policies, Guidelines and Provincial Water Quality Objectives of the Ministry of Environment and Energy, 1994
9. MOEE Manual of Guidelines and Procedures, 1994
10. Annual Industrial Dischargers Report
11. Generic Conditions for Industrial and Municipal Sewage, May 1990
12. Public Consultation Resource Kit for Ministry Staff
13. An Outline of the Information Required for the Preparation of a Hearing Brief under Sections 25 and 26 of the Ontario Water Resources Act for the Environmental Assessment Board

14. Guidelines for Financial Assurance: (Part X-A), Ontario Environmental Protection Act, February 1988
15. MISA General and Sectoral Monitoring Regulations
16. Guidelines for the Decommissioning and Clean-Up of Sites in Ontario, January 1989
17. Guidelines for Environmental Protection Measures at Chemical Storage Facilities, October 1978
18. Guidelines on Applying for the Approval of Water and Sewage Works to Deal with Zebra Mussel Control, May 1990 (revised)
19. Guidelines for the Handling and Disposal of Selected Liquid Wastes from Automotive Service Stations, December 1985
20. The Incorporation of the Reasonable Use Concept into the Groundwater Management Activities of the Ministry of the Environment, September 1986
21. Registration Guidance Manual for Generators of Liquid Industrial and Hazardous Wastes
22. Guidelines on the Preparation of Applications under Section 24, the Ontario Water Resources Act
23. Guidelines for the Use of Chlorine, SO₂, and Ammonia in Water and Sewage Treatment Plants in the Province of Ontario, February 1987
24. The Ontario Water Resources Commission Guidelines for Embankment Retention Systems for Waste Slurries
25. Information Required for Pumping Station Applications
26. Manual for Computer Storage and Retrieval of Indexing Information of Certificates of Approval, January 1986
27. Draft Guideline for the Use of Ultra-Violet (UV) Irradiation Process for Sewage Effluent Disinfection, October 1988.

FEDERAL POLICIES, REGULATIONS AND GUIDELINES RELATED TO INDUSTRIAL WASTEWATER

1. Canadian Environmental Protection Act - S.C. 1988, c. 22, as amended
2. Fisheries Act - R.S.C. 1970, c. F-14, as amended

Regulations and Guidelines under the Fisheries Act

- a. Chlor-Alkali Mercury Liquid Effluent Regulations - C.R.C. 1978, c. 811, No. 5 - September 1983
- b. A Code of Good Housekeeping Practise for the Metal Finishing Industry - November 1977
- c. Existing Metal Mining Effluent Guidelines
- d. Existing Petroleum Refinery Liquid Effluent Guidelines (Quality of Liquid Effluents) - January 1974
- e. Fish Processing Operations Liquid Effluent Guidelines - June 1975
- f. Meat and Poultry Products Plant Effluent Guidelines
- g. Meat and Poultry Products Plant Liquid Effluent Regulations - C.R.C. 1978, c. 818
- h. Metal Finishing Liquid Effluent Guidelines
- i. Metal Mining Liquid Effluent Guidelines
- j. Metal Mining Liquid Effluent Regulations - C.R.C. 1978, c. 819
- k. Petroleum Refinery Liquid Effluent Guidelines (Acute Toxicity of Liquid) - 1974
- l. Petroleum Refinery Liquid Effluent Regulations - C.R.C. 1978, c. 828
- m. Potato Processing Plant Effluent Guidelines - July 13, 1977
- n. Potato Processing Plant Liquid Effluent Regulations - C.R.C. 1978, c. 829
- o. Guidelines for Pulp and Paper Effluent Regulations - May 1972

p. Pulp and Paper Effluent Regulations - C.R.C. 1978, c. 830

q. Toxicity Guidelines for Potato Processing Plants - July 1977

APPENDIX B

**TREATMENT TECHNOLOGY BASED GUIDELINES RELATED TO
MUNICIPAL WASTEWATER**

From the *MOEE Manual of Guidelines and Procedures* (MOEE, 1994b):

Guideline F-5

**Levels of Treatment for Municipal and Private Sewage Treatment Works
Discharging to Surface Waters**

F-5-1 Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters

F-5-2 Relaxation of Normal Level of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters

F-5-3 Derivation of Sewage Treatment Works Effluent Requirements for the Incorporation of Effluent Requirements into Certificates of Approval for New or Expanded Sewage Treatment Works

F-5-4 Effluent Disinfection Requirements for Sewage Works Discharging to Surface Waters

Guideline F-8

**Provision and Operation of Phosphorous Removal Facilities at Municipal,
Institutional and Private Sewage Treatment Works**

F-8-1 Determination of Phosphorus Removal Requirements for Municipal, Institutional and Private Sewage Treatment Works

Guideline F-10

Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)

F-10-1 Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)

APPENDIX C

GUIDELINES FOR HANDLING REQUESTS FOR DEVIATIONS FROM MOEE SURFACE WATER QUALITY MANAGEMENT POLICY 2

The general basis for considering a deviation from Surface Water Quality Management Policy 2 is outlined in *Water Management* and states, in part:

"... in exceptional cases, where it is clearly demonstrated that all reasonable and practical measures to attain the Provincial Water Quality Objectives have been undertaken but where:

- 1) the Provincial Water Quality Objectives are not attainable because of natural background water quality; or
- 2) the Provincial Water Quality Objectives are not attainable because of irreversible man-induced conditions; or
- 3) to attain or maintain the Provincial Water Quality Objectives would result in substantial and widespread adverse economic and social impact; or
- 4) suitable pollution prevention techniques are not available;

then deviations from this policy may be allowed, subject to the approval of the Ministry of Environment and Energy."

The following procedures have been developed to process requests for deviations from Policy 2.

C.1 General Procedures

The Request for Deviation from Policy 2 should be requested by the MOEE Region, based on either:

- ! a request by a proposed discharger to the Regional Office, or
- ! a determination by the Region that consideration of a deviation may be the appropriate course of action.

A standardized format has been developed to document the Request for Deviation and ensure that appropriate information is presented upon which to evaluate the request. The information requirements and layout of the form are described in C.2.

The form is in three parts with the first part to be completed by the Region, the second by the Approvals Branch and the third by the Program Development Branch. Once the Region has completed Part 1, copies should be forwarded to the Approvals Branch and the Program Development Branch. The Approvals Branch should complete Part 2 of the form and forward the results to the Program Development Branch who will be responsible for evaluating all of the information supplied and coordinating the response to the Request for Deviation.

Once the Director of the Program Development Branch approves or denies the proposed deviation and signs the form, it is forwarded to the Regional Director for concurrence and signature. Where approval is given, the original copy of this form is filed by the MOEE with the original copy of the Certificate of Approval.

C.2 Information Requirements for a Deviation Request

Part 1

(To be completed by the MOEE Region)

Basic Information

Identification of the proponent, including:

- ! name
- ! proponent's office address

Identification of the proponent's consultant, including:

- ! name of consulting firm
- ! address
- ! telephone and Fax number
- ! contact person

Identification of receiving waterbody and the proposed point of discharge, including:

- ! official name of waterbody directly receiving the discharge (from the Ontario Gazette or topographic map)
- ! location (lot, concession, township, latitude and longitude)

- ! Copy of the appropriate section of a topographic map to scale of 1:50,000 or larger showing the receiver and the specific point of discharge. The map name and number should be indicated (e.g. Temagami 31 M/4)

Identification of important dates, including:

- ! proposed start-up
- ! proposed commencement of discharge

Evaluation

An evaluation should be provided of the:

- ! anticipated contaminants, loadings and concentrations in the effluent and the proposed discharge period
- ! receiving water quality data and flow data
- ! Applicable PWQOs
- ! any modifying parameters/conditions that might be applicable (e.g. hardness, pH, temperature)
- ! downstream waterbodies and water uses that could be affected and the anticipated effects
- ! any other information relevant to the deviation request

The parameter(s) for which a deviation from Policy 2 is being sought must be clearly stated.

Documentation

List any documentation (e.g. consultant's reports, MOEE correspondence, etc.) which was reviewed to support the request for a deviation. Copies of pertinent information must accompany the deviation request.

Liaison with Other Agencies

Communication with other agencies with a direct interest, especially the Ministry of Natural Resources and/or the Federal Department of Fisheries and Oceans, is encouraged, wherever appropriate, and the results of those discussions are to be summarized and included with the deviation request.

Other Issues of Potential Concern

Any other issues which may be of concern (e.g. other potential problem contaminants, proposed delisting of a waterbody, groundwater impacts, etc.) should be identified under this heading.

Reasons for Deviation Request

A statement of the basis for the deviation request must be provided, citing which of the four reasons identified in *Water Management* (Section 3.2.2) is being used. Any documentation supporting this basis is to be included.

Part 2

(To be completed by the Approvals Branch in consultation with the Region)

Abatement to be Applied

A brief evaluation of the type of treatment (e.g. reference to consultant's report or to pertinent discussions between Approvals Branch and the discharge proponent/consultant) should be supplied. An evaluation of the suitability of the proposed type and degree of treatment should be provided.

Approvals Branch should comment on the follow-up work subsequent to abatement controls that has been identified in, for example, the consultant's report or by Regional and Approvals Branch staff.

Other Issues of Potential Concern

Any other issues which may be of concern should be identified under this heading (e.g. other potential problem contaminants).

Part 3

(To be completed by the Program Development Branch)

Water Management Requirements

The Program Development Branch evaluates the information provided to determine the following:

1. Does the Program Development Branch agree that the quality of the waterbody, at the point of discharge for the parameter(s) of concern, does not meet the relevant PWQO (i.e. a Policy 2 situation)? Evaluation includes an assessment of the data base, comparison to PWQO, etc.)
2. Does the Program Development Branch agree that all reasonable and practical measures are to be taken and that exceptional circumstances prevail which preclude compliance with Surface Water Quality Management Policy 2?
3. Do the reasons for requesting a deviation fulfil the requirements specified in *Water Management*, Section 3.2.2?
4. Have concerns of other interested agencies been adequately addressed?
5. Have satisfactory arrangements been made for follow-up work subsequent to abatement controls?

After reviewing the recommendation of staff, the Director of the Program Development Branch will either:

1. Agree to a Deviation from Policy 2.
2. Agree, with qualifications, to a Deviation from Policy 2. (Qualifications specified)
3. Disagree, with reasons, with a Deviation from Policy 2.
4. Request further information upon which to base a decision on the Deviation Request.

The documentation will be forwarded to the Regional Director for review and signature or appropriate action related to qualifications or further information needs . A Deviation Request is considered to be granted once the Director of the Program Development Branch and the Regional Director have given their written consent.

Copies of the Deviation Request Form

Copies of the completed Deviation Request form and the decision regarding the request should be distributed as follows:

- ! Regional Director
- ! Director of the Program Development Branch
- ! Director of the Approvals Branch

The original, signed version of the Deviation Request and decision should be filed with the original copy of the Certificate of Approval, usually kept on file by the Approvals Branch.