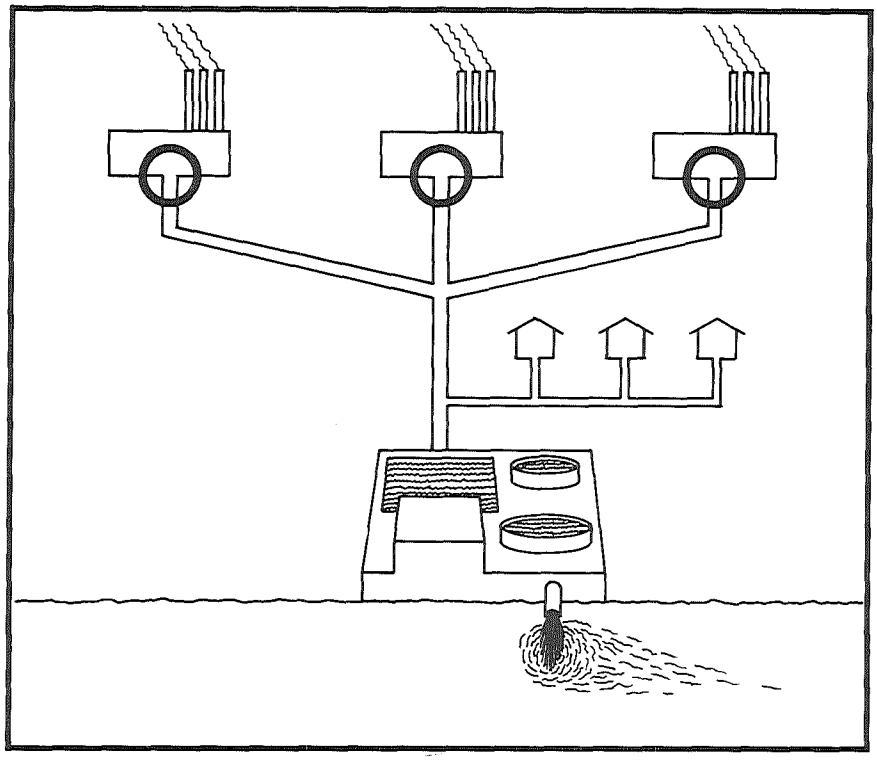
CONTROL AT SOURCE

REGULATING INDUSTRIAL SEWER-USE IN ONTARIO



CANADIAN INSTITUTE FOR ENVIRONMENTAL LAW & POLICY

CONTROL AT SOURCE:

Regulating Industrial Sewer-Use in Ontario

Canadian Institute for Environmental
Law and Policy

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EXECUTIVE SUMMARY

More than one million tonnes of hazardous waste are discharged into municipal sewer systems each year from more than 12,000 commercial and industrial sources. The Provincial Government currently regulates the movement of hazardous wastes from generation to final disposal with one exception. The province leaves the task of controlling the release of toxic contaminants into sewers to municipal authorities. Increasingly, however, members of the public are recognizing the need to develop a more comprehensive strategy for regulating industrial use of sewers.

In September, 1987, The Canadian Environmental Law Research Foundation initiated a project to study and develop recommendations to address the complex environmental and regulatory problems associated with industrial sewer use. This report represents the results of this work, setting out the project findings, conclusions and recommendations, including a set of specific regulatory proposals.

Based on an analysis of the current regulatory regime in Ontario, which permits each municipality to set and enforce its own sewer-use standards, the report identifies the following problems:

a. Current standards governing industrial discharge to sewers are not strict or comprehensive enough to provide adequate environmental protection.

b. The types and numbers of pollutants controlled and the limits set on these pollutants vary from municipality to municipality across the province.

c. Efforts to ensure compliance with sewer-use standards also vary from municipality to municipality.

d. In many cases, the level of municipal monitoring and enforcement is not sufficient to ensure that industrial sewer-users are in compliance with current standards.

It was also found that, to be effective, any regulatory approach must focus on control at source, that is, controlling contaminants at the point where they are first released by industrial users into municipal sewer systems.

The purpose of the second part of the report is to develop a workable strategy for control at source, which will address the regulatory environmental concerns identified in the first part. The report reviews options and develops specific recommendations to address four key questions:

a. What level of government should be responsible for setting regulatory standards for industrial discharge into sewers?

b. What types of standards should be set?

c. What level of government should be responsible for ensuring compliance with these standards?

d. By what means can compliance best be ensured?

The recommended strategy is described in two parts: standard-setting and compliance.

Recommendations for a Standard-Setting Program

The recommended standard-setting program would have the following features:

a. **The provincial government should be responsible for setting standards for industrial discharges to sewers.**

b. **These standards should be established in regulations passed under provincial environmental legislation.**

c. Disposal to sewers of industrial hazardous wastes and other persistent toxic substances should be banned. As a starting point, the prohibitions set forth in the 1988 model sewer-use bylaw should be incorporated into provincial regulations.

d. Technology-based standards should be developed for identified categories of industrial sewer-users.

e. Water quality-based standards, developed under the Municipal-Industrial Strategy for Abatement (MISA) program for environmentally sensitive areas, should apply to direct dischargers as well as those who discharge into municipal sewer systems. The provincial government should put increased emphasis on the water-quality track of the MISA program to complement the extensive work currently being done to develop technology-based standards.

The report provides a detailed description of the proposed standard-setting process, which includes representation by both industry and other groups throughout, and supervision by a publicly accountable committee responsible for overseeing the development of all environmental protection standards. The purpose of this committee would be to advance an integrated approach to environmental standards, by reviewing changes from the perspective of total exposure to toxic contaminants of the environment via air, land and water.

Recommendations for a Compliance Program

The proposed compliance program has the following features:

a. The provincial government would be responsible for ensuring compliance with sewer-use standards. The Ontario Ministry of the Environment would be required to establish sewer-use comtrol departments in regional and district offices of the ministry across the province.

b. Municipalities may elect to opt-in as the agency responsible for ensuring compliance with provincial sewer-use standards, in which case provincial approval of the enforcement program would be required and provincial financial and technical assistance would be available to the opt-in municipality.

c. The minimum requirements of a compliance program, applicable to all agencies undertaking compliance activities, would be set out under

provincial legislation. Minimum requirements would be set out for the following three components of the compliance program:

i. promoting voluntary compliance,
ii. regular monitoring and record keeping, and
iii. investigations and enforcement.

d. All industries that discharge to sewers would be required to conduct an inventory of products, processes and discharges in order to account for any contaminants released during their production processes.

e. Industrial sewer-users would be responsible for on-going monitoring of waste discharged to sewers, and for reporting results to the compliance agency on a regular basis.

f. The compliance agency would be responsible for spot investigations to ensure the veracity of data received from individual industries and to monitor industry compliance efforts.

g. The compliance agency would be required to submit semi-annual reports on monitoring activities, and all monitoring information on file with the compliance agency would be available to the public.

The administrative and legislative changes required to implement both the proposed standard-setting and compliance programs are set out in detail in part 2 of the report.

A central finding of this report is that industries should not be able to rely on municipal sewers as a disposal method for their hazardous wastes. This means that the recommended approach imposes a significant additional burden on industries, which must find new ways to reduce, treat and dispose of the wastes that they generate. The report recommends that studies be undertaken to determine the impact of stricter standards on various types and sizes of industries, and that public dialogue among industry, government and other interested parties on how to meet the costs of stricter environmental regulations begin immediately.

The proposed compliance program also imposes costs on industries, which must self-monitor and report on a regular basis, and on the regulatory agencies, whether provincial or municipal government, which must monitor industrial sewer-use activities and prosecute industries that are in violation

of standards. The report includes a preliminary analysis of these costs, and concludes that a workable and affordable approach to province-wide monitoring and enforcement can be developed. This work is intended as a preliminary contribution to the important debate that must proceed alongside the development of a regulatory strategy -- that is, the debate over appropriate allocation of environmental protection costs among members of our society. While the costs of action in this area are significant, the costs of inaction, in terms of risks to both human health and the environment, are far greater. It is hoped that this report can contribute meaningfully to the important dialogue among industry, the public and both provincial and municipal governments, which will lead to much-needed regulatory action in this area.

ACKNOWLEDGEMENTS

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CHAPTER 1 - Introduction

1.1 Purpose and Background

According to recent estimates by the Ontario Ministry of the Environment[1], Ontario industry generates approximately 3.6 million tonnes of liquid industrial waste and hazardous waste each year. These same estimates indicate that more than 1 million tonnes of hazardous industrial waste are annually discharging to municipal sewer systems.[2] Sewage treatment plants (STP) are not designed to provide adequate treatment for hazardous waste. As a result, contaminants are entering the Ontario environment through discharge intor receiving waterbodies, of sludges onto land, and volitization, or emission from sludge incinerators, into the air.

At the Canadian Environmental Law Research Foundation Bolton forum on hazardous waste policy (November 30 - December 2, 1986) sewer discharge was identified as a major hazardous waste problem which requires urgent attention.[3] Earlier that year, Ontario Minister of the Environment Jim Bradley had announced the Municipal-Industrial Strategy for Abatement (MISA) program, which eventually will impose stricterstandards on effluent leaving sewage treatment plants. The MISA paper was silent, however, on the question of where those higher STP effluent standards should be met through up-grading the treatment capacity of sewage treatment plants or imposing higher regulatory standards on wastes discharged into sewer systems.

This study, undertaken by the CELRF, with funding from the Ontario Ministry of the Environment and the Municipality of Metropolitan Toronto, is intended to identify environmental problems associated with the discharge of industrial wastes to sewers, review the weaknesses in the present regulatory system governing such discharges and recommend a regulatory system for Ontario. Its objective is to develop a sewer-use control program that will further the

province's stated goal of "virtual elimination of toxic contaminants entering Ontario's waterways."

The study was initiated in September 1987, at approximately the same time that the ontario Ministry of the environment was completing its review of sewer use control options, using the consulting services of M.M. Dillon Ltd. The Ministry will soon be releasing a white paper on this subject for public review. The purpose of the CELRF study is to provide an independent perspective that will complement that of the Ministry and stimulate policy discussions as final decisions are made in the coming year, about regulating industrial sewer use in Ontario.

1.2 Scope of the Report

This report is focused on the specific problem of non-domestic discharges[4], including industrial, commercial and institutional discharges to sewers. while the problem of controlling household hazardous wastes also merits study, it is beyond the scope of this project. The report is focused geographically on the problems and possible regulatory responses applicable to Ontario. The experience of other jurisdictions is considered only to the extent that they assist in developing Ontario's regulatory response.

Since the subject of the report is regulatory action, a general discussion of the nature of the problem is required as background information. The report does not, however, attempt to provide a detailed scientific discussion of the problem of toxic contamination or a technical review of current pollution control capabilities.

It is recognized that industrial discharge to sewers must be reviewed in context of the total loading of toxic contaminants into the environment from all sources. The report attempts to develop regulatory strategy that is consistent with this general ecosystem approach to environmental protection. However, in order to concentrate on the problem of controlling discharges from industrial sources, the contribution of non-point sources of industrial contaminantion, such as storm run-off and the movement of toxic contaminants through the environment from one medium to another, has not been expressly addressed. Further, the report concentrates on regular, ongoing discharges as opposed to spills or accidentalreleases.

The report also distinguishes between discharges to sanitary and combined sewers on the one hand and storm sewers on the other, with the primary focus being the specific problems related to control of discharges to sanitary and combined sewers. It should be noted that industrial wastes discharged to storm sewers travel untreated to Ontario water bodies. Thus, they are in effect direct discharges to the receiving environment, which should be controlled under the province's MISA program for direct dischargers.

Finally, the report is designed to be complementary to and generally consistent with the objectives and basic framework of MISA. Where recommendations proposed here go beyond the specific area of sewer-use control and proposed standard-setting framework, these general changes as well as the rationale in support of them, are expressly set forward.

1.3 Method

1.3.1 Research

A) Primary Research

The project team conducted a series of interviews with staff from 11 Ontario municipalities representing a cross section in terms of geographic locations, populations and industrial base in order to assemble information on current regulatory practices and problems associated with industrial discharge to sewers. Information was obtained on the types and numbers of industries discharging to sewers, the current level of treatment at source, the operation of sewage treatment plants, plant capabilities and operational problems associated with industrial discharge and current monitoring and enforcement efforts. The sewer use bylaws of the 11 municipalities, as well as the current draft model sewer-use bylaws were reviewed and compared. This information is summarized in tabular form in chapter 3 of this report. Municipal staff were also asked to discuss their views on the MISA program and its implications in terms of both the costs to the municipality and the need for increased regulatory efforts.

B) Literature Review

An English-language literature review of industrial sewer-use practices in North American and European jurisictions was conducted. Appendix A is a

complete listing of sources used for the report. The starting point for the international review was the report by M.M. Dillon on sewer-use options, which surveyed current practices in Canada, the United States, the United Kingdom, France, West Germany and Japan. In Phase II of that report, a variation of the current program in the United States was chosen as the preferred sewer-use option. Concurring with this general finding, the project team focused on U.S. literature which describes and evaluates the effectiveness of the U.S. approach.

1.3.2 Consultation

From the outset of the project, an advisory committee was established with representation from industry, environmental groups, the Association of Municipalities of Ontario, the Municipal Engineers' Association and all levels of government. Appendix B lists the members of the advisory committee and their affiliations. The purpose of this committee, which met four times during the life of the project, was to assist in the development of terms of reference and study method, and to provide advice and comments on the report's findings and recommendations. Committee members also reviewed a draft of the report prior to its completion. While the final recommendations benefitted from the advisory committee comments, the final decisions oj their contents were made by the CERLF project team.

On January 25, 1988, a workshop was held to discuss the problems and possible regulatory responses to the problem of industrial sewer-use in Ontario. The workshop was attended by 40 participants from industry, environmental groups and all levels of government. Appendix C is a listing of the workshop

participants. Discussion was based on a background paper prepared by CELRF, which set up preliminary findings on the nature of the problem and the adequacy of current regulatory efforts in Ontario and set out various options for sewer-use control. Appendix D is the workshop agenda. The workshop provided valuable feedback on preliminary findings and directions for further study. In addition, it provided representatives who must address the problems associated with industrial sewer-use on a day-to-day basis with an opportunity to share their ideas on current problems and future actions.

1.4 Contents of the Report

This report is divided into Parts I and II.

Part I reviews the physical and environmental problems associated with industrial sewer use in Ontario (Chapter 2) and evaluates the current regulatory response (Chapter 3) drawing key conslusions from this discussion (Chapter 4).

In Part II, these conclusions become the basis for a proposed regulatory strategy which is laid out in Chapters 5 and 6. Chapter 5 outlines a program for the development of sewer-use standards, addressing the question of who should be responsible for setting sewer-use standards and how such standards could be implemented. Chapter 6 addresses the question of who should be responsible for ensuring compliance with sewer-use standards and how best to ensure compliance. A preliminary cost study (Appendix E) was undertaken to investigate the economic feasibility of monitoring and enforcement under the proposed compliance program.

Throughout the report, both in the assessment of the current regulatory response and in the selection of specific regulatory options, three basic

considerations provided guidance. First, is the option effective in terms of achieving the objective of virtual elimination of toxic contaminants entering the environment? Second, is the option workable, that is, is it feasible in the context of the general regulatory environment in Ontario? Finally, is the option fair, that is, does it provide the regulated industry with an assurance of uniformity and consistency of application?

In this way, the recommended regulatory strategy developed in this report is designed to respond to the practical problems of industrial sewer-use as experienced in Ontario and other jurisdictions.

NOTES - Chapter 1

1. These estimates are based on data gathered by MOE Waste Management Branch under their Hazardous Waste Generator Program and summarized in Ontario Waste Management Corporation, Environmental Assessment (draft) Volume 1 The OWMC Undertaking (February, 1988) pp 4-10.

2. Ibid., p 5-13.

3. Throughout the report, the phrase "industrial discharge" is used to signify all non-domestic releases to municipal sewer systems.

4. Ontario Hazardous Waste Policy: A Provincial Forum. Proceedings and Discussion Paper, (CELRF 1987).

PART I: THE NATURE OF THE PROBLEM

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Chapter 2 - Industrial Sewer Use: The Environmental Problem

2.1 Industrial Waste Management in Ontario: An Overview

2.1.1 Off-site Management

According to information gathered in the past two years by the Ontario Ministry of the Environment as part of its industrial waste generator registration program, Ontario generates about 3.6 million tonnes of liquid industrial and hazardous wastes each year.[1] Approximately one-third, or 1,115,000 tonnes, of this total is treated and/or disposed of away ffrom the place of generation.[2] Most of these wastes must be tracked from the point of generation to final disposal through a manifest and reporting system established under Ontario Regulation 309.[3] Wastes that are tracked under this system must be transported, treated and disposed of by provincially approved operators and facilities. Thus, off-site wastes are generally more closely monitored than those which are dealt with at the generating site.[4] Table 2.1 provides a listing of the major destinations of off-site wastes in Ontario. The table indicates that the largest quantity of these wastes goes to publicly owned sewage treatment plants. Wastewater containing organic chemicals comprises about 60 per cent of this total, and most of this id leachate from private landfill sites.

2.1.2 On-site Management

The remaining two-thirds of the liquid industrial and hazardous wastes

TABLE 2.1 DESTINATION OF MANIFESTED WASTES GENERATED IN ONTARIO, 1986 (EXCLUDES TRANSFER STATIONS)

DESTINATION	AMOUNT (TONNES)
Provincial or municipal sewage treatment plants	293,400
Reclamation	133,000
Commercial and public landfills	82,500
Dust Suppression	75,000
Incineration	50,200
Private Landfills	48,900
Out-of-Province	43,000
Miscellaneous	18,000
TOTAL MANIFESTED*	743,500

* SUM MAY NOT BE EXACT DUE TO ROUNDING

Source: Ontario Waste Management Corporation, Environmental Assessment

TABLE 2.2 ON-SITE TREATMENT AND DISPOSAL OF INDUSTRIAL WASTES IN ONTARIO

TREATMENT/DISPOSAL TYPE	AMOUNT (TONNES)	% OF TOTAL
Sanitary sewers	1,045,000	41.6
Private wastewater treatment facility+	919,000	36.6
Incineration	335,000	13.3
Land Disposal		
Landfill	114,000	4.5
Dust suppression	29,000	1.2
Land farming	6,000	.2
TOTAL	149,000	5.9
Treatment Operations++ (by filtration and solidification)	52,000	2.1
Storage+++	11,000	.4
Waste derived fuel	1,000	.0
TOTAL	2,512,000	100.0*

Source: Ontario Waste Management Corporation, Environmental Assessment

+ These facilities discharge directly into Ontario waterbodies and therefore require provincial approval under the Ontario Water Resources Act.

++ These facilities require provincial approval as waste management systems under Part V of the Environmental Protection Act.

+++This means that wastes are stored on-site, where most of this waste is inventoried for shipment off-site, re-use on-site or treatment and disposal.

generated in Ontario, or approximately 2.5 million tonnes, are treated and disposed of on-site.[5] The largest portion of these wastes, more than 1 million tonnes, do not actually remain on-site but are disposed of by way of discharge to municipal sanitary sewers.[6] It should be noted that this amount includes only wastes defined by the regulation as hazardous. Generators are not required to report the amounts of liquid industrial wastes other than hazardous wastes, that they discharge to sanitary sewers.[7] Table 2.2 shows the fate of industrial wastes which are dealt with on-site by Ontario generators, based on information obtained by the Ontario Minsitry of the Environment under its generator registration program.

2.2 Industrial Wastes Discharged to Sewers in Ontario

The best way to determine the types of wastes currently entering municipal sewer systems in Ontario, is to study the problem at source. However, no complete at-source inventory has yet been undertaken. The data gathered under the MOE generator registration program discussed above, for example, does not specifically require generators to identify the types of contaminants that they are discharging to sewers. Instead, the registration program yields information on the types of contaminants that are managed on-site.[8] However, since more than 40 per cent of this total is discharged to sewers, the available data provides some indication of the range of contaminants entering municipal sewer systems.

The generator-registration data indicates wastes managed on-site contain the full range of persistent toxic organic and inorganic chemicals which have been identified by the province [9] and the International Joint Commission [10] as requiring immediate regulatory action. Wastes managed on-site include those

TABLE 2.3 TYPES OF WASTES MANAGED ON-SITE

WASTE CATEGORY+	AMOUNT (TONNES)	PER CENT OF TOTAL
Heavy metals and residues	2,153,700	87.3
Solvents and organic solutions	86,300	3.5
Aqueous solutions with organics	75,200	3.0
Organic and oily residues	58,100	2.4
Sludges and inorganic residues	46,600	1.9
Miscellaneous chemicals and products	16,200	.7
Organic sludge and stillbottoms	14,700	.6
Clean-up residues	4,100	.2
Oil and water mixtures	3,800	.2
Anion complexes	2,700	.2

Source: Ontario Waste Management Corporation Environmental Assessment (Volume I)

+ Based on categories established vor the MOE Generator Registration Program under Ontario Regulation 309.

registered under the program in the following classes: [11] hazardous; leachate toxic; severely toxic; acutely hazardous chemical; PCB; hazardous waste; and liquid industial waste. Further, wastes with properties such as corrosivity, ignitability and reactivity, which are potentially damaging to sewer systems and sewage treatment plant operations, are also managed on-site.[12] Table 2.3 provides an indication of the types and quantities of wastes that are currently being managed on-site in Ontario.Since the table disaggregates waste types for on-site wastes but not specifically for wastes discharged to sewers, this information is of limited value. For example, not all of the waste types listed in the table are discharged to sewers. However, the table does indicate that the vast majority of wastes managed on-site are heavy metals and residues. Since more than 40 per cent of on-site wastes end up in municipal sewer systems, it is likely that a high percentage of these discharges contain heavy metals and residues.

Information about the types of chemicals leaving industrial sources via municipal sewer systems is also being collected by some municipalities that require industrial sewer-users to complete waste surveys. Since only a few municipalities currently require the completion of these surveys, this information source would provide an indication only of local circumstances in these areas. As discussed in section 3.2.2., however, the information obtained through these surveys could provide valuable information on the nature of the problem.

A less direct source of information about the types of industrial contaminants entering Ontario sewer systems is the recent MOE study of Ontario Sewage Treatment Plants.[13] This study involved monitoring STP influent, effluent and sludge at 37 plants across the province for 182 chemicals including

TABLE 2.4 PRELIMINARY RESULTS: MOE 37 STP STUDY
NUMBER OF MISA PRIORITY POLLUTANTS FOUND AT
SEWAGE TREATMENT PLANTS

MEDIUM MONITORED (# of STPs IN SAMPLE)	NUMBER OF CONTAMINANTS OCCURING FREQUENTLY	OCCURING INFREQUENTLY	NOT DETECTED
INFLUENT (37 STPs)	66	68	48
EFFLUENT (28 STPs)	56	68	58
SLUDGE (34 STPs)	81	48	56

Source:

conventional pollutants, metals, dioxins, PCBs, pesticides, hydrocarbons and volatile organics. The study is now complete, however full results are not yet publicly available. When released, it will provide information on both the types of conatminants industries are currently releasing to sewers and the ability of sewage treatment plants processes to treat these contaminants safely. Preliminary results indicate that a large number of both organic and inorganic toxic chemicals are currently entering and leaving Ontario's sewage treatment plants. Table 2.4 shows the number of different types of chemicals which occurred in the influent, effluent and sludge of the STPs surveyed. For example, after testing influent at 37 plants, the monitoring team found that of the 182 persistent toxic contaminants monitored, 66 occurred frequently, 68 infrequently and 48 were not detected. This table will be further discussed in section 2.3 below.

2.2.2 Sources

According to recent estimates, more than 12,000 industries, comprising 98 per cent of known industrial dischargers in Ontario, discharge their wastes to municipal sewer systems.[14] It is further estimated that these industries are responsible for between 20 and 40 per cent of the total sewage flow to Ontario's municipal sewage treatment plants.[15]

A comprehensive profile of the types of industries discharging to municipal sewers in Ontario has yet to be conducted. As background for its study of sewer-use control options in Ontario for MOE, M.M. Dillon Ltd. developed a profile by extrapolating from a U.S. Environmental Protection Agency study on

TABLE 2.5 TOTAL LOADING OF ORGANIC AND INORGANIC CHEMICALS AT METROPOLITAN TORONTO STPs, 1985

CHEMICAL TYPE	HUMBER STP (kg./yr)	MAIN STP (kg./yr)
ORGANICS	12,331	36,964
INORGANICS	548,000 (estimate)	621,000 (estimate)

Source: Neighbourhoods Committee, Remedial Action for the Toronto Waterfront. (April, 1987)

the discharge of hazardous wastes to sewage treatment plants .[16] Data from the U.S. study provided an indication of the types of industries likely to discharge to sewers. This information was used in conjunction with Statistics Canada data on Ontario's industrial base. The major indirect dischargers in Ontario and an estimate of the total flow from each of these industrial groupings, as abstracted from the Dillon profile, is provided in Table 2.5. This profile indicates that industrial sewer users in Ontario span the full range of industrial and commercial businesses.

Further information on industrial sewer users is available from municipalities that have carried out or are planning to carry out industrial-waste surveys. Some of this data was obtained during the survey of 11 Ontario municipalities conducted for this report. This survey served to support the finding that industries discharging to into Ontario sewer systems span the full range of sizes and types of industries that make up the province's industrial sector. Within the municipalities surveyed, available information indicated that most of the medium and small industries, both commercial and industrial, discharged to municipal sewers. Identified industries include food-processing plants such as meat packers, dairies and cereal manufacturers, electroplating and metal finishing plants and a full catalogue of the small manufacturing industries that would be expected in urban areas. These included producers of automobile parts, plastic moldings, optical products, cosmetics, metal and steel fabrication,lighting fixtures and hospital products.

From this necessarily cursory review of the source of industrial discharges to sewers, the complexity of the regulatory problems associated with industrial sewer use is clear. Ontario's industrial sewer users are large in number and varied in type. They utilize many different types of industrial processes and

generate a huge range of chemical wastes in carrying out these processes.

2.2.3 Findings

a. More than one-quarter of the industrial hazardous wastes generated in Ontario are discharged to municipal sewer systems. Unknown quantities of other liquid industrial wastes are also discharged to sewers

b. The types of contaminants discharged to sewers include a wide range of organic chemicals, metals and conventional pollutants

c. Discharges from Ontario industries make up a significant percentage of total sewage flow entering Ontario sewage treatment plants. Estimates range from 20 to 40 per cent.

d. The vast majority of Ontario industries that generate liquid industrial and hazardous wastes - at least 12, 000 sources - disharge to municipal sewer systems. These include a broad range of types of industries.

2.3 Pathways

Once discharged to sewers the contaminants contained in industrial wastes can reach the environment via a number of pathways. In order to identify these pathways of exposure it is first necessary to review the operation of Ontario's sewage-treatment facilities.

2.3.1 Sewage Treatment Plants

A) Plant Operation

Ontario has 407 facilities that are licenced to treat sewage entering municipal sewage works (STPs).[17] Not all of these are owned by the municipalities. The Ontario Ministry of the Environment owns and operates 238 STPs, mainly on behalf of smaller municipalities.[18]

Sewage treatment facilities may have primary, secondary or tertiary treatment capabilities. STPs with primary treatment facilities use only physical treatment processes, such as settling ponds. Facilities with secondary treatment are also capable of biological treatment through, for example, the use of activated sludges containing bacteria which enhance the biodegradation of wastes. Tertiary treatment refers to additional chemical treatment processes. The operation of a typical Ontario treatment facility with secondary treatment capabilities is described below.[19]

From Discharger to STP. Industries, households and commercial establishments discharge wastewater into a system of drains, pipes and pumping systems (a sewage collection system) that channels the flow to municipal treatment plants. The municipal wastewater enters the water pollution control plant through influent channels and passes through screens and shredding devices. The screens prevent entry of large objects which may damage equipment and the shredding devices cut the larger particles to a size suitable for handling in the treatment units that follow.

Primary Treatment. From the shredders, the wastewater flows into a collector well and from there it is pumped up to the grit removal facilities. The grit removal facilities receive and delay the flow long enough to allow the heavier particles of grit and sand to settle to the bottom of the tanks for removal. This material, if not removed, interferes with the operation of the digesters and could damage machinery in the treatment units following. Periodically, the settled grit and sand is removed and taken to a disposal area.

From the grit chambers, the wastewater flows into the primary settling tanks. It is here that the removal of organic materials begins. These tanks reduce the velocity of the flow and allow the heavier organic matter to settle to the bottom. It takes up to two hours for the wastewater to pass through these tanks. This retention period settles out about 60 per cent of the solids. The settled material, called "raw sludge", is drawn from the bottom of the tanks and delivered to the digesters for further treatment. Surface scum is removed by a skimming mechanism and delivered to the digesters. The partially treated wastewater, now called the "primary effluent", flows out fromthe tanks over a weir into a collector channel.

Secondary treatment. The primary effluent then flows into another set of tanks, called "aeration" tanks, where finely divided, suspended and colloidal organic material remaining inthe wastewater is oxidized by aerobic bacteria. The aeration tanks retain the primary effluent long enoug to allow the bacteria to assimilate (oxidize) most of the remaining organic matter. To do this the bacteria require an abundance of oxygen, which the wastewater does not normally have at this point. Air compressors are used to feed a steady stream of air into the tanks to supply the needed oxygen. The air creates enough agitation in the tanks to prevent material from settling. As bacteria assimilate the organic matter, a light sludge floc is formed, which is the vehicle in and upon which the bacteria grow. This sludge is called "activated sludge".

The discharge from the aeration section flows into the final settling tanks and is retained for about three hours to allow the activated sludge to settle. This sludge is then removed and pumped back into the aeration section to be mixed with the primary effluent. This transfer "seeds" the primary effluent and maintains the bacteriological process.

Any unwanted activated sludge is transferred to the digesters. At this point 90 to 95 per cent of the solids contained in the raw wastewater have been removed. The settled water, called the "final effluent", flows out from the tank, over a weir, and into collector channels. These channels deliver the final effluent to a chlorine contact chamber, where a chlorine solution is mixed with the final effluent to destroy any bacteria that may remain after treatment. An outfall sewer carries the disinfected effluent from this chamber to the watercourse.

At some STPs a nutrient removal stage has been incorporated. Nutrient removal is achieved by the addition of ferric chloride to the treatment process. This chemical reacts with phosphates in the sewage and forms an insoluable iron phosphate, which also settles out in the clarifier and helps reduce the amount of phosphorous being discharged into the receiving waters.

Sludge Treatment and Disposal. The raw sludge removed from the primary settling tanks, the surface scum, and any excess activated sludge are delivered to the digesters for further treatment. Sludge digestion is carried out in two stages. In the first stage "primary digestion", anaerobic bacteria partially break down the sludge into various substances while the contents are constantly being mixed to ensure overall treatment. The second stage, "secondary digestion", receives the partially digested sludges and completes the process. At some plants where larger quantities of sludge are produced, the water content of the sludge is reduced to cut down the volume. These sludges are then either incinerated at sludge incineration facilities or trucked away to be disposed of in landfills or by spreading on agricultural land.

B) Treatment Capabilities of Sewage Treatment Plants

Most sewage treatment plants are designed to remove the conventional pollutants contained in domestic wastes such as BODs, suspended solids and phosphorous. Studies indicate that sewage treatment facilities that are functioning efficiently can successfully remove such conventional pollutants.[20]

The evidence about the effectiveness of STPs in removing toxic contaminants is less clear. A recent U.S. EPA study of secondary sewage treatment plants indicates that while the removal rates for conventional pollutants are high, the capability of conventional activated sludge treatment processes for removing toxic contaminants is extremely variable.[21] It was found that in plants with industrial sources, there was little or no reduction in the toxicity of wastewater by means of this treatment process.[22] A 1986 report to Congress by the Environmental Protection Agency on the discharge of hazardous wastes to sewage treatment plants reported that, for sewage treatment plants with secondary treatment operating at peak efficiency, 62 per cent of all pollutants received would be biodegraded.[23] It was estimated that the remaining 38 per cent, largely persistent toxic chemicals, would be air stripped in the collection system or at the treatment plant (14%), removed to sludge (16%), or would pass through to water bodies receiving STP effluent (8 per cent).[24]

For systems defined in the report as not operating at peak efficiency, it was estimated that 43 per cent of the pollutants received would be biodegraded, it was estimated that 43 per cent of the pollutants received would be biodegraded. In this second case, the remaining pollutants would also end up

in the air (25%), sludge (14%), or the receiving waters of sewage treatment plants (18%).[25] The report did notdetermine which treatment scenario -- peak efficiency or something less than peak efficiency -- is most representative of actual treatment conditions at STPs with a significant industrial flow. It may be consluded, however, that in either case, a significant amount of the pollutants received by treatment plants is escaping via various exposure routes to the natural environment.

2.3.2 Exposure to Water

STP Pass-through. An undetermined percentage of pollutants discharged to sewers never reaches the sewage treatment plant. These routes of exposure to the natural environment are discussed in detail below. As discussed above, since sewage treatment plants are not generally designed to remove toxic industrial contaminants, these contaminants may pass partially treated or untreated, into receiving waters. In Ontario, there is only limited information on the toxic contaminants contained in the effluent of secondary treatment plants. An Environment Canada review of information on 105 secondary-treatment-plant effluents in Canada and the United States found that typically 10 to 15 persistent toxic contaminants identified by the U.S. Environmental Protection Agency as priority pollutants were found in significant concentrations in the effluent of STPs.[26]

A 1982 survey [27] summarized and discussed selected data on STP removal efficiencies from U.S. EPA data. The results are summarized in Table 2.6.

TABLE 2.6 EXAMPLES OF TOXIC TREATMENT EFFICIENCY IN MUNICIPAL TREATMENT PLANTS

STUDY	REFERENCE	TREATMENT EFFICIENCY
40 STP SURVEY	U.S. EPA (1982a)	For half of the STPs studied: 70% for metals 82% for volatile organics 65% for base-neutral organics
25 STP SURVEY	Cohen (1981)	80% for many organics
PILOT PLANT STUDY	Petrasek	90% for the semi-volatiles studied

The authors of the study concluded that: [28]

- individual inorganics (i.e., As, Cd, Hg and Pb) and organics (i.e., polynuclear aromatic hydrocarbons (PAHs) and pesticides) pass through a substantial number of treatment plants in sufficient quantities and with sufficient frequency to be a probable cause for concern;
- as influent concentrations of many conventional and priority pollutants increased, effluent concentrations also increased (this implies that the removal rates for priority pollutants are relatively constant and that a fixed percentage of the loading of these pollutants is removed by secondary treatment); and
- in general, the higher the industrial contribution to an STP, the higher the concentration of priority pollutants in the STP influents (The mass loading of both metallic and organic priority pollutants in STP influents is higher on weekdays when more industries are operating than on weekends.)

The recently completed MOE study of sewage treatment plant effluent provides further indication that toxic contaminants contained in industrial discharges are passing through Ontario sewage treatment plants.[29] For example, as indicated in Table 2.5, the study found that of the 66 types of MISA priority pollutants occurring in STP influent, 56 were found occurring frequently in effluent.

The recently completed MOE study of sewage treatment plant effluent provides further indication that toxic contaminants contained in industrial discharges are passing through Ontario sewage treatment plants.[29] For example, as indicated in Table 2.5, the study found that of the 66 types of MISA priority pollutants occurring in STP influent, 56 were found occurring frequently in effluent.

The preliminary results of the MOE STP study cited above are not conclusive since these results do not include data on the amounts of these pollutants being discharged from STPs. However, even small concentrations of persistent toxic substances may create a significant environmental problem at receiving

waters. Dr. Ross Hall, a professor of biochemistry at McMaster University, states that low concentrations of pollutants in STP effluent are significant due to the large daily volumes discharged from these facilities, which result in large total loading and "major stress on the environment".[30] This can be illustrated by reference to a 1985 analysis of effluent samples at Metro Toronto sewage treatment plants undertaken by the Metro Works Department.[31] This analysis involved sampling and testing STP effluent over a four-day period for 148 chemicals. The results, summarized in Table 2.7 indicate significant loading of both organic and inorganic chemicals to STP receiving waters over time.

Combined Sewer Overflow. In the older portions of many Ontario municipalities, a single system combining storm and sanitary sewers receives both storm runoff and wastewater from domestic, commercial and industrial sources. At one time these sewers transported all flows directly to nearby watercourses. However, this practice ceased with the advent of sewage treatment facilities. In municipalities with combined sewers, intercepters were installed to convey combined sewer flows through STPs. However, during storm or spring runoff, that portion of the combined sewage flow which exceeds the interceptor or treatment plant capacity is automically discharged dfirectly into a receiving waterbody. A recent report on combined sewer overflows in the Great Lakes basin compiled by a task force set up under the Great Lakes Water Quality Agreement [32] concluded that where combined sewers are still in use, overflows of untreated wastewater occur routinely.[33] The report found that changes in municipal population, surface characteristics, or poor maintenance and operation practices often result in increased overflow volumes and frequencies.

The traditional method of addressing the problem of combined sewer overflows in Ontario has been sewer separation. However, this approach has proved to be extremely costly. Other alternatives include:[35] installation of overflow regulators, trunk storm relief sewers and overflow retention tanks. These latter engineering solutions are also expensive and subject to mechanical breakdown.

2.3.3 Exposure to Land

As noted above,[36] the U.S. EPA estimated in its 1986 report to Congress that between 14 and 16 per cent of all hazardous wastes received by STPs accumulate in sewage sludge generated by the treatment process. Hazardous metal compounds such as arsenic, cadmium, mercury, chromium and nickel constitute 59 per cent of this total.[37] The report also found that toxic organic compounds which tend to accumulate in sludges included phthlates amd PAHs. Chlorinated compounds such as PCBs also concentrated in sludge during treatment.[38]

Preliminary results of the MOE study of Ontario STPs, as shown in Table 2.4, lend support to these findings. For example, the table indicates that 81 MISA priority pollutants were found to occur frequently in STP sludges. The table further indicates that more pollutants were found to be occurring frequently in sludges than in STP influent (81 vs. 66). This indicates that pollutants not detected as they enter sewage treatment plants accumulate to detectable levels in sewage treatment plant sludges.

These findings indicate that industries that discharge hazardous wastes to sewers are in effect transferring the treatment and disposal problem to the

sewage treatment plant. Treatment plant operators are faced with the problem of safely disposing of sludges containing toxic contaminants. For the 83 per cent of Ontario's STPs that do not have the capacity to incinerate these sludges this means land disposal -- either by application to agricultural lands as fertilizer or at a landfill site licensed to receive these sludges.

Landfilling. Twenty per cent of Ontario's STPs dispose of sludges at landfill sites. Sludges disposed of in landfills represent approximately 17 per cent of the total generated in Ontario.[39] This practice is likely to become less common. Stricter conditions attached to operation of existing sites and the high cost of obtaining approvals for new landfill sites are reducing the number of Ontario landfill sites permitted to receive STP sludges. Little information is available on the risks of exposure to the environment associated with disposing of sludges at landfills. However, as noted above, STP sludges often contain high levels of hazardous contaminants which may, over time, leak down to acquifers and contaminate local groundwater. This risk will vary depending on the operational practices, engineering features and hydrogeological characteristics of a given site. Landfilling of these sludges could result in contamination of ground water as contaminants in the sludge leak down through the soil.

The regulation of the toxic content of wastes entering landfill sites is becoming more stringent. As landfill costs rise to meet the costs of siting and operating new landfills, and as conditions attached to certificates of approval for the operation of landfills become stricter, the option of sludge disposal by landfill is likely to become less viable.

Application to Agricultural Lands. Approximately 20 per cent of the sludges generated in Ontario are disposed of on agricultural land.[40] Usually this

is done through arrangements between municipalitis and local landowners. The danger of this practice is that toxic contaminants contained in the sludge will bioaccumulate in farmers' crops or leak through the soil and contaminate local groundwater.[41] Ontario has specific guidelines for heavy metals, which must be met prior to landspreading, however, there are no guidelines for organic compounds.[42] Metals are of concern because of the growing evidence that these contaminants accumulate in abnormally large amounts in tne vegetables harvested from lands to which STP sludges have been applied.[43] Application of STP sludge to agricultural lands is increasingly becoming an unviable option for municipalities. For example, the Municipality of Metropolitan Toronto can no longer make use of this options since sludges are found consistently to contain metals in excess of MOE guidelines.[44]

2.3.4 Exposure to Air

Volatilization. Some industrial contaminants evaporate directly into the air either before or during sewage treatment plant processes. According to the 1986 EU.S. EPA report to Congress, between 14 per cent and 25 per cent of pollutants are volatilized depending on the efficiency of STPs.[45] Volatilization of contaminants occurs frequently in the aeration basins of the activated sludge systems by diffusing through the surface of air bubbles used to aerate the system.[46] It also occurs at numerous other points in the treatment process including: flumes, grit chambers, sumps, equalization basins, pH adjustment stations, clarifiers, oxidation basins, transfer lines, pipes and ditches.[47]

Volatilization tends to be the dominant removal mechanism for a group of

contaminants called halogenated compounds.[48] Further, where a high rate of aeration is used during treatment, air-stripping has been shown to compete with biodegradation as a removal mechanism in activated sludge for other organic compounds such as benzene, toluene, ethylbenzene and chlorobenzene.[49] Sewage treatment experts have pointed out that the physical layouts of many sewage treatment plants, with their open tanks and basins, are not designed to prevent volatilization of wastewater during treatment.[50]

Incineration Approximately 58 per cent of the total sludge generated in Ontario is ultimately incinerated. Contaminants may be released during the incineration process.

2.3.5 Findings

Ontario's sewage treatment plants are designed to remove conventional pollutants such as those causing biological oxygen demand (BOD), suspended solids and phosphorous. They are not designed to treat the persistent toxic contaminants contained in industrial effluent.

Not all industrial discharges to sewers reach STPs. A significant amount of toxic contaminants flows directly into Ontario water bodies, through STP by-passes, pass-through and storm sewer discharges or pass into air, through volatilization.

There is evidence that STP processes do not effectively remove significant amounts of pollutants contained in industrial effluents, and that these contaminants accumulate in the receiving waters of STPs.

Contaminants contained in industrial discharges to sewers reach the natural environment via a number of pathways:

i. to air through volatilization and incineration of STP sludge;

ii. to water through STP by-passes, pass-throughs, and storm sewer discharge; and

iii. to land through land disposal of sludge, either at landfills or by application to agricultural lands.

2.4 Effects

A comprehensive discussion of the effects of toxic contaminants on human health and the environment is beyond the scope of this report. The purpose of this section is to highlight some of the known effects which can be drawn from a review of the literature on industrial sewer-use. The discussion is necessarily in the nature of a general overview.

2.4.1 Effects on Human Health

All of the pathways from the sewer to the environment outlined above increase the likelihood of human exposure to persistent toxic contaminants. Laboratory studies have shwon that human exposure to constituents of hazardous waste can result in a variety of adverse health effects, ranging from minor irritation to serious injury or death.[52] The potential adverse health effects for humans exposed to waste in the environment are dependent upon many factors. The ultimate health effect depends upon a variety of factors such as the toxicity of the chemical, the extent of exposure, the characteristics of the exposed individuals, the dose reaching the target organs, the route of entry, the interaction between the chemical and other concurrent chemical exposures and the normal protective and restorative mechanisms of the body.[53]
The most reliable data on potential human health effects associated with exposure to a specific chemical are from studies on humans which have been undertaken to determine the effects of accidental occupational exposure.[54] For example, evidence of the carcinogenicity of vinyl chloride and asbestos

comes from studies of workers exposed to these substances in the work place.[55] However, the availability of human data is limited; thus, studies involving laboratory animals are most often used to evaluate toxicological effects. This toxicological data has raised a number of uncertainties and a great deal of dispute because extrapolation from animals to humans and from acute to chronic exposure levels is required.[56]

Despite this controversy, however, many scientists have come to believe that exposure to any concentration of certain contaminants could lead to genetic mutation, cancer and other health problems.[57] According to the OWMC study of human health and special waste, the potential adverse health effects in humans can involve impacts on any body function or organ system.[58] Health effects of primary concern to populations exposed to hazardous chemicals include organ damage, cancer, genetic effects, reproductive abnormalities, immunological imbalances, nervous system disorders, and adverse impacts to the blood and skin.[59]

2.4.2 Effects on Occupational Health

Workers who operate sewage treatment plants run the risk of exposure to the contaminants contained in the industrial wastes which enter the plant through sewage system. According to the National Safety Council, sewage treatment plant workers suffer disabling injuries and illnesses at almost five times the rate of the average industrial worker.[60] To put this in perspective, sewage treatment jobs are almost four times as dangerous as underground coal mining jobs and 6.5 time as dangerous as working in a blast furnace.

These risks have been documented in numerous studies. For example, one study found a higher frequency of urinary mutagens among sewage treatment employees as compared with water treatment workers.[61] This suggested that sewage workers experienced a higher frequency of exposure to toxic chemicals, more specifically to mutagenic chemicals.[62] The study also noted a higher incidence of various cin sewers are also well documented. Case studies demonstrate that the release of gases have led to serious injuriesmand death at STP sites. While most accidents were caused by the formation of hydrogen sulphide gases, more recent incidents have been linked to certain organic pollutants that either volatilized or reacted with hydrogen sulphide within the STP collection system.[63]

Many effects have not yet been documented since exposure levels are not high enough to cause any acute health effects, but may later cause very severe latent or chronic health problems such as cancer or birth defects. For instance, increased rates of miscarriages among the wives of male sewage treatment plant workers and birth defects among their children have been observed.[64]

2.4.3 Effects on the Natural Environment

Any exposure of industrial waste to the environment presents the risk of bioaccumulation and biomagnification of those contaminants through the food chain. For example, persistent loading of contaminants by sewage treatment plant discharges and combined sewer overflows could result in bioaccumulation and biomagnification of these contaminats in the marine life of the receiving waterbody. Substantial damage to the fish populations can occur in receiving environments which are downstream of STP discharges with a high component of industrial waste, according to a U.S. study.[65] Further, MOE has recognized that continued discharge of toxic substances into waterbodies has resulted in the accumulation of substantial amounts of these contaminants in sediments. In response, they have initiated an extensive study of "in-place pollutants " to determine the impact of contaminated sediments and develop a strategy for managing the problem.[66]

Polluted sediments are considered to be not only a depository for these contaminants but also an ongoing source for contamination of biota. For example, polluted sediments have been recognized as a problem in 15 of the 17 IJC "areas of concern" because of the potential impacts related to the release

of contaminants to the water column, and the build-up of toxic chemicals, which are reaching critically high levels.[67] A recent MOE study addressed the contaminant levels in sediments and benthic, or bottom dwelling aquatic organisms from 12 locations in Lake Ontario and the Great Lakes interconnecting channels.[68] Evidence from the study strongly suggested that contaminated sediments can exert toxic influences on benthic organisms which reduce their diversity only a few tolerant species or even eliminate them.[69] Further, bioconcentration on benthic organisms increases the potential for biomagnification up the food chain.

Disposal by spreading of sludges on agricultural lands can also affect biota. In a European study, 70 leeks, globe beets, potatoes and carrots were grown on soil treated with sludge over a long period of time (19 years). While no adverse effects on crop yields were observed, plants accumulated abnormally large amounts of certain trace elements. Globe beets and potatoes grown in sludge treated soil contained significantly larger concentrations of nickel and zinc than normally found.[71]

2.4.4 Effects on Sewage Treatment Plant Operations

While the impact of industrial sewer-use on human health and the environment has not yet been adequately documented, there is evidence that industrial sewer use has an adverse impact on the efficiency of municipal treatment works and causes damage to municipal infrastructure. In particular, a 1986 study of 18 municipalities, including 12 from Ontario, identifies a number of ongoing problems. It was found that a fifth of the municipalities studied had regular problems due to toxic waste interfering with sewage treatment processes.[72]

Information from this study is augumented by information on plant problems identified during conversations with municipal staff as part of background work done for this report.[73]

Hydraulic Overloading. In some cases, sewage treatment plants are overloaded as a result of heavy discharges by industries. Such overloads reduce treatment efficiency.[74]

Biochemical Oxygen Demand (BOD) and Suspended Solids Overloading. Industries discharging high levels of BODs and suspended solids overload sewage treatment plants, sometimes reducing efficiency of treatment and causing odour problems. Overloadig can be traced to industries such as meat and fish packing plants, breweries, tanneries, cheese and vegetable processors and septic tank haulage companies. Heavy BOD loading can cause system exhaustion, raise costs and reduce treatment efficiencies.[75]

Petroleum By-Products. Waste oils, grease, gasoline, phenolics and other petroleum by-products discharged to sewer systems cause problems in the sewer system, as well as in pumping stations and at the sewage treatment plant. Problems include grease build-up in the sewer, odour from solvents, potential explosions due to mixtures of chemicals and equipment problems at sewage treatment plants.[76]

Pipe Deterioration. Discharge of corrosive materials such as those from metal-plating industries, chemical manufacturers, electircal equipment manufacturers, and others can cause corrosion of sewer pipes and, in certain instances, pipe collapse.[77]

Biological Interference. Industrial waste can interfere with anaerobic digestion of domestic wastes. Biological wastes are broken down by bacteria in a secondary sewage treatment plant. High and/or sudden changes in concentrations of metals or organic chemicals kill thes otherwise hardy bacteria, thus inhibiting the operation of the sewage treatment plant. To restore the sewage treatment plant to normal operations may require a period of up to two or three weeks. This can result in millions of gallons of sewage entering the receiving body only partially treated.[78]

Physical Blockage and Plugging. Some sewage treatment works experience blockages and clogging due to fobrous discharges from industries such as tanneries, textile mills and carpet manufacturers. Problems created by these discharges include blockages of sewer lines and clogging of pumps, aeratorsand clarifiers at sewage treatment plants. Some discharges can build up on the inside old sewer pipes and reduce pipe capacity.[79]

Odours. Odour problems in sewage treatment works are often related to industrial sewer-use. Some common sources of such odours are the mixing of chemicals from various sources and discharges from food processing plants and industries using acids or solvents.[80]

Foaming. Foaming at sewage treatment plants is often tne result of idustrial discharges of detergent and alkaline matter. Problems associated with foaming include pH fluctuations and grease fouling of sewage treatment equipment such as chlorine contact tanks and gratings.[81]

2.4.5 Findings

There is growing evidence that contaminants contained in industrial discharges to sewers impose significant risks to human health especially the health of STP workers.

There is growing evidence that contaminats contained in industrial discharges to sewer accumulate in the receiving environment causing damage to plant and animal life.

Industrial discharges to sewers cause damage to sewage treatment works and reduce the efficiency of STP operations and their ability to treat the wastes received.

2.5 Information Needs

In order to fully understand the nature of the problems and environmental risks posed by industrial sewer-use in Ontario, further research is required in the following areas:

Sources

- types of wastes generated by discharging industries; and
- monitoring at the source to determine the types of wastes entering sewage systems.

Current Treatment

- extent and effective new of current industrial pretreatment at source, including information on the types of systems in place, the contaminants removed, and the system efficiency;
- effectiveness of current treatment processes at Ontario's 407 sewage treatment plants in removing persistent toxic substances, including organic chemicals and metals; and
- types and quantities of cotaminants captured in sludges generated at sewage treatment plants.

Pathways of Exposure

- types and amounts of contaminants escaping into receiving bodies by STP by-passes;
- types and quantities of contaminants reaching the air via incineration of STP sludges; and
- types and amounts of contaminants volatilized prior to and during sewage treatment processes.

Effects

- impact on human health
- impact of occupational exposure
- effect of toxic substances in combination, including antagonistic and synergistic effects;

- level of accumulation of toxic substances in sediments of receiving bodies;
- exchange of contaminants between air, water, sediments, land and biota; and
- socio-economic impacts of environmental degradation.

NOTES - CHAPTER 2

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CHAPTER 3 - THE CURRENT REGULATORY RESPONSE

3.1 Overview of the Regulatory Framework

3.1.1 International Activities

A) Discussion

Sewer-use issues are addressed at the international level in the context of the shared clean-up commitments of the jurisdictions bordering the Great Lakes. The Great Lakes Water Quality Agreement of 1978 (GLWQA) between Canada and the United States commits the signators to the goal of virtual elimination of persistent toxics, and to setting standards for industrial pollutants which will meet that goal.[1] The respective responsibilities of Ontario and Canada in the implementation of this Agreement are set out in the Canada-Ontario Agreement Respecting Great Lakes Water Quality.[2] The Great Lakes Water Quality Agreement and its annexes

set objectives for allowable concentrations of "persistent toxic substances" as defined by the agreement,[3]

require the parties to maintain a list of substances known to have toxic effects on aquatic and animal life, and a list of substances which could potentially have such effects,[4]

set out a number of specific programs and measures aimed at eliminating discharges of persistent toxic substances and other hazardous contaminants*,[5] and

require the parties to develop and implement programs for the control of pollution from municipal sources.[6]

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* The most detailed set of programs addresses the problem of phosphorous loading in the Great Lakes. Due in part to government commitments arising from the Agreement, significant gains have been made in reducing phosphorous loading in the Great Lakes.

In November of 1987, the signatories to the Agreement renewed these commitments and signed a pact which set timetables for the progress of the clean-up activities and the control of toxic substances.[7] The Agreement is administered by the International Joint Commission (IJC), an intergovernmental agency with representation from state, provincial and federal governments bordering the Great Lakes. The IJC was established by the Treaty Relating to Boundary Waters and Questions arising along the Boundary Between Canada and the United States.[8]

The IJC has no regulatory authority. Instead, its responsibility, as set out in by the Agreement involves:

> providing advice and recommendations to federal, state and provincial governments on matters related to pollution control; and
>
> providing assistance in the co-ordination of the activities undertaken jointly by two or more jurisdictions.[9]

As a transboundary organization with responsibilities relating to an ecologically rather than politically determined area, the IJC is in a good position to study the problem of toxic contamination by means of an ecosystemic approach. The information gathered and studies completed by the IJC could assist Ontario regulators in developing standards and establishing regulatory efforts which are consistent with the health of the ecosystem. Two IJC initiatives that may assist Ontario regulators in developing standards for discharges to sewers are discussed below.

Remedial Action Plans. The principal advisory body to the IJC, the Great Lakes Water Quality Board, has identified 42 "areas of concern" with serious environmental problems in the Great Lakes basin.[10] Twelve of these "areas of concern" are located in Ontario and four others are the shared

responsibility of Ontario and the United States. In 1985, the Board reported that little progress had been made to clean up these areas and then adopted a planning process to address this problem. The Board called for the development of remedial action plans (RAPs), with the objective of restoring all beneficial uses at each "area of concern".[11]

RAPs are currently being prepared for all 42 "areas of concern". Eight Great Lakes states and the province of Ontario play the lead role in preparing the plan, with assistance from federal and local governments. The process typically involves consultation with all interested and affected parties (stakeholders) within the area, including industries, affected citizens, and public interest groups.[12] Opportunity for input from members of the public is provided at several stages in the process. Ontario's 16 RAPs, indicated in Table 2, are at various stages of development.[13]

The RAP program could assist Ontario regulators in the development of standards for discharge to sewers by providing information on the nature and sources of environmental problems in specified areas. Further, the method used by the Great Lakes Water Quality Board to identify areas of concern could be adopted by Ontario regulators to focus the resources and efforts of the province in developing water quality-based standards under the MISA program. The potential role of IJC remedial action plans in the province's standard setting process is discussed in Chapter 5 of this report.[14]

Municipal Abatement Task Force. In 1982, the Great Lakes Water Quality Board established a municipal abatement program task force with a mandate to review the effectiveness of the current municipal effluent control programs in the Great Lakes.[15] The task force study had the following components:

an inventory of all wastewater treatment facilities in the Basin;

a detailed assessment of selected facilities;

an examination of jurisdictional pollution control programs and requirements; and

an assessment of monitoring and data quality assurance programs.

The recommendations of the task force, which were presented to the Great Lakes Water Quality Board in November, 1983, included the following:

Greater resources should be devoted to the development of industrial pretreatment programs, particularly with respect to the control of toxic organic contaminants.[16]

Emphasis should be placed on developing and assessing the effectiveness of various ways of monitoring municipal wastewaters.[17]

Analytical capabilities and quality assistance programs should be improved at laboratories monitoring municipal effluent.[18]

Improved programs and increased financial support should be provided to reduce operational problems at sewage treatment facilities in the Great Lakes Basin.[19]

In 1987, the Great Lakes Water Quality Board established a municipal pre-treatment task force to review and assess jurisdictional treatment programs. This task force is to submit a report on municipal treatment in the Great Lakes basin to the Board by September 30, 1988, which is to include the following:

significant features and objectives of current pre-treatment programs and their impact on pollution problems;

future plans to improve current programs;

the level of compliance by industrial sources;

the contribution of toxic substances released to the basin by municipal facilities, and the portion of this which comes from industrial or commercial sources;

an assessment of the adequacy of current progams; and

a set of recommendations for the consideration of the Water Quality Board[20]

B) Findings

Canada and Ontario have an international obligation to reduce transboundary pollution in the Great Lakes and sewer-use regulation is an essential component of that obligation.

As a non-regulatory body with no power to implement environmental protection measures, the IJC relies on the participating jurisdictions to act on its studies and recommendations.

As a transboundary organization focused on the impact of persistent toxic chemicals in the Great Lakes, the IJC could provide

information on the health of the ecosystem and the adequacy of existing efforts to protect it from toxic contamination. This could assist Ontario regulators in setting water quality-based standards.

The Great Lakes Water Quality Board's research on the problems associated with industrial discharge to municipal sewage treatment facilities supports the conclusion that these discharges must be controlled at source.

3.1.2 Federal Role

A) Discussion

The Constitution Act, 1867 does not expressly allocate legislative

responsibility for environmental protection to either the Federal Government

or the provinces. However, section 91 and 92 of the Constitution Act, lists a

number of heads of power such as Navigation and Shipping, Sea Coast and Inland Fisheries and Canals under which the Federal Government could establish legislation on environmental protection and, more specifically, water quality protection. Parliament has enacted a number of statutes under these heads which empower the Federal Government to regulate discharges into water bodies. For example, the Fisheries Act,[21] the Canada Shipping Act,[22] and the Navigable Waters Protection Act,[23] all contain provisions establishing Federal Government regulatory powers for discharges to waterbodies. In practice, however, the Federal Government has not performed a significant regulatory function under this legislation. Instead, primary regulatory responsibility in most areas of environmental protection has been left to the provinces, and the Federal Government has played a supporting role, providing provinces or municipalities with technical assistance, information, and funding.

The Federal Government, through Environment Canada, provides assistance for a number of Ontario initiatives aimed at water quality protection and sewer-use control. These initiatives are summarized below.

MISA. Environment Canada is providing assistance to the Ontario Ministry of the Environment (MOE) in the development of its Municipal-Industrial Strategy for Abatement (MISA). More specifically, it is represented on the industrial sector joint technical committees which have been set up under MISA to develop regulations to control toxic discharges for each sector. Environment Canada is also represented on the federal-provincial task force, which was established to identify priority pollutants requested under MISA and to assist in the development of mandatory regulations to monitor these pollutants.[24]

Construction and Operation of Municipal STPs. Between 1960 and 1980 the Federal Government has provided financial assistance to municipalities for the

construction and repair of sewage treatment works.[25] However, in November, 1987, the Federal Minister of the Environment announced its Federal Water Policy, which significantly reduced the federal role in providing such assistance.[26] The policy states that all costs of supplying municipal water and sewage treatment, including the costs of monitoring and equipment should be financed through the realistic pricing of these services. It restricted federal involvement in this area to providing technical support and assistance in:

studying the cost and pricing of municipal water and wastewater treatment;

developing programs and requirements to deal with industrial discharge to sewage treatment plants; and

research, development and information sharing for new wastewater technology.

The policy also states that financial assistance for the repair and upgrading of municipal facilities will be considered only if the project is eligible for assistance under existing federal programs and is consistent with federal and provincial priorities.

Sewer-Use Regulation. Environment Canada also provides information and assistance to municipal and provincial governments for the development of sewer-use regulations. In this regard, Environment Canada has recently participated in two activities: the development of the 1988 Model Sewer-Use Bylaw which has just been completed by the Ontario Ministry of the Environment;[27] a Canada-wide study of municipal regulatory efforts under municipal sewer-use bylaws culminating in a 1986 report with recommendations.[28] Both the draft by-law and the report are discussed in detail below.[29]

B) Findings

Despite broad regulatory powers contained in a number of federal statutes, the Federal Government continues to play a non-regulatory supporting role with respect to sewer-use regulation by providing technical assistance and expertise to the province.

Federal funding to assist municipalities in financing the costs of repairs to sewer infrastructures has been significantly reduced.

3.1.3 Provincial Role

A) General

As stated above, Canada's Constitution does not expressly assign responsibility for environmental protection to either level of government. In practice, however, primary responsibility for environmental protection rests with the provinces. In Ontario, the province's regulatory powers are established primarily through two statutes: The Environmental Protection Act (EPA)[30] and the Ontario Water Resources Act (OWRA).[31] The EPA regulates the discharge of contaminants into the natural environment generally. Subsection 5(1) sets out the general regulatory provisions:

> No person shall discharge into the natural environment any contaminant, and no person responsible for a source of contaminant shall permit the discharge into the natural environment of any contaminant from the source of contamination in an amount, concentration or level in excess of that prescribed by the regulation.

The Act and regulations which have been passed pursuant to it also regulate, among other things, waste management activities in the province,[32] sewage systems which do not fall under the regulatory provisions of the

"blue book" entitled Water Management - Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment - May 1984.

The Ministry of the Environment's announcement in June 1986, of its MISA program, marked a distinct break with the case-by-case approach. The program calls for the development of standards for identified categories of direct dischargers in Ontario and these standards are to apply province-wide. Given the important role that the MISA program is likely to play in water quality protection in the province, this program is discussed in detail in section 3.3.2 below.

One key category of direct discharger for which the province has specific regulatory powers is Municipal Sewage Treatment Works. Under the OWRA the Ministry of the Environment is empowered to approve the detailed technical plans for and construction and operation of municipal and large private sewage treatment works.[45] The Ministry may also set standards on a case-by-case basis, using conditions attached to Certificates of Approval, in order to regulate sewage treatment work operations,[46] the quality of effluent discharged by STPs,[47] and the disposal of sludges generated during the sewage treatment process. All three methods of sludge disposal -- incineration, landfilling in an approved site, and by conditioning the sludge and spreading it on agricultural land as fertilizer -- are regulated by the province.

Incinerators must meet provincial emissions and operating standards established under the EPA.[48]

Disposal at landfill sites is regulated under the waste management provisions of the EPA.[49]

Disposal on agricultural land is subject to the Ministry of the Environment's "Guidelines for Sewage Sludge Utilization on Agricultural Lands", which suggests allowable limits for 11 metals in sludges applied to the soil. Sludge guidelines do not include limits for organic chemicals.[51]

Provincial Regulation of Sewer Discharges. As noted above,[51] the Ontario Water Resources Act specifically empowers the Ministry of the Environment to regulate sewer discharges. Section 52 - (1) states that Ministry officials may require the discharger to stop discharging or depositing into sewage works where such discharge may interfere with the proper operation of a sewage works. Further, under this section the Ministry can even require that the appropriate municipality take action to regulate such discharges. Section 44 - (1) empowers the Minister to, among other things, regulate and control the content of sewage entering sewage works. This provision allows the Minister to prescribe methods of calculating surcharges to pay for the establishment or the operation of sewage works.

The province does not exercise these regulatory powers. Instead, regulatory responsibility for indirect discharge into municipal sewer systems has been, in effect, delegated to local and regional municipalities. The Municipal Act, states that local municipalities may pass by-laws

> for prohibiting, regulating and inspecting the discharge of any gases, liquids or solids and connections to any sewer, sewer system or sewage works for the carrying away of domestic sewage or industrial wastes or both, whether connected to a treatment works or not.[52]

Similarly, the Acts which establish the various regional municipalities in Ontario empower those governments to regulate industrial discharge through municipal by-laws.[53]

Recent amendments to the OWRA repealed a provision which gave operators of sewage treatment plants immunity from prosecution provided that the facility's operation was in compliance with all the conditions of its various approvals. However, section 30 of the Act was amended to confirm that a municipal treatment plant operator may rely on the due diligence defence if it

is charged by the province for discharging in violation of Section 16 - (1) of the Act.[54] Presumably, this means that a municipality can exceed standards contained in its certificate of approval, (and when MISA is in place can exceed MISA effluent limits) provided that it can show that it has conscientiously enforced its industrial sewer use by laws.

These changes to the Act are in part an attempt to address difficulties associated with the regulation of industrial sewer use. Municipalities will soon be required to maintain tougher standards for discharges from their sewage treatment plants, including standards for persistent toxic substances which originate in industrial discharges to sewers. These recent amendments to the OWRA raise questions about the relationship between municipal enforcement of sewer use standards, and provincial enforcement of standards for sewage treatment plant operations. For example, is it reasonable to expend provincial resources prosecuting municipalities for failure to comply with STP effluent limits when the municipality's failure to meet these limits is due to industry violations of sewer use standards? In section 6.1 of this report, it is argued that with respect to STP violations due to industrial discharges, provincial efforts should be focused on ensuring industry, rather than municipal, compliance.

The province has assisted municipalities in the development of sewer-use bylaws through their periodic efforts to develop a model bylaw which municipal councils may choose to adopt in whole or in part. Most current municipal bylaws have incorporated some of the provisions of the most recent bylaw which was drawn in 1975 by a joint committee of the Ministry of the Environment, Environment Canada, and the Municipal Engineers Association of Ontario (MEA).[55] In August, 1988, the Ministry of the Environment released a new model bylaw for municipalities to consider. This bylaw was prepared by a

joint committee represented by Environment Canada MOE and MEA.[56] Both the current and new model bylaws are discussed in detail in the next section. The province also provides assistance to municipalities for the construction, maintenance and operation of municipal sewage treatment works, through its Lifelines Infrastructure Renewal Program. Ontario's Ministry of the Environment recently announced that $12-million will be dedicated to this program in the 1988 fiscal year.[57]

C) Findings

In Ontario the Provincial Government has the primary responsibility for ensuring environmental protection generally and for ensuring the protection of water quality in provincial waterways.

The Ontario Water Resources Act empowers the province to regulate industrial discharge into municipal sewer systems and to require municipalities to take action against industries that violate sewer use bylaws.

In practice, the province has left primary responsibility for controlling industrial discharge into sewers to local and regional municipal governments, while retaining an advisory role through the periodic development of a model sewer-use bylaw.

3.1.4 Municipal Role

A) Discussion

In practice, Ontario's local and regional governments are responsible for both setting and ensuring compliance with standards for industrial discharges into municipal sewer systems. In the areas of the province where a regional level of government has been established, the regional council still has primary

regulatory responsibility pursuant to the Act which establishes the regional municipality.[58] In the rest of the province, the local municipality has primary responsibility pursuant to the Municipal Act.[59]

Since municipal bylaws regulating industrial sewer-use are not passed pursuant to environmental legislation, they are not based on the provincial statutory objective of environmental protection. Instead, standards set in sewer-use control bylaws are typically designed to ensure that two more specific municipal responsibilities are fulfilled: the maintenance and safe operation of sewage treatment works; and compliance with provincially set operating standards for STPs. Operating standards are set out in STP certificates of approval. These standards are based on provincial guidelines for:

discharge of conventional pollutants (BODs, suspended solids and in some cases phosphorous and ammonia nitrogen, as opposed to toxic organic and inorganic contaminants which are found in industrial effluents to sewers) to water bodies;[60] and

metals in sludges which are generated by the plant and are to be applied to agricultural land.[61]

All sewer-use bylaws set out standards for discharges into both sanitary and storm sewers, and contain provisions related to the municipality's responsibility to monitor industry discharges and enforce the limits set out in the by-law. The contents of sewer-use bylaws and current municipal regulatory practice will be discussed in detail in the next section.

B) Findings

Municipalities have the primary responsibility for regulating discharges into municipal sewer systems.

This regulatory responsibility is based on the municipal objective of ensuring the protection and safe operation of municipally owned sewage treatment works and related, only indirectly to the provincial objective of water quality protection set forth in Ontario's environmental legislation.

3.2 Current Practice - Regulation by Municipal Sewer-Use ByLaws

This section reviews current regulatory practices pursuant to municipal sewer-use bylaws. Regulatory activities are divided into two component

parts: standards and compliance. In discussing current practice with respect to each of these parts, the section will review current bylaws, and the 1976 model bylaw. The review of standards set under current bylaws is based on two surveys: a survey of 11 municipal by-laws done for this Report (CELRF survey), and the 1986 Environment Canada study by Simcoe Engineering Ltd. (Simcoe Survey), which surveyed 18 municipalities, 12 of which were from Ontario.[62] The review of current compliance efforts is based on the Simcoe Survey, on the CELRF survey which included a series of interviews with municipal officials -- sewer use experts employed by municipalities to operate sewage treatment plants or sewer use control programs -- conducted by CELRF in fall, 1987. A list of municipal participants in these interviews can be found in Appendix A. In selecting municipalities for the CELRF survey, efforts were made to select a representative sample of Ontario municipalities. The sample includes municipalities with large, medium and small populations and industrial bases, and a variety of types of industries. Municipalities from north, central and southern Ontario are represented. In addition to the interviews, sewer use control bylaw for each of the participating municipalities was reviewed.

The findings of the CELRF survey are presented in tabular form below. Table 3.1 summarizes the sewer use standards in the municipalities surveyed. Table 3.2 sets out information on current compliance efforts in each of these municipalities. The findings contained in these two tables are referred to throughout this section of the report.

3.2.1 Standards Under Municipal By-Laws

As noted in the previous section, current municipal sewer-use bylaws are not passed pursuant to environmental protection legislation. In deciding on the

TABLE 3.1 STANDARDS UNDER MUNICIPAL BYLAWS

MUNICIPALITY	PROHIBITIONS					SPECIFIC LIMITS (concentration in mg/L)																																										
								METALS																											NON METALS																
	general prohibition	pesticides/ herbicides	dyes	radioactive materials	Regulation 309 toxics	total # of parameters	# of metals	Al	Sb	As	Ba	Be	Bi	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	Sn	Ti	V	Zn	Cl	HCN	F	P/C[2]	P	SO_4	H_2S	BOD[3]	av[4]	ms[5]	SS[6]	da[7]
1976 model	/					23	12	50		1	5			2	5		5	50	5		0.1		5			5			5	1500	2	10	1	100	1500	2	MD*	MD*	15	MD*	/
1987 draft model	/		/	/	/	31	20	50	5	1			5	1	5	5	2	50	5	5	0.1	5	2	5	5	5	5	5	2	1500	2	10	1	10	1500		300	150	15	350	/*
Barrie	/			/		14	6							5	3		3		5				5						5	1500	3		0.1		1500	3	300	100	15		/
Halton	/			/		23	12	50		1	5			2	3		3	50	3		0.1		3			5			3	1500	2	10	1	100	1500	2	300	100	15	350	/
Hastings	/			/		15	6							3	3		3		3				3						3	1500	2		0.1		1500	2	300	100	15	350	/
Michipicoten	/			/		10	3								3		3						3								2		0.1			2	300	150	15	300	/
Muskoka	/			/		14	6							8	10		8		10				10						10	1500	5		1		1500	5	500	150		600	/
Niagara	/	/		/		23	12	50		1	5			2	5		5	50	5		0.1		5			5			5	1500	1	10	1	100	1500	2	500	100	15	500	/
Strathroy	/			/		28	17	50		1	5	5		2	5		5	50	5	5	0.1	5	5	5	2	5			5	1000	2	10	1	100	1500	2	300	100	15	350	/
Thunder Bay	/					13	6							3	3		2		3				3						3		2		50+ 100++			2	300	100	15	350	/
Toronto	/			/		22	12	50		1	5			2	5		5	50	5		0.1		5			5			5	1500	2	10	1	100	1500	2	500	150		600	/
Waterloo	/	/		/		20	10	50						0.5	5		5	50	5		0.1		5			5			5	1000	2		1	100	1000	3	300	100	15	350	/
Windsor[8]	/			/		27	16	50		1	5			2	5	5	5	50	5		0.1	5	5	3	2	5			5	1500	2	10	1	100	1500	2	500	150	15	600	/*
Windsor[9]	"	"	"	"	"	"	"	50		1	1			0.5	1	1	1	50	1		0.03	1	1	1	1	1			1	1500	0.5	3	0.3	25	1500	0.5	500	150	15	600	/*

1 Regulation 309 toxics. This catagory of specific prohibitions is described in section 3.3.1.
2 P/C. Phenolic Compounds. Derivatives of aromatic hydrocarbons which have an attached hydroxyl group.
3 BOD. Biochemical Oxygen Demand. This refers to the quantity of oxygen utilized in the biochemical oxidation of matter.
4 av. Solvent extractable matter of animal or vegetable origin.
5 ms. Solvent extractable matter of mineral or synthetic origin.
6 SS. Suspended Solids.
7 da. Discharge agreements.
8 specific concentration limits when total daily flow is > 500,000 L/day
9 specific concentration limits when total daily flow is < 500,000 L/day
/ indicates that the provision exists in the by-law.
MD* Municipal Discretion. Concentration limit is left to the discretion of the municipality.
/* indicates that discharge agreements will be allowed for certain parameters only
+ indicates allowable concentration limit if primary treatment
++ indicates allowable concentration limit if secondary treatment

TABLE 3.2 MUNICIPAL COMPLIANCE PROGRAMS

Municipality [1]	Flow to STP		Promoting Voluntary Compliance				Monitoring										Resource Requirements				Enforcement					
	total flow m³/day	industrial component	technical assistance	financial assistance	program approvals provision (by-law)	program approvals (practice)	waste surveys provision (by-law)	waste surveys (practice)	# of industries routinely monitored [2]	manhole requirement provision (by-law)	spot inspections	industry self monitoring (by-law)	industry self monitoring (practice)	written records	computerized records	publically available records	manhours/yr. sampling	manhours/yr. lab. analysis	budget - $/yr. sampling	budget - $/yr. lab. analysis	# of charges 86/87	# of prosecutions 86/87	success rate for prosecutions	maximum fine allowable (by-law)	fines collected $ 86/87	service cutoff provision (by-law)
1976 model	N/A	N/A	N/A	N/A	Yes	N/A	No	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MD	N/A	No
1987 draft	N/A	N/A	N/A	N/A	Yes	N/A	Yes	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,000	N/A	No
Barrie	26,800	40%	Ltd	No	No	No	No	Yes	100	No	No	No	Some	Yes	No	No	4,000	650	114,000	14,000	0	0	N/A	300	0	No
Halton	1,891,900	INA	Ltd	No	Yes	Yes	No	Yes	150	Yes	Yes	No	Some	Yes	Yes	No++	4,000	2,000	75,000	35,000	0	0	N/A	1,000	0	Yes
Hastings	7,200	0	N/A	N/A	No	N/A	No	Yes	N/A	No	N/A	Yes+	N/A	Yes	Yes	No	200	MOE	N/A	N/A	0	0	N/A	300	0	No
Michipicoten	36,050	0	N/A	N/A	No	N/A	No	N/A	N/A	No	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	300	0	No
Muskoka	229,350	INA	Ltd	No	No	No	No	Yes	0	Yes	No	No	No	Yes	No	No	N/A	N/A	N/A	N/A	0	0	N/A	300	0	Yes
Niagara	2,230,000	40%	Ltd	No	Yes	Yes	No	No	100	Yes	Yes	Yes+	Some	Yes	Some	No	6,000	2,000	250,000		0	0	N/A	2,000	0	No
Strathroy	42,350	20%	Ltd	No	Yes	No	No	No	2	Yes	No	No	No	Yes	Yes	No	200	MOE	25,000	MOE	0	0	0	1,000	0	No
Thunder Bay	811,600	2%	Ltd	No	No	No	No	No	0	No	No	No	No	No	No	No	0	0	0	0	0	0	0	300	0	No
Toronto	14,189,000	40%	No	No	Yes	Yes	No	Yes	850	Yes	Yes	No	No	Yes	No	No	36,000	14,000	850,000	400,000	163	163	90%	2,000	200,000	No
Waterloo	243,425	35%	Ltd	No	No	No	No	Yes	150	Yes	Yes	No	No	Yes	Yes	No*	8,000	10,000	435,000	225,000	6	0	N/A	1,000	0	No
Windsor	1,200,000	35%	Ltd	No	No	No	No	Yes	80	Yes	Yes	No	Some	Yes	No	No	2,000	2,000	310,000		3	3	100%	1,000	2,600	No

[1] Municipality . The names of the municipal staff contacted are contained in Appendix D.

[2] # of industries routinely monitored. Routine monitoring refers to monitoring which occurs at least once per year.

N/A not applicable.

MD indicates fine level is left to municipal discretion; $1000 is suggested.

INA information not available.

Yes+ indicates that industry self monitoring may be required.

No++ indicates that information is not freely available but will be provided on a need to know basis.

No* indicates that information is not freely available but a routine public reporting mechanism has been established.

MOE indicates that the Ministry of the Environment does the laboratory analysis.

Ltd limited.

types of contaminants to be controlled and the level of control for each contaminant, each municipality may consider a broad range of local considerations such as type of industry, current sewage treatment capabilities, avoidance of identified damage to municipal sewer infrastructure or STPs, and the concerns of local residents or industries. Most municipalities rely, in part, on standards established in the 1975 model sewer-use bylaw. Both the model bylaw and each of the municipal bylaws make use of five types of standards to set limits on industrial discharge to sewers. Each is discussed below.

A) General Prohibitions

All bylaws surveyed contain a general prohibition and a listing of specific prohibitions and concentration limits. For example, the general prohibition in the 1975 model by-law states that:

> no person shall discharge or deposit (into sanitary or combined sewers) matter of any type or at any temperature or in any quantity which may be or may become harmful to a sewage works, or which may interfere with the proper operation of a sewage works, or which may impair or interfere with any sewage treatment process, or which may be or may become a hazard to persons, animals or property...[63]

All of the municipalities in the CELRF survey rarely, if ever, monitor for violations of, or attempt to lay charges under, a general prohibition provision. The reason most commonly cited for the relative disuse of this provision is that violations are more difficult to determine and build a case around than a violation of a specific limit. It requires municipal enforcement officers and prosecutors to link industrial discharges to physical damage or injuries in order to demonstrate violation. After identifying

damage or injury, municipalities would be required to identify the contaminants that caused the problem and then trace back up the sewer pipe in an attempt to determine the source of the contributing contaminants. Although the general provisions usually require only that the municipality demonstrate that the discharge may cause damage or injury, municipalities have been reluctant to attempt to ensure compliance with these provisions because of the difficulties in determining whether or not the requisite circumstances exist. In contrast, specific standards provide a precise reading of what constitutes a violation, and requires only that the municipality demonstrate that an industrial discharge to the sewer contains contaminants in excess of specified amounts.

B) Specific Prohibitions

In general, the current Ontario bylaws surveyed do not prohibit the discharge of persistent toxic chemicals. However, most bylaws do contain a number of specific prohibitions for substances based on their physical properties other than toxicity. For example, the 1976 model bylaw establishes specific prohibitions for a number of substances which may cause damage to sewage systems because of their physical properties. Prohibited substances include explosive matter, gasoline, solvents and other petroleum products, sewage that may cause offensive odour, storm water (excluding discharges to combined sewers), sewage that may obstruct flow, and sewage that has more than one layer. Table 3.1 provides a breakdown of the types of specific prohibitions contained in the surveyed by-laws.

C) Specific Limits

Consistency in the Types and Number of Substances Controlled. The types and number of contaminants for which specific discharge limits have been set varies from municipality to municipality. The 1976 model bylaw provides a fairly representative example of the types of substances which are controlled by Ontario's sewer-use bylaws. It specifies concentration limits for 22 substances including 12 metals, phenolic compounds, chloride, cyanide, fluoride, phosphorus, sulphate, sulphide and inorganic solvent extractive matter. However it does not specify limits for BOD, suspended solids and organic solvent extractable matter.[64]

The existence of a model bylaw has not led to uniformity. Each of the municipalities surveyed has elected to determine which substances it will regulate. This has resulted in variances in the types and numbers of substances regulated across the province. For example, in the CELRF survey, the number of contaminants identified in bylaws varied from 28 parameters in the Town of Strathroy to 10 in Michipicoten, with 19 as an average. The number of metals for which limits have been set varied from 17 in Strathroy to three in Michipicoten. In the Simcoe survey the number of controlled parameters ranged from 30 in London to 14 in Belleville.[65] The Environment Canada Survey also indicated a wide range in the numbers in metals listed in bylaws.[66]

There does not appear to be any basis for these variances. For example, there is no correlation between the type and number of parameters regulated and the size and industrial diversity of the municipality. To illustrate this, it may be noted that Toronto regulates 22 parameters including 12 metals while Strathroy sets limits for 28 substances including 17 metals.

Consistency in Level of Control for a Given Substance. The level of control for particular substances also varied from municipality to municipality. For example, the CELRF survey indicates that the highest level allowable for cadmium varies from 8 mg/l in Muskoka to .5 mg/l in Waterloo. The Environment Canada report indicated that of the surveyed municipalities, the highest permissible limit for cadmium was 2 to 5 times greater than the lowest. Similar variances were found for chromium. copper, lead, nickel, zinc, phenolic compounds and other substances. Some municipalities do not set any limits for many of these substances. Table 3.1 provides a breakdown of the types and numbers of substances regulated and the concentration limits for the 11 municipalities, as well as the 1976 and, 1987 draft, model bylaws.

The Simcoe study noted that variances in the level of control could be accounted for by municipality-specific factors such as removal efficiencies in the sewage and sludge processes, biomass toxicity limits, and the level of industrial versus non-industrial flow rates.[67] However, variances in the type and number of substances controlled and the level of control required give new industries an opportunity to shop for municipalities with lower standards. Thus, these variances give municipalities with lower standards a competitive edge in attracting new industries that wish to discharge to municipal sewers.

Scope and Adequacy of Protection. Specific standards set in current bylaws do not appear to be either stringent or comprehensive enough to ensure adequate protection for human health, the natural environment and municipal sewage treatment facilities. Two problems have been identified: specific limits do not control the total loading of substances and a large number of substances are not controlled.

In the 1976 model bylaw, and in all the other municipal bylaws surveyed, specific discharge limits are set by establishing an allowable concentration limit. However, these bylaws do not relate this limit to the total flow to the sewer over time. Sewer-users who are discharging large quantities of contaminants due to heavy flows will not be in violation of the bylaw provided they can meet the concentration limit. This means that industrial dischargers are, in effect, permitted to dilute effluent prior to discharge in order to meet sewer-use standards.

Recent work completed as a part of the MISA program indicates that current bylaws do not deal with the vast majority of toxic contaminants entering sewer systems. A Federal-Provincial Task Force has identified 180 contaminants which potentially exist in industrial and sewage treatment plant effluents discharged in Ontario and are of sufficient concern to warrant ongoing monitoring under MISA.[68] A recent MOE study of 40 sewage treatment facilities tested influent and effluent for more than 180 contaminants.[69] In contrast, current bylaws set specific limits for between 10 and 30 substances.

The Simcoe survey also indicates that most of the surveyed sewer-use bylaws do not set any controls for many contaminants which require regulation in order to ensure adequate environmental protection.[70] It found that the majority of municipalities did not provide specific limits for 11 key substances that affect either sewage treatment plant operation, water quality, public health, food production and/or land productivity.[71] The report also noted that some municipalities which dispose of sewage treatment plant sludges on farmland did not set sewer-use limits for toxic metals such as mercury, molybdenum and arsenic.[72]

D) Standards Set by Agreement

The 1976 model bylaw and most sewer-use bylaws in Ontario make provisions for discharging industries to enter into negotiated agreements with the municipality, which permit the industry to exceed concentrations established in the bylaw. These agreements are permitted in 16 of 18 municipalities surveyed for the Simcoe study[73] and in all of the municipalities in the CELRF survey effectively permit variances in standards for discharge of specific substances, within a municipality. Such variances, however, may be acceptable. All of the municipalities interviewed for the CELRF survey stated that these discharge agreements allowed industries to exceed bylaw limits only for conventional pollutants -- those substances which the sewage treatment plants were designed to treat. Further, these municipal discharge agreements required industries to pay the municipality a surcharge to cover the cost of additional treatment. Municipalities are generally using discharge agreements as a means of providing industry with treatment facilities, on a user-fee basis, for pollutants which the municipal facility has both the capability and capacity to treat. Current municipal bylaws, however, do not provide sufficient assurances that discharge agreements will be used for this limited purpose. Thus, there is no assurance in municipal by-laws that

sewage treatment plants have sufficient capacity to safely treat additional conventional pollutants received from industry,

discharges in excess of bylaw limits be on a user-fee basis, and

discharge agreements permit excesses only for substances which do not contain persistent toxic chemicals and which the sewage treatment plant is capable of treating

E) Findings

Sewer-use bylaws do not control the total loading of toxic contaminants entering sewers from discharging industries.

Sewer-use bylaws set specific limits on relatively few toxic contaminants. In particular many toxic chemicals identified by the MISA Federal-Provincial Task Force as potentially occurring in industrial effluent are not controlled by sewer-use bylaws.

The types and number of contaminants controlled in sewer-use bylaws vary from municipality to municipality. These variances do not directly correlate to the size of a municipality, or the industrial diversity of its sewer-users.

The limit set for a given contaminant varies from municipality to municipality.

Most municipal bylaws provide for the use of discharge agreements which permit variances in standards for conventional pollutants applied to discharging industries within municipalities.

3.2.2 Compliance Efforts Under Municipal By-Laws

Activities undertaken to ensure compliance with industrial sewer-use standards

are divided into three groups for the purposes of this report:

- Promoting Voluntary Compliance. This involves assisting and encouraging industry voluntarily to meet sewer-use standards.
- Monitoring. This would include activities by both the regulated industries and the regulators to monitor effluent discharged into municipal sewers in order to measure a current level of compliance and assist in detection of sewer-use violations*.
- Enforcement. This refers to activities by the regulator to investigate and prosecute sewer-use violations.

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* Information gathered by way of regular monitoring is useful for a number of purposes other than ensuring compliance. For example, monitoring data can be used by regulators to measure the environmental impact of industrial sewer-use and the effectiveness of current standards and also to assist in the standard setting process. The uses of monitoring information will be further discussed in Chapter 5.

Current activities by municipalities in each of these areas is discussed below. Table 3.2 summarizes current municipal compliance efforts under these three heads.

A) Promoting Voluntary Compliance

Financial and Technical Assistance. None of the municipalities in the CELRF study provided financial assistance to industries requiring pollution control equipment in order to meet sewer-use standards. Some municipalities assist industries by providing lists of consultants and technical experts which industries could use in their development of a strategy for meeting sewer-use standards.[74] Municipal staff will also provide some technical assistance to industries by offering informal advice or suggestions on how to address compliance problems.[75]

Program Approvals. Three municipalities in the CELRF survey, Halton, Toronto and Niagara sometimes issue program approvals. These programs allow industry to exceed sewer-use by-law standards for an interim period of time to give that industry an opportunity to put equipment and processes in place to meet standards. In order to obtain an approval, industries are required to submit, to the municipal commissioner of works, a detailed program which sets out their plans to prevent or reduce and control discharges. If the program is acceptable, the commissioner issues a 'program approval' which includes a deadline for coming into compliance with standards set out in the bylaw. Once the program is approved the industry cannot be prosecuted under the bylaw for the discharge or deposit of sewage until time expires for coming into compliance, provided that the industry adheres to the terms of the program.

Program approvals may be categorized as a tool for ensuring voluntary compliance since they provide municipalities with an opportunity to work with an industry in developing a realistic time schedule for making necessary changes to manufacturing processes and installing pollution control equipment, in order to comply with sewer-use bylaws.

B) Monitoring

Monitoring the level of the compliance with sewer-use standards could involve one or more of four types of activities:

- collection of information about industrial sewer-users;
monitoring and reporting by industry;
monitoring at source by the municipality; and
record keeping.

The extent of current municipal efforts for each of these activities is discussed below.

(i) Information about industrial sewer-users.

Most of the municipalities interviewed as part of the CELRF survey had little detailed information on the types of industries discharging into the sewer systems. However, several of the larger municipalities, including Toronto, Waterloo and Halton have conducted initial industrial surveys in order to identify the industries using municipal sewer systems and to obtain detailed information on the raw material used, products and by-products produced, the processes and production procedures used, operating schedules, the wastes

produced and waste treatment methods employed. Seven of the municipalities surveyed require industries wishing to connect to municipal sewer systems to complete an industrial waste survey. For example, in Halton, new industries are required to submit a preliminary waste survey before they hook up to the municipal sewer system. An inspector makes the initial contact with the industry, explains the survey and in most cases carries out a preliminary on-site inspection to determine the types of processes involved and the waste characteristics and waste volumes likely to be produced. In Waterloo, this preliminary information gathering activity is triggered by the receipt of an application for a building permit which includes sewer connections. When the municipality receives the completed waste survey it establishes a file for the discharging industry. Subsequent waste surveys are then carried out on a annual basis to ensure that information on products, processes and waste generated is current.

Municipalities that carry out these surveys usually focus on "wet industries," which typically are defined as industries that carry out production processes involving continuous discharges into municipal sewer systems. Halton indicates that it is currently making efforts to identify "dry industries," which make regular discharges to sewers.

Information gathered through industrial waste surveys are used by municipalities to identify industries that would require monitoring on a regular basis and provide initial information upon which a regular monitoring program can be developed.

(ii) Industry monitoring and reporting.

The municipalities in the CELRF survey do not require industries to monitor discharges into sewer systems and report on a regular basis. Two municipalities interviewed for the CELRF survey indicated that they do have some discharging industries undertaking this activity. In Halton, a few industries have voluntarily agreed to adhere to a self-monitoring and reporting schedule.[76] In Niagara region, industries are required to self-monitor and report on a regular basis pursuant to discharge agreements.[77] On the other hand, in Waterloo, the regional municipality does all of its own monitoring to ensure the veracity of information.78

(iii) Municipal monitoring.

Routine monitoring. According to the CELRF survey, small municipalities do not have a routine or regular monitoring program for industries within their jurisdication while most of the larger municipalities have identified discharging industries that require monitoring on a regular basis. In these municipalities, sewer-use inspectors are responsible for regularly taking samples from manholes located near the industry, testing the samples and assessing the results to determine whether the industry is in compliance. Since municipalities do not rely on industry self-monitoring and reporting, they must rely primarily on unannounced inspections by municipal staff as a check against any non-compliance by industries discharging to sewers.

Spot inspections. The five largest municipalities reviewed in the CELRF survey have inspection teams that carry out random on-site inspections.

These inspections are undertaken selectively because of the limited laboratory capacity in most municipalities and budgetary restrictions. Metro Toronto has the largest spot-monitoring program with nine two-man crews working seven days a week. Each crew uses a van fully equipped with sampling and testing devices.[79]

Manpower and resources. The manpower, equipment, and monies dedicated to monitoring efforts vary from municipality to municipality across the province. The Simcoe Engineering study found that there was a poor correlation between the total industrial waste flows treated at municipal plants and the monies and manpower dedicated to monitoring activities.[80] A more recent report on five Ontario municipalities further illustrates this disparity between amounts of waste generated and manpower and resources.This report indicated that Hamilton-Wentworth Region, which generates more industrial wastes to sewers than Metropolitan Toronto, uses only two teams of two to carry out spot inspections.[81]

Sampling and testing. All municipalities surveyed tested for a relatively limited number of parameters. In most cases monitoring was focused on conventional parameters, (i.e., BOD, pH, suspended solids), and some metals. No testing is currently done by municipalities for organic compounds. While larger municipalities such as Metro Toronto, Halton Region, Waterloo Region and Niagara Region have laboratory facilities, most small and medium sized municipalities rely on laboratories run by either the private sector or the Ontario Ministry of the Environment. According to the CELRF survey, with the exception of the Metro Toronto laboratory, all municipal laboratories have limited analytical capacity; most can test for conventional parameters such as phosphorous and suspended solids; a few can test for some metals and phenols.

(iv) Record keeping.

The CELRF study indicates that most municipalities keep files on industrial sewer users. Larger municipalities keep fairly comprehensive records including all survey information and monitoring data. This information is generally confidential and not available to the public. Municipalities do not release summary information on the level of compliance with sewer-use by-laws or any detailed information on types and amounts of contaminants discharged. Most municipalities surveyed are using manual record keeping systems. However, as indicated in Table 3.2, one municipality has a fully computerized record keeping system and four others are in the process of converting to a computerized system.[82]

(v) Enforcement

Investigations. The 1976 model bylaw provides that municipalities may "...enter any commercial or industrial premises to observe, measure, and sample the flow of sewage to any sewer". Eight of the eleven municipalities in the CELRF survey have incorporated a provision similar to this one into their sewer-use bylaw.

Investigations of industries suspected of violating sewer-use bylaws are undertaken by municipal staff who are also responsible for regular monitoring and efforts to promote voluntary compliance. This distinguishes municipal enforcement efforts for industries discharging into sewers from enforcement activities of the Provincial Ministry of the Environment for direct

dischargers. The provincial ministry employs local abatement officers who work with the industries to ensure compliance. Cases of non-compliance which could lead to prosecution are handled by investigation officers. None of the municipalities surveyed distinguished between these two functions. Generally, municipalities use investigations as a 'last resort' when efforts to ensure voluntary compliance fail.

Prosecutions. Both the Environment Canada and the CELRF surveys indicate that municipalities rarely initiate legal action to enforce sewer-use by-laws. The CELRF survey indicated that 9 of the 11 municipalities surveyed have never prosecuted an industry under their sewer-use bylaw. Municipal officials identified a number of reasons for the reluctance of municipalities to prosecute.[83]

High profile prosecutions can damage the relationship between the municipality and its industry constituents.

Maximum fines for violations, established in the Municipal Act, are not high enough to deter industrial dischargers.

Successful prosecutions place a high demand on municipal resources and manpower.

Municipalities do not have adequate investigation powers to gather the evidence needed for successful prosecutions. Even where by-laws empower municipal staff to gain access to private property in order to monitor industrial sewer-use, some municipal officials are reluctant to exercise this power.

Some municipal enforcement personnel follow the practice of obtaining council approval prior to prosecution under sewer-use bylaws. In these cases municipal councillors often elect to postpone the prosecution until further efforts are made to bring the industry into compliance voluntarily.

The Municipality of Metropolitan Toronto has a policy to prosecute industries that violate sewer-use standards. The municipality laid 300 charges in 1985, and 163 in 1986/1987. During this three year period, it has been successful in convicting offenders in 90 per cent of the cases that reached the courts.[84]

Sanctions. The Municipal Act establishes a maximum fine of $2,000 for bylaw violations. Current sewer use by-law sets fines at or below this $2,000 maximum. As indicated in Table 3.2, many have elected to set fines considerably below this level. For example, of the 11 municipalities in the CELRF survey, five established maximum fines of $300 per offence, and only three have incorporated the maximum allowable fine.

Three of the bylaws surveyed empower the municipality to disconnect industries from the municipality's sewer system. It has been suggested that this provision would be an effective sanction for industries that fail to comply with sewer-use bylaws.[85] None of the municipalities surveyed, however, have ever cut off municipal services to industries which violate sewer-use standards.

The Provincial Government, introduced a bill into the Legislature which amends the Municipal Act to allow municipalities to impose higher fines for sewer-use violations.[87] Section 11 of the proposed legislation would increase maximum allowable fines for individuals to $5,000 for first offences and $20,000 for subsequent offences. Fines for corporations would be increased to $25,000 and $50,000. These changes would only apply to local municipalities.

In its submission to the Government on the proposed legislative amendments the Association of Municipalities of Ontario (AMO) recommended that higher fine limits apply to both tiers of municipal government.[88] It has also recommended that another major shortcoming of the bill be addressed: even with the proposed changes municipalities cannot impose sanctions for environmental offences which are consistent with those now available to the Provincial Government. Recent changes to the Environmental Protection Act[89] allow the province to impose maximum fines on individuals and corporations which are twice as high as those municipalities may impose under Bill 59, and to

subject polluters to a maximum of one year's imprisonment. AMO noted that these tougher penalties would apply to municipalities that fail to detect illegal sewer discharges but not to the person or company responsible for the discharge.

D) Findings

Only a few municipalities are making efforts to promote voluntary compliance with sewer-use standards. This is done by municipal staff through on-site inspections and discussions with industrial users.

While a few municipalities utilize industrial waste surveys to gather information on the nature of industrial wastes discharged to municipal sewers most know little about the actual types and amounts of toxic contaminants entering their system.

Municipalities do not generally require industries to report regularly on discharges to sewers. Instead, most municipalities with compliance programs undertake their own monitoring, a combination of regular monitoring of some industries and random spot-inspections for most industrial sewer-users.

Municipalities monitor for only a small number of contaminants discharged into municipal sewer systems.

Municipal monitoring efforts are constrained by inadequate resources and a shortage of laboratory facilities and equipment.

Excepting the Municipality of Metropolitan Toronto, municipalities rarely if ever prosecute companies for violating sewer-use bylaws.

There is a lack of uniformity across the province with respect to efforts to ensure compliance with sewer-use standards. Each municipality has its own level of monitoring and enforcement and the methods used to ensure compliance vary from municipality to municipality.

The manpower and resources expended on efforts to ensure compliance with sewer-use bylaws varies from municipality to municipality. Smaller municipalities and municipalities in northern Ontario do not have programs in place to ensure compliance with sewer-use bylaws. These municipalities do not undertake regular monitoring and enforcement activities. Larger municipalities have established an office responsible for ensuring compliance with sewer-use bylaws with an annual operating budget and full-time staffing.

3.3 New Developments

3.3.1 The 1988 Draft Model Sewer-Use Bylaw

In 1985, the Industrial Sewer-Use Control Bylaw Review Committee was established, with representation from the MOE Water Resources Branch, Environment Canada and the Municipal Engineers Association, to develop a new model sewer-use bylaw. In June, 1987, the Ministry released a new model bylaw in draft form for public comment and on August 17, 1988 the completed bylaw was released. Through the bylaw, the review committee is proposing a number of significant changes to regulatory practices in Ontario. These are discussed below.

A) Standards Under the 1988 Model Bylaw

(i) General Prohibitions

The 1988 model bylaw expands the general prohibition contained in most current municipal bylaws by prohibiting sewer discharge of any substance which may cause sewage treatment effluents to contravene standards under the Environmental Protection Act or Ontario Water Resources Act, or cause sludges, generated by sewage treatment plant processes, to fail to meet the provincial sludge quality guidelines.[90] These guidelines are applicable when the sludges are to be applied to agricultural land. As is the case with the current bylaws, the new model bylaw does not provide sufficient detail on how this general prohibition is to be applied. For example, the bylaw does not

specify how the municipality is to determine whether the contaminants contained in the industrial effluent will cause STP effuent or sludge to contravene provincial standards. Further, a violation can be determined only after that contaminant has been discharged into municipal sewer systems. The standard fails to account for the fact that contaminants discharged into municipal sewer systems may escape into the environment prior to, or during, sewage treatment plant processes.

(ii) Specific Prohibitions

The bylaw bans a number of substances from municipal sewer systems. Specifically, the bylaw prohibits the discharge into municipal sewer systems of any amount of sewage containing:[91]

fuel;

PCBs;

pesticides;

severely toxic materials;

waste radioactive materials;

hauled sewage;

waste disposal site leachate; and

hazardous wastes, including acute hazardous waste chemicals, hazardous industrial wastes, hazardous waste chemicals, ignitable wastes, pathological wastes, PCB wastes, and reactive wastes.

The bylaw defines most of these prohibited substances by a reference to existing provincial legislation. All types of hazardous wastes to be

prohibited, as well as severely toxic materials, are defined by reference to Ontario Regulation 309 under the Environmental Protection Act.[92] Hauled sewage is also defined by reference to this Act.[93]

The Regulation 309 Prohibitions. Part V of the Environmental Protection Act establishes an approvals process for all waste management activities in the province including activities to manage all commercial, liquid industrial, and hazardous wastes generated. Regulation 309, passed pursuant to this Part, establishes specific requirements for the management of industry-generated wastes. This regulation requires the generating industry to register, with the Provincial Government, the hazardous and industrial wastes it generates. Further, it imposes on industry responsibility for tracking the wastes that leave the generation site and ensuring that these wastes are safely disposed of at provincially approved waste disposal facilities.[94] The Regulation also defines the types of industrial wastes which must be registered and monitored by the generating industry.[95]

The model bylaw prohibits the discharge of substances which have been defined under this regulation. For example, the severely toxic materials which are banned by the bylaw are, in fact, the seven organic chemicals compounds in Schedule 3 of the Regulation. The hazardous industrial wastes prohibited in the bylaw are set out in Schedule 1 of the Regulation. Schedule 1 wastes are specific hazardous wastes that have been identified as by-products of industrial processes in the province. Each waste is defined by reference to the industrial process from which is generated. Acute hazardous waste chemicals and hazardous waste chemicals are those chemicals which are listed in schedules 2A and 2B respectively, in the regulation. These schedules set forward a listing of potentially hazardous products used in industrial processes. The regulation states that these products are only prohibited if

they are discharged into the environment in pure form. This means that if a wastestream contains hazardous waste chemicals or acute hazardous waste chemicals, they are not prohibited under the bylaw since these chemicals are being discharged as part of a wastestream as opposed to being discharged in pure form.

There are a number of exceptions to the specific prohibitions set out in the bylaw:

> Waste radioactive materials may be discharged in accordance with a licence from the Atomic Energy Control Board, or in small quantities where approved by the Ontario Ministry of the Environment and the local municipality;[96]
>
> trace amounts of PCBs may be discharged where the discharger obtains approval from the Ontario Ministry of the Environment;[97]
>
> waste disposal site leachate may be discharged where the discharger has obtained the required approval from the Ministry of the Environment and permission from the relevant municipality;[98] and
>
> carriers of hauled sewage may discharge this sewage into municipal sewers provided that approval has been obtained from both the Ministry of the Environment and the relevant municipality, and that the discharge occurs at the approved time and location.[99]

In addition, Regulation 309 establishes a number of specific exemptions which may be applicable to substances prohibited under the bylaw. Most important of these are the small quantity exemptions set out in the regulation and summarized in Table 3.3.[100]

If an industry generates less than the specified quantities of the above substances, it is not required to register that contaminant with the Ontario Ministry of the Environment. This means, in effect, that small quantity generators are not subject to the regulatory regime for controlling industrial wastes set out in Regulation 309. The bylaw does not expressly state whether

these small quantity exemptions will apply to industries that discharge into municipal sewers. The intent of the drafters of the bylaw, however, appears to be that these exemptions should not apply to the discharge of hazardous wastes to sewers. The Ontario Ministry of the Environment has taken the position that exemptions under Regulation 309 are not applicable to the prohibitions in the model bylaw since those small quantity exemptions have not been expressly included.[102]

(iii) Specific Limits

The new model bylaw proposes a number of changes in the setting of specific limits on contaminants. The following changes from the 1976 bylaw represent significant advancements in the standard-setting approach.

Stricter Limits. As indicated in Table 3.1, the new model bylaw sets out stricter limits for copper, nickel, zinc, cadmium and phosphorous. Further, specific limits are set for both organic and inorganic solvent extractable matter, BOD and suspended solids -- parameters which were formally left to the discretion of the municipality. No changes were suggested for the other 13 specifically limited substances under the 1975 bylaw.

More Metals. The new bylaw sets concentration limits for nine metals not controlled under the 1975 bylaw. One metal for which a limit was set under the old bylaw, barium, is not included in the 1988 version.

Prohibition on Dilution. Section (2) of the bylaw states that any water added to industrial effluent for the purpose of meeting a concentration limit set out in the bylaw is to be disregarded for the purposes of determining whether

that limit has been met. The purpose of this provision is to ensure that industries cannot meet the limits set out in the bylaw by dilution.

(iv) Program Approvals

Like its predecessor, the 1988 model sewer-use bylaw permits the use of program approvals, whereby non-complying industries are given a deadline for installation of pollution control equipment, but are permitted to discharge effluent which contravenes sewer-use standards during the installation period. However, the new bylaw sets out the process for obtaining program approvals in greater detail than the 1975 bylaw. Specifically, the bylaw requires that the program approval be for a specified length of time and be specific as to the remedial action to be implemented, the dates of commencement and completion, and the contaminants and other characteristics of the sewage or storm water to be discharged while the approval is in effect.[102] The bylaw also requires that the industry submit an activity report to the municipality following the scheduled completion date for each activity listed in the program approval. The form that both the program approval and the activity progress report must take are attached as appendices to the 1988 model by-law.[103]

If implemented, the program approval process set out in the new model bylaw would require industries to put in place a pretreatment program to ensure compliance with bylaw requirements. These provisions represent a significant advancement since the bylaw requires strict adherence to deadlines for putting such a program in place.

(v) Discharge Agreements

The 1988 bylaw continues the practice of permitting municipalities to enter into agreements that sanction discharges by industries in excess of bylaw limits.[104] However, the bylaw expressly limits the use of such agreements to the discharge of conventional pollutants, phenolic compounds, solvent extractable matter, kjeldahl nitrogen and phosphorous.[105] All other substances controlled by the bylaw including metals, hazardous wastes and other persistent toxic substances, cannot be the subject of discharge agreements.[106] The bylaw also specifies the form the discharge agreement must take. This restricted use of discharge agreements is aimed at allowing municipalities to provide treatment services to industries for wastes which the sewage treatment plant is capable of adequately treating on a user fee basis. It should be noted, however, that the bylaw does not expressly require the agreeing parties to demonstrate that the municipal sewage treatment facility can safely treat and dispose of the volumes and types of wastes set out in the agreement without increasing the threat to the natural environment. Without such assurances, discharge agreements may well prove to be a licence to pollute.

B) Compliance under the Draft By-Law

(i) Monitoring

Waste Survey Reports. The model bylaw states that all dischargers within a municipality must submit to the municipality a waste survey report in the form set out in an appendix to the bylaw, by a deadline to be specified by the municipality. The bylaw specifies that following that deadline any

industry which has not submitted to the municipality its waste survey report shall not be allowed to discharge into the municipalities' combined, sanitary or storm sewers.[107]

Waste survey reports are to include the following information:[108]

description of process operations, including rates of production, hours of operation and standard industrial classification codes;

description of the waste discharge points;

generator registration number assigned under Ontario Regulation 309;

information about wastes generated which have been submitted to the Ontario Ministry of the Environment under Regulation 309;

information on wastes and pollutants discharged, including an indication of whether the wastes generated by the industry contain any of the contaminants controlled or prohibited under the bylaw; and

information on pretreatment devices or processes used.

The owner or operator of the discharging premises is required to report any changes to the information set out in the survey within 30 days of the change and submit a new waste survey report within 60 days of the change.[109]

If implemented province-wide, a waste survey report could provide essential information for setting standards and ensuring compliance with standards for industrial discharges. By cross-referencing this information with the data collected on industrial wastes by the Provincial Ministry of the Environment under Regulation 309, the proposed waste surveys will provide regulators with an integrated database on the generation, movement, treatment and disposal of industrial wastes in Ontario. However, many smaller municipalities may not have the resources or staff expertise required to gather and utilize the information required in the waste survey report. Moreover, the bylaw does not specify who has access to the information gathered, or provide any mechanism

for public access and information sharing with the Ontario Ministry of the Environment.

Sampling and Analysis. The 1988 model bylaw establishes a few basic ground rules for sampling and analysis:[110]

one sample, either a grab sample or a composite sample, is sufficient to determine the contents of the sewage;

testing and analysis is to be done according to standard methods as set out either by the Ontario Ministry of the Environment or in Standard Methods of the Examination for Water and Wastewater; and

metals, limited by the bylaw, are to be analyzed for quantity of total metal in the sample.

Industry Self-Monitoring and Reporting. The new bylaw permits municipalities to require industries to install and maintain devices to monitor sewer discharges and to submit monitoring reports to the municipality.[111]

Spills. The 1988 model bylaw establishes a notification process for discharges or deposits to combined, sanitary or storm sewers which are "not in the ordinary course of events". If such a discharge occurs, the industry is required to notify either the municipality or the agency responsible for operating or managing the sewer works "forthwith". The industry must provide information on the time of the spill, the type and volume of material discharged and the corrective action being taken to control the spill. Within five days following the spill the industry is required to submit a report to the municipality which describes the cause of the spill and the actions being taken to prevent reocurrence.[112]

(ii) Enforcement of the 1988 Model Bylaw

The 1988 bylaw incorporates the fine increases contemplated in the proposed amendments to the Municipal Act discussed above.[113]

C) Evaluation

By establishing specific prohibitions based on work done at the provincial level to identify and control industrial wastes, the 1987 model sewer-use bylaw review committee has significantly advanced the standard setting process for industrial sewer-use regulation. However, the model bylaw approach does not address the problem of lack of uniformity in the application of standards. Municipalities may choose not to implement some or all of the bylaw provisions. The specific prohibitions established under the bylaw incorporate provincial standards under Regulation 309. The proposed industrial waste survey, drafted by the bylaw review committee, requires industry to provide specific information relating to Regulation 309, to the municipality. These overlaps reflect the provincial interest in controlling the discharge of industrial contaminants into the environment. However, requiring municipalities to set and ensure compliance with standards developed at the provincial level raises a number of potential problems including:

confusion at the municipal level in the implementation of standards developed by the senior level of government; and

conflict between the two levels of government regarding the interpretation of the application of provincial standards.

D. Findings

The 1988 model sewer-use bylaw proposes a number of changes which would increase environmental protection from industrial discharges into municipal sewer systems including:

prohibiting the discharge of a number of hazardous contaminants not addressed by current bylaws;

establishing stricter control over discharge to storm sewers;

prohibiting the practice of dilution to meet standards;

requiring specific deadlines for industries implementing pretreatment programs in order to meet standards;

restricting the types of substances that can be discharged in contravention of bylaw standards pursuant to discharge agreements

promoting increased information gathering and monitoring through waste survey forms, industry notification requirements for sewer spills, and a provision which allow municipalities to require industry self-monitoring and regular reporting.

The achievements in the 1988 bylaw are offset by the continued reliance on bylaws as a standard setting instrument and on municipal governments of varying size and environmental commitment to implement the sewer-use control program.

E) Recommendations

Recommendations regarding the 1988 model sewer use bylaw discussed in this section are incorporated into the recommended strategy for control at source developed in Part II.

3.3.2 Sewer-Use and the Municipal Industrial Strategy for Abatement (MISA)

A) Overview of MISA

In June 1986, the Ontario Ministry of Environment released a white paper describing a new program to control municipal and industrial discharges into surface waters.[114] The stated objective of this program is "virtual elimination of toxic contaminants in municipal and industrial discharges into waterways".[115] In order to achieve this objective the MISA program breaks with the past in three ways:[116]

i. standards are to be developed based on total loading into the environment rather than concentration;

ii. the program will focus on control of toxic discharges at the source; and

iii. standards will be set in regulation and applied uniformly across the province, rather than on a case-by-case basis, by conditions of approval, control orders or abatement agreements with individual dischargers.

The program combines two standard setting approaches.

i. Technology Based Standards. Initially, the major criterion for standard-setting is to be the best available technology that is economically achievable (BATEA). Technology-based standards will be developed for each industrial and municipal sector.

ii. Water Quality-Based Standards. In cases where BATEA standards prove insufficient to ensure environmental protection, water quality standards will be developed based on detailed assessment of receiving waterbodies.

Both the Ministry and the regulated sectors are currently focused on the program's technology-based track. BATEA standards are being developed for the eight industrial sectors and one municipal sector which discharge directly into Ontario waterbodies. Standards are being developed in three stages:[117]

Preregulation, which involves initial consultation with the regulated sector and initial monitoring to provide data for developing regulations;

Monitoring regulation, which will require industries to monitor effluent and report to the Ministry; and

Effluent limits regulations, which are to be based on data gathered under the monitoring regulation and on a pollution-control technology assessment.

There are four evolving components of the MISA program which will have an impact on the development of regulations for industrial sewer-use. These components are discussed in the following four sections.

B) Effluent Monitoring Pollutants List

In October, 1986 a federal-provincial task force was established for the purpose of assisting in the identification and listing of toxic contaminants to be regulated under the MISA program.[118] The task force had a mandate to develop a list of chemicals which have been detected or are potentially present in industrial or municipal effluent in Ontario and could pose a hazard to the receiving environment.[119] According to the terms of reference for the task force, this listing was to serve the following purposes:

establish a basis for the development of the monitoring and effluent limit regulations; and

establish formal characterization requirements in the monitoring regulations;

focus government and public attention on the control of specific contaminants;

set priorities for

- development of laboratory testing protocols,
- research to be done,
- provincial water quality objectives, and
- ambient monitoring program.

In August, 1987, the Task Force released an Effluent Monitoring Priority Pollutants List (EMPPL) for public review. This list was developed in two steps:

i. **Chemical Identification:**
A comprehensive list of more than 1,500 candidate chemicals was compiled after surveying American and international chemical lists. Those lists had been gathered by agencies and organizations which have assessment and regulatory responsibilities. As the list is expanded it could incorporate additional contaminants identified by the monitoring of Ontario's industrial sectors under MISA.[120]

These identified chemicals were assessed to identify potential effects, environmental fate, and risks of exposure. Chemicals were reviewed in terms of "concern level" in the following categories:

ii. **Preliminary Hazard Assessment:**
In the time it had available to develop a EMPPL the Task Force was not able to comprehensively assess all 1500 chemicals. Instead, it undertook a less rigorous preliminary review in an attempt to identify candidates for priority action. The Task Force considered

- persistence;
- bio-accumulation;
- acute toxicity;
- hereditary mutagenicity;
- teratogenicity;
- carcinogenicity; and
- other adverse effects.[121]

Using this approach the task force has so far promoted 180 chemicals to the effluent monitoring priority pollutants list.[122]

In addition to establishing the 1987 version of the priority pollutants list, the task force report recommended that a process be established for the further development of listing.[123] It was recommended that this process should include a means of modifying and updating the list as new information becomes available, and a mechanism for external review and input. The process is to be implemented by a permanent working group. This group's recommendations for listing and delisting chemicals would be reviewed by an advisory committee prior to a final decision. The task force also recommended that the working group be responsible for gathering a comprehensive database,

undertaking the more detailed hazard assessment and developing a means to feed information from subsequent montioring efforts back into the listing process. The work of the task force provides a good starting point for setting advisory committee prior to a final decision. The task force also recommended that the working group be responsible for gathering a comprehensive database, undertaking more detailed hazard assessment and developing a means to feed information from subsequent monitoring efforts back into the listing process. standards to control the discharge of hazardous chemicals into the environment. It provides a vehicle for the ongoing process of identifying and reviewing chemicals that pose a threat to the environment and ensuring that these chemicals are controlled by regulation. However, as the role of the EMPPL and the proposed listing process is developed over the next few years, the following issues should be considered.

First, the need to control pharmaceuticals and pesticides as part of the province's water quality efforts should be assessed. In developing the EMPPL, the Task Force expressly excluded consideration of these substances.[124] This was largely because the presence of these substances in industrial and sewage treatment plant effluent may be due to their presence in the industrial intake waters and influent to sewage treatment plants, resulting from household use. Since MISA was initially designed to address the discharge of toxic chemicals primarily from industrial sources the task force reasoned that the EMPPL would not be an appropriate instrument to address the environmental release of pesticides and pharmaceuticals. However, the water quality track of the MISA program may require identification and control of non-industry contributors to pollution problems in order to meet water quality objectives. If the priority pollutants list is to serve the broader water quality objectives of the MISA program, the listing should not exclude any pollutants that pose a risk to the environment.

Second, the task force's report suggests that the priority pollutants listing process should be used mainly to identify chemicals for which there is sufficient concern to warrant further monitoring for the development of technology-based standards under MISA.[125] However, the listing could serve a number of other purposes including:

the purposes identified in the terms of reference for the task force as listed above;

ranking pollutants in terms of risks to the environment and identification of pollutants which should be banned or more strictly controlled; and

providing information on chemicals that could be used as part of the water quality track of the standard-setting process.

Third, membership of the task force was restricted to government officals from Environment Canada and the Ontario Ministry of the Environment.[126] Public input into the process for producing the 1987 priority pollutants list was restricted to a public review period following completion of the task force's work. The task force has recommended no change in this approach for future listing and the delisting of priority pollutants.[127] The use of non-government experts on the permanent listing/delisting group would bring a fresh perspective and increased credibility to the decision making process.

C) Technology-Based Standards

The initial regulatory action of the MISA program is focused primarily on the development of technology-based standards for nine categories of direct dischargers. These categories include eight major industrial sectors which discharge directly into Ontario waterbodies and the municipal sector which discharges STP effluent.

For each sector, a Joint Technical Committee (JTC) composed of MOE, Environment Canada, and representatives of the sector have been established. Each joint committee is responsible for developing first, the monitoring regulation and second, the regulatory standards for effluent of discharges in that sector.

The monitoring regulation will require each sector to monitor toxic contaminants commonly discharged. Industry self-monitoring will be backed up by on-site inspections by Ministry Staff. Failure to comply with the monitoring regulation will lead to prosecution under the Environmental Protection Act. Information obtained during the monitoring regulation phase will be used to develop effluent limit regulations to be based on "best available technology economically achievable". Socio-economic impact studies will be done for each sector to assist in the preparation of the effluent limit regulation.[128]

Both the monitoring regulation and the effluent limit regulation will be reviewed by the MISA Advisory Committee (MAC), an independent group of experts which advises the Minister on matters related to the MISA program. There is also a public review period.

The work of the Joint Technical Committee on the Municipal Sector JTC is of particular importance to this report since the information obtained during the development of monitoring regulations for municipal sewage treatment plants will assist in the assessment of the problem of industrial discharge into municipal sewers.

As discussed in Chapter 2 above, the MOE has commissioned a 40-plant survey of sewage treatment facilities. The purpose of this study is to assist in the development of regulations for discharges by municipal STPs.

However, the 40-plant survey will also provide information on the ability of sewage treatment plants to treat industrial effluent discharged to sewers. This information will be useful both in developing effluent limits for sewage treatment plants, and in the standard setting process for industrial sewer use. The Ministry is now planning to develop a monitoring regulation for the municipal sector. MAC, however, has recommended to the Minister of the Environment that the information obtained in the 40 STPs surveyed should be used as the basis for developing effluent limits for sewage treatment plants, and that resources should not be expended on developing a monitoring regulation for the municipal sector.[129] Instead, MAC recommends that primary efforts be directed toward developing BATEA standards for industrial sewer-users.

D) Water Quality-Based Standards

The white paper states that the water quality track of the MISA program will require dischargers to carry out receiving water assessments to evaluate the impacts of their discharges on receiving waterbodies.[130] It further states that the calculation of water quality effluent limits would require the collection and analysis of data on existing water quality, effluent quality, sediment, aquatic life, and local stream flow and lake currents. The Ministry would select modelling and other assessment techniques to determine the impact of discharges on receiving waterbodies and the effluent limits required to protect receiving water quality at a given site would be determined.[131] The Ministry envisioned that the BATEA effluent limits would be in place prior to the consideration of water quality standards. The intent is to use the water quality track as a complement to the BATEA approach where it was

determined that more stringent limits were necessary to protect "particularly sensitive receiving waterbodies".[132] Thus, water quality standards will be required only for industries that are discharging into "sensitive receiving waters". The white paper proposes that initially the Ministry will identify and prioritize sensitive receiving waters using existing information and knowledge of areas of concern and local water uses.[133] The selection and ranking of sensitive receiving waters will provide dischargers with some warning of whether they will be required to undertake detailed water quality impact studies.[134]

The Ministry has initiated the water quality track of the MISA program by conducting field studies at six pilot sites across the province in order to assess the impact of various discharges on receiving waterbodies. These pilot studies are to be completed by the end of 1989, and will serve as test cases for development of water quality standards in other areas.

However, most of the work on water quality track of the MISA program has been deferred until the technology-based standards are in place. This sequential approach may create future problems if, after industries have expended resources on pollution control equipment to meet one set of standards, they are required to expend further resources in order to meet a second set of standards. Further, the water quality approach will provide information on local water quality problems, which would be valuable early in the standard-setting process. Although the Ministry has begun to study six areas, environmental problems at other locations across the province would not be identified until much later in the process. Both industry and environmental groups have expressed concern about the lack of clarity on how these two tracks will be co-ordinated into one consistent set of standards.

E) Response to the White Paper

In January, 1987, the Ministry of the Environment released a summary of the public review of the MISA white paper and its proposed response. Concerns were raised regarding the development of both industrial-sector regulation and municipal sector regulation.

Concerns about standards for industry. Industry expressed concern over the application of future load reductions beyond BATEA and recommended that periodic review of a limit should require consideration of the economic impacts on industry. BATEA is not clearly defined by the program and may not provide adequate protection of receiving waterbodies. They recommend that BATEA should be defined in regulation, and that a higher prominence be given to the water quality track of the MISA program.

Environmental groups were concerned that emphasis on economic considerations in the standard-setting process -- and giving joint government-industry committees primary responsibility for developing regulations -- will cause the standard-setting process to devolve into negotiations between the regulator and the regulated industry.

Concerns about standards for municipal STPs. Municipalities stated that the additional cost to the municipality of regulation under MISA, including monitoring, treatment upgrading, enforcement, and administration, would be difficult to meet. Municipalities also argue that they "could save millions in expensive upgrading if effective pretreatment programs were established and paid for by industry in accordance with the "polluter-pays principle". Environmental groups, members of the public and some municipalities were concerned that the focus of the MISA white paper was on the regulation of

direct dischargers while little detail was given on how indirect dischargers would be regulated under MISA. It was recommended that the Province assume greater responsibility for control of discharges into sewer systems by taking the following steps:

develop technology-based standards for indirect dischargers to reduce toxics coming into sewers and sewage treatment plants, at the same time as the development of direct discharger standards;

improve the sewer-use bylaw and provide greater financial/investigative support to municipalities to improve enforcement capabilities;

remove the exemption of municipal sewage treatment plants from prosecution established under the OWRA; and

adopt a long-term goal of completely phasing out the use of Ontario's municipal sewer systems for any toxic discharges since municipal STPs are not designed to treat toxic waste successfully.

F) Sewer-Use Control Options

As a result of the response to the white paper, the Ministry began to focus in more detail on the development of a strategy to regulate industrial sewer-use. In February, 1987, the Ministry, through the MISA Municipal Sector Joint Technical Committee, initiated a study of sewer-use control options.[135] This study, prepared by the consulting firm of M.M. Dillon Ltd., had two objectives:[136]

i. to assess alternatives for controlling industrial and domestic use of municipal sewers; and

ii. to identify a preferred control option.

The study was completed in two phases, with the first phase released for public comment in December, 1987 and the second phase released in March, 1987.

Phase One. The first phase of the study involved reviewing current sewer-use

control practices in the U.S., the U.K., France, Germany, Japan, as well as Canada. These options were then screened to identify control options worthy of more detailed consideration in Phase 2 of the study. Preferred control options were selected on the basis of compatibility with the objectives and basic method of MISA and compatibility with Ontario's "basic jurisdictional framework".

Using these criteria the control options currently in place in England, Japan and Canada were excluded.[137] The exclusion of the Canadian approach was based on a review of the April, 1987, draft model bylaw which was determined to be "as advanced as any other control program" in the country. It was concluded that the model bylaw was not consistent with the MISA objective of "virtual elimination of toxics to surface water" since it does not address toxic organic discharges to sewer systems. Phase 1 identified eight options for further study.[138] These included the German and French approaches as well as two options suggested by the U.S. experience. The other four options were "hybrid" options identified from the collective data of these countries. For the purposes of summarizing and distinguishing between each option, they were each characterized in terms of three factors.

i. Type of Standard. Options were described as either "categorical pretreatment standards" or "industrial effluent quality standards". Pretreatment standards are defined as permissible concentration limit or mass emission applicable to a specific industrial category and based on best available technology. Industrial effluent quality standards are emission standards set for all industry.

ii. Cost to Industry v. Incentives. Each option was characterized according to whether the regulator offers industry a fiscal incentive to reduce pollution.

iii. Regulatory Authority. Each option was characterized according to the level of government that sets and enforces standards. The options considered include regimes where:

- regulations are set by the senior level of government but enforced by the junior level;
- regulations are set and enforced by the senior level of government; and
- regulations are set and enforced by the junior level of government.

Phase Two. The second phase of the study involved selecting a preferred option from the eight options identified in Phase 1 using a two-step evaluation process. First the options were evaluated according to their "effectiveness".[139] This was defined as a measure of the option's ability to abate the discharge of pollutants from industry into municipal sewer systems and minimize subsequent impacts on the environment. Second, each option was examined to determine whether the cost implications of implementing the program would modify the initial ranking according to "effectiveness".[140] This evaluation process resulted in the selection of a program based on the current U.S. program with some modifications. The preferred option would have the following features.[141]

. Technology-based standards would be set for identified categories of indirect dischargers along with one industry-wide standard for industies not included in the categories identified.

. Regulations would be set by the province with an option for municipalities to set more stringent standards if they can demonstrate a need based for example, on the impact on quality of local receiving water.

. Regulations would be enforced by the local or regional municipality with provincial auditing, unless "local capability does not exist" in which case the province would become the enforcement agency.

(G) Findings: The MISA Program

. The process for establishing Effluent Monitoring Priority Pollutants is not yet well developed. There is no provision for non-government representatives on the group responsible for development of the list, and the way in which the listing fits into the standard-setting process is not clearly established.

- By imposing stricter standards on sewage treatment plants, the MISA program substantially increases the burden on municipalities to control industrial discharges to municipal sewer systems. However, the white paper does not address the question of how these additional responsibilities should be carried out.

- Joint Technical Committees for eight industrial sectors and one municipal sector have been allocated primary responsibility for developing regulations under the MISA program. Environmental interest groups are not represented on these committees.

- The water quality track of the MISA program appears to have been, for the most part, deferred until technology-based standards are in place.

- The Ministry's recently completed study of sewer-use control options concluded that any strategy for regulating industrial sewer-use must involve province wide standards and focus on control at source.

(H) Recommendations

Recommendations discussed in this analysis of the MISA program are incorporated into the strategy for control at source developed in Part II of this report.

NOTES - CHAPTER 3

1. Great Lakes Water Quality Agreement of 1978, Agreement, with annexes, and terms of reference between the United States of America and Canada, signed at Ottawa, November 22, 1978, and the 1987 amendments to the Agreement, Article II.

2. Agreement between the United States of America and Canada respecting water quality, with schedules, signed at Ottawa, April 1, 1985.

3. Great Lakes Agreement, supra. note 1, Annex 12.

4. Ibid., Annex 10, Appendix A.

5. Ibid., Article VI.

6. Ibid., Article VI (a).

7. Amendments to Great Lakes Water Quality Agreement of 1978, with amendments to Annexes and new Annexes 13-17.

8. Treaty Relating To Boundary Waters And Questions Arising Along The Boundary Between Canada And The United States, January 11, 1909.

9. Ibid.

10. Great Lakes Water Quality Board, International Joint Commission on Great Lakes Water Quality, Appendix A, p. 3.

11. Ibid., p. 1.

12. Ibid.

13. Ibid., pp. 2-3.

14. Infra., section 5.4.2 (C). See also the discussion of water quality based standards under MISA infra., section 3.3.2 (D).

15. Municipal Abatement Task Force, Report to the Great Lakes Water Quality Board, a Review of the Municipal Pollution Abatement Program in the Great Lakes Basin. (Windsor: November, 1983).

16. Ibid., p. 100.

17. Ibid.

18. Ibid.

19. Ibid., p. 101.

20. "Terms of Reference of the Municipal Pretreatment Task Force of the Great Lakes Water Quality Board", February 4, 1987.

21. Fisheries Act, RSC 1970 c. f-14 (as amended)ss.31-33.

22. Canada Shipping Act, RSC, 1970 c. s.9 (as amended).

23. Navigable Waters Act, RSC, 1970. c.N-19 (as amended).s.5.

24. MISA Priority Pollutants Task Force, Effluent Monitoring Priority Pollutants List (MOE, August 1987). Discussed infra., section 3.3.2 (B).

25. Environment Canada, Federal Water Policy, November, 1987 at p. 21.

26. Ibid.

27. Ontario Ministry of the Environment et. al. A Model By-Law to Control Waste Discharges to Municipal Sewers (MOE, August 17, 1988).

28. Simcoe Engineering Limited, Sewer Use By-Law Implementation and Enforcement: Current and Recommended Practices, Environment Canada, 1986.

29. Infra., section 3.2, 3.3.1.

30. Environmental Protection Act, RSO 1980 (as amended).

31. Ontario Water Resources Act. RSO 1980 (as amended).

32. Environmental Protection Act supra., note 30. ss. 24-47h.

33. Ibid., ss. 62-72.

34. Ibid., ss. 79-112.

35. Ibid., ss. 113-116.

36. Ibid., ss. 117-119.

37. Ibid., ss. 146, 146(a)-146(f), 147.

38. Ibid., ss. 126-130.

39. Supra., note 31, s. 16.

40. Ibid., ss. 21-22(q).

41. Ibid., s. 23

42. Ibid., ss. 24-33.

43. Ibid., s. 41-(1)(f), s. 52-(1).

44. Ibid., s. 24.

45. Ibid.

46. Ibid., s. 44-(1)(j)

47. Ibid., s. 16. and supra. note 46.

48. Environmental Protection Act, supra., note 30, Regulation 309, RRO 1980 (as amended), s.9. See also Regulation 308, RRO 1980 (as amended), for specific standards on air emissions.

49. Ibid., ss. 24-33, 136-(4)(c), (d).

50. Ontario Ministry of the Environment et. al. "Ontario's Guidelines for Sewage Sludge Utilization on Agricultural Land", (MOE: January, 1986).

51. Supra., p. 46.

52. Municipal Act, RSO 1980, c. 302. s. 210 p. 147.

53. See for example, Municipality of Metropolitan Toronto Act, RSO 1980, c.314 s. 56.

54. Environmental Statute Law Amendment Act, 1988, c. 54.

55. Ministry of the Environment, Municipal Engineers Association of Ontario, A By-Law to Control Industrial Waste Discharges to Industrial Sewers, (MOE, 1975).

56. 1988 Model By-Law, supra., note 27.

57. Ministry of the Environment Press Release, "New Program Offers Provincial Funds for Municipal Infrastructure Renewal", June 24, 1987.

58. Supra., note 53.

59. Supra., note 52.

60. Water Management Goals, Policies Objectives and Implementation Procedures (MOE, May, 1984).

61. Sludge Guidelines, supra., note 50.

62. Simcoe, supra., note 28.

63. 1975 Model Sewer Use By-Law, supra., note 55., s. 2.

64. Ibid., s.3.

65. Simcoe, supra., note 28, p. 26.

66. Ibid., p. 20.

67. Ibid., p. 21.

68. MISA Priority Pollutants Task Force, Effluent Monitoring Priority Pollutants List (Draft), (MOE, August, 1987).

69. Ontario Ministry of the Environment Press Release, "Study of Ontario Sewage Treatment Plants Reveals Presence of Dioxins, Furans and PCBs", (December 11, 1987).

70. Simcoe, supra., note 28, p.20.

71. Ibid.

72. Ibid.

73. Ibid., p. 41.

74. Personal communication, Ralph Lahowy, Manager, Waste Operations, Regional Municipality of Waterloo, May 17, 1988.

75. Ibid.

76. Personal communication,
Region of Halton, May 17, 1988.

77. Personal communication, Michael Glynn, Supervisor of Industrial Waste, Regional Municipality of Niagara, November 12, 1987.

78. Personal communication, Ralph Lahowy, Manager, Waste Operations, Regional Municipality of Waterloo, May 18, 1988.

79. Personal communication, Vic Lim, Senior Engineer, Water Pollution Control Division, Municipality of Metropolitan Toronto, November 7, 1987.

80. Simcoe, supra., note 28, pp. 27-30.

81. Harry Poch, "Liability under Municipal Bylaws" from The Company Polluted - So Why did I Get Charged?, a one-day conference of the Canadian Environmental Law Research Foundation (Toronto: January 21, 1988).

82. As indicated in Table 3.2, Waterloo has a fully computerized system, and Halton and Hastings are in the process of converting to a computerized system.

83. These reasons are abstracted from interviews with municipal staff for the CELRF survey. They do not represent a consensus among municipalities, but demonstrate the range of municipal concerns regarding current enforcement practices.

84. Supra., note 79.

85. Municipal Act, RRO 1980, c. 302 (as amended) s.321.

86. Harry Poch, P. PICKFIELD WILL PROVIDE FOOTNOTE.

87. Municipal Act Amendment Act, 1987 (Bill 59), First Reading, December 7, 1987.

88. Letter dated January 15, 1988 to the Honourable John Eakins, Minister of Municipal Affairs from the Association of Municipalities of Ontario.

89. Environmental Enforcement Statute Law Amendment Act, 1986, Statutes of Ontario, c. 68.

90. 1988 Model By-Law, supra., note 27, s.2(1).

91. Ibid., s. 2(1) 2(g), (r) and (s).

92. Supra., note 48, s.1.

93. Ibid.

94. Ibid., ss.15 and 16.

95. Ibid.

96. 1988 Model By-Law, supra., note 27, s.2(5).

97. Ibid., s.22(6).

98. Ibid., s.2(7).

99. Ibid., s.2(8).

100. Reg. 309 supra., note 48 s.1..

101. Personal communication, Brian LeClair, MOE, Water Resources Branch, Memeber, Sewer Use By-Law Committee, February 22, 1988.

102. 1988 Model By-Law supra., note 27 s.6.

103. Ibid., Schedules D and E.

104. Ibid., s.5.

105. Ibid., s.5(2).

106. Ibid., Schedule C.

107. Ibid., s.4(2).

108. Ibid., (Schedule B1).

109. Ibid., s.4(5).

110. Ibid., s.7.

111. Ibid., s.9(5).

112. Ibid., s.8.

113. Ibid., s.10. See also supra, section 3.2.2(B)(v).

114. Ontario Ministry of the Environment, Municipal-Industrial Strategy for Abatement (MISA): A Policy and Program Statement of the Government of Ontario on Controlling Municipal and Industrial Discharges to Surface Waters (MOE, June, 1986).

115. Ibid., p. 7.

116. Ibid., pp. 7- 8.

117. Ibid., pp. 18-23.

118. Priority Pollutants List, supra., note 68.

119. Ibid., Appendix B, "Terms of Reference MISA Priority Pollutants Task Force".

120. Ibid., pp. 5-9.

121. Ibid., pp. 9-16.

122. Ibid., p. 21.

123. Ibid., pp. 38-42.

124. Ibid., pp. 16-17.

125. Ibid., pp. 38-42.

126. Ibid., Appendix A.

127. Ibid., pp. 38-42.

128. MISA: A Policy Statement., supra., note 114. pp. 19-21.

129. Letter dated January 11, 1988 to the Honourable Jim Bradley, Minister of the Environment, from James MacLaren, Chairman, MISA Advisory Committee.

130. MISA: A Policy Statement, supra. note 114, pp. 8-9.

131. Ibid., p. 15.

132. Ibid.

133. Ibid., Appendix, p. 42.

134. Ontario Ministry of the Environment, Public Comment on the MISA White Paper and Ministry Response To It, (MOE, January, 1987).

135. Ontario Ministry of the Environment Press Release, "Contract Awarded for Study on Sewer Use Control Options", February 13, 1987.

136. M.M. Dillon Limited, Evaluation of Municipal Sewer Use Control Options - Phase I, (MOE, September, 1987).

137. Ibid., 9-5 to 9-10.

138. Ibid., 9-11 to 9-18.

139. M.M. Dillon Limited, Evaluation of Municipal Sewer Use Control Options - Phase II (MOE, March, 1988), pp. 25-65.

140. Ibid., pp. 67-71.

141. Ibid., p. iv.

CHAPTER 4 - CONCLUSIONS

4.1. The Need for Stricter Standards

In chapter 3[1] it was found that current sewer-use bylaws set standards based on concentration, and do not control the total loading of toxic contaminants entering sewers from discharging industries. It was further found that sewer-use by-laws set limits on relatively few toxic contaminants. Many toxic chemicals, identified by the MISA Federal-Provincial Task Force as potentially occuring in industrial effluent, are not controlled by sewer-use bylaws. Moreover, current standards have not been designed to meet the province's stated goal of virtual elimination of toxic substances entering Ontario's waterways, but for the narrower purpose of ensuring the safe and effective operation of sewage treatment facilities and sewage treatment plant workers.

Conclusion: Stricter standards to reduce the amounts of toxic substances entering the environment and control of a far wider range of contaminants than current sewer-use bylaws are required to meet provincial objectives for environmental protection.

4.2 The Need for Increased Compliance Efforts

In chapter 3, municipal efforts with respect to three types of compliance activities were discussed: promoting voluntary compliance, monitoring and enforcement.

Voluntary Compliance. It was found that a few municipalities made efforts to promote voluntary compliance by providing industries with information on current requirements under bylaws and assisting in the

development of program approvals, but that no municipalities are currently providing any financial or significant technical assistance to industries.[2]

Monitoring. Medium to large southern Ontario municipalities have generally developed a monitoring program. A few are beginning to develop a database on the types of industries discharging to their sewer systems and the types of wastes they generate, and many have inspection teams to randomly monitor discharging industries. Generally, smaller municipalities and those located in northern parts of the province undertake little or no monitoring. Most compliance programs across the province have insufficient resources and manpower to comprehensively monitor discharges to sewers on a regular basis and have not implemented an industry self-monitoring and reporting system for industrial sewer users.[3]

Enforcement. Few municipalities enforce sewer-use bylaws through prosecutions. Low fine levels and infrequent prosecutions provide insufficient incentive for violating industries to comply with municipal bylaws.[4]

There is no publicly available information on the current level of compliance with sewer-use bylaws in Ontario. However, the findings of Chapter 2 provide some indication of non-compliance. Chapter 2 identified problems with the operation of Ontario's sewage treatment facilities that can be attributed to industrial discharges to sewers, which do not comply with current standards. Such problems include: damage to infrastructure, upset of biological treatment processes, high levels of concentration of contaminants in STP sludges, and occupational health and safety risks to sewage treatment plant employees.[5]

Conclusion: While there is inadequate data available to determine the current level of compliance with sewer-use bylaws in Ontario, sufficient evidence exists to conclude that additional efforts are required in order to ensure that industries comply with sewer-use standards.

4.3 The Need for Uniformity

In Chapter 3, it was found that the types and numbers of contaminants controlled in sewer-use by-laws, and the concentration limits set for a given contaminant vary from municipality to municipality. It was further found that most municipal bylaws provide for the use of discharge agreements that permit variances in the standards applied to discharging industries within municipalities. In reviewing current compliance activities, the chapter found that the level of monitoring and enforcement also varied from municipality to municipality.[6]

Consistency in the application and enforcement of regulations is an important objective of any regulatory effort. Within a reasonable range, competing industries should have some assurance that their competitors in other jurisdictions are required to meet the same pollution control standards. A lack of uniformity gives industries, in the process of identifying a location for a new operation, incentive to select a municipality with lower sewer-use standards. Moreover, municipalities may be reluctant to pass stricter standards if they believe such action would make their municipality relatively less attractive to new industries

Conclusion: In developing a regulatory strategy, efforts should be made to address the need for uniformity and consistency both in the application of standards, and in ensuring compliance with those standards across the province.

4.4 The Need for Control at Source

Before considering regulatory options to address the problems associated with industrial sewer-use in Ontario, a central premise of that discussion

should be identified and discussed: the need to control industrial wastes discharged to sewers at source. The selection of the control at source strategy is based on the problems identified above, which make the alternative approach -- upgrading sewage treatment facilities to remove wastes from the industrial wastestream unattractive. The latter strategy is fundamentally flawed in two ways:

i. it fails to address the risks of exposure to air, land and water associated with the discharge of industrial hazardous wastes to sewers; and

ii. it imposes prohibitive costs and technical difficulties on government by requiring the construction of a central facility to treat and dispose of industrial wastes safely.

First, with respect to the former flaw, it was found in Chapter 2 that sewage treatment plants were not designed to remove the toxic contaminants discharged by industry and that there is significant evidence that sewage treatment plants are ineffective at removing contaminants.[7] Many of the contaminants that are removed accumulate in STP sludges. Thus, the problem of disposing of hazardous contaminants is transferred to the municipalities, which are faced with limited and diminishing options for the disposal of sludges with high concentrations of persistent toxic contaminants.[8] In addition, it was found that a substantial percentage of these contaminants can escape directly to air through volatilization or sludge incineration, or to water due to the problem of combined sewer overflows, which force STP operators to redirect sewage, untreated, into receiving waterbodies.[9] Further, a significant portion of toxic contaminants pass through STPs and accumulate in the receiving waters, sediments and biota near the plant.[10]

Second, upgrading the sewage treatment plants to deal with the complex mixtures of contaminants contained in STP effluent does not seem feasible.

While no studies have been done to determine the costs of upgrading sewage treatment plants to treat industrial wastes safely, the technical and economic barriers to this approach appear to be prohibitive. Industrial effluent from a wide variety of sources and production processes mix in the sewage pipe to create more complex wastes. Developing and implementing technologies capable of safely treating this wide range of contaminants would involve drastic expenditures of government funds. Control at source, on the other hand, permits the use of control technologies specific to a particular chemical generated by a specific plant. Treatment at the site of generation makes it possible to separate wastestreams and isolate specific contaminants for treatment. Moreover, control at source facilitates process changes, material substitutions, re-use, recovery and recycling to reduce the amounts of waste that require treatment and disposal.

There is a third rationale for the selection of control at source as the basis for a regulatory strategy. The approach is consistent with the Provincial Government's major environmental protection initiatives.

The provincial Clean Air Program (CAP) calls for the development of standards which replace dispersion of emissions with control at source, before such emissions can escape to the atmosphere.[11]

Recent amendments to Regulation 309 under the Environmental Protection Act require industry to control and monitor the movement of hazardous substances from their point of generation.[12]

The MISA program, with its goal of "virtual elimination of toxic substances entering Ontario waterways" and its focus on effluent standards, will require industries to treat industrial contaminants at source using best available technology.

Conclusion: The basis of a strategy for the regulation of industrial discharge to sewers should be control at source.

NOTES - Chapter 4.

1. For findings discussed in this section see supra., section 3.2.1.

2. Supra., section 3.2.2 (A).

3. Supra., section 2.2.2 (B).

4. Supra., section 3.2.2 (C).

5. Supra., section 2.4

6. Supra., section 3.2

7. Supra., section 2.3.

8. Supra., section 2.3.

9. Supra., section 2.3.

10. Supra., section 2.3

11. Ontario Ministry of the Environment, Clean Air Program: Stopping Air Pollution at Its Source, (December, 1987).

12. Regulation 309, RRO, 1980, as amended by O. Reg. 464/85 (September, 1985).

PART II: A STRATEGY FOR CONTROL AT SOURCE

CHAPTER 5 - STANDARD-SETTING

5.1 Who Should Set the Standards for Industrial Sewer Use?

5.1.1 Identification of Options

Continuation of the current approach. Each municipality sets standards for industrial discharge into sewers, with the provincial government providing a model bylaw to assist municipalities in establishing standards.

Standards set by the provincial government. The Provincial Government would have responsibility for setting standards to apply across the province, using either provincial legislation or a mandatory bylaw.

5.1.2 Evaluation

In part I of this report, it was concluded that the current approach, which leaves primary responsibility for setting standards to each local or regional municipality is not satisfactory for two reasons. First, the approach has not led to the development of standards which are adequate to protect the natural environment and the operation of sewage treatment plants.[1] Second, the approach has led to a lack of uniformity across the province in both the types and quantities controlled, and the level of control for a given contaminant.[2] These inconsistencies in standards across the province have developed despite the Provincial Government's efforts to promote uniformity through the use of model sewer-use bylaws.

The second option has two major advantages over the current approach. First, a provincial standard that applies province-wide solves the problem of lack of uniformity. While standards may still vary among competing industries, as in the case where a provincial standard requires industries within

"environmentally sensitive areas" to comply with stricter standards, the second option would put in place minimum base standard across the province since one level of government is accountable to all the regulated industries within the province. Moreover, a provincial standard-setting process is more likely to lead to uniformity, since one level of government would be accountable to all industries within the province. Second, provincially set standards are consistent with the province's primary responsibility for environmental protection. In meeting this responsibility, the province has initiated a number of programs aimed at controlling the amounts of industry-generated hazardous contaminants entering the environment. These programs include: the MISA program;[3] industrial waste management requirements under Regulation 309 aimed at controlling the movement, treatment and disposal of hazardous wastes;[4] and the Clean Air Program (CAP) aimed at controlling industrial emissions to air.[5] Given that a significant portion of Ontario's hazardous wastes are discharged to municipal sewer systems, provincial responsibility for standard-setting with respect to these systems is necessary to ensure that this portion of the hazardous waste problem is dealt with in manner consistent with other regulatory initiatives. For example, unless the province retains standard-setting authority for discharges to sewers, it will have no way of ensuring that the standards set are consistent with the MISA program's objective of "virtual elimination of toxic contaminants entering Ontario waterways".

In addition, expertise and resources -- already devoted to setting standards for toxic contaminants under these other initiatives -- provide the province with the means to set standards for industrial sewer-use. Individual municipalities, on the other hand, do not have the expertise and resources available to develop effective sewer-use standards on their own.

Recommendation: The Provincial Government should be responsible for setting standards for industrial discharges to sewers.

5.2 What Standard-Setting Instrument Should Be Used?

5.2.1 Identification of Options

There are two means by which provincially set standards could be brought into force.

i. Mandatory municipal bylaw. Municipalities would continue to set standards for sewer-use in municpal bylaws, however, the province would establish sewer-use standards in provincial legislation. This legislation would require all municipalities to incorporate these provincially set standards into their sewer-use bylaws.

ii. Regulations under provincial legislation. Standards would be set in regulations established pursuant to provincial legislation.

5.2.2 Evaluation

In the case where standards are to be set by the province but enforced by individual municipalities, the province may consider continuing the practice of allowing municipalities to establish standards in bylaws while at the same time establishing certain minimum standards which must be incorporated into all bylaws. This approach could, potentially, serve two purposes. First, it would allow municipal councils the discretion to adopt tougher regulatory standards where they deem provincial standards inadequate. Second, this approach may avoid potential problems associated with requiring municipal councils to oversee the enforcement of provincial legislation. Use of a mandatory bylaw would allow councils to retain a degree of responsibility for both legislative and enforcement activities related to the control of

discharge to sewers. The use of a mandatory provision is not unprecedented in Ontario. For example, municipalities are required to incorporate the provisions of the provincial building code into bylaws related to the issuance of building permits.[6]

The imposition of mandatory bylaw provisions on municipalities by the Provincial Government in Ontario is a rare occurrence. Once the province has identified an area that merits regulatory action across the province, it has generally elected to take action by way of provincial legislation and regulations. The latter approach avoids a number of potential problems. First, implementation of standards by way of a mandatory bylaw would be slow and cumbersome, requiring action by more than 800 municipal councils to amend their sewer use bylaws. This process would have to be repeated each time standards were changed. Second, the approach makes it more difficult to achieve uniform minimum standards by adding an unnecessary layer of political decision making to the process. For example, some municipal councils may be reluctant to incorporate mandatory provisions and the province would be required to take legal action to force elected officials to carry out their legislative function.

Setting standards in provincial regulation, on the other hand is the most effective means of ensuring that standards apply uniformly across the province. Standards can be enacted and amended through one legislative action, and the uncertainties associated with requiring two levels of government to take legislative action in order for the standard to be enforceable is avoided.

Recommendation: provincial regulations should be used to establish industrial sewer-use standards.

5.3 What Type of Standard Should be Set?

5.3.1 Identification of Options

Following a review of European and North American regulatory regimes, three generic types of standards for industrial discharges into sewers have been identified.

(1) **Water quality-based approach** The water quality-based approach has two variants: relative standards; and absolute load reductions.

(a) Relative water quality standards are based on the traditional North American approach of setting concentration limits aimed at maintaining current ambient water quality. This process would typically involve two steps:[7]

i. defining a "designated use" for a receiving water body (ie. warm water fishing); and

ii. developing criteria which specify the maximum allowable concentration level that the receiving water body can tolerate without impairing the selected designated use. Polluters are permitted to discharge contaminants in doses that will result in maintenance of the ambient standard.

(b) An alternative water quality approach involves setting standards which achieve absolute load reductions. This approach focuses on the needs of the receiving environment, and takes into consideration the cumulative effects of continued discharge of persistent toxic contaminants. A standard setting process using the water quality approach to achieve absolute load reductions could involve any or all of the following features:[8]

i. concentrating on particular geographic regions or localities (as for example in the case of the MISA program which calls for the identification of "sensitive and confined aquatic areas" and the assessment of these areas to determine water quality-based standards).

ii. an assessment of the environmetal problems in this selected locality, including testing of water quality, and accumulation of contaminants in sediments and biota;

iii. setting of load reduction targets to address environmental problems identified; and

iv. identification of all industries in the locality that discharge contaminants identified by the assessment and allocation of required load reduction among these industries. The water quality approach has been incorporated into the U.S. standard setting process for industrial sewer use. local limits are set in excess of technology-based standards following an assessment of the impact of industrial discharge on, among other things, the quality of receiving surface waters.[9] Water quality standards are also to be set under the MISA program.[10]

(2) **Technology-based approach.** Standards are set according to the level of technology currently available for pollution control. Standards are based on economic and technological considerations. Thus, they focus on the source of the pollution instead of the quality of the receiving media. The technology-based method has been used in the U.S. to develop standards for industrial discharge into receiving bodies and municipal sewer systems.[11] In Ontario, the process to develop MISA's technology-based standards for direct discharges is well under way. The following common features of the technology-based method have been identified.[12]

i. The regulator is required to survey available pollution technologies currently in use and technologies that are new and developing and then set standards according to the level of technology currently or soon to be available for pollution control.

ii. The economic impact on the regulated industry of various levels of standards are considered in determining the final standard.

iii. The U.S. process has involved the setting of less stringent requirements for existing pollution sources because of the high costs of retrofitting the existing sources.[13]

iv. Performance standards* are set for each sector.

(3) Prohibitions. It may be appropriate to prohibit the discharge into sewers of certain substances. Current sewer-use bylaws in Ontario[14] and U.S. federal legislation[15] have established general prohibitions

* Performance standards are standards that specify what the quality of industrial effluent must be, as opposed to what type of pollution control equipment or operational changes must be implemented. Those latter decisions are left to the industry.

against industrial discharges which could cause damage to human health, the receiving waterbody and the operation of the sewage treatment works. Ontario's municipal bylaws[16] and U.S. legislation[17] also contain more specific prohibitions for the discharge of substances which have physical properties that may damage sewage treatment processes. Current municipal bylaws do not, however, establish specific prohibitions based on toxicity or impact on receiving water quality. The 1988 model sewer-use bylaw,on the other hand, does establish specific prohibitions based on toxicity. A detailed discussion of the specific prohibitions in the by-law is provided in section 3.4.1 above.

5.3.2 Evaluation

(1) Water Quality-based Approach

(a) Relative pollution control standards. Concentration limits designed to maintain ambient water quality for current use are predicated on the assumption that the receiving water body will assimilate persistent toxic contaminants. This approach is no longer acceptable to government, environmentalists or the public because it fails to recognize the problem of accumulation of persistent toxic substances in sediments, water bodies and their biota.[18]

In order to achieve the MISA goal of virtual elimination of toxic chemicals entering Ontario waterways, the total amount of substances discharged by industrial sewer users will have to be controlled. Thus, concentration limits which do not set limits on total loading of contaminants to the environment are not consistent with the MISA objective.

b) Absolute load reductions. A water-quality based approach which is aimed at reducing absolute loading of toxic contaminants into the environment has the advantage of relating standards to the needs of the receiving water body.

Unlike the technology based approach described below, this approach would allow standard setters to design limits to address directly environmental problems associated with the mass loading of toxic contaminants entering an identified area. Such standards would not lock in current technology or be limited by economic considerations. Thus, industries may be required to develop new and more effective technologies or assess current production methods to identify ways of minimizing the wastes generated during production. These standards could encourage industries to develop new, innovative solutions to pollution control problems.

The approach is consistent with the objectives of the MISA program, since it calls for standards which reduce absolute amounts of persistent toxic contaminants entering receiving waters. Work is currently under way, as part of the MISA program, to develop a process for setting standards based on water quality assessments of environmentally sensitive areas.

The approach lends itself to an open public process to determine problems with local receiving bodies and develop solutions to those problems. In contrast to technology-based standards, standards are linked to environmental quality, and therefore to matters of public interest and concern. Since water quality standards would be developed on a local or regional basis, the process would lend itself to community participation.

(1) Water Quality based standards

The water quality based approach has a number of potential weaknesses. First, since water quality standards are based on the requirements of local waterbodies, standards among competing industries may vary from region to region. Thus, water quality standards compromise the objective of uniformity

across competing industries. Second, industries may argue that, since the economic impact and technical feasibility of standards are not considered, the standards developed will place an unrealistic burden on some industries. Industries could also argue that environmental degradation is due, in part, to non-industry sources, such as household hazardous wastes, groundwater contamination or non-point sources. Thus, standards based on water quality which apply only to industrial dischargers may involve allocating an unduly large portion of the costs of clean-up to industry.

Finally, the process for developing water quality-based standards is likely to involve greater expenditures of time and money than the other standard-setting options. These expenditures of time and money can be attributed to the need for information, public involvement, and load reduction allocation as described below.

Need for information. Initially, the approach will require environmental impact assessments and information on current loadings of contaminants in waterbodies, sediment and biota. Secondly, it will require information on the sources of contaminants, which have been identified as requiring reduction, in order to allocate load reductions. The approach may also require information on the long-term health and environmental effects of the contaminants to be regulated, and on what constitutes an acceptable environmental risk. This type of information would be required only if water quality objectives are to be based on an assessment of acceptable environmental risks.

Public involvement. An open public standard-setting process will require expenditures of time and money, both to educate participants and to develop consensus on the actions to be taken.

Load reduction allocation. Regulators will be required to decide on a scheme for allocating load reduction requirements among dischargers. While other types of standards are set on either a case-by-case basis, or uniformly across a regulated group, the water quality-based approach would require regulators to make a decision on how to distribute regulatory requirements across a variety of sources.

(2) Technology based standards

This type of standard is the cornerstone of both the U.S. Environmental Protection Agency's environmental protection programs under the Clean Water Act and Ontario's major water quality initiative - MISA. The approach offers a number of benefits.

First, since the standard setting process involves prior consultation with the regulated industry on the technical and economic feasibility of the proposed standards, the process facilitates the development of standards with which industries are capable of and committed to complying.

Second, by dividing industries into groupings with common features the process facilitates discussion of specific practical problems facing each sector. For example, standards in a given sector would be developed after identifying shared characteristics such as production processes and types of contaminants generated.

Third, technology-based standards ensure control of pollutants without first demonstrating the adverse impact of those pollutants on the receiving environment. Thus, it could be argued that technology based standards can be more easily ascertained than water-quality-based standards since they do not require the standard setter to address difficult questions associated with the risks to the health of the environment and the need for tougher standards. Instead, standard setters can focus on questions which are, arguably, more manageable, such as the capability of current technology.

On the other hand, technology based standards have a number of limitations. First, the standard setting process tends to encourage compromises between economic practicality and environmental protection. Standards are not set on the basis of the needs of the receiving environment, but on the capabilities

of existing pollution control technology and the abilities of a particular industry to meet the costs of tougher standards. Thus, in some cases, the technology based approach will not yield standards strict enough to ensure adequate environmental protection for a receiving body that is particularly sensitive to a particular contaminant, or in cases where high levels of a contaminant have accumultaed. In short, the approach does not impose limits on the basis of the needs of the receiving environment.

Second, the approach is not "technology-forcing". Since industries are required only to meet the standards based on current technologies, they will have no incentive to develop technological innovations that could lead to a lower minimum standard. Finally, technology-based standards do not ensure a reduction in the total loading of pollutants into the environment. Typically, these standards allow pollutant loadings to increase as production increases or as the number of polluting industries expands. Thus, the total amount of contaminants entering the environment may increase over time despite the imposition of technology-based standards if, for example, the number of industries discharging that contaminant increases or the level of production of an industry subject to the standard increases.

Since the technology-based approach is an important aspect of the MISA program, it is likely to be utilized in the future development of sewer use standards. Further, the process by which these standards are developed will be a useful starting point for identifying and addressing technological and economic barriers industry must overcome in order to achieve MISA's objective of virtual elimination of toxic contaminants entering the environment. However, a review of the U.S. experience with technology based standards indicates that a number of important issues must be addressed in order to

ensure technology based standards are an effective component of the MISA strategy.

Best available technology economically achievable. The U.S. experience indicates the need to develop generic criteria to assist standard setters in working with phrases such as best available technology and economic achievability. Disputes among industry, public interest groups and regulators over how these general phrases can be translated into specific standards for individual sectors has led to lengthy delays in the implementation of technology based standards in the United States.[19]

Exploring 4R's alternatives. In exploring best available technology, standard setters should be required to look first to changes in production processes, substitution of raw materials or other methods of minimizing amounts of waste generated. Technology-based standards should not lead to capital-intensive engineering solutions subject to obsolescence as technology advances. For all sectors, best available technology should be defined broadly enough to ensure full consideration of solutions that lead to long-term reductions in the quantities of toxic contaminants generated.

Delays. In the U.S., the development of technology based standards has been subject to lengthy delays. It has been 10 years since the legislation authorizing the development of technology based standards came into force, but standards have not yet been set for some sectors. Sources of delay have included [20]

> litigation generated by the process, as industries, public interest groups and regulators disputed the meaning of regulatory provisions

> consultation with industry has been lengthy in some cases, as industry and regulators cannot agree on the definition of phrases such as best available technology, best practical technology and economic achievability; and
>
> in some sectors, extensive study was required to generate data on the effectiveness of various technologies and the economic impact of standards.

Under the MISA program, Ontario regulators will likely be able to avoid many of these delays by utilizing the work already done by the U.S. Environmental Protection Agency on technology based standards as a starting point for their own standards for industrial sewer users, and by providing clear guidance on the meaning of key standard setting phrases which have led to controversy in the U.S. context.

Public access to the standard setting process. The standard setting process for technology based standards focuses on technical and economic issues unique to industries within a given sector. Both the U.S. experience and that under MISA indicate that the emphasis on industry consultation on technical issues has led to a closed standard-setting process with a limited role for non-government, non-industry participants. For example, until recently, the joint technial committees responsible for developing technology-based standards for direct dischargers under MISA were composed of government and industry experts exclusively. A closed process without public involvement could result in standards which are based on negotiations or unduly focused on industry concerns. Moreover, such a process raises public concerns about thecredibility of standards and the standard setting process. Recently, the Ontario Minister of the Environment has moved to address this concern by

assigning a member of his independent advisory committee to each joint technical committee. In general, however, the technical and industry-specific discussions required to develop technology-based standards make participation in the development of these standards by the general public difficult.

(3) Prohibitions.

The most effective means of achieving the regulatory objective of reducing the amounts of persistent toxics entering the environment achieved, is through the use of prohibitions. The long-term environmental and human health effects of many persistent toxic substances are unknown. Prohibiting the entry of these substances into the natural environment eliminates long-term environmental risks. This approach also encourages industry to utilize cleaner and safer production processes and raw materials. Prohibitions establish clear uniform standards that are not subject to change due to technological advances (technology-based standards) or degradation of the receiving environment (water quality-based standards). By providing industry with standards not subject to future change, such prohibitions allow industries to develop long-term pollution-control strategies. For the regulator, prohibitions may have administrative advantages. They are relatively simple to monitor and enforce since any detectable limit is a violation.

A number of potential concerns related to the use of prohibitions may be identified first. Prohibitions may unfairly burden industries that produce extremely small amounts of a prohibited substance. For these industries, the cost of removing the prohibited substance from the wastestream may be disproportionately high when compared to the cost to industries that generate larger amounts of the prohibited substance. Second, industries may also argue that it is unfeasible to impose prohibitions until it has been determined that

alternatives to sewer disposal are available. Prohibitions and tougher standards are likely to increase dramatically the demand on alternative waste management and disposal facilities and studies conducted by the Ontario Waste Management Corporation have indicated that Ontario's demand for such facilities far exceeds the supply.[21]

A Combined Approach.

In order to achieve a mix of the benefits associated with each of the three identified types of standards, while at the same time ensuring consistency with the provincial government's other regulatory initiatives, a mix of all three standard-setting methods could be adopted. A number of specific benefits have been identified.

> The establishment of specific prohibitions for certain industrial wastes is consistent with the objectives of the MISA program and the work done by the Industrial Sewer-Use Control Bylaw Review Committee.
>
> By adopting, and incorporating into provincial legislation, the prohibitions set forth in the 1988 model bylaw, this approach enhances the province's efforts to control the movement of industrial wastes. The model bylaw proposes that certain industrial wastes, which are contained under Regulation 309, not be discharged to sewers*. Regulation 309 establishes a system of monitoring the movement of industrial wastes once they leave the generator site, but does not control the movement of those wastes off-site by way of sewer discharge. The proposed prohibitions would close this gap by prohibiting the movement of these wastes off-site via municipal sewers.

This proposed approach would be consistent with two recent provincial initiatives: the specific prohibitions identified in the 1988 model sewer-use bylaw; and MISA's two-track standard-setting process. In Chapter 3, specific concerns were raised about each of these initiatives. The following changes are proposed to address these concerns.

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* The relationship between the 1988 draft model sewer-use bylaw and Regulation 309 is described in section 3.3 above.

Prohibitions under the 1988 draft model sewer-use bylaw. The bylaw does not expressly state whether the small quantity exemptions established under Regulation 309 would apply to industries that discharge into municipal sewers. It is proposed that these small quantity exemptions should not apply to industrial sewer-use dischargers. The prohibitions set out in the bylaw should apply to all discharges into municipal sewers, with no exemptions.

MISA's two-track approach. One of the major concerns about the MISA program identified in Chapter 3 was the secondary importance given to the development of water quality-standards. These standards are to be developed only after technology-based standards have been put in place. Two concerns about this sequential approach were identified.

i. There is a need for more information on the impacts of industrial discharges, both direct and indirect, to Ontario waterways. This information would be beneficial to an initial standard-setting process, but, currently under MISA, will not be available until after BATEA standards are in place.

ii. Water quality assessments may indicate that significant reductions in the amount of contaminants discharged by industry are required. If work on the water quality track is delayed, industries will not be able to prepare in advance to meet these tougher standards. Instead, they may commit resources to developing solutions adequate only to meet the standards being developed under the technology-based track.

In order to address these concerns, it is proposed that the process for developing water-quality standards under MISA begin immediately.
A number of specific changes to the standard-setting process proposed under MISA, which are required to implement this proposed standard-setting approach, are set forth in section 5.4.2 of this report.

Recommendation: Standards for industrial sewer-use should be based on three standard-setting approaches:

i. Specific prohibitions for persistent toxic substances should be established in provincial regulations. As a starting point, the prohibitions set forth in the draft 1987 model sewer-use bylaw should be incorporated into provincial regulation.

ii. Technology-based standards should be developed for identified categories of industrial sewer-users.

iii. Water quality-based standards, developed under the MISA program for environmentally sensitive areas, should apply to direct dischargers as well as those who discharge into municipal sewer systems.

5.4 Implementation

5.4.1 Establishing Provincial Responsibility

The recommended strategy requires legislation empowering the Provincial Government to set province-wide standards that will apply to industries discharging into storm and sanitary sewer systems. Current legislation, by and large, achieves this end. For example, the Ontario Water Resources Act gives the province broad regulatory powers to control discharges into the environment, which could adversely affect Ontario waterways. However, while the Provincial Government could implement most aspects of the proposed standard-setting program under current legislation, it is recommended that specific legislative changes be made to address the following shortcomings in current legislation.

Conflicting jurisdiction. The effect of provisions of the Municipal Act which empower municipalities to pass sewer-use bylaws has been effectively to delegate primary responsibility for setting sewer-use standards to the municipalities.

Provincial mandate. The Ontario Water Resources Act does not clearly establish a provincial mandate to regulate indirect discharges to sewers.

Need for specificity. Experience under the Ontario Water Resources Act indicates that the general provisions, prohibiting discharges which could impair water quality, have not led to the promulgation of specific regulatory standards for discharge into waterbodies. The proposed strategy calls for three kinds of standards - prohibitions, technology-based, and water quality-based. There is currently no regulatory authority for establishing these standards. For example, the Act does not specifically provide for the banning of specific persistent substances.

In order to implement these regulatory changes, amendments to both the Municipal Act, RSO, 1980 as amended, and the Ontario Water Resources Act, RSO, 1980 as amended, will be required.

A) Amendments to the Municipal Act

The recommended strategy requires that the Provincial Government, through the Ministry of the Environment, be given full authority to set all standards for industrial discharges into sewers. As noted in Chapter 3 of this report, the municipalities currently have primary responsibility for setting these standards. Section 210-(147) empowers municipalities to pass bylaws for:

> ...prohibiting, regulating and inspecting the discharge of any gaseous, liquid or solid matter into land drainage works, private branch drains and connections to any sewer, sewer system or sewage works for the carrying away of domestic sewage or industrial wastes or both, whether connected to a treatment works or not.

In order to establish provincial primacy in setting sewer-use standards, and to remove potential overlaps in standard-setting authority, this section of the Municipal Act should be repealed.

The Municipal Act also empowers municipal councils, with the approval of the Ontario Municipal Board, to pass bylaws which impose a special surcharge on owners of buildings that may impose a heavy load on the sewer system (section 215 of the Act). This provision should be amended to specify that these

charges are only to be permitted where the heavy load on the sewer system is imposed by sewer users discharging conventional pollutants. Surcharges should not be permitted to licence the discharge of persistent toxic substances into the environment.

A number of other provisions of the Municipal Act empower municipal councils to pass bylaws related to the construction, operation and maintenance of sewage treatment works as well as the financing of these activities. Under the proposed framework, these functions would continue to be a municipal responsibility. Only the provisions of the Act which empower the municipalities to regulate industries discharging into municipal sewer systems require amendment.

B) Amendments to the Ontario Water Resources Act

Establishing Primary Responsibility for Regulation of Industrial Sewer-Use.

The Ontario Water Resources Act empowers the Ontario Minister of the Environment to regulate surface and ground water quality in Ontario. The Act does not expressly establish provincial standard-setting authority for discharges into municipal sewer systems. Section 16(1) of the Act prohibits municipalities, or persons, from discharging into any waterbody or watercourse including wells, reservoirs, or streams, any material that could impair water quality. Section 17 empowers the Ministry of the Environment to prohibit or regulate such discharges or deposits. However, these provisions do not specifically empower the province to regulate sewer use. In order to give the provincial Ministry of the Environmenta clear legislative mandate to regulate discharges into municipal sewer systems, and to provide a legislative

statement of the environmental significance of indirect discharges, amendments to these two sections are required.

Section 16 of the Act should be amended to prohibit expressly the discharge of any substance that could impair water quality, into municipal sanitary or storm sewers. Section 17(1) of the Act should be amdended to empower the Ministry of the Environment to prohibit or regulate discharges or deposits into sewage treatment systems.

C) Other Legislative Changes

Specific standard-setting provisions. The recommended strategy requires the Provincial Government to set specific regulatory standards for industrial discharge. Section 44(1) of the Act empowers the Minister of the Environment, subject to the approval of Cabinet, to promulgate regulations on specific matters related to water-quality protection.

Section 44(1)(g) empowers the Ontario Cabinet to pass regulations for the purpose of "...regulating and controlling the content of sewage entering sewage works". However, no regulations setting standards for discharge into sewage works have ever been promulgated. It is proposed that a regulation establishing standards for industrial sewer-use be made pursuant to this existing, but unused provision.

An industrial sewer-use regulation. This regulation would set forth specific standards for industrial sewer-use which would apply across the province. The regulation would include two schedules. Schedule A would establish a listing of prohibited substances for which discharge to sewers is not permitted.

Schedule B would establish a listing of substances that are controlled, but not prohibited, and specific parameters for these substances in terms of total allowable mass loading. The schedule would be divided into categories according to industrial sector.

The Regulation would also include provisions establishing the following:

a process for making changes to the two schedules including a specified period of public review prior to any changes (see section 5.4.2 for the details of the process for developing both prohibitions and technology-based standards);

a process for developing water-quality standards for environmentally sensitive areas (see section 5.4.2 for the details of the process for developing water quality-based standards);

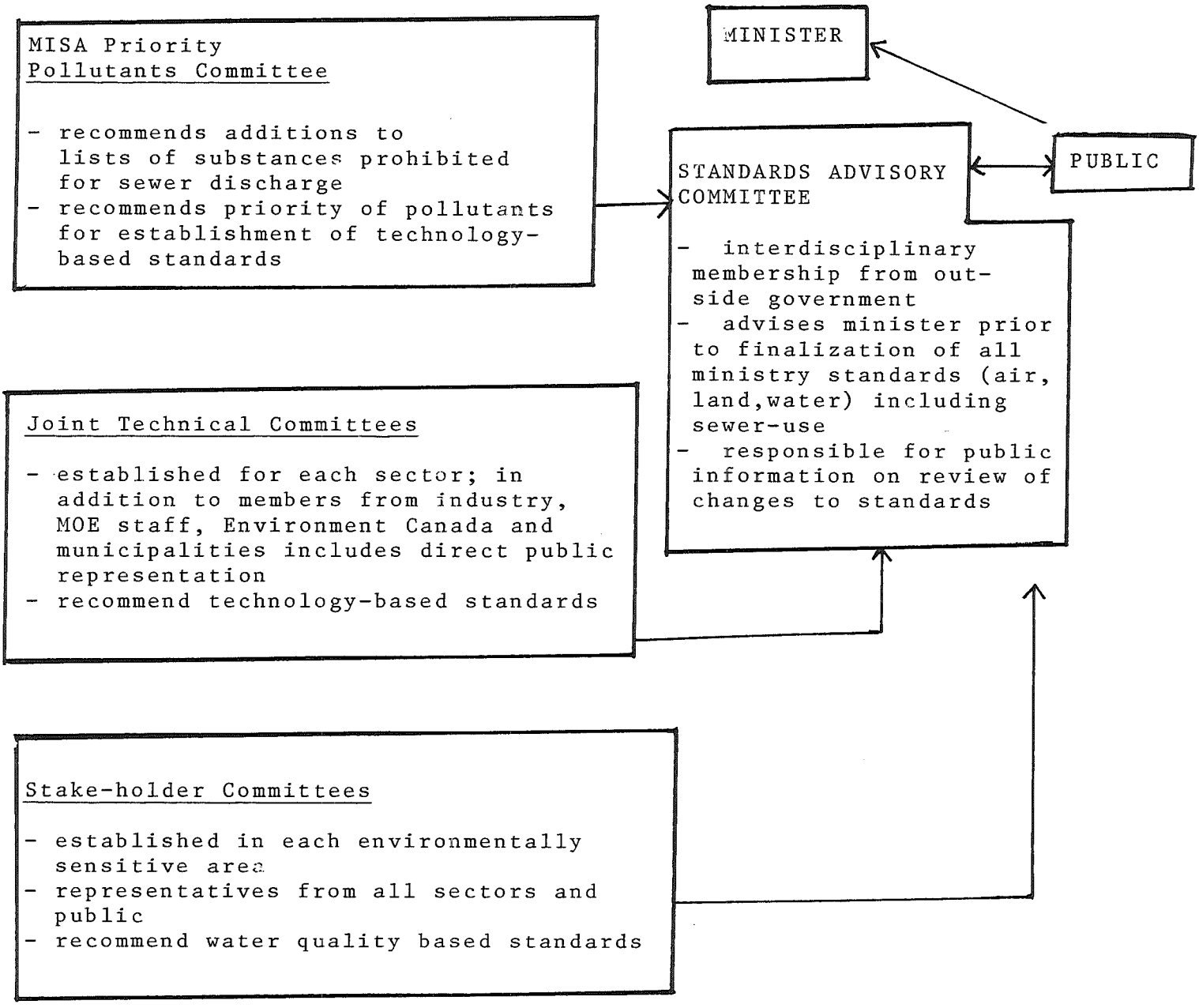
for environmentally sensitive areas, authority for the Ministry of the Environment to issue discharge permits setting out specific standards stricter than those set out in the technology-based listings; and in a case where a limit is set for a substance under more than one of the standard-setting processes described above, the strictest standard shall apply.

It should be noted that this regulation would not necessarily set standards for conventional pollutants (i.e. BOD, suspended solids and phosphorous) since these substances are biodegradable and can be treated adequately at the sewage treatment plant. The regulation of industrial discharges of these substances could remain the responsibility of the sewage treatment plant operator. Each sewage treatment plant will have a different capacity and will set different regulatory requirements for these substances based on that capacity. The sewage treatment facility will, however, itself be regulated. It must meet operating requirements under current legislation, and, under MISA, will be required to meet effluent limits set by the province.

5.4.2 Standard-Setting Process

The recommended process for developing sewer-use standards combines three

FIGURE 5.1 THE PROPOSED STANDARD-SETTING PROCESS



distinct but related components: prohibitions, technology-based standards, and water quality-based standards. The recommendations set out below are designed to incorporate these three components within the still-evolving process for developing environmental standards in Ontario. Specifically, sewer-use standards are to be developed within the basic MISA standard-setting framework and within the more general framework proposed in the Ministry's recent discussion paper regarding the establishment of an advisory committeeon environmental standards. Figure 5.1 opposite provides a schematic representation of the recommended standard-setting process.
The key features of the process, including the required changes to legislation and to current standard-setting practice under MISA, are outlined below.

A) Prohibitions

i. Establishing the prohibitions list

The prohibitions list would be established by listing the contaminants prohibited by the proposed 1987 model sewer-use bylaw and the sewer-use regulations under the Ontario Water Resources Act.

The small quantities exemption set out in Ontario Regulation 309 would not be applicable in the case if industrial discharges to sewers. The prohibitions would apply to any quantity of waste discharged.

ii. Expanding the prohibitions list

The standing MISA Priority Pollutants Committee, proposed by the priority pollutants task force, in addition to being responsible for listing the priority pollutants from which the technology-based standards are to be developed, would also have a mandate to identify persistent toxic chemicals which are candidates for the prohibitions list.

The Committee would have two initial tasks:

- to consider prohibitions of those substances on the IJC list of critical pollutants for the primary track; and

- to consider expanding the prohibitions list to include not only the listing of producsts contained in schedules 2A and 2B of Regulation 309 to also to prohibit the discharge of wastewaters containing these products.

Prior to a decistion regarding whether a contaminant should be added to the list the Standing Committee would be required to release a report whcih includes: a recommendation to the Minister of the Environment as to whether the contaminant(s) should be placed on the prohibition list; and reasons for the recommendations, including any scientific upon which the recommendation was based.

The report and recommendation would be submitted to the Minister's Standards Advisory Committee. The Standards Advisory Committee would be responsible for conducting a public review of the report, including, at the Minister's request, a public hearing. The Standing Committee's report and recommendation would be made public prior to the public review.

The Standards Advisory Committee would submit a report to the Minister outlining public submissions and making recommendations on whether the contaminant should be added to the prohibitions list. Based on this report and the report of the Standing Committee, the Minister would decide whether to add the contaminant(s) to the prohibited list.

The Standing Priority Pollutants Committee should include experts from both government and non-government organizations.

B) Technology-Based Standards

After reviewing the Canadian Standard Industrial Classifications, the U.S. EPA categories of industrial sewer-users, and the Regulation 309 generator registration database, the Ministry should establish categories of industrial sewer-users for the purpose of developing technology-based standards. A listing of industries that fall into each industrial sector would be developed, including a listing for industries which do not fall into one of the specified sectors.

The MISA standard-setting process for technology-based standards should be followed. For each industrial sector, a joint technical committee (JTC) would be formed.

The Ministry would develop specific publicly stated policy criteria to guide the JTC in developing a "best available technology economically acheivable" (BATEA) standards.

When considering what constitutes BATEA for a sector, each joint technical committee should be required to determine first whether controlled contaminants could be removed from the waste stream or significantly reduced (ie., by waste minimization practices such as recycling, re-use or reduction, or by changes to production processes, or by substitution of raw materials).

Prohibitions, and water quality-based standards stricter than those developed by the joint technical committee should apply regardless of the technology-based standard developed.

The Standing MISA Priority Pollutants Committee should be responsible for identifying new contaminants to be added to the priority pollutants list. When a new contaminant is added to the priority pollutants list, all technical committees, for the industrial sectors that generate that contaminant should automatically be required to develop a monitoring regulation for industries within the sector, and to consider establishing effluent limits.

Joint technical committees for all sectors should include representation from municipal and provincial governments, industries within that sector and an environmental public interest group.

C) Water Quality-Based Standards

The province should immediately identify the 'environmentally sensitive areas' for which water quality standards should be developed. The 16 Ontario sites for IJC remedial action plans (RAPs) should be treated as environmentally sensitive areas.
The Ministry of the Environment should be developed by which concerned individuals or groups may apply to have an area designated as an "environmentally sensitive area". A set of criteria should be developed for determining whether this designation should be applied.

The Ministry of the Environment should be responsible for assembling a group of stakeholders to oversee the development of water quality standards for the area. This group would be composed of local respresentatives of industry, municipal government, and public interest groups.

Within each area, the Committee should be responsible for developing a water quality assessment program designed to identify contaminants that have accumulated in high levels in the receiving environment. Specifically, the program would involve assessing the amounts of particular contaminants contained in receiving waters, biota and sediments.

The Standing Committee should be responsible for setting specific reduction targets and deadlines which are based on information obtained through the water quality assessments and consistent with the objective of virtual elimination of toxic substances.

The Standing Committee should have access to all monitoring information gathered on industries discharging into sewers and/or directly into receiving waterbody (see the discussion of monitoring in section 6.2 below). The Committee should also be responsible for identifying non-industrial sources and non-point sources of wastes.

Based on the information gathered on source contribution, load reductions required to meet the reduction target for each contaminant, should be allocated on a pro rata basis among contributing sources.

Specific standards for contaminants based on these allocations would be set in a certificate of approval issued by the Ministry of the Environment to individual sources.

D) Standards Advisory Committee

All standards which are to apply across the province, including standards for discharge to waterbodies and sewers under the MISA program, to air under the clean air program (CAP), and to land through any proposed changes to the regulation of land disposal under Regulation 309, should be reviewed by the Standards Advisory Committee.

This Committee would serve two purposes:

i. to provide members of the public with an opportunity to have input into the standard-setting process; and

ii. to advance an integrated approach to the development of environmental standards, by reviewing changes in standards from the perspective of total exposure to the environment via air, land and water.

With respect to the Committee's public input function, the Committee should be the key component of a two-way standard-setting process available to the public, and providing opportunities for public input prior to the Minister's decision on whether a standard should be established.

With respect to the Committee's integrative function, the Committee should be the key component of a two-way standard-setting process. First, where the Committee determines that the total exposure to the envionment of a particular contaminant is too high it should require that the standard-setting programs for land, air and water develop standards which reduce total loading. for example, it could require the MISA Standing Committee on priority pollutants to consider prohibiting or developing technology-based standards for a particular contaminant. Second, where one of the Ministry's programs (land, air, water) is proposing changes to standards, those changes should be reviewed by the Standards Advisory Committee to ensure consistency with total

exposure objectives. For example, where the MISA Priority Pollutants Committee identifies a contaminant to be added to the prohibitions list, the Standards Advisory Committee could be required to consider whether changes to the standards for the discharge of that contaminant to air or land should also be considered.

As proposed in the Minstry's discussion paper on the establishment of an advisory committee on environmental standards, the membership of the advisory committee should be inter-disciplinary and include experts from fields such as health, engineering, biology, toxicology, socio-economics and law and representatives from industry, consumer and environmental groups.

5.5 Implications of the Recommended Program

5.5.1 Compatibilitiy with MISA

The standard-setting process recommended above is designed to be compatible with the standard-setting process now under way under the province's major water quality initiative - MISA. The proposed process for developing sewer-use standards makes use of the three main components of the MISA process.

i. Contaminants, to be prohibited or restricted by sewer-use regulations, are to be identified by the MISA Priority Pollutants Committee, which is the committee designated to determine substances to be studied and controlled under the MISA program.

ii. Technology-based standards for sewer-use regulations are to be developed in the same manner as the standards currently being developed for industries discharging directly into Ontario waterbodies under MISA. These standards would be developed on a sector-by-sector basis by joint technical committees.

iii. Water quality standards for industrial sewer-use should be developed in the same manner as those developed for direct dischargers under MISA.

However, the process outlined above for developing sewer-use standards, includes a number of features not part of current standard-setting efforts under MISA. If the recommendations advanced above were implemented, without change to the MISA program, different standards, and therefore costs, would be imposed on idustries discharging to sewers as opposed to those discharging

directly to receiving waters. A number of features of the proposed standard setting process should apply equally to all types of discharge into the environment. Thus, the following features of the proposed standard-setting program must be incorporated into the framework.

Prohibitions. The current program does not include outright bans on the discharge of certain contaminants into municipal sewers. However, prohibitions should apply equally to all industries regulated under the MISA program. Thus, it is recommended that the prohibitions component of the standard setting process be applicable to industries discharging to sewers as well as those discharging directly to receiving waters.

Parallel track approach. Currently, the MISA program calls for the imposition of technology-based standards in advance of water quality-based standards. It is recommended that the water quality track be given increased priority. the process for developing water quality standards, outlined in the precious subsection, would apply equally to all sources in an environmentally sensitive area, including industries which discharge directly into receiving waters.

Participants in the standard-setting process. The following changes to the composition of groups responsible for setting standards under MISA would be required:

i. Non-government experts nominated by both industry and environmental interest groups would be included on the Standing Committee responsible for developing the priority pollutants list and prohibitions list;

ii. Joint technical committees for all sectors under MISA would include a representative not affiliated with either government or industry;

iii. All standards developed under MISA would be subject to public review co-ordinated by the Minister's Environmental Standards Advisory Committee.

5.5.2 Treatment and Disposal Alternatives

Tougher standards and prohibitions on sewer-use will require industrial users to rely on alternative methods of managing the wastes they generate. As noted above, this is likely to increase dramatically the demand for alternative waste treatment and disposal facilities. This increased demand will

exacerbate an existing problem: Ontario's demand for such facilities far exceeds the supply, according to studies conducted by the Ontario Waste Management Corporation. Further, the OWMC's proposed central treatment and disposal facility is, according to a recent estimate by the corporation, 5 to 7 years away from start-up, assuming that the facility can obtain approval through a hearing under the Environmental Assessment Act due to begin in the next year.

While the various issues surrounding the treatment and disposal facilities are beyond the scope of this report, it is noted that government must address the question of alternatives as it develops stricter standards for industrial sewer-use. However, delays in the development of treatment and disposal facilities should not lead to similar delays in the development of standards. This report has concluded that the use of sewer systems as a treatment and disposal alternative is not acceptable and that immediate efforts must begin to control these discharges at source.

Increase waste minimization efforts. In order to address industry's concerns about the lack of alternatives to the disposing of industrial wastes into municipal sewer systems, government should assist industries in developing alternative production processes and waste minimization techniques to reduce the amounts of hazardous substances requiring treatment and disposal. One of the advantages of stricter standards alongside improved compliance efforts is that they will provide an incentive for industry to move in this direction.

Storage of industrial waste. As an interim measure, the province may be required to approve the construction of waste storage facilities, either on-site or off, to house wastes containing prohibited or controlled substances that cannot be dealt with through reduction, re-use, re-cycling or safe

treatment and disposal. Storage is, at best, a short-term solution to the hazardous waste management problem, and does involve environmental hazards and risks. However, this approach provides a greater degree of control over hazardous contaminants than continued discharge to sewer systems.

5.5.3 Costs

Prohibitions and increased standards will impose potentially significant additional costs on industries that discharge to sewers. Industries will be required to make alterations to production processes and install pollution control equipment in order to meet stricter standards. This internalization of environmental costs has a number of potentially positive implications for the achievement of environmental goals:

it will encourage industries to seek ways of reducing, re-using or recycling wastes generated or to find alternative products and processes which impose a lower environmental cost; and

to the extent that environmental costs are passed on to the consumer, in the form of price increases, the true environmental costs of a product will be reflected in the marketplace.

On the other hand, the cost of meeting stricter standards could threaten the viability of some operations, particularly the smaller industries discharging only small quantities of a prohibited or restricted substance but still required to spend large amounts of money installing pollution control equipment to meet standards. An assessment of the economic impact of prohibitions and stricter standards on industry is beyond the scope of this report. However, it is essential that public dialogue amongst industry, government and other interested parties regarding the impact of stricter

environmental regulations begin immediately. It is recommended that studies be done to determine the impact of stricter standards on various types and sizes of industries. These studies could be undertaken for each industrial sector by the joint technical committee set up under MISA to develop technology-based standards. The studies should not be aimed at reducing environmental standards, but at developing ways to mitigate adverse economic impacts.

NOTES - CHAPTER 5

1. Supra., section 4.1.

2. Supra., section 4.2 and section 3.3.2.

3. Supra., section 3.3.2.

4. Regulation 309, RRO, 1980 (as amended).

5. Ontario Ministry of the Environment, Clean Air Program: Stopping Air Pollution at Its Source, (December, 1987).

6. Building Code Act, RSO 1980, c. 51 (as amended).

7. Paul Muldoon and Marcia Valiante, Zero Discharge: A Strategy for the Regulation of Toxic Substances in the Great Lakes (Canadian Environmental Law Research Foundation, 1988) p. 54.

8. This description is based on a review of information on the water quality track of the MISA program and Victor and Burrell, Research and Consulting et. al., Evaluation of Receiving water-based Toxics Control Initiatives: Final Report (MOE: Water Resources Branch, undated).

9.

10.

11. Two programs developed pursuant to the Clean Water Act, 33 U.S.C. (and supp. V) 1251 utilize technology based standards. The National Pretreatment Program (NPP) requires industries discharging to municipal sewers to pretreat wastes to meet technology-based limits. The National Pollutant Discharge Elimination System (NPDES) Program sets technology based standards for discharge to surface waters.

12. Based on a review of the MISA Program and the U.S. standard setting programs pursuant to the Clean Water Act.

13. See, for example, U.S. Environmental Protection Agency, Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards, (February, 1984) pp. 2-4 to 2-6.

14. Supra., s. 3.2.1 (A).

15. U.S. Environmental Protection Agency, Overview of National Pretreatment Program (October, 1984), p. 2-3.

16. Supra., s. 3.2.1. (B).

17. Overview, supra., note 15, p. 3.

18. Zero Discharge, supra. note 7., pp. 54-56.

19. Personal communication, Richard Mott, Research Associate, Environmental law Institute, December 18, 1987.

20. Ibid.

21. Ontario Waste Management Corporation, Environmental Assessment - Volume I The OWMC Undertaking (Draft), February, 1988, section 6.3.

CHAPTER 6 - COMPLIANCE

6.1 Who Should be Responsible for Ensuring Compliance?

6.1.1 Options

Three options regarding the allocation of regulatory responsibility for ensuring compliance are evaluated below.

(1) Sole Municipal Responsibility

(2) Sole Provincial Responsibility

(3) Shared Municipal and Provincial Responsibility

6.1.2 Evaluation of Options

Option 1: Municipal Responsibility

Since compliance is a municipal responsibility, this option may be the least disruptive of the three options set out above. In its recently completed study of sewer use control options for the Ministry of the Environment, M.M. Dillon Ltd. proposes that the current practice in Ontario be continued. The study recommends that province wide sewer use regulations be

> enforced by the local or regional municipality (with provincial auditing) except in those cases where the local capability does not exist, in which case the province takes over the role of enforcement.[1]

This recommendation follows from the study's selection of a sewer-use control option similar to the U.S. Environmental Protection Agency's approach

to the problem. In order to evaluate the M.M. Dillon Ltd. recommendation, an assessment of the U.S. approach is provided below.

(i) Features of the U.S. approach

Primary standard-setting authority rests with the senior level of government. The Federal Water Pollution Control Act, or Clean Water Act [2] establishes federal regulatory authority for industrial discharges into municipal sewers. Pursuant to this legislation, the U.S. Environmental Protection Agency (EPA) administers the National Pre-Treatment Program (NPP) under which the EPA sets technology-based standards on a sector-by-sector basis for industries discharging to municipal sewers and the National Pollutants Discharge Elimination Program (NPDES) under which the EPA sets standards for discharges to surface waters by both industry and municipally owned sewage treatment works (POTW).[3] Under the NPDES program, local POTW's are required to obtain and comply with permits issued by the EPA.

Primary responsibility for ensuring compliance with these standards rests with the local POTW, which is operated by the local municipal government. In order to discharge into surface waters, the POTWs must obtain a discharge permit from the EPA. In order to obtain this permit, large POTWs (those designed to accommodate flows of more than 19,000,000 litres per day) and smaller POTWs which receive significant amounts of industrial effluent must establish local pretreatment programs conforming to the criteria prescribed under the NPP, by the EPA. Thus, each local POTW must develop a compliance program, to monitor and enforce industrial sewer-use within their jurisdiction based on discharge standards developed at the federal level.[4]

The POTWs may establish local limits stricter than federal standards. Local agencies are required to identify the need to put in place limits stricter than the federal standards. This involves conducting an assessment of the sewage treatment work's operation and the local waterbodies to determine whether federal standards are adequate to prevent interference with plant operation, sludge contamination, NPDES permit violations, adverse impacts on surface water and safety hazards for municipal employees. If federal standards are not adequate to prevent any of these occurrences the POTW is required to establish local limits.[5]

The EPA may take over responsibility for ensuring compliance with sewer-use standards from the local POTW. Where the local POTW fails to develop and implement a pretreatment program that meets EPA requirements the federal agency may take over responsibility for developing and operating a pretreatment program.[6] This power has not yet been exercised by the EPA.[7]

The EPA can delegate its power to approve POTW discharge permits, and therefore local pre-treatment programs, to the state level. If the state wishes to become the approval authority for permits to discharge into surface waters it must submit an approval program to the EPA.[8] If this approval meets EPA criteria then the state becomes the approval authority. So far, 22 states have taken over primary responsibility for approving POTW discharge permits.[9] Once a state becomes authorized to approve POTW discharge permits, it also takes on the responsibility of approving local pretreatment programs.[10]

The state may elect to take over responibility for ensuring compliance with pretreatment. If a state becomes the approval authority it may elect to take over the responsibility for ensuring compliance with sewer-use standards by developing and operating a state-wide pretreatment program. Three states have elected such direct programs at the state level. Several other states retain authority for some POTWs.[11]

The EPA retains the authority to audit compliance and take enforcement actions where state or local authorities are not adequately enforcing sewer-use standards. Both EPA and states with approval authority are required to report POTWs failure adequately to implement its pretreatment program. EPA may also undertake monitoring, investigations and prosecutions to ensure compliance with standards where local POTWs are not adequately ensuring enforcement. In the past five years, U.S. EPA has prosecuted industrial sewer-users for non-compliance with pretreatment standards, and local authorities for failure to implement adequate pretreatment programs or ensure compliance. In addition to prosecutions, the U.S. EPA Office of Water Enforcement and Permits is now taking municipalities across the Unites States to court to obtain administrative orders forcing local authorities to correct deficiencies in existing programs.[12]

(ii) Assessment of the U.S. Approach

The U.S. EPA bases its decision to delegate authority, for ensuring compliance with pretreatment programs, to the local level on three factors.

POTW officials are familiar with their industrial users. They usually know the location, wastewater flow, and pollutant loading of the industries they serve. In many cases they have developed administrative mechanisms and client relationships which could serve as the basis for enforcement activities.

The POTWs have knowledge of the operation of their own sewage treatment systems and thus are in the best position to correct problems. They are also in the best position to develop pretreatment permits for individual industrial users since they are aware of the special concerns and hazards associated with their sewage treatment systems.

POTWs are in the best position to respond to emergencies in the treatment system.

However, a review of the problems associated with the U.S. National Pretreatment Program indicates that many of these problems can be attributed to the EPA's decision to delegate primary responsibility for ensuring compliance to the local level.

Lack of uniformity. Both the types of standards enforced and the level of enforcement effort varies from one local authority to the next. There are several factors which contribute to these variations.

Each POTW may select the means by which it will meet federal requirements under NPDES permits. POTWs may elect to enter into discharge agreements with individual industries, set standards in municipal ordinances, or upgrade sewage treatment facilities and recover the costs by setting sewer-use surcharges instead of stricter standards.

The National Pretreatment Program has not been implemented uniformly. Local pretreatment programs are in different stages of development. The resources allocated, at the local level for monitoring and enforcement activities vary from municipality to municipality.

The political will to adhere to strict enforcement practices varies from municipality to municipality.

Adequacy of local pre-treatment programs. The U.S. EPA conducts regular audits of the POTWs to determine the adequacy of the current efforts by local authorities to ensure compliance with sewer-use standards. According to the a U.S. EPA audit summary released in March 1988,[13] 93.6 per cent of the POTWs surveyed are operating under discharge permits which do not meet minimum federal requirements for pretreatment programs. The survey indicated that 7.9 per cent of the discharge permits reviewed do not mention pretreatment program and 67 per cent do not provide specifications on how the indicated pretreatment program is to be implemented. Thus, many local authorities were able to obtain discharge permits for their sewage treatment plants without first having developed a program for ensuring industry compliance with federal sewer-use standards.

Adequacy of regular monitoring and enforcement efforts. The March, 1988 EPA audit summary indicates that only 23 per cent of the POTWs surveyed have "generally successful" programs for ensuring compliance with sewer-use standards. It further indicates that 53.4 per cent had inadequate inspection programs in place, 52.8 per cent had inadequate sampling programs and 31.9 per cent were failing to take enforcement measures when required.

Three factors appear to have contributed to inadequate enforcement efforts to two factors:

Lack of understanding about how federal pretreatment standards are to be applied. The survey found that 54.7 per cent of the POTWs audited were incorrectly applying categorical pretreatment standards and local limits. The majority of local authorities surveyed have failed to develop adequate local limits.[14]

Insufficiency of regulatory requirements. Initially, Federal regulations did not set out detailed regulatory requirements with which local authorities setting up pretreatment programs must comply. EPA officials are of the view that detailed regulatory directions would have avoided many of the problems with implementation of the National Pretreatment Program.[15] More recently, U.S. EPA has taken steps to correct this problem by clarifying regulatory provisions and developing guidance manuals instructing local authorities on how to develop and implement pretreatment programs.[16]

Lack of local commitment to enforce. The state approval authority in Michigan has noted that, in general, municipalities have not experienced an increase in prosecutions or other enforcement measures as a result of the approval of local pretreatment programs. Local municipalities rarely take local industries to court in order to enforce sewer use standards. This problem has been attributed to the lack of "political muscle" at the local level, and is particularly acute in the case of small municipalities where the discharging industry is the community's major taxpayer. One problem, cited by a state official in Michigan, was that most POTWs in the state view themselves as service industry, with industry as their major client, rather than as regulatory bodies. A second problem has been pressure by municipal politicians to encourage industry. Local authorities are reluctant to create bad relations with existing industries through prosecutions. To date, most enforcement action has been taken by either the U.S. EPA or by state agencies.

Level of industry compliance. The EPA audit summary indicated that a significant percentage of POTWs with pretreatment programs in place, continue

to experience problems as a result of industrial discharge. For example, it was reported that 28.8 per cent of the sewage treatment plants surveyed have experienced plant upsets in the past year as a result of industrial discharges.

(iii) Evaluation of Option 1

Both Option 1 and the U.S. approach outlined above involve dividing regulatory responsibility between two levels of government. The preceding assessment of the U.S. approach, however, indicates that this division of responsibilities can lead to problems in the implementation of a sewer-use strategy. Three major weaknesses have been identified:

long delays in implementing local pretreatment programs;

lack of uniformity in compliance efforts from one local authority to the next; and

inadequate compliance efforts in many jurisdictions, as indicated by recent U.S. EPA audits.

The assessment indicates that these problems are due, in part, to the division of regulatory responsibilities between two levels of government. Local governments may not set as high a priority on carrying out a sewer-use strategy as the agency initiating this strategy. Each local authority is subject to different economic and political pressures. As a result, some U.S. local authorities were not recognizing compliance programs as a political priority, or were reluctant to enforce standards due to political pressures at the local level.

These findings raise questions about the effectiveness of separating the roles of initiating a sewer-use control program and setting regulatory standards under that program, on the one hand, and ensuring compliance with those standards on the other. While not all the problems experienced in the U.S. context are necessarily translatable to the Ontario situation, many of the concerns identified above would not arise if the agency initiating the regulatory response was also directly responsible for all aspects of its implementation and enforcement.

In anticipation of these concerns, the Provincial Government has stated that it will take a supervisory role to ensure adequate municipal compliance efforts. In a speech delivered in April, 1988, Christine Hart, MPP and Parliamentary Assistant to the Minister of the Environment, stated that

> our (MOE's) proposal will give municipalities the authority to provide a first line of enforcement. We will back up this authority with provincial laws to prosecute polluters for discharge violations. If a municipality is unwilling to meet its enforcement responsibilities, it will also be charged.[17]

This approach to municipal-provincial relations is unprecedented in Ontario. Given that the control of toxic discharges to sewers is a provincial initiative, the province is likely to be reluctant to bring charges against municipalities that are inadequately carrying out this initiative. Such prosecutions would lead to confusion and uncertainty among municipalities, the public and industry as to the regulatory agency that is accountable for sewer-use control, and would put both levels of government in an untenable political position. Further, the approach would misdirect scarce resources to the resolution of complex jurisdictional and legal issues between governments. Public attention and government funds should be directed toward controlling industries discharging to sewers rather than unnecessary conflicts

between two artificially separated arms of the regulatory process.

For these reasons, it is concluded that primary responsibility for ensuring compliance with the province's sewer-use control program should not rest with municipal governments.

Option 2: Provincial Responsibility

This option would have three advantages over option 1.

Accountability. By allocating responsibility for the regulation of industrial sewer-use to the level of government that is responsible for ensuring the protection of the natural environment in Ontario, the approachwould allow for clear lines of accountability between government, the regulated industry and the public

Uniformity. Since one level of government would be responsible for ensuring compliance province wide, the approach would minimize the opportunity for inconsistent enforcement of sewer-use standards across the province. It would reduce the potential for variations among municipalities which has been identified as a concern both in the U.S. and under the current regulatory system in Ontario.

Efficiency. The standard-setting and compliance components of the program would be consolidated at one level of government, thereby minimizing duplication of efforts and taking advantage of economies of scale. For example, it may be efficient to undertake testing and sampling of waste for the purposes of monitoring at the provincial level. Currently, many municipalities rely on provincial laboratory facilities and personnel in order to monitor sewer-use in their jurisdictions. Consolidation of the two regulatory functions would also facilitate the use of information collected

for the purposes of monitoring in the standard-setting process. Further, by allocating this responsibility for ensuring compliance to the provincial government, the approach would make use of existing Ministry of the Environment expertise in ensuring compliance with environmental legislation. For example, the expertise of the MOE Investigations and Enforcement Branch, and the regional and district enforcement and abatement offices could be applied to the sewer-use compliance program.

In section 3.2.2, it was found that the larger Ontario municipalities have developed administrative structures for ensuring complance with their sewer-use bylaws. If compliance were a purely provincial responsibility this expertise would be lost unless municipal staff were transferred to the provincial level. Such a transfer is not unprecedented in Ontario. For example, during the late 60s and early 70s, the Provincial Government assumed provincial responsibilities for air quality control. At that time, many municipal employees were hired by the provincial agency.[18] It should be noted, however, that such a shift in manpower and expertise from the municipal to the provincial level would inevitably be a major undertaking, leading to disruption and difficulty. This leads to consideration of shared responsibility between the provincial and municipal levels of government. In order to take advantage of existing sewer-use control expertise and efforts at the local level, it is necessary to consider a hybrid option whereby some municipalities would retain responsibility for ensuring compliance.

Option 3: Shared Responsibility

This option involves allocating primary responsibility for ensuring

compliance to the provincial level in some circumstances, and the municipal level in others. Two variations of this option were considered. The first variation, recommended in the Dillon study, would allocate primary responsibility to municipalities but permit small municipalities to opt-out in cases where it lacked the resources or political will to undertake this regulatory function. In these cases, the Provincial Government would take over the responsibility for ensuring compliance. The second variation would allocate primary responsibility for ensuring compliance to the provincial government, but permit municipalities, presumably larger ones with existing compliance programs, to opt-in by adopting measures and procedures consistent with provincial compliance program. Municipalities wishing to opt in would be required to demonstrate to the Ministry their capability and commitment by submitting a detailed compliance program for provincial approval.
The second variation has a number of advantages over the first.

> since the province would retain primary responsibility for both standard setting and ensuring compliance, the approach avoids the concerns identified above arising from the division or regulatory functions between two levels of government.
>
> the approach permits the Provincial Government to play the leading role in all aspects of sewer-use cont ol. This is consistent with the province's traditional responsibility for ensuring adequate environmental protection in Ontario.
>
> the approach would minimize the opportunity for consistent enforcement of sewer-use standards across the province. The Provincial Government would be able to control the content of municipal compliance efforts from the outset by setting minimum requirements for such programs.

Recommendation: the provincial government should be responsible for ensuring compliance with sewer-use standards with a provision to delegate this responsibility to individual municipalities in some cases.

6.2 Recommendations for Implementation of the Compliance Program

Specific recommendations for implementing a compliance program for control of discharges to sewers are set out in this section. The recommendations address specific problems identified in Part 2 of this report and incorporate elements of existing regulatory activities in this area.

6.2.1 The Provincial Program

A) Establishment of Regional Sewer-Use Control Offices

The Ontario Ministry of the Environment should be required to establish sewer-use control departments in regional and district offices across the province. Each office should be responsible for regulating industries discharging into sewer systems located within the region or district. Where municipalities opt-in the regional and district officer should continue to have responsibility for ensuring that the municipal program complied with provincial requirements.

Responsibilities can be divided into three areas:

i. promoting voluntary compliance;

ii. regular monitoring and record-keeping; and

iii. investigations and enforcement.

Guidelines should be established to identify the activities required under each of these functions. These guidelines should include means of separating the voluntary compliance function from the monitoring and enforcement functions, and an explanation of how information obtained from the monitoring function should be used for enforcement purposes. These guidelines should be a matter of record.

The activities of the regional offices with respect to industrial sewer-use should be co-ordinated with the MOE responsibilities for ensuring compliance by direct dischargers with limits set under the MISA program.

B) Voluntary Compliance

Industry survey. The first step in developing a compliance program should be to distribute a survey to all industries discharging into the municipal sewer system. All discharging industries should be required to conduct an inventory of products, processes and discharges in order to account for any contaminants released during their production processes. Information required would include products and by-products produced, processes and procedures used, wastes produced and current waste treatment practices. This information would be kept on file with the regulatory agency and industry would be required to advise the agency of any process changes that may have an effect on industrial wastes discharged.

The information from these surveys would serve two purposes:

i. initiate industry consultation with the compliance agency as a starting point for the agency's efforts to ensure voluntary compliance with standards; and

ii. initiate the monitoring function.

Development of implementation schedules. The compliance agency should begin working with discharging industries to develop a schedule for implementing industrial pretreatment and reduction programs.

Training and technical assistance. The agency would provide technical assistance to industries by working with them in the development of the pretreatment programs, training them to self-monitor and report and helping them to understand the regulatory system and how to comply with regulatory requirements.

A central office for ensuring voluntary compliance should be set up to assist and support the efforts of local compliance offices. This office could be responsible for:

i. publishing and disseminating information on how industries can comply with sewer-use standards, including requirements for self-monitoring and reporting, with periodic updates on changes to standards;

ii. publishing compendiums of information that would assist industries in developing programs to minimize the wastes generated;

iii. cataloguing current information on "best available technology" for pollution control;

iv. acting as a clearing house for information collected by the joint technical committees in each industrial sector; and

v. allocating financial assistance to industries for pollution control, research and development, or the development of ways to recycle or reduce the wastes they generate.

These administrative requirements would be applicable to compliance programs undertaken by either the local municipalities or the local or district office of the Ministry of the Environment, depending on whether or not the municipality elects to become the compliance agency.

C) Monitoring

(i) Administrative Requirements

Industry self-monitoring and reporting requirements. The preferred strategy allocates the primary responsibility for collecting and analyzing industrial waste discharged into municipal sewers to the discharging industry. Initially, the compliance agency would be required to assist municipalities by informing them of the reporting requirements and the sampling and testing protocols. Then the agency would receive monitoring data in accordance with a reporting schedule. The frequency of testing and reporting would be determined on a sector-by-sector basis, for each category of indirect discharger, by the joint technical committees.

Reporting of Spills and Hiccups. Industries would be required to report any spills or unusual discharges. If the industry can demonstrate that there was no intent to violate sewer-use standards, the company would be given a period of time to clean-up or rectify the problem and report on how the spill or hiccup happened, the clean up activities undertaken and the procedures developed to ensure that this type of accident would not happen again. These requirements are consistent with those set out in the 1988 model sewer-use bylaw.

Spot checks by the regulator. In order to ensure the veracity of data received by the regulatory agency from individual industries, a regular program of spot checks is required. U.S. sewer-use enforcement agencies have reported that the most common charge laid against industrial sewer users relates to non-compliance with reporting requirements. Spot checks would provide a deterrent for industries considering non-compliance with reporting requirements and would likely result in a higher level of compliance with sewer-use standards.

Spot checks would involve on-site visits by trained agency officials to collect samples and test them for a comparison with the industry reports, and to review industry self-monitoring procedures.

Another useful tool is an environmental audit of industrial sewer-use practices. Such audits would be conducted on a random basis by the regulatory agency and could serve two purposes: deterring non-compliance; and identifying opportunities to assist industries having trouble establishing pretreatment programs or meeting sewer-use standards.

Testing and sampling protocols. These protocols could be developed by the joint technical committees responsible for developing technology-based standards. The compliance agency would be responsible for outlining the sampling and testing protocol requirements to the regulated industries.

Failure to report. A ticketing system should be set up for industries that fail to comply with reporting requirements or sampling and testing protocols. Industries failing to submit reports would automatically be charged with an offence under The Ontario Water Resources Act and would be required to pay a fine. The more serious offence of submitting false information would be subject to prosecution and more severe penalties.

Licenced laboratories. The provincial Ministry of the Environment would be responsible for licencing all laboratories that monitor and test contaminants. All information used in reports to the regulator must be certified by an accredited laboratory. This would ensure the credibility of results generated from these laboratories and ensure that sampling and testing protocols are complied with. Failure on the part of a laboratory to comply with sampling and testing protocols could result in the suspension of the status as an accredited laboratory for MOE data.

Record keeping. All regulatory agencies should be required to keep records on each industry which discharges into sewers within their jurisdictions. This should include records on the level of compliance with sewer-use standards. It is recommended that the provincial MOE develop a uniform and simplified approach to record keeping, which would be implemented by all compliance offices. Computerization could greatly assist record keeping efforts.

Use of information. The information gathered by compliance agencies should feed into the other components of the regulatory process. Compliance agencies should be required to release semi-annual reports which summarize monitoring activities. The reports would include the following:

a listing of all industries monitored by industrial sectors;

for each reporting industry, a summary of the reports submitted by the industry during the reporting period, including the types and amounts of contaminants discharged;

a summary of all auditing activities;

a summary of all spot investigation activities;

an identification of all non-complying industries and the corresponding actions taken by the agency; and

a summary of the enforcement activities of the agency and the number of successful prosecutions.

This information would be submitted to: the Ontario Ministry of the Environment's Investigation and Enforcement Branch; joint technical committees responsible for developing technology-based standards; the working group responsible for developing the Priority Pollutants List and Prohibition List; and to the local stakeholders' group responsible for developing water quality-based standards. The report would also be released to the public and distributed throughout the locality. Information contained in the report could be used in the following ways:

to evaluate current regulatory efforts;

to assist in assessing the nature of the problem of industrial discharges into sewers; and

to assist in assessing the adequacy of current standards and the need for changes.

Monitoring information would also be fed directly into the investigation and enforcement function of the compliance agency. All cases of non-compliance, detected by industry self-reporting, regular monitoring or spot checks of industry outlets, would be reported to the investigation and enforcement team.

Public access to information. Members of the public should have access to all industry reports of violations. Provisions should be made in each local office for public review of monthly compliance summaries and the actions to be taken by the compliance agency in cases of non-compliance. This sharing of information will allow for public scrutiny of the compliance efforts of the local agency and provide an opportunity for private prosecution.

(ii) Legislative Requirements

Industry self-reporting. Minimum requirements for self-monitoring and reporting should be set out in regulation. For each industrial sector the following reporting requirements should be specified:
types of contaminants that must be monitored;
number of times per year that sampling and monitoring is to take place; and
the reporting schedule to be used.

Failure to comply with the reporting schedule should be an offence under the Ontario Water Resources Act with provision for an automatic fine.

Sampling and Testing. All industry reports must be certified by a licenced laboratory. Regulations under the OWRA should specify sampling and testing protocols for various types of contaminants. These regulations should also require all industries, private laboratories and monitoring services, and regulators (MOE laboratory services) to comply with these requirements. The OWRA should also establish a process for licencing laboratories to take samples and test contaminants in order to certify the accuracy of the self-monitoring reports. Regulations should be developed which specify the conditions under which a licence would be revoked.

Government Reporting. The Ontario Water Resources Act should specify that the compliance agency is required to submit semi-annual reports on monitoring activities, as described above under administrative requirements.

Public Access. Provisions should be established under the Ontario Water Resources Act for public access to all the monitoring information on file with the compliance agency.

D) Enforcement

(i) Administrative Requirements

Investigations. A specially trained investigations team would be set up for each compliance office. Training and assistance could be supplied by the MOE Investigations and Enforcement Branch. The team would carry out the following functions:

spot checks to verify industry self-monitoring activities;

routine random inspection of sites discharging into municipal sewer systems; and

follow-up investigations on reports of violations.

Given the overlap between regular monitoring and these investigations responsibilities it is anticipated that in some compliance offices the same personnel could carry out both of these functions. However, the personnel responsible for voluntary compliance should be different from that responsible for enforcement.

Prosecutions. Prosecution of sewer-use violations should be conducted by the MOE legal services branch. The branch should develop a procedure for prosecuting violators which sets out evidentiary requirements and a policy regarding what sanctions would be required for particular offences. A sewer-use prosecutions team could be set up within the branch. This team could work with representatives from the investigations teams from across the province to develop a uniform procedure for gathering evidence for prosecutions. For 'opting-in' municipalities, prosecutions could be handled by municipal solicitors. Provinces and "opt-in" municipalities should work together to ensure a uniformity of approach for prosecutions.

ii) Legislative Requirements

Investigations. Under the Ontario Water Resources Act, the Minister and his employees and agents have broad investigatory powers. Section 10(1) of the Act authorizes a ministry official to enter onto private lands or into buildings and "make such surveys, examinations, investigations, inspections or other arrangements as he considers necessary". However, for greater clarity,it is proposed that regulations be passed which specify the investigatory powers of sewer-use enforcement officers. The regulations should state that the officer is empowered to inspect sewer works, connections and manholes, and should establish a procedure for taking samples and testing those samples which is consistent with those required for regular monitoring.

Sanctions. Sanctions for all illegal discharges into the environment, including discharges into municipal sewer systems, should be consistent. Since the province has established sanctions aimed at deterring environmental offences, and there has been insufficient time to measure the effectiveness of these sanctions in deterring such illegal activity, increased sanctions are not proposed in this report. However, amendments should be made to specify that sanctions under the Ontario Water Resources Act apply to the violation of sewer-use standards. Where municipalities are required to enforce sewer-use standards, they should be empowered to impose the same penalties as the province and not the lesser penalties established in recent amendments to the Municipal Act.

6.2.2 The Municipal Opt-In Program

The Provincial Ministry of the Environment should produce a document outlining the minimum requirements of a compliance program as described in section 6.2.1 above. This document would be distributed to all the municipalities across the province that are currently responsible for monitoring and enforcing industrial sewer-use by-laws. Where responsibility is shared between local and regional governments, both levels of government would be provided with this document. The document would provide some estimate of the anticipated costs of administering the program and would set out two options for consideration by municipal councils: opting in, or transfer of responsibility to MOE Regional or District offices. The document would also set out the benefits of opting in, including the availability of provincial grants and technical assistance in implementing and operating the compliance program. Funding and technical assistance would be made available to municipalities that elect to opt in. It is recommended that the province cover the cost of initial implementation and provide technical assistance and training at the regional and district office level.

The regional or district office should be responsible for ensuring that municipalities develop a compliance program that meets the minimum requirements set out in provincial legislation. A strict time limit should be set for the municipality's decision on whether to opt in. Following a three month decision-making period, non-response by the municipality would initiate steps to develop a compliance program for the municipality's sewage system at the district or regional office.

If a municipality elects to opt in, it should be required to submit a compliance program that includes minimum requirements for promoting voluntary compliance, regular monitoring and record keeping, and investigations and enforcement. This program must be approved by the Provincial Ministry of the Environment. The Provincial Ministry of the Environment should work with the municipality to develop its compliance program.

At minimum the compliance program should require the following:

a commitment to incorporate all applicable provincial sewer-use standards into a municipal bylaw; and

a commitment of funds necessary to operate the program.

All aspects of the compliance program should be subject to periodic auditing by the regional or district office to ensure compliance with the requirements of the program.

6.3 The Costs of the Recommended Compliance Program

The proposed compliance program imposes costs on industries, which must self-monitor and report on a regular basis, and on the regulatory agency, whether provincial or municipal government, which must monitor industrial sewer-use activities and prosecute industries who are in violation of standards. In order to determine whether or not these costs would make the proposed program prohibitively expensive, CELRF undertook a preliminary cost study, provided as Appendix E of this report. This study estimates the cost of compliance monitoring and enforcement under the proposed program to municipal and provincial governments as well as industry. Specifically the

study calculates the following program costs:

the cost to industry of scheduled monitoring and self-reporting

the cost to municipalities of compliance monitoring

the cost to municipalities for enforcement where violations occur

the cost to the province of compliance monitoring and enforcement where municipalities choose not to opt in

In order to calculate these estimates, it was necessary to develop a number of assumptions about how the proposed compliance program would operate. For example, in order to calculate provincial costs where municipalities have chosen not to opt in as a compliance agency, the study was required to develop a theory on how a provincial compliance effort might be set up across the province. Based on this work, it is concluded that a workable and affordable approach to province-wide monitoring and enforcement can be developed. Cost estimates under each of the four headings are not unreasonable.
The study also provides some preliminary comments on how the operating costs of the program might be recovered. The purpose of the study is not to develop precise estimates of the costs of regulatory action, or to suggest a preferred approach to meeting those costs. Rather, it is intended as a preliminary contribution to the important debate that must proceed alongside the development of a regulatory strategy - the debate over the appropriate allocation of environmental protection costs among members of our society.

NOTES - Chapter 6

1. M.M. Dillon Limited, Evaluation of Municipal Control Options - Phase II: Effectiveness, Cost Evaluation and Policy Recommendations (MOE, March, 1988) p. iv.

2. Clean Water Act, 33 U.S.C. (and supp. V) 1251 et. seq.

3. Ibid., s. 307(b)1, 33 U.S.C. (and supp. V) 1317 (b)(1).

4. M.M. Dillon Ltd., Evaluation of Municipal Control Options - Phase I (MOE, September, 1987) pp. 4-3 to 4-8. POTW compliance responsibilities under the Clean Water Act are outlined in U.S. EPA, Report to Congress on the Discharge of Hazardous Wastes to Publicly Owned Treatment Works, (U.S. EPA, February, 1986) and in more detail in U.S. EPA, Guidance Manual for POTW Pre-treatment Program Development, (U.S. EPA, October, 1983).

5. Ibid. See also U.S. EPA, Guidance Manual on the Development and Implementation of Local Discharge Limitations under the Pre-treatment Program, (U.S. EPA, November, 1987).

6. Clean Water Act, 33 U.S.C. (and supp. V) s. 309 (b)(2) and 40 C.D.R., Part 122.

7. Personal communication, Edward Bender PhD., Biologist, Policy Development Branch, Office of Water Enforcement and Permits, U.S. Environmental Protection Agency, April 14, 1988.

8. U.S. EPA, Overview of the National Pretreatment Program, (U.S. EPA, October, 1985).

9. U.S. EPA, "Pre-treatment Program Approval Status Report", (U.S. EPA, December, 1987) with update by personal communication, Jim Elder, Director, Office of Water Enforcement and Permits, March 22, 1988.

10. Ibid.

11. Ibid.

12. See for example U.S. v. City of Philadelphia Eastern District Court of Pennsylvania (September 2, 1988); U.S. v. City of Akron, Northern District Court of Ohio, Eastern Division (C8-88-2279); or U.S. v. Auburn, N.Y., Northern District Court of New York (86-CV-93).

13. U.S. EPA, "Pre-treatment Audit Summary Report", (U.S. EPA, March 2, 1988).

14. This problem is also discussed in Pre-treatment Implementation Review Task Force, Final Report to the Administrator, (U.S. EPA, January 30, 1985).

15. Bender, supra. note 7.

16. See for example, U.S. EPA, Office of Water Enforcement and Permits, Guidance Manual for POTW Pre-treatment Program Development, (U.S. EPA, October 1983).

17. Christine Hart, MPP, Speech to the 1988 Pollution Control Association of Ontario Annual Conference, (Kingston: April 10, 1988).

18. Personal communication, John Swaigen, Solicitor, Municipality of Metropolitan Toronto, August 31, 1988.

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APPENDIX D: JANUARY 25, 1988 WORKSHOP AGENDA

APPENDIX D

WORKSHOP ON THE REGULATION OF INDUSTRIAL SEWER-USE IN ONTARIO

January 25, 1988
9:00 a.m. - 4:30 p.m.

Canadian Bar Association Offices
120 Adelaide Street West
Toronto, Ontario
10th Floor

A G E N D A

This agenda is not intended to preclude the discussion of different topics suggested during the workshop. Neither is the time allocation fixed - participants may wish to spend more time discussing a specific topic.

8:30-9:00	Registration and coffee
9:00-9:15	Introduction and project overview
9:15-10:00	Topic 1 Nature of the problem: (a) Presentation - Canadian Environmental Law Research Foundation (b) Discussion . What risks are posed to the environment by industrial sewer-use in Ontario?
10:00-10:45	Topic 2 Current regulatory framework: (a) Presentation - Canadian Environmental Law Research Foundation (b) Discussion . What are the current problems with sewer-use regulation in Ontario?
10:45-11:15	Coffee
10:15-12.30	Topic 3 Setting standards for industrial sewer-use: Discussion . Should province-wide standards for sewer-use be set by the provincial government?

- Should standards be set on a sector-by-sector basis or should all standards be subject to the same standards?
- Is the best available technology approach to standard-setting adequate?
- Should standards based on the quality of the receiving water body be developed?
- By what means should standards be set and who should be involved in the standard-setting process?

12:30-1:30 Lunch (a sandwich lunch will be provided)

1:30-2:00 Topic 4
Monitoring

Discussion
- What are the barriers to an effective monitoring system?
- Who should play the lead role in monitoring sewer-use?
- What are the components of an effective monitoring system?
- How can spills and discharges into storm sewers best be monitored?

2:00-3:00 Topic 5
Enforcement

Discussion
- Should the province take over the field of sewer-use enforcement? If so, what changes and additional resources will be required?
- What, if any, additional investigatory powers would be required to order to enforce sewer-use regulation?
- What additional fines and penalties are required to ensure compliance?

3:00-3:30 Coffee

3:30-4:30

Topic 6
Costs and Financing

Discussion

- What will the major costs of increased regulation of industrial sewer-use be?

- How should these costs be met? Options include user-fees, increased provincial taxes, increased municipal property taxes, or some combination of these.

- Should an industrial surcharge or user-fee system be employed and, if so, how could this system be implemented?

APPENDIX E: PRELIMINARY COST STUDY

COST ESTIMATES FOR REGULATING INDUSTRIAL SEWER DISCHARGES IN ONTARIO

FOR THE CANADIAN ENVIRONMENTAL LAW RESEARCH FOUNDATION

RONALD PUSHCHAK
SCHOOL OF URBAN AND REGIONAL PLANNING
RYERSON POLYTECHNICAL INSTITUTE

1988
TORONTO

1. STUDY PURPOSE

The Canadian Environmental Law Research Foundation has proposed a framework for regulating industrial discharges into municipal sewer systems in accord with the MISA goal of eliminating toxics from municipal STP discharge, which calls for the use of discharge standards based on Best Available Technology Economically Achievable (BATEA). Under the proposed framework, industry would have the primary responsibility for self-monitoring, while regulatory agencies would be responsible for intermittent monitoring to determine whether industries comply with the regulation, and responsible for enforcement when violations occur. Because municipalities differ in their abilities to monitor and enforce such regulations, CELRF has proposed that municipalities be able to "opt in" to the monitoring and enforcement activities where the interests of the municipality are advanced by developing monitoring and enforcement capabilities. In cases where the municipality decides not to opt in, the province is expected to assume the responsibility for monitoring and enforcement.

This study estimates the cost of the proposed regulations on the Province, municipalities and on industry. The objectives were to determine:

A. the costs of imposing the regulation on industry, municipalities, and the province.

   i) Cost to Industry of scheduled monitoring and self-reporting

   ii) Cost to municipalities for compliance monitoring

   iii) Cost to municipalities for enforcement where violations occur

   iv) Cost to the Province of compliance monitoring and enforcement where municipalities choose not to "opt in"

B. The most likely means of recovering costs.

2. COST TO INDUSTRY OF MONITORING

To establish monitoring costs for industry, a list of industry types likely to discharge wastes into municipal sewer systems was taken from the Ontario Ministry of the Environment study of municipal sewer use control options (Dillon, 1987; 2-4). The industries noted did not include those producing only common organic wastes (BOD, suspended solids and grease) since these industries only create problems for sewage treatment plants by their rate of flow. Rather industries that were likely to produce toxic contaminants or discharges that might adversely affect sewage treatment plant functions were included (Table 1).

The number of industries likely to be discharging into municipal sewage treatment systems was estimated using ratios developed in the Domestic Sewage Study (U.S., EPA, 1986). The U.S. ratios may not be directly applicable to Ontario since there are more direct discharges in U.S. industry. Consequently, a range of costs has been calculated to allow for a larger number of indirect discharges in Ontario.

For each industry, the number of times a year it would be expected to sample its effluent and report findings was estimated using sampling frequency rates used in Michigan (U.S.), France and Germany, where self-monitoring programs are used (Dillon, 1987). Generally, industries are expected to report on effluent quality 1-4 times a year depending on the type of industry with higher reporting intervals for those industries that typically discharge hazardous or toxic materials or those where flow rates are high. For this study, similar sampling frequencies were used. Frequencies were increased up to 12 times a year if the average flow rate for an industry exceeded 50,000 gpd or if the type of industry was one that would

Table 1: Industrial Self-Monitoring Cost

CANADIAN SIC NUMBER	TYPE OF INDUSTRY	AVERAGE FLOW RATE G/D	TOTAL NUMBER OF INDUSTRIES	EST. NO. OF INDIRECT DISCHARGE	SAMPLE FREQ. /YR	FREQ. BY FLOW RATE OR INDUSTRY TYPE	TYPES OF SAMPLE REQUIRED	TOTAL COSTS FOR ALL INDUSTRIES (1985 $)	COSTS FOR INDUSTRIES DISCHARGING INDIRECTLY (1985 $)	INDUSTRY AVERAGE COST/YR DISCHARGING INDIRECTLY
3792	Adhesives	4,500	21	12	2	---	B	21,000	12,000	1,000
3391	Battery	25,000	14	8	4	1/4 @ 12	ABD	57,772	31,512	3,939
3611-3699	Refined Petroleum, Lubeoil & Asphalt	440,000	43	11	4	12	ABCD	416,154	106,458	9,678
3352	Electronic Parts & Components	74,000	125	124	3	1/2 @ 12	ABCD	759,723	750,045	6,048
304163921	Electroplating, Metal Finishing & Jewelry	35,000	338	264	4	1/3 @ 12	ABD	1,481,064	1,155,440	4,376
3111-3299	Equipment Mfg. & Assembly (Agri., Trans)	---	1,433	*831	2	---	ABD	1,881,529	1,091,103	1,313
9721-9725	Laundry and Dry Cleaning	7,600	1,924	1,920	2	---	B	1,924,000	1,920,000	1,000
3791	Printing Ink	4,000	30	14	2	---	ABD	39,390	18,382	1,313
3711-3722	Inorganic Chemicals, Agriculture & Fertilizer	79,000	82	13	4	12	ABCDE	1,531,596	242,814	18,678
2911-2941	Iron & Steel Foundries and Production	363,000	99	16	4	12	ABD	779,922	126,048	7,878
3011-3099	Ferrous Metal Forming & Non-Ferrous	355,000	2,767	827	4	1/4 @ 12	ABD	10,900,526	3,258,866	3,940
1711-1719	Leather Tanneries & Leather Manufacturing	32,000	161	142	2	1/4 @ 12	AB	455,211	406,042	2,859
2961-2999	Non-Ferrous Metal Forming	41,000	117	36	4	1/3 @ 12	ABD	512,070	157,560	4,376
2950	Non-Ferrous Metal Smelting	---	11	3	4	---	ABD	28,886	7,878	2,626
3712-3799	Organic Chemical Manufacturing	102,000	185	80	4	2/3 @ 12	ABCDE	2,683,406	1,158,036	14,475
3751	Paint & Varnish	400	82	41	3	---	ABD	161,499	80,749	1,969
3729	Pesticides & Agricultural Chemicals	4,000	5	1	4	---	ABCDE	31,130	6,226	6,226
3741	Pharmaceutical & Medical Manufacturing	86,000	68	41	3	2/3 @ 12	BDE	777,084	467,016	11,390
3912	Photographic Chemicals & Films	---	75	*44	3	---	ABD	147,712	86,658	1,969
1611-1699	Plastic Molding & Forming	5,900	507	224	3	---	BD	800,046	353,472	1,578
3731	Plastic and Synthetic Resin	47,000	42	17	4	1/2 @ 12	BC	218,400	85,800	5,047
3512	Porcelain Enamelling	41,000	29	22	2	1/2 @ 4	ABD	56,459	43,329	1,969
2811-2849	Printing & Publishing	700	2,320	1,590	2	---	AB	2,925,520	2,004,990	1,261
2711-2719	Pulp & Paper Industry	700,000	39	15	4	12	ABD	307,242	118,170	7,878
1511-1521	Rubber Products	68,000	79	26	2	2/3 @ 12	B	132,000	43,000	1,653
1811-1999	Textile Mills, Carpet & Fibre	114,000	435	174	2	4	B	870,000	348,000	2,000
2512-2599	Timber Products, Wood Processing & Veneer	---	838	419	1	---	B	419,000	209,500	500
			11, 897	6,449				30,318,341 ** 1987 $ =32,956,036	14,289,094 1987 $ =15,532,245	

* The number of indirect discharges was estimated by taking the overall average of indirect discharges for all industries (58%).

** 1987 costs were estimated using the consumer price index rate of increase.

typically produce concentrations of contaminants.[1] Where average flow rates were near 50,000 gpd, it was assumed that the distribution about the mean was normal consequently a proportion of the industries that might exceed the target flow rate was estimated for more frequent monitoring.

For each industry, the types of sampling required were estimated for one or all of 5 tests (A - metals, B - organics, C - pesticides and PCB's, D - total cyanide, and E-dioxins and furans), each of which imposes a different cost on industry. Costs were estimated using standard Ontario laboratory fees. It was assumed for this study that industries would not have in-plant testing capabilities and that all dischargers would send their samples to private laboratories for testing.[2] Private laboratory costs were taken from the Canviro (1985) study of costs for monitoring hazardous contaminants.[3] The total cost of self-monitoring for all industries discharging indirectly is $15,532,245 (1987 $) for an average 1987 cost per industry of $2408. Given that the proportion of indirect (sewer) discharges

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1 For flow rates at or above 50,000 gpd, it is assumed that small concentrations of hazardous or toxic contaminants can produce large absolute amounts. A survey of enforcement actions in the U.S. for industrial user pre-treatment violations (FY 1985-86) indicated the average flow rate for violators was 84,000 gpd and that of the 44 violations prosecuted, 37 (84%) were electroplating and metal finishing industries.

2 Estimates of costs do not include cost of shipping samples or cost of reporting. It was also assumed that industries would discharge to sewers at one outfall point requiring one sample in each time period.

3 Unit costs for private laboratory fees in 1985 dollars were:

A.	Metals	$ 130.50
B.	Total Organics	500.00
C.	Pesticides and PCB's	150.00
D.	Total Cyanide	26.00
E.	PCDD's and PCDF's	750.00

Costs include overhead and profit for private laboratories.

Canviro, 1985,
table ES-17

is greater in Ontario, the maximum cost for all industries is estimated to be $32,956,036 assuming every industry discharges into a municipal sewer.

3. MUNICIPAL COSTS FOR COMPLIANCE MONITORING

3.1 Municipal Sampling Costs

The proposed regulatory framework calls for a regulatory agency, either municipal or provincial to monitor industries for compliance with discharge standards for effluents entering the sewer system. Assuming that municipalities will likely retain responsibility for monitoring, sampling costs were estimated for municipalities. Because the profile of industries and the number of industries vary by municipality, a sample of four municipalities was taken to estimate the cost for compliance monitoring. The municipalities selected included Toronto and Waterloo, both large municipalities with municipal sewer discharge programs and compliance monitoring systems in place, and the smaller industrial municipalities Windsor and Sarnia, to estimate the cost of municipal monitoring efforts.

Data on the industrial composition of each municipality were taken from the 1982 Census of Metropolitan Areas by industry. For each SIC number noted in Table 1, the number of plants in each metropolitan area for each industry type was obtained. It was assumed that all industries operating within metropolitan boundaries were sewer dischargers, consequently a monitoring cost for all industries was calculated.

Sampling frequencies were assumed to be 1-4 times per year with 4 times per year required for industries with a high potential to discharge toxic or hazardous wastes.[4] As in the case of industry self-monitoring,

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[4] In the U.S., compliance sampling frequencies were 1-2 times per year with 2 samples per year for high potential industries. In Germany, sampling frequencies ranged from 1-4 times per year with higher frequencies for significant industries and for high rates of flow. The existing monitoring program in Toronto uses higher frequency rates, consequently the 1-4 times per year rate was used in this study.

Table 2: Compliance Monitoring By Municipality

	CANADIAN SIC NUMBER	TYPE OF INDUSTRY	NUMBER OF IND'S.	SAMPLE FREQ. /YR	FREQ. BY FLOW RATE	TYPES OF SAMPLE REQ'D	TOTAL COST	SAMPLING EVENTS
METROPOLITAN TORONTO	3041	Electroplating & Metal Finishing	268	4	1/4 @ 8	ABD	143,380	1,340
	1811-1999	Textile Mills, Carpet & Fibre	11	2	4	B	3,520	44
	2512-2599	Timber Products, Wood Process & Veneer	86	2	---	B	13,760	172
	3011-3099	Ferrous & Non-Ferrous Metal Forming	1,210	1	1/4 @ 2	ABD	161,784	1,512
	3111-3299	Equipment Mfg. & Assembly	127	1	---	ABD	13,589	127
	3390-3399	Metal Reprocessing (Battery)	60	2	1/4 @ 4	ABD	16,050	150
	3512	Porcelain Enamelling	7	1	1/2 @ 2	ABD	1,177	11
	3791-3792	Ink Mfg. & Adhesives	23	1	1/4 @ 4	ABD	4,387	41
	3799	Wood Chemicals & Related Oils	104	2	2/3 @ 4	ABCDE	43,507	139
	3912	Photographic Chemicals & Film	5	4	---	ABD	2,140	20
	3921	Jewelry & Silver	145	2	1/3 @ 4	ABD	41,516	388
			2,046				473,130 1987$ = 514,292	3,944
REGIONAL MUNICIPALITY OF WATERLOO	1611-1699	Plastic Molding Forming	5	4	---	BD	1,680	20
	2512-2599	Timber Products, Wood Processing & Veneer	30	2	---	B	4,800	60
	2940	Iron Foundries	5	4	---	ABD	2,140	20
	3011-3099	Ferrous & Non-Ferrous Metal Forming	38	1	1/4 @ 2	ABD	5,136	48
	3352	Electric Parts & Components	14	1	---	ABCD	2,142	14
	3921	Jewelry & Silver	21	2	1/3 @ 4	ABD	5,992	56
	3041	Electroplating & Metal Finishing	5	4	1/4 @ 8	ABD	2,996	28
			118				24,886 1987$ = 27,051	246
WINDSOR METRO AREA	3011-3099	Ferrous & Non-Ferrous Metal Forming	143	1	1/4 @ 2	ABD	19,153	179
	3041	Electroplating & Metal Finishing	8	4	1/4 @ 8	ABD	4,280	40
			151				23,433 1987$ = 25,471	219
LAMBTON COUNTY (SARNIA)	2512-2599	Timber Products, Wood Processing & Veneer	7	2	---	B	1,120	14
	2811-2849	Printing & Publishing	14	1	---	AB	1,442	14
	3011-3099	Electroplating & Metal Finishing	27	4	1/4 @ 8	ABD	14,552	136
			48				17,114 1987$ = 18,603	164

sampling frequencies were increased if flow rates exceeded 50,000 gpd.

The cost for municipal compliance sampling was derived by assuming government laboratory costs for municipalities since municipalities would establish their own laboratories if sampling frequency warranted, or would send their samples to a provincial regional laboratory if sample numbers were small. In either case, "at cost" lab charges would be incurred.[5]

As table 2 indicates, the sampling costs for municipalities excluding sample shipping and administrative expense, range from a high of $514,292 for Metropolitan Toronto to $18,603 for small municipalities with medium sized cities at $25,471 to $27,051 per year.

3.2 Sample Collection Costs

Industrial effluent samples are commonly taken using two man crews with a van to carry sampling equipment. Observed rates of sampling in the U.S. and Canada suggest a two man crew working full time (200 days/year) can sample 150 to 200 moderately complex industries twice a year for a total of 400 sampling events. Given this sampling rate, a city the size of Toronto would need 9 crews or more to take 3,944 samples. Waterloo, Windsor and Sarnia would each require a crew working at 1/2 time to collect the required samples.[6] The cost for crew and equipment is given in $1987 as:

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[5] Government laboratory costs were estimated to be the following in 1985 dollars:

A.	all metals	$ 23.00
B.	total organics	80.00
C.	pesticides & PCB's	46.00
D.	total cyanide	4.00
E.	PCDD & PCDF's	160.00

Canviro, 1985, table ES-17

[6] Estimates of sampling rates, crew salaries and equipment costs are adapted from the Association of Metropolitan Sewerage Agencies (1982) Pretreatment Resource Reader, Chapter 5, pp 82-110.

Crew Salary	$ 45,645
(1) Van & Equipment	34,480
total	$ 80,125

for a first year of $80,125 to equip and operate one sampling crew. For Toronto, the initial year cost to equip 9 crews would be $310,320 and the operating cost would be $410,805 for a first year cost of $721,125 and an annual operating cost of $410,805 excluding maintenance and supplies. For Waterloo, Windsor and Sarnia, the initial equipment cost would be $34,480 and an annual operating cost of $22,823 assuming a half-time monitoring effort. This would create a first year cost of $57,302 and an annual operating cost, excluding maintenance and supplies of $22,823.

It is assumed that a municipality with 100 sampling events or less would not decide to "opt in" to compliance monitoring because of the economic inefficiencies imposed but would leave sampling responsibility to a regional crew employed by the province for small municipality sampling.

3.3 Laboratory Costs for Municipalities

The rate for laboratory analysis of samples is governed by the number of samples routinely handled by the two principal testing machines. Metals tests require an atomic absorbtion spectrophotometer (A.A.) which can sample a full range of twenty elements at a rate of 3-7 samples a day. Given 200 working days a year, samples can be processed at a rate of 600-1400 samples a year. Similarly, analyses of organics requires a Gas Chromotograph-Mass Spectrometer (GC-MS) which can, at 4 samples a day, analyze 800 samples a year.

Assuming the lower number (800 samples a day) determines the rate at which total samples can be analyzed, one lab station (A.A. and GC-MS) would be able accommodate 800 sampling events a year. Toronto with 3,944 sampling events per year would require a laboratory with 5 equipment stations, whereas

it is assumed any community with fewer than 800 samples a year would choose not to establish a laboratory, but rather send samples to a regional provincial laboratory for analysis, unless the municipality develops laboratory capabilities to administer a sewer surcharge program as did Waterloo.

Laboratory costs (for one lab station)

a)	A.A.	Equipment cost	$ 69,100
		Supplies (yearly)	4,146
		Operator salary	27,640
		Total	$ 100,886
b)	GC-MS	Equipment cost	$ 165,000
		Supplies	6,910
		Salary (2 technicians, 1 operator)	105,000
		Total	$ 276,910

Given that Toronto would require 5 equipment stations, the laboratory cost for the initial year would be $1,888,980 and the annual operating cost, excluding space and administrative costs, would be $718,480.

Table 3: Annual Operating Costs for Municipalities (1987 $)

	TORONTO 5 lab stations 9 sampling crews	WATERLOO 1 lab station 1 sampling crew at half time	WINDSOR 1 sampling crew at half time	SARNIA 1 sampling crew at half time
Analysis Costs for Municipalities without Laboratories	-----	-----	25,471	18,603
Sampling Costs	410,805	22,823	22,823	22,823
Laboratory Costs	718,480	143,696	-----	-----
10% Depreciation Cost on Laboratory & Sampling Equipment	148,082	26,858	3,448	3,448
Estimated Total Annual Costs	1,277,367	193,377	51,742	44,874

The costs in Table 3 represent the total cost to each municipality, excluding offsetting revenues such as those derived from sewer use surcharges, which both Toronto and Waterloo presently impose on discharges. These costs represent a per capita expenditure of $.59 for Waterloo, $.38 for Metropolitan Toronto, $.04 for Sarnia, and $.02 for Windsor. Smaller municipalities tend to pay lower costs by avoiding the expense of operating a laboratory.

4. MUNICIPAL ENFORCEMENT COSTS

Enforcement costs for the proposed sewer discharge regulations depend on the number of enforcement actions required as a proportion of all sampling events. In the U.S. in fiscal year 1986, for all regions, 6.2% of all inspections were referred to legal authorities for action whereas 2.1% of all inspections were referred by State governments. In fiscal year 1987, 2.6% were referred by EPA and 2.4% by State governments.[7] In Canada, Toronto enforcement data indicate that in 1987, of 2,759 samples taken, 62 were in violation and 41 companies were charged, representing 2.3% of all samples taken. In Toronto, to prosecute 41 cases in 1987 required 1 1/2 full legal counsellors at an estimated cost of $110,000 a year. This results in an average cost per action of $1,682.93 excluding administrative overhead and court costs.[8] Assuming that present legal staff in a municipality would act to prosecute where the number of cases does not warrant a full time counsellor, enforcement costs for the selected municipalities would be:

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[7] Source: Regional SPMS/EMAS analysis data reported to US, EPA for fiscal years 1986 and 1987.

[8] Costs per action in smaller municipalities would likely be lower given the Toronto cost reflects higher average legal salaries paid in the Toronto Metropolitan area.

Toronto	110,000
Waterloo	14,316
Windsor	11,724
Sarnia	6,170

Province-wide, the number of actions resulting from 20,748 samples would number 477 actions for a total province-wide cost of $1,279,757 for all municipalities, excluding administrative, overhead, and court costs.

5. PROVINCIAL COSTS

In cases where municipalities have chosen, because of cost or other reasons, not to participate in monitoring and enforcement efforts, the Province will be required under the proposal regulation to sample and analyze effluents from industries in those municipalities. It is assumed that 5 Regional sampling and analysis facilities would be established to collect samples from regional municipalities and conduct analyses.

For estimation purposes, sampling and laboratory facilities would be established in the following regions:

1. South West
2. South Central
3. South East
4. North West
5. North East

Because of the smaller municipality sizes and the greater distances between municipalities, it is assumed each northern regional facility would have one laboratory station and two crews for sampling purposes. Conversely, in the southern facilities, 2 laboratory stations are estimated to be required together with 2 sampling crews.

total for all regions:	sampling crews	10
	laboratory stations	8

The provincial cost in the initial year would be $801,250 for sampling (equipment plus operation) and $2,215,280 for laboratory stations resulting in a total cost in the initial year of $3,016,530, excluding administrative

and overhead costs. Subsequently the province would spend $1,827,778 a year in operating costs, including depreciation, to obtain samples and conduct analyses in those regions.[9]

6. "OPT IN' PROVISION

The proposed regulations for sewer users allow for municipalities to voluntarily take up monitoring, analyses and enforcement responsibilities. Given the provincial capability to sample, analyze and enforce through regional facilities, municipalities that elect not to participate can be regulated by the province. Municipalities may choose to "opt in" to control local water quality or to establish a monitoring program in order to derive revenue from a surcharge on non-toxic waste loads. Municipalities will not likely participate in sampling if the number of samples required a year is less than 200 and will not develop laboratory capabilities if the number of samples processed each year is less than 800. Consequently, in remote areas, small communities with a limited number of industries would not likely "opt in " to the system.

7. COST RECOVERY

The proposed framework for regulating sewer discharges creates a reasonably equitable distribution of costs. The province pays for regional monitoring and enforcement in cases where municipalities have chosen not to participate. Industry pays for self-monitoring and reporting in an equitable manner since reporting costs are greatest for those industry types which tend

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[9] This would create a total provincial capacity to conduct approximately 11,200 samples a year. The province-wide number of samples is expected to be 20,748 given the sampling frequencies established in this report. Consequently, a detailed regional analysis of industries and sampling requirements is needed to establish the appropriate location for additional non-private lab capacity.

to discharge greater concentrations of toxic contaminants, or have larger discharge rates. Municipalities pay for compliance monitoring and enforcement.

The costs to be recovered in this regulation are municipal and provincial costs since costs to industry are, by design, reasonably distributed. The two criteria in choosing among cost recovery methods are efficiency and the "polluter pays" principle. First, it is necessary to choose an efficient means of cost recovery since all industries may not be able to support means which have large administrative or technical requirements. The objective would be to use a cost recovery method that is administratively simple and relatively equitable. Second, where possible, a cost process should recover the largest proportion of costs from industries that by type or flow rate require the greatest monitoring or enforcement effort.

7.1 Municipal Cost Recovery

Options for Municipal cost recovery include:

- effluent tax
- discharge fee
- general tax on property
- tax on industrial property

a) Effluent Tax

An effluent tax would impose a cost per unit of effluent discharges to municipal sewer systems which would create an economic incentive to reduce the production of effluents to lower the tax paid. While this method of cost recovery is appropriate for non-toxic simple organic discharges, the proposed regulation has as its goal the virtual elimination of toxic discharges to municipal sewer systems. An effluent tax would not guarantee virtual toxics elimination, rather it would allow inefficient plants to continue to

discharge toxics by paying the fee. It is commonly held that effluent taxes are appropriate means of cost recovery for non-toxic discharges but are not a reasonable means of dealing with toxic contaminants, particularly since a sewage treatment plant may not be able to deal with the substance once it is introduced to the effluent stream.

Several communities do, however, presently impose a surcharge on non-toxic, common organic effluents as a means of recovering additional sewage treatment costs where high rates of flow stress the existing system. Surcharges are generally perceived by industry as acceptable because they appear to be fees for additional services provided. Surcharge programs could however create revenues in municipalities where they are not presently used to offset the monitoring and enforcement costs of toxic contaminant discharges and should be encouraged as part of a municipality's cost recovery system.

b) Discharge Fee

Costs can be recovered by imposing a fee on industries for discharging into the sewer system which pays for compliance monitoring and enforcement. This recovery method would be equitable if the fee were set by industry flow rate and type to reflect the costs each industry imposes. It would be less equitable if a flat fee were imposed on all industries in a municipality to recover costs. The difficulty with a discharge fee is the administrative cost created in setting the appropriate fee for each industry. For many municipalities the small number of industries does not warrant a method which increases administrative costs.

c) Tax On All Property

Municipalities could recover costs by a general increase in property tax. This method would be equitable in that all members of the tax base

which benefit by the operations of discharging industries would pay for the cost of monitoring and enforcement. This would, however, not meet the objective reflected in the "polluter pays" principle. Costs would be borne by properties that did not discharge toxic contaminants into sewer systems.

d) Tax On Industrial Property

A tax on industrial property tends to meet the objective of making the polluter pay in that the costs are borne by industries alone rather than by other property owners. It is also administratively simple in that an increase in the industrial property tax would be relatively easy to apply and would be greater for industries with greater assessed value. Average annual costs for each industry that potentially discharges toxic effluent would be:

Toronto	$ 599
Waterloo	1,638
Windsor	342
Sarnia	934

If this cost were distributed across all industries through an increase in industrial tax, the tax for individual industries would be lower. Consequently, because of administrative simplicity and potential for cost recovery from industry. The suggested approach to recovery costs would be an increase in municipal industrial tax equal to municipal costs of compliance monitoring and enforcement. Municipalities would be able to maximize cost recovery if their monitoring and enforcement operations included a surcharge system to recover additional costs for non-toxic discharges. This is efficient for large municipalities since sampling and analysis resources can be used for surcharge and non-surcharge actions.

7.2 Provincial Cost Recovery

The arguments of administrative simplicity and imposition of costs on polluters apply to provincial recovery of costs. Costs to the province for

regional compliance monitoring could be reasonably recovered by a tax on industrial income. Given the province's annual cost of $1,827,778 to collect and analyze samples regionally, the average cost to each industry potentially discharging toxic effluents would be $153. If the tax were imposed on all industries, the average cost would be considerably less.

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REGULATING INDUSTRIAL SEWER USE IN ONTARIO

Over one million tonnes of industrial hazardous waste is discharged into Ontario's municipal sewers each year. Since sewage treatment plants are not designed for the job of treating toxic wastes, industrial discharges pose a serious threat to both the health of plant operators, and the receiving environment.

Ontario's present system of regulating sewer discharges, through municipal by-laws, is not capable of meeting this threat. The standards set in these by-laws, and current enforcement efforts, are often inadequate and vary from municipality to municipality. Regulatory action to control industrial discharges to sewers is long overdue.

This major study by the Canadian Institute for Environmental Law & Policy (formerly Canadian Environmental Law Research Foundation) reviews the nature of the environmental threat, analyzes existing regulation to identify aspects requiring reform, and then presents an integrated plan of action, setting forth specific and practicable recommendations for regulatory reform.

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