HAZARDOUS WASTE MANAGEMENT IN BRITISH COLUMBIA AND ONTARIO:

A Comparative Analysis of Federal and Provincial Regulatory Approaches

by

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ABSTRACT

In Canada, public and government concern about the risks associated with hazardous wastes generated by industrial plants have resulted in legislation, regulation, policy and programs at the federal and provincial levels. This study focuses, first, on the documented differences of hazardous waste-related regulatory frameworks in British Columbia and Ontario. Second, it focuses on the perception and attitude responses between these provinces for two groups; environmental non government organizations (ENGOs) and private firms, arguing that there are significant differences with measurable variables under the two different regulatory regimes.

A comparative assessment between environment ministries highlights the non-existence of hazardous waste regulation in British Columbia and the problems this has posed. Although Ontario has an abundance of hazardous waste-related regulations, policies and programs, a statistical review suggests an inadequacy in law enforcement.

An empirical investigation using a questionnaire was conducted with ENGOs and private industrial firms. Responses are discussed with respect to each province, then the provinces are compared statistically using a Mann-Whitney U test to determine if there are any significant differences.

The major issues and concerns of both groups appear to be similar across jurisdictions. This study determined that perceptions and attitudes towards government involvement did not vary under different regulatory regimes. This similarity is an indication that ENGOs and private firms are increasingly more cognizant of the risks associated with hazardous wastes, regardless of regulatory and policy structure.

EXTRAIT

Au Canada, la prèoccupation des gouvernements et du public concernant les risques associès aux dèchets toxiques sènèrès par l'industries ont conduit à des lègisiations, règlementations, politiques et programmes tant au niveau provincial que fèdèral. La prèsente ètude s'attarde en un premier temps sur les diffèrences de cadre de règlementation qui sont documentèes sur les dèchets toxiques, et qui prèvalent en Colombie-Britannique et en Ontario. En un deuxième temps, l'ètude traite de la perception et de l'attitude caractèristiques de deux groupes de ces deux provinces, à savoir les citoyens et l'entreprise privèe, en faisant ressortir qu'il existe des diffèrences significatives pouvant ètre identifièes avec des variables mesurables sous les deux cadres de règlementation.

Une èvaluation comparative des ministères de l'environnement respectifs dèmontre qu'il n'existe pas de règlementation sur les dèchets toxiques en Colombie-Britannique, avec les problèmes qui en dècouient. Meme si l'Ontario dispose d'une panoplie de règlements, politques et programmes sur la question, les statistiques sussèrent que l'application des règlements n'est pas sans faille.

Une investigation empirique a ètè conduite a l'aide d'un questionnaire administrè à des organisations non-gouvernementales et a l'entreprise privèe. Les rèsultats sont discutès en regard de chaque province qui sont ensuite comparèes entre elles statistiquement à l'aide d'un test U de Mann-Whitney.

La similitude des prèoccupation et des points majeurs relevès par les deux groupes pourtant sous juridiction diffèrente, est ètonnante. Cette ètude a permis de dèterminer que les perceptions et attitudes envers l'intervention des gouvernements ne variaient aucunement selon les diffèrences de règlementation. En consèquence, cette similitude fait ressortir que les citoyens et l'entreprise privèe sont de plus en plus conscients des risques associès aux dèchets toxiques, sans ègard à la structure des politiques et règlementations sur le sujet.

PREFACE AND ACKNOWLEDGMENTS

The subject of risk has increasingly become a major focus of discussion in Canada among industry, citizens and government. Risks associated with hazardous waste management, or mismanagement, continue to be brought to the forefront in environmental risk management. There is not a province in Canada without its share of contaminated creeks, rivers, lakes or parcels of land. Public and private perception and attitudes towards government involvement in hazardous waste management suggests a 'mixed' view on the effectiveness of government approaches in regulating offenders.

In this thesis, I present insights about the hazardous waste management problem (and prospects), particularly in British Columbia and Ontario, that I have gained during the past three years of research. The main goal of this study is to assess the effectiveness and impact of hazardous waste management from two perspectives; environmental non government organizations and the private industrial sector. I describe the extent of the problem and the regulatory approaches used by federal and provincial governments to deal with it. This description is based primarily on previous relevant work and investigation, and my interpretation of current government material.

In addition, perceptions and attitudes of environmental non government organizations and private industrial companies, obtained through a questionnaire distributed in 1986/87 in British Columbia and Ontario, are presented and statistically analyzed between provinces. Consequently, the text is supported by both historical and original data. Views expressed in this thesis are my own unless they appear in quotations or are footnoted.

I would first and foremost like to thank my Thesis Supervisor, Dr. T. Meredith, for his encouragement, patience and constructive criticisms throughout the preparation, drafts and the final submission. In addition, a special thank you is extended to Dr. T. Hills for taking the time during his sabbatical to examine my final draft. Timely suggestions, assistance and criticisms from Dr. S. Olson, Dr. T.R. Moore (both of McGill University) and Dr. L.G. Smith (University of Western Ontario) are gratefully acknowledged.

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TABLE OF CONTENTS

LIST OF BOXES

LIST OF FIGURES

LIST OF MAPS

Page

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Environmental Risk Management

Canadians live in a chemical society that extends to all developed countries and many of the developing ones. Worldwide, about 100,000 chemical substances are in commercial production or use, and newcomers are added each year (Environment Canada, 1986a).

Man-made chemicals are essential ingredients in the processes and products of modern society. The benefits are numerous: pesticides, herbicides and chemical fertilizers for gardens and farms; additives and preservatives for the food we eat; pharmaceuticals to maintain or improve our health; and polymers for the construction industry. Canadians rely on man-made chemicals to maintain one of the highest living standards in the world. Unfortunately, our dependence on chemicals has created numerous risks, both in Canada and around the world.

The subject of risk has increasingly become a major focus of discussion in Canada among industry, citizens and government. This is reflected in the large and growing literature on the subject (e.g. Burton, et al. 1978; Whyte and Burton, 1980; Burton, Fowle, and McCullough, 1982; Grima, et al., 1986; and Martin and Lafond, 1988). Many different types of risks have been discussed including those related to environment/natural resources, human health, economic development, man-induced disasters, natural disasters, food and drugs, and other consumer products (Whyte and Burton, 1980).

The word 'risk' has two distinct meanings in environmental risk management. In one context, Whyte and Burton (1980) have suggested it can mean 'a hazard' or 'a danger', such as exposure to a mishap or peril. In the other context, risk has been defined by numerous 'risk management practitioners' as a judgment about the measure of probability or chance of suffering an adverse consequence to human health and/or the environment, or of encountering some loss (Lowrance, 1976; Whyte and Burton, 1980; and Grima, et al., 1986).

Whyte and Burton (1980) defined environmental risk management as the search for the most acceptable route between social benefit and environmental risk. The process involves balancing or trading-off various combinations of risk by comparing and evaluating the risks with particular social and economic gains.

A key component of environmental risk management is risk assessment. Kates (1978) described risk assessment as having three interrelated components: risk identification, risk estimation and risk evaluation. Whyte and Burton (1980) view these three components as being essential to environmental risk management but as serving merely as a starting point for discussing "questions surrounding the implementation of a risk assessment approach":

> The focus of scientific research on problems of the environment has highlighted many gaps and inadequacies in present knowledge. The pressure of events requires, however, that important decisions about environment and development be made now rather than at some indefinite time in the future. To do so involves making decisions under conditions of risk and uncertainty. The concept of risk has therefore become central to the environmental management process. (Whyte and Burton, 1980: 11-12)

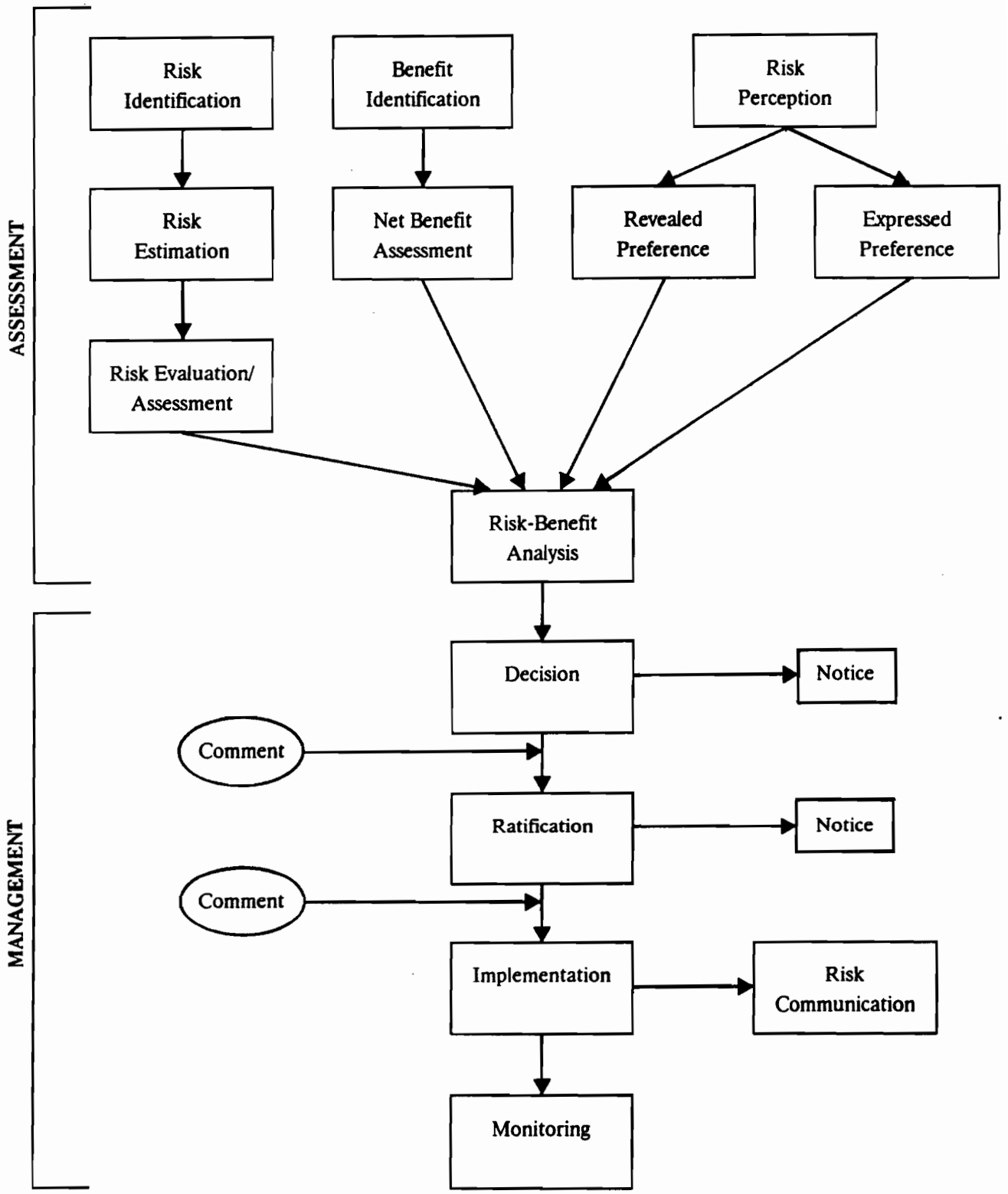
Although not accepted by all, environmental risk management has been referred to by many as the overall term or field which includes the identification and quantification of risks, evaluation of alternative strategies and designs that mitigate potential impacts, and the decision and implementation of a preferred course or route of action (Whyte and Burton, 1980; Grima, et al., 1986; Leiss, 1985; Lind, 1988). Leiss (1985) and Lind (1988) both believe a distinction in the risk management process must be made between risk assessment and risk management. In the assessment phase, risks, benefits and perceptions are studied and reported as objectively as possible. Together this work constitutes, in a broad sense, risk-benefit analysis. Consequently, a decision in risk management, the second phase, takes the outcome of risk assessment as one input, but also includes social, economical and political considerations as well. The sequence of steps in the environmental risk management process is shown in Figure 1.1.

Risk perception is perhaps the least understood of all the components of the environmental risk management process. Primarily this is because the interactions that constitute risk perception are not well enough understood to allow the formulation of descriptive models that would predict risk perceptions (Whyte and Burton, 1982). A major reason for including risk perception in the process is to determine what the public considers to be an acceptable risk. Two main approaches used to study risk perception include revealed preferences (Starr, 1969) and expressed preferences (Fischhoff et al., 1976):

> The distinction corresponds in large part to the two approaches to behavioural research - asking people questions and thus getting them to express

Figure 1.1

Environmental Risk Management Process



(Source: Adapted from Whyte and Burton, 1982; Leiss, 1985 and Lind, 1988)

> verbally what they prefer (expressed preference), and observing how people behave and taking this as a measure of preference as shown or needed (revealed preference). (Whyte and Burton, 1982: 39)

Information for revealed preference is primarily obtained by a combination of direct observation and previous data to reveal and compare patterns of acceptable risk-benefit tradeoffs on a systematic basis. Data for expressed preference are obtained predominately through surveys, questionnaires and written experiments.

The 'perception of risk' is important because it often has more influence on government policy than objectively analyzed risk alone. Consequently, the need for undertaking the complete environmental risk management process is often encouraged by government officials. Public regulatory and legislative controls are closely associated with risk management. Part of the apparatus of risk management (or control) is public:

> Regulatory and legal authorities must serve in a way that broadly reflects the citizens' understanding of the nature and magnitude of the risks and represents their idea of acceptable risk. If there is serious disagreement between informed professionals and the public over the nature and level of risk, a fundamental problem of the role of the state must be faced: Does the state have to faithfully carry out the wishes of the citizens, or must it act in the way it considers in the best interest of the citizens? (Lind, 1988: 48)

Regulatory approaches to environmental risk management generally rely on the government's ability to enforce compliance mechanisms with respect to specific health and safety requirements (Marchant, 1984; Krewski and Birkwood, 1988). Krewski and Birkwood (1988) identify three main

regulatory options used at the Federal Government level: direct regulation, where stringent regulations are enforced by prosecutions or direct order to comply; self regulation, where industries use their technical documents (e.g. risk management manual) to remain within acceptable government guidelines and; permits and approvals, where industries must obtain special permission prior to engaging in a particular activity, thus addressing risk problems before they arise.

The difference between what is considered professional/expert opinion and the views of the public and industrial representatives have created a growing body of literature often referred to as "the perception of risk". This literature has not been codified to any great extent, consequently little work has been undertaken to apply data systematically to assist with interpreting long-range risk issues (Grima, et al. 1986).

1.1.1 The Consequences of Our Chemical Society

The most severe risk or consequence from our dependence on chemicals is the contamination that results when chemicals enter the environment through one of three sources: process residue, accidental release or improper management of chemical substances. Process residue refers to the waste stream generated by an industrial, commercial or municipal operation that contains a chemical component. This residue is 'managed' by either using a nearby sewer to discard the waste or storing it for subsequent removal.

During chemical production, storage, or transportation, accidental releases may occur. This may be caused by an explosion during production (e.g. incompatible chemicals), a leak in a holding tank or a road, rail or air mishap involving a chemical carrier. Human error is often to blame for accidental releases.

Improper management of chemical substances is the broadest of the three sources and probably results in the most severe environmental impairment. Improper management encompasses many components including:

- improper application of fertilizers and pesticides to farmland may allow them to wash off the land into nearby steams and lakes;
- chemical substances, improperly disposed in landfills decades ago, which tend to migrate from the site and contaminate both land and water;
- unauthorized disposal of chemical substances usually done in an environmentally unacceptable manner (e.g. roadside ditch, sanitary landfill, stream).

Improper management of process residue also falls under this last source when an industrial operation uses an unauthorized practice to dispose of waste. Also evident between the three sources is the difference between chemical substances (i.e. toxic chemicals) and discarded wastes (i.e. hazardous wastes). This difference is addressed in section 1.4.3.

Besides the introduction of man-made chemicals, the environment also contains many naturally occurring contaminants such as lead, mercury and arsenic. These natural cycles are often disrupted by human activity elevating the

toxicity of the cycle to a level beyond the ability of the natural environment to absorb them. Thus, the environment becomes a sink for contaminants and is faced with flushing out both natural and synthetic chemicals.

All chemicals can be toxic, even those which are necessary for life such as oxygen and copper. The key is the amount the environment is subjected to at any one time or over a period of time. Deviations from "normal" can cause severe environmental impact.

The toxicity of a substance is dependent upon numerous conditions including: dosage and length of exposure, composition and basic properties of the substance, reaction with other chemicals and susceptibility of the organism exposed. Upon entering the environment, the contaminant can directly or indirectly effect all forms of life. It can be ingested by terrestrial or aquatic organisms causing immediate effects, or bioaccumulate up the food chain where its effects may be prolonged. Once the environment has become contaminated, two categories of consequences often occur: environmental and human health conditions are degraded (Cote, 1986).

The concern for the environment:

> ...centers on the direct effects of toxic chemicals on sensitive macrobiota (fish, birds, plants) and microbiota (bacteria, diatoms, fungi, etc.) and on the indirect effects on the habitat...(Concern for human health focuses on) toxic effects which may result from both short-term (acute) and long-term (chronic) exposure, often to relatively low levels in air, water and food. The effects of exposure can include: chromosomal and gene mutations, which may result in congenital abnormalities in children,

> teratogenic changes (that result in developmental anomalies independent of genetic factors), altered reproductive capability or an increase in the incidence of cancer, others (pro-carcinogens) require tissue metabolism before they can be carcinogenic. Others (co-carcinogenic) act jointly with other chemicals to cause cancer....(Cote, 1986: 16)

To begin to understand the damage that contaminants can cause, scientists are faced with several dilemmas. First, very few chemicals in existence have been subjected to the rigorous testing they require to determine adequately their toxicity. Therefore, most toxicity tests have been done after the environment has become contaminated. Secondly, when chemicals enter the environment they may be altered, react with others or bioaccumulate; all possibilities which may render pre-screening data as inadequate. Finally, tests that are done on laboratory animals may not accurately represent what will happen under other conditions or in humans. Perhaps the only chance for scientists to determine the full extent of a contaminant is to study the result after the fact, that is using an inflicted species for test purposes.

A partial list of chemicals that have undergone oral tests for "lethal dose 50" (LD_{50}) compiled by the United States Department of Health and Human Services are shown in Table 1.1.[1] The LD_{50} is the dose of chemical which when taken orally is found to cause a 50% death rate of a particular population. It is expressed as milligram per kilogram body weight (mg/kg). Data for three types of the chemical dioxin are shown for oral exposure to indicate the large variability between species. The guinea pig test population recorded a LD_{50} reading of 0.001 mg/kg which is a far less dose than the 5.0 mg/kg needed to kill 50% of a hamster test population (Kruus and Valeriote, 1984). Although the guinea pig is a larger animal than a

hamster it is far more susceptible to an oral dose of dioxin. TCDD is known to exhibit a wide range of toxicity in laboratory animals based on different species, strains within a given species and the administration method (Kruus and Valeriote, 1984).

Table 1.1

Comparisons of Selected Acute Toxicity of Chemicals

Substance	Animal	LD_{50}(mg/kg, oral)
Alcohol	rat	14000.0
Arsenic trioxide	rat	20.0
Arsenic trioxide	man	1.4
Benzene	rat	3800.0
Cadmium	rat	225.0
Caffeine	rat	192.0
Captan	rat	10000.0
Chloroform	rat	800.0
Carbon tetrachloride	rat	2800.0
DDT	rat	113.0
Dioxin (2,3,7,8-TCDD)	guinea pig	0.001
Dioxin	mouse	0.11
Dioxin	hamster	5.0
Formaldehyde	rat	800.0
Fenitrothion	rat	250.0
Nicotine	rat	50.0
PCP	rat	50.0
Sucrose	rat	29700.0
Tris	rat	1010.0
2,4-D	rat	370.0
2,4,5-T	rat	300.0

(Source: Kruus and Valeriote, 1984: 227.)

Arsenic trioxide was tested on a rat population and registered a 20 mg/kg body weight for the LD_{50}. Available data suggest the 50% lethal dose for humans is 1.4 mg/kg body weight. Further research showed the rat as having a unique arsenic metabolism which is completely different to that of a human or other animals (Kruus and Valeriote, 1984). As in this case, finding a suitable animal model for comparative purposes is often a problem.

The test rat populations show large differences in LD_{50} for the various chemical substances ranging from a high of 29,700 mg/kg body weight for sucrose to a low of 20 mg/kg body weight for arsenic trioxide. One question will always remain with researchers; how accurately can information obtained from a single species be used to represent the results of another species?

Society's dependence on chemicals has resulted in numerous chemical mishaps that have occurred during production, transportation and use, or from the ultimate disposal of hazardous wastes (whether legally or not). Negligence, on the part of a single person or an entire company, appears to be a common vein that runs through most mishaps. Providing a list of chemical mishaps around the globe would be virtually impossible because of the shear number that have occurred and, providing a suitable definition of what constitutes a mishap. Five case examples that helped to jolt the industrial world into a recognition of the seriousness of chemical contamination are presented in Appendix A as follows:

1. Unexpected consequences of hazardous waste disposal, (mercury poisoning; Minamata Bay, Japan) (Kurzel and Cetrulo, 1981);

2. Accidental release of chemical substances, (dioxin release; Seveso, Italy) (Dagani, 1981; The London Free Press, 1986);

3. Improper disposal of hazardous waste, (Love Canal; Niagara Falls, New York, U.S.A.) (Epstein, Brown and Pope, 1982; Freudenberg, 1984);

4. Negligence, (dioxin contamination; Times Beach, Missouri, U.S.A.) (Anderson, 1985);

5. Accidental release of intermediary chemicals, (methyl isocyanate release; Bhopal, India) (Iyer, 1984).

These examples illustrate the sources of entry for chemical substances and hazardous wastes into the environment and how human health and environmental conditions were degraded. The examples are not isolated to one region of the world, nor to developed or developing countries. They show the kinds of conditions and processes that legislation must try to anticipate and regulate.

1.2 Rationale for the Study

1.2.1 Hazardous Waste Management Risk Perception and Management

Canada has had its share of accidents and mishaps, making it as vulnerable to toxic chemicals and hazardous waste as any other country. Many of these incidents have been well documented in published books and journals (e.g. Troyer, 1977; Howard, 1980). Early incidents clearly show that the environmental risk management process, or for that matter risk assessment in general, was not a priority.

One of the earliest comprehensive studies compiled on a polluting industry was that of Troyer (1977) on mercury pollution from the Reed Paper Ltd. in Dryden, Ontario (see section 1.4.2, case example 5). According to Howard (1980), crash efforts by a team of government researchers who attempted to find inaccuracies in Troyer's research failed to successfully refute the facts. Howard (1980) presented, in conjunction with the Canadian Environmental Law Association, many case studies of environmental pollution in Canada and arrived at several conclusions including:

> It may come as a surprise to most Canadians that the concept of prevention and protection is almost nonexistent in environmental policies and practices in Canada. Pollution prevention has not prevailed in the past and it still doesn't today. (Howard, 1980: 13)

Although Howard (1980) found that prevention and protection of the environment was nonexistent, legislation and regulation did evolve to deal with the violators. Estrin and Swaigen (1978) prepared a detailed handbook of Ontario and, to a lesser extent Canadian, environmental law during the 1970s. The authors highlighted that:

> One of the most frequent sources of conflict between citizens and government, and citizens and industry, has been garbage dumps - or their modern counterpart, engineered sanitary landfill sites. (Estrin and Swaigen, 1978: 226)

The pollution problems analyzed by Estrin and Swaigen (1978) included those related to air, noise, water, pits and quarries, waste management, visual, pesticides and radiation. Although not stated by these two authors, nor by Troyer (1973) and Howard (1980), is that the majority of the pollution

problems are in fact hazardous waste disposal problems. As a result of this early research, the fields of toxic chemical management and hazardous waste management began to emerge in the late 1970s and early 1980s. However, the emergence was not smooth as professionals and lay people wrestled with the definition of what constitutes the field of hazardous waste management and, more important to many, what it does not include.

By the mid-1980s, the technical aspects (e.g. chemical composition, technologies) of hazardous waste management were mostly standardized however, the title of the field still had several interchangeable titles, some of which are perceived to be professionally incorrect:

- hazardous wastes, hazardous substances, toxic wastes, chemical wastes, industrial wastes, liquid industrial wastes;
- hazardous waste management, toxic waste management, chemical waste management, toxic chemicals management, toxics management.

This problem persists today, however a glance through legislation and regulation in a particular jurisdiction will provide the appropriate definition and clarify if any misnomers do exist in a given region.

Hazardous waste management in Canada, which includes discarded toxic chemicals (see section 1.4.3 for definitions), is addressed by legislation, regulation and policy at both the federal and provincial levels. Municipal government

involvement is generally restricted to waste management by-laws and specific conditions placed on waste disposal facility (i.e. landfill, incinerator) permits.

Castrilli (1980) provided one of the first analyses of hazardous waste laws in Canada and particularly Ontario when he completed research under contract with Environment Canada for contribution to the work of the Federal Task Force on Hazardous Waste Definition. Castrilli (1980) concluded that at the federal level very little leadership had been demonstrated despite substantial technical knowledge on hazardous waste issues. He continued that the federal government:

> lacks both a coherent plan and adequate statutory authority and thus appears to have little credibility with the public, industry or the provinces on this issue. (Castrilli, 1980: 162)

Castrilli (1980) was equally harsh with his provincial assessment identifying these hazardous waste related problems:

- illegal dumping,
- inadequate or no hazardous waste tracking capabilities,
- abandoned sites,
- insufficient enforcement and disposal facilities,
- serious loopholes in new programs,
- increasing quantities of hazardous wastes,
- increasing public concern resulting from past government and industry performance.

Castrilli's efforts did not stop after this submission. He published two more significant papers in conjunction with the Canadian Environmental Law Association on behalf of Environment Canada:

- "Toxic Chemicals Control in Canada: An Analysis of Law and Policy," 1981;
- "Hazardous Waste Management in Canada: The Legal and Regulatory Response," 1982.

In the 1981 paper, Castrilli distinguished between toxic chemicals and hazardous waste by stating that the later "could be partly construed as the back-end of the toxic chemicals problem" and has developed or likely will develop a separate body of law and policy. Thus, Castrilli chose to write separately about the two fields and reinforced this distinction again in his 1982 paper. Numerous conclusions on government performance are threaded throughout both papers and are perhaps best captured in the last paragraph of the 1982 paper:

> The picture that emerges is one of a major national problem for which the regulatory and legal system is still evolving its response. Considering the potential damage to human health and the environment from continued mismanagement of hazardous wastes, it is clear that legislative improvements to both the government authority to act and the role of the public in the process are past due. (Castrilli, 1982: 96)

The primary responsibility for hazardous waste management at the federal level falls within the jurisdiction of Environment Canada. However, due in part to perceived or actual constitutional constraints, Environment Canada's role has usually been confined to an advisory one, not a regulatory

attitudes and approaches of representatives from industry, government and public on environmental enforcement. However, the various attitudes and the number of different but often similar approaches to enforcement are quite startling. Unfortunately, it was not the goal of the Conference to determine if actually one or more attitudes or approaches were prevalent among participants.

Jurisdiction and responsibility for the environment was the theme of a Symposium organized by the Environmental Law Centre in Edmonton, Alberta (April 9-10, 1987). Similar to the environmental enforcement Conference of 1985, industry, government and the public were all represented. In fact, two sessions were held where various perspectives were presented on defining environmental issues and evaluating current policy and practice. These included:

- The Federal Perspective,
- The Provincial Perspective,
- The Industry Perspective,
- The Public Interest Perspective (Tingley, 1987).

Also similar to the environment enforcement conference, the Symposium and proceedings only went as far as discussing participants' concerns and activities with a limited look at problems and opportunities. Organizers hoped that the Symposium and proceedings "would serve to clarify the issue of jurisdiction and responsibility for the environment within Canada's federal system, and to offer constructive proposals for reform" (Tingley, 1987). The last point, constructive proposals for reform, did not receive as much attention or

response as other points, although this is the discussion a reader would look towards for knowledge of new directions for improved environmental protection and enforcement.

The studies and proceedings identified thus far have many similar contextual characteristics, one of which is the perceptions and attitudes of participants (i.e. government, industry, ENGOs) towards environmental management, and often specifically, hazardous waste management. The perceptions and attitudes are presented usually to emphasize a point and tend to be strictly a viewpoint. This approach was used extensively by Jackson, Weller & WPIRG (1982) as almost a scare tactic to try and prove the ineptness of government and industry in coming to terms with hazardous waste management issues. The intended public for their publication was other ENGOs and concerned citizens, thus their approach was effective but biased.

There has been no attempt in Canada to compare perceptions and attitudes statistically towards hazardous waste management between two provinces in an effort to understand the problem. Instead, authors, editors or researchers have chosen to just present and compare perceptions and attitudes. This thesis attempts to go one step further by supporting perceptions and attitudes through the use of a statistical test based on information obtained from attitudinal questionnaires distributed in British Columbia and Ontario.

At a more general level, Whyte and Burton (1982) compared the perceptions of risks in Canada across several diverse aspects including industrial waste disposal, acid rain, food additives and shopping habits. The two researchers found that:

> Regional differences exist in the priorities accorded to certain problems and in the level of public awareness of particular risks. These differences often reflect regional variations in economic and political conditions. (Whyte and Burton, 1982: 56)

The use of attitudinal questionnaires to obtain information is a primary tool for research into human behaviour. Psychological concepts and techniques have been employed in research endeavours in an attempt to understand the struggle and adjustment behaviour of individuals or groups in a hazardous environment. Mitchell (1984) maintains that:

> populations at risk and public hazard managers often perceive hazards in many ways that are in variance with actual characteristics and thus may be led to make an inappropriate adjustment decisions. (Mitchell, 1984:52)

The exploration of this conflict of misconstrued perceptions provides the basic framework for risk (hazard) perception studies. Day (1987) provides a comprehensive review of numerous hazard perception studies. Techniques explored include cognitive mapping (Levy, 1979), personality tests (Trigg, et al, 1976; Schiff, 1977), repression-sensitization scales (Simpson- Housley, 1978a), and trait-anxiety measures (Simpson-Housley, et al., 1986). Through his review, Day (1987) notes that:

> Research into human behaviour has produced a plethora of explanations ranging from the rich and insightful theories of Freud to the more rigorous stimuli-response approaches. None of them are necessarily better or worse, right or wrong. As Phares (1976) argues, theories about behaviour should be regarded as alternatives in which utility rather than truth is the ultimate test. (Day, 1987: 12)

The majority of documented risk perception studies using questionnaires are primarily associated with air pollution, flooding and, to a lesser extent, water pollution. Most of these attitude surveys reported findings in terms of simple percentages of respondents who are aware, concerned or knowledgeable about environmental problems. In addition, many of these studies only investigate perceptions of the problem that has occurred (e.g. water pollution in the Great Lakes) rather than focusing on those that may be responsible (e.g. an industry, government) to ensure that the problem does not occur.

In Canada, the role of government at both the federal and provincial level in relation to hazardous waste management has been discussed and criticized, however statistical comparisons between provinces have been ignored. It is this gap in the literature that has provided the rationale for carrying out this study.

1.2.2 Objectives of the Study

The main goal of this study is to assess the effectiveness and impact of hazardous waste management in Canada, primarily from two perspectives; ENGOs and the private industrial sector. To assist with this assessment, an overview of federal and provincial regulatory approaches (Chapter 3.0) provides a useful background to establish an understanding of the context within which ENGOs and the private industrial sector operate.

Two provinces have been included in this study, British Columbia and Ontario, for the purpose of comparing and contrasting their respective hazardous waste management

activities. These two provinces will constitute the provincial analysis. The reasons behind the choice of these two provinces is discussed in section 1.5. The role of the federal government in hazardous waste management also is addressed.

The specific objectives are as follows:

1. to describe and comment on the impact of hazardous waste management and policy at the federal level based on past and present legislation pertaining to standards, enforcement and regulations.

2. to describe the variation in the approach, and comment on the effectiveness and impact of hazardous waste management and policy in British Columbia and Ontario based on past and present legislation pertaining to approvals, controls, standards, enforcement and regulations.

To assess the effectiveness of government legislation and policy, inputs from industries and ENGOs obtained from two questionnaires are described and statistically compared to determine perceptions and attitudes towards government approaches. The two groups' views will be used to analyze Objective 3:

3. to interpret and analyze the inputs, perceptions and attitudes of the private industrial sector and environmental non government organizations towards:
   (i) legislation, regulation and policy;
   (ii) corporate and citizen responsibilities; and
   (iii) the activities (monitoring, enforcement, etc.) of government departments
   between British Columbia and Ontario.

1.3 Approach of the Thesis

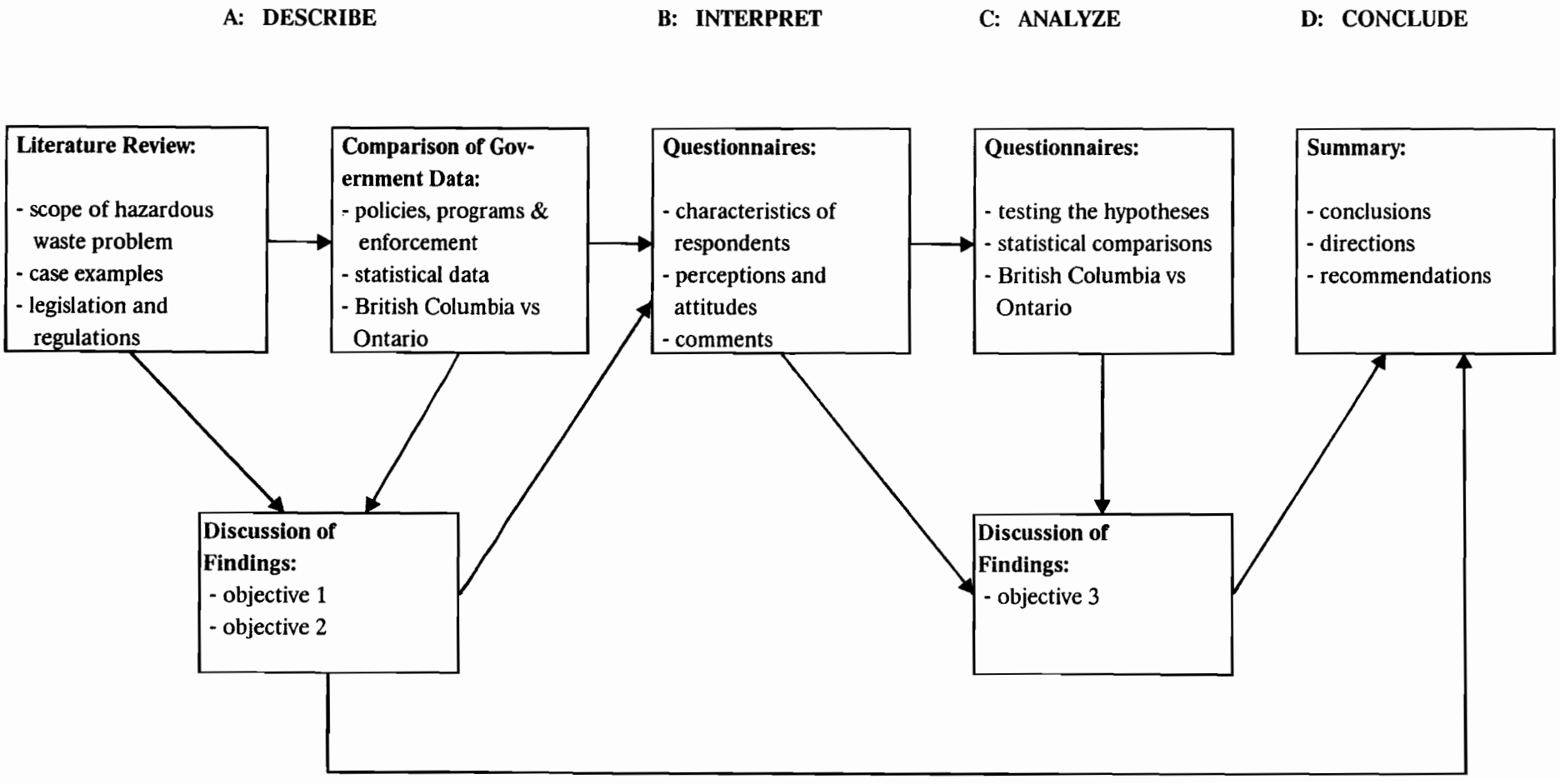
This thesis is concerned with policy and regulatory approaches governing hazardous waste management at the federal and provincial levels. It is concerned also with responses to legislation and policy by private industries and ENGOs. These three groups; government, ENGOs and the private industrial sector, each play a role in the management of hazardous wastes in Canada as depicted previously (refer to Figure 1.1). To meet the three objectives of this study (section 1.2.2) in order to draw conclusions, it was determined that collected data should undergo descriptive, interpretative and/or analytical evaluation. The evaluation activities have been placed in a four-phase framework (Figure 1.3) that closely corresponds with the required research for this study. The three evaluation primary phases are categorized by the predominant activity; that is describing, interpreting or analyzing the data. Conclusions are then drawn from a combination of all three evaluation activities.

The thesis proceeds from the observation that the two levels of government are the major bodies in which enforcement and monitoring practices are directed at industry through hazardous waste legislation and regulation. The relevant Acts and regulations are outlined in Chapter 2.0 (Figure 1.3 A).

Hazardous waste legislation and regulation, both federal and provincial, are evolving regulatory fields. What is law one year may be revised or revoked the following year. One major piece of federal legislation, the Canadian Environmental Protection Act, and provincial regulation, the Special Waste Regulation of British Columbia, came into power in the latter part of this study. Consequently, the relevant Acts and

Figure 1.3

Data Evaluation Framework



regulations outlined in Chapter 2.0 are accurate only to August, 1987. The new pieces of legislation and regulation are also briefly outlined to ensure that thesis research is as current as possible. All data collected during this study occurred prior to August, 1987, consequently new legislation and regulation have no impact on data interpretation and analysis.

An overview of federal and provincial regulatory processes for hazardous waste management are described in Chapter 3.0. Information was obtained from the government departments concerned with the approval and permit system, waybills and manifests and enforcement and compliance practices (Figure 1.3 A).

The methods used for data collection and presentation to describe and assess the effectiveness of hazardous waste management in Canada are outlined in Chapter 4.0. Two hypotheses also are presented.

Government legislation and policy are interpreted (Figure 1.3 B) and analyzed (Figure 1.3 C) through questionnaire responses obtained from ENGOs and the private industrial sector in Chapter 5.0. A response from the private industrial sector concerning hazardous waste legislation and policy is important for a number of reasons. First, industry is a major link between the state of the environment and regulatory policy because of their potential to be large environmental polluters. Second, policies are often formulated with a particular industrial sector or all industry in mind, to try and reach all goals established by the two parties. Unfortunately, ENGOs often view this as collusion with the environment coming out as the loser. Finally, specific

industries may lose a competitive edge in the marketplace if government legislation is too severe. Similarly, if only some industries are obeying the law while others do not pay the extra price for pollution control equipment or technology change, certain industries could be driven out of the marketplace.

ENGOs open up another avenue for input and comment when they participate in policy formulation or the opposition of existing ones. These groups become the voice of the people and enable a wider spectrum of public awareness to be developed. In addition, their input is also viewed as the environmental voice and, to support this, their activities often include "watchdog" practices to ensure the environment is not being abused. At times, the power of ENGOs can become very influential in the decision making process and has on a number of occasions successfully fought the expansion of existing facilities or the siting of new facilities.

Conclusions and directions are presented in the final chapter (Figure 1.3 D). The remainder of this introduction chapter will highlight the scope of the hazardous waste problem in Canada including early legislation, case examples demonstrating the problem, the emerging definitions and hazardous waste generation by province and by industry.

1.4 The Scope of the Hazardous Waste Problem in Canada

The chemical industry experienced a rapid growth, both world-wide, and in Canada, since the end of World War II. Major growth was also experienced by chemical-using industries such as the primary metal sector (e.g. blast furnaces,

smelters) and the petroleum and coal sectors. All this industrial development and expansion spurred increased problems with the disposal of wastes with toxic properties.

Estimating the magnitude of the hazardous waste problem in Canada has been difficult for a number of reasons:

- Early evaluation of the situation by the federal government focused on the lack of awareness of the nature and the extent of the problem held by industry, the public and regulatory agencies and the general lack of agency resources and policies to handle the various issues and economic factors (Canadian Environmental Advisory Council, 1978).
- A uniform definition of what constitutes hazardous waste was non-existent and what had evolved varied between provinces and the federal government.
- There have been no requirements to maintain records for on-site disposal of hazardous wastes (Environment Canada, 1986).
- Hazardous wastes are often disposed with municipal wastes and treated by wastewater treatment facilities or co-disposed with solid waste in sanitary landfills.
- Illegal dumping practices became an easy and cost efficient method of disposal due to the lack of adequate treatment and disposal facilities designed specifically for hazardous waste (Canadian Environment Advisory Council, 1978).

1.4.1 Early Legislative Efforts

At the turn of the century, legislative concerns in Canada focused mainly on immediate environmental problems with little thought of the future. Initial environmental legislation dealt with the protection of fish, adequate sewage treatment, sanitation and nuisance control and a few others. Pollution of any type had not reached a serious enough level to cause an alarm although some politicians and educators did point out the potential problems. In the first half of the twentieth century, hazardous waste problems went unnoticed or were classified among general waste problems (Castrilli, 1982).

The 1950's brought about increased awareness in environmental protection and more sophisticated administrative arrangements for water pollution were developed in some provinces. However, waste disposal still remained largely influenced by early twentieth century approaches (Castrilli, 1982). Sanitary landfills, whether suitable or not became the final repository for hazardous wastes. As late as 1980 in Alberta, for example,:

> ... no special provisions have been developed for disposal of industrial wastes, nor have procedures or legal requirements been established to distinguish any types of waste material going into landfills... At the City of Edmonton Clover Bar landfill, no special provision exists for disposal... although toxic waste material is not supposed to be dumped into the landfill, according to By-law 5173, this rule is not enforced. (Environment Council of Alberta, 1980: 11)

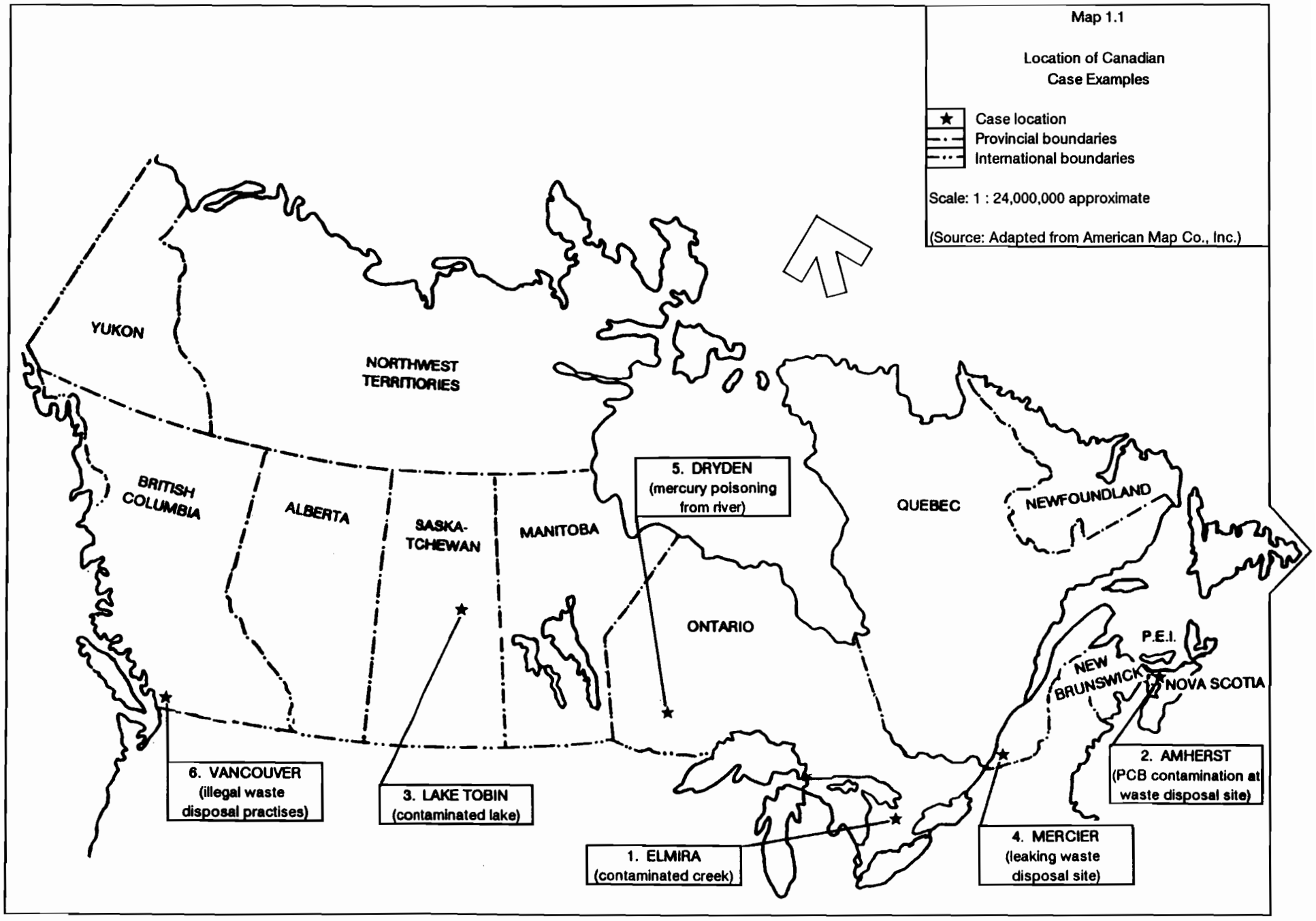
Numerous incidents across Canada illustrate the results of the mismanagement of hazardous wastes. There is not a province in Canada without its share of contaminated creeks, rivers, lakes

and parcels of land. Many industries have in the past taken advantage of 'relaxed' environmental laws or non-existent ones to unload large volumes of hazardous wastes to various waterways. Other disposal options include the previously mentioned landfills which were never designed to accept waste of this type or the practice of disposal by burial on the company's own land with the waste often returning to the surface decades later and often under a new landowner. The next subsection outlines six case examples (Map 1.1) of how hazardous wastes have contaminated the Canadian environment when early regulatory approaches were generally ineffective.

1.4.2 Industrial Neglect of the Environment: Case Examples

1. Contaminated Creek: Elmira, Ontario

Elmira, Ontario is the home of one of the chemical plants belonging to Uniroyal Ltd. It is also the home of the Canagagigue Creek which runs past the chemical plant and has subsequently become severely contaminated downstream. For several decades the creek was used by Uniroyal to wash away its hazardous wastes. Adding to this was the burial of millions of litres of chemical wastes in 1969 in two pits beside its plant. The buried wastes include trichlorophenol, often used in manufacturing herbicides. However, inevitably present with trichlorophenol are dioxins, perhaps the most poisonous group of chemicals in existence. As a result of this disposal practice, wastes from the pits have been creeping towards the creek.


Map 1.1
Location of Canadian
Case Examples
Case location
Provincial boundaries
International boundaries
Scale: 1 : 24,000,000 approximate
(Source: Adapted from American Map Co., Inc.)
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASKA-TCHEWAN
MANITOBA
ONTARIO
QUEBEC
NEWFOUNDLAND
P.E.I.
NEW BRUNSWICK
NOVA SCOTIA
5. DRYDEN
(mercury poisoning from river)
6. VANCOUVER
(illegal waste disposal practises)
3. LAKE TOBIN
(contaminated lake)
1. ELMIRA
(contaminated creek)
4. MERCIER
(leaking waste disposal site)
2. AMHERST
(PCB contamination at waste disposal site)

The effects of the contaminated creek have already surfaced:

> "The cattle started getting sick and they started dying," reported Leander Martin, a Mennonite farmer who lives on a 173-acre farm near Elmira, Ontario. Their illnesses, 15 deaths and tainted milk were caused by drinking from the creek that wanders across his farm - a creek contaminated by toxic wastes from a nearby chemical company. (Jackson, Weller & WPIRG, 1982:11)

The Ontario Ministry of the Environment found increased pollution in the creek after tests were completed in the early 1980's. Cause for greater alarm still exists because the creek empties in the Grand River, which provides water for several southern Ontario communities (Jackson, Weller & WPIRG, 1982).

2. PCB Contamination: Amherst, Nova Scotia

At a municipal dump site in Amherst, Nova Scotia, eighty 45-gallon (204 litres) drums of waste liquid PCBs were buried in 1973. Five years later the drums were removed when on-site monitoring wells indicated increased levels of PCBs in groundwater. Several thousand electrical capacitors containing PCBs were also buried at the same site, however these were not removed.

An Environment Canada study completed in 1980 showed the presence of PCBs in the sediment of a stream leading from the dump to the Nappan River. Cancer, chloracne, still-births and deformities in infants have all been linked to PCBs (Castrilli, 1982).

3. Contaminated Lake: Lake Tobin, Saskatchewan

In 1981, research completed by Environment Canada found toxic chemicals from industry and agricultural practices to be causing significant numbers of mutations in some animal life in Lake Tobin, a major Saskatchewan lake. One species of insect had an extremely high incidence of mutations with the possibility of having a significant impact on the lake's ecosystem (Environment Canada, 1981b).

4. Leaking Waste Disposal Site: Ville Mercier, Quebec

About 12 square miles (31.2 square kilometers) of Quebec farmland was contaminated due to a leaking waste disposal lagoon in Ville Mercier, about 16 kilometres southwest of Montreal. Between 1968 and 1972, more than forty-five million litres of liquid organic wastes were dumped into the old gravel pit. Chemical pollution from the site has spread underground and contaminated several thousand domestic wells. Also, Quebec's Environment Ministry officials told vegetable growers not to use ground water for irrigation purposes within one and half kilometers of the lagoon.

The contaminants include a list of toxic chemicals, oils, grease and phenols which have caused the chemical level in the water to be 1000 times higher than allowed by the federal government drinking water standards. The Quebec government has made several efforts to stop the spread of contamination, however it is possible that it has become permanently contaminated and could threaten an adjoining water supply, one of Quebec's largest reserves of underground fresh water (Jackson, Weller & WPIRG, 1982).

5. Mercury Poisoning: Dryden, Ontario

The following example includes in point form and chronological order many of the significant events or developments surrounding Reed Paper Limited (formerly called Dryden Chemicals Ltd.) and its dealing with the Government of Ontario concerning its polluting problems.

1962 - Reed Paper Ltd. began to use mercury to manufacture chemicals for its adjacent pulp and paper plant in the small town of Dryden, Ontario, population about 7,000. About ten to twenty pounds (five to ten kilograms) of mercury waste went into the nearby Wabigoon River daily on top of the tonnes of industrial sewage that had been pouring into the river for more than a decade.

1970 - Reed has now dumped more than ten tons (nine tonnes) of mercury into the river.
- The Ontario government orders Reed to halt its mercury dumping.
- The government begins testing for mercury-in-blood levels among the Indians that lived downstream as many of them ate the river fish regularly.
- In May the government officially bans all commercial fishing in the contaminated river destroying the Indians prime occupation.
- The government serves Reed with its first order, a Control Order, to halt its mercury dumping and to curb its daily dumping of thousands of litres of non-mercury pollution. In the order, both sides agreed to Reed's installation of pollution control devices within four years.

1971 - By mid-1971, the flow of mercury into the river has been drastically reduced but not completely stopped as stated in the Control Order.

1972 - Only moderate progress has been achieved in installing the ordered pollution controls.
- A company report from Reed officials shows a bleak financial picture.

1973 - An environment ministry analysis of Reed's situation was circulated inside the government but kept secret for three years; the report noted that Reed was the worst pulp and paper polluter in Ontario.

1974 - The existing mercury pollution has remained intact and nothing has been done to compensate the Indian victims.
- Reed is granted two more years for the installation of pollution control features based on unfortunate delays and associated cost increases.

1975 - By October, Reed had dumped another 978 pounds (440 kilograms) pounds of mercury into the river since it had "officially" halted mercury dumping; another 2,600 pounds (5,770 kilograms) were unaccounted for.

1976 - November; Reed charged with mercury pollution offenses concerning a current discharge of untreated effluent.
- Abatement deadline passed again; Reed faces a possibility of a $10,000-per-day fine but ministry officials chose to lay lesser charges.
- Reed never made it to court and another two year extension was granted for pollution abatement.

1977 - July; Reed found guilty of five of ten accounts of dumping industrial sewage into the river and paid a total of $5,000 in fines.

1978 - August; Reed asks for a further extension until 1980 and perhaps longer to meet the pollution abatement guidelines.

1979 - March; any quick clean up order from the government and Reed would pull out of Dryden and 1,700 jobs would be lost (24% of the population worked at Reed).
- October; Reed is granted until 1983 for the same pollution abatement devices it was ordered to install in 1970.
- November; Reed is sold to Great Lakes Forest Products Ltd. for $80 million and the transaction includes guaranteed provincial government protection against any lawsuits (Howard, 1980; Troyer, 1977).

6. Illegal Disposal Practices: Vancouver, British Columbia

In May of 1981, the British Columbia Ministry of the Environment received an emergency call from the North Vancouver Premier Street Landfill concerning a recent shipment of waste from ERCO Industries, a division of Tenneco Canada Ltd. The truck was preparing to unload sludge containing chromium, barium, cadmium and copper mixtures.

Upon further investigation by the government it was discovered that ERCO, a chemical division, had been dumping sludge at the same landfill for several years now, at a rate of approximately 3,500 gallons (15,890 litres) per month. No charges were laid and three questions remained unanswered; how much of the dump site was contaminated, was any of the contamination leaking from the site and how many other companies were using this disposal facility in the same manner as ERCO?[2]

In summary, the six examples illustrate the mismanagement of hazardous wastes by both industry and government. Each of the examples clearly fit into one or more of the five reasons that estimating the magnitude of the problem is difficult. In the case of Uniroyal Ltd., a quick, easy and cheap method of disposal was used (local creek and on-site disposal) to rid the company of its hazardous wastes. Similar to this was the ERCO Industries example, as they chose to dump their hazardous wastes at a municipal landfill along with wastes that were allowed to be disposed in this manner. Both these examples demonstrate illegal practices of disposal.

The two examples of disposal sites in Quebec and Nova Scotia demonstrate inadequate facilities for the acceptance of hazardous wastes. The Lake Tobin example exemplifies the general lack of awareness of the hazardous waste problem held by industry and the farming community as their combined practices endangered the lake's ecosystem.

Reed Paper Limited offers two dimensions to the hazardous waste problem. The first being the illegal practices demonstrated by the company and general lack of awareness and concern for the environment and the people who depend on it. The second dimension illustrates the inconsistencies in governmental affairs to rectify the problem and punish the offenders.

Early legislation and policy was virtually ineffective in solving the hazardous waste problem as proven by these examples ranging from the early 1960s to the late 1970s. However, the 1980s brought about a whole new era in the management of hazardous wastes with the implementation of new legislation, regulations, guidelines, and a host of other regulatory actions, at both the federal and provincial levels, designed to combat the problem.

1.4.3 Definitions: Toxic Chemicals and Hazardous Wastes

To assist with regulation and identification of chemicals and hazardous wastes, Environment Canada has on several occasions administered and/or coordinated many programs for the purpose of providing definitions to be included in legislation. Two definitions emerged in 1980, one from the Toxic Chemicals

Management Program and the other from the Task Force on Hazardous Waste Definition (Box 1.1). Input came from several sources including provincial governments and industry.

BOX 1.1

Toxic Chemicals and Hazardous Waste Definitions

Toxic chemicals are those substances which, when released into the environment, or thereafter if chemically transformed through combination or otherwise, could pose a significant threat to natural ecosystems or to human health or well-being. Chemical substances under this definition have characteristics which include: the ability to become widely dispersed in air, land and water, great distances from their sources and avenues of entry to the environment; the capability of causing biological changes at trace concentrations; the ability to become more toxic when combined in the environment with other chemicals; and the ability to become irretrievable once released into the environment with effects that are largely irreversible (Environment Canada, 1980a; Castrilli, 1981).

Hazardous wastes are those discarded materials or substances in solid, semi-solid, liquid or gaseous form which, due to their nature and quantity, require specialized waste management techniques for handling, transport, storage, treatment and disposal because they may cause or contribute to adverse, acute or chronic effects on human health or environment when not properly controlled. Such wastes may contain toxic chemicals, or explosive substances or other materials in sufficient amount to cause death, cancer, birth defects, mutations, disease or infertility upon exposure (Environment Canada 1980b; Castrilli, 1982).

The distinction between toxic chemicals and hazardous wastes can be confusing both in definition and its application to government legislation and policy. Based on the definitions from Box 1.1, toxic chemicals, after their release into the environment, become one type of hazardous waste. Thus, it is necessary to discuss legislation and policy that pertains to both definitions (Chapter 2.0).

As stated at the beginning of this section, there is still no uniform definition in Canada for toxic chemicals and hazardous wastes and this will be emphasized when discussing the application of provincial laws in British Columbia and Ontario. For now, these two definitions provide the reader with an understanding of the complexity each definition entails and the possible effects on human health and the environment.

1.4.4 Canadian Hazardous Waste Estimates

Estimates of the quantity of hazardous waste generated in Canada have only appeared since the late 1970s and early 1980s. During this period several inventory studies were prepared for Environment Canada and various provincial governments[3]. In 1984 an unpublished report prepared by Environment Canada provided an overview of various studies on hazardous wastes in Canada. This report, "Data on Hazardous Wastes, Rubber Wastes, and Oil Wastes in Canada - 1983"[4], is based on published information and attempts to standardize the available data and consolidate it into a common format.

This report (Environment Canada, 1984) attempts to determine the annual generation of hazardous waste for each of fourteen consolidated waste types. On-site quantities of hazardous waste have generally been excluded from this study. Also excluded is disposal by consumers; the food processing industry; hospitals and other institutions; and federal, provincial and municipal facilities that are not included among the twelve Standard Industrial Classification (SIC) categories. These exclusions and any others were not explained in the report[5].

As well as the estimates for consolidated waste type, the report (Environment Canada, 1984) also included estimates by province, industrial category and source. Information from this report (Environment Canada, 1984) is highlighted below under four separate categories.

By Province:

Approximately 2,763,800 tonnes of hazardous wastes were generated across Canada in 1982 (Table 1.2). This number has been derived from the fourteen consolidated waste types and is applied to each of the four area waste estimates. Ontario is the highest generator (1,407,800 tonnes/year), producing about 51% of all Canada's hazardous waste. If Quebec's total were added to this amount their combined totals would account for 85% of all the hazardous waste generated in 1982. However, these two provinces only account for 62% of the population at this time. Thus, population and hazardous waste generation do not appear to be related.

To further this point, Nova Scotia generated 3.9% of Canada's hazardous waste but only comprises 3.5% of the population. Hazardous waste generated per capita in Nova Scotia is 0.124 tonnes, third only to Ontario (0.159 tonnes) and Quebec (0.146). Hazardous waste is primarily a function of industrial employment and not necessarily population.

Table 1.2

Hazardous Waste Generation by Province in 1982

Province	Population	Total Hazardous Waste Generated (tonnes)	Hazardous Waste Generated Per Capita (tonnes)	Percentage of Total Waste Generated
Alberta	2,345,500	87,500	0.037	(3.2%)
British Columbia*	2,837,700	66,300	0.023	(2.4%)
Manitoba	1,049,600	33,300	0.032	(1.2%)
New Brunswick	709,200	46,900	0.066	(1.7%)
Newfoundland	580,800	20,700	0.036	(0.7%)
Nova Scotia	863,000	106,800	0.124	(3.9%)
Ontario	8,854,700	1,407,800	0.159	(50.9%)
Prince Edward Island	124,500	400	0.003	(0.0%)
Quebec	6,530,000	951,900	0.146	(34.4%)
Saskatchewan	997,400	42,200	0.042	(1.5%)
TOTAL	24,892,400	2,763,800	0.111	(100.0%)

* includes Yukon and Northwest Territories

(Source: Environment Canada, 1984, see note 4)

By Standard Industrial Classification:

The study identified twelve industrial sectors under the Standard Industrial Classification (SIC) two digit system that generated the 2,763,800 tonnes of hazardous waste across Canada in 1982. The information, displayed by SIC, and the amount generated in each province, is shown in Table 1.3.

Table 1.3

Hazardous Waste Generation By Standard Industrial Classification in 1982

Standard Industrial Classification (SIC)	Alberta	B.C.*	Manitoba	New Brunswick	NFLD	Nova Scotia	Ontario	P.E.I.	Quebec	Sask-atchewan	TOTAL	Percent of TOTAL
22 -Textile Mill Products	90	70	170	40	0	125	1,400	5	21,800	5	23,705	(0.9%)
24 -Lumber & Wood Products (except Furntiure)	370	720	20	25	100	10	1,400	0	300	40	2,985	(0.1%)
26 -Paper & Allied Products	1,850	5,700	740	15,850	0	1,500	82,700	0	36,900	400	145,640	(5.3%)
28 -Chemicals and Allied Products	20,000	7,000	2,300	9,200	20,150	59,600	146,900	300	575,500	1,200	842,150	(30.5%)
29 -Petroleum and Coal Products	42,900	40,200	23,500	20,000	0	12,800	62,800	0	73,600	37,000	312,800	(11.3%)
30 -Rubber & Plastics	100	0	0	5	0	0	12,700	0	0	0	12,805	(0.5%)
31 -Leather & Leather Products	850	230	2,400	5	50	0	3,000	0	3,750	370	10,655	(0.4%)
33 -Primary Metal Industries	9,000	8,000	2,000	460	350	32,000	766,700	0	197,200	2,200	1,017,910	(36.8%)
34 -Fabricated Metal Products	3,900	1,900	1,100	1,300	50	710	125,200	95	40,800	515	175,570	(6.4%)
35 -Machinery (except Electrical)	1,130	830	400	15	0	5	106,200	0	800	330	109,710	(4.0%)
36 -Electric Machinery	110	250	150	0	0	50	16,200	0	750	80	17,590	(0.6%)
37 -Transportation Equipment	7,200	1,400	520	0	0	0	82,600	0	500	60	92,280	(3.3%)
TOTAL	87,500	66,300	33,300	46,900	20,700	106,800	1,407,800	400	951,900	42,200	2,763,800	(100%)

* includes Yukon and Northwest Territories

(Source: Environment Canada, 1984, see note 4)

Primary Metal Industries (SIC-33) generate about 37% of all hazardous waste in Canada with the Province of Ontario contributing 75% of this total (766,700 tonnes). Included in this sector are blast furnaces and rolling mills, primary smelters and producers, foundries, drawers and extruders, rollers, casting plants and metal treating industries.

The second largest generator is Chemical and Allied Products (SIC-28) which is a diversified group that includes the manufacturing of chemical compounds, pharmaceuticals, synthetic products, paints, cleaners, pesticides and fertilizers, adhesives, explosives, ink and other chemical related products. This industrial sector provides both manufactured products and raw materials for other industrial processes. Quebec is the largest generator with approximately 68% of the 842,150 tonnes generated in 1982 which accounts for 30% of all hazardous wastes in Canada.

The Petroleum and Coal Products sector (SIC-29) generated about 11% of the total waste in 1982 with the principal generators located in Quebec (24%) and Ontario (20%). Fabricated and Metal Products (SIC-34) is the next largest, producing 6% of Canada's total output with Ontario being the major producer accounting for 71% of the waste generated by this industry. The remaining 15% is distributed among the other eight classifications.

By Consolidated Waste Type

Hazardous waste generation for 1982 by fourteen consolidated waste types across the provinces are displayed in Table 1.4. The largest contributor is Heavy Metal Solutions and Residuals comprising approximately 42% (1,159,600 tonnes) of the total

Table 1.4

Hazardous Waste Generation By Consolidated Waste Types in 1982

Consolidated Waste Type	Alberta	B.C.*	Manitoba	New Brunswick	NFLD	Nova Scotia	Ontario	P.E.I.	Quebec	Sask-atchewan	TOTAL	Percent of TOTAL
Organic Sludges and Still Bottoms (No Oil)	900	500	200	500	800	2,300	35,000	10	22,200	300	62,710	(2.3%)
Solvents and Organic Solutions	6,700	4,100	2,900	7,800	5,200	10,200	39,800	75	166,700	3,200	246,675	(8.9%)
Oils and Greases	20,300	21,000	10,200	18,600	700	13,900	48,200	100	109,800	14,200	257,000	(9.3%)
Oil/Water Mixtures	1,700	1,400	700	100	30	2,100	54,300	10	16,900	900	78,140	(2.8%)
Organic and Oily Residuals	1,300	1,100	600	50	50	100	209,100	0	3,600	400	216,300	(7.8%)
Heavy Metal Solutions and Residuals	31,600	22,400	2,650	12,200	11,500	52,700	545,900	150	467,100	13,400	1,159,600	(42.0%)
Miscellaneous Chemicals and Products	9,200	3,700	300	800	1,400	4,300	142,000	20	41,800	600	204,120	(7.4%)
Paint and Organic Residuals	700	400	200	350	500	1,500	49,000	10	15,600	200	68,460	(2.5%)
Aqueous Solutions with Organics	7,900	5,600	11,200	6,000	10	7,800	700	0	21,900	4,200	65,310	(2.4%)
Anion Complexes	490	200	340	150	10	50	33,500	10	5,700	100	40,550	(1.5%)
Sludges and Inorganic Residuals	3,500	2,900	2,200	200	350	11,100	242,000	10	74,600	4,400	341,260	(12.3%)
Pesticide and Herbicide Wastes	200	90	0	100	130	300	600	5	2,700	100	4,225	(0.2%)
PCB Wastes	10	10	10	0	0	0	200	0	0	0	230	(0.0%)
Clean-Up Residuals	3,000	2,900	1,800	50	20	450	7,500	0	3,300	200	19,220	(0.7%)
TOTAL	87,500	66,300	33,300	46,900	20,700	106,800	1,407,800	400	951,900	42,200	2,763,800	(100.0%)

* includes Yukon and Northwest Territories

(Source: Environment Canada, 1984, see note 4)

hazardous waste generated in Canada. The Provinces of Ontario, Quebec and Nova Scotia contain 92% of this amount. The primary source of these type of wastes are the steel mills and other primary and secondary metal and fabricated metal industries.

Sludges and Inorganic Residuals account for about 12% of the hazardous waste generated with Ontario being the largest contributor with 71% of the 341,260 tonnes generated. These waste are primarily generated by petrochemical industries with the main source being the Sarnia region.

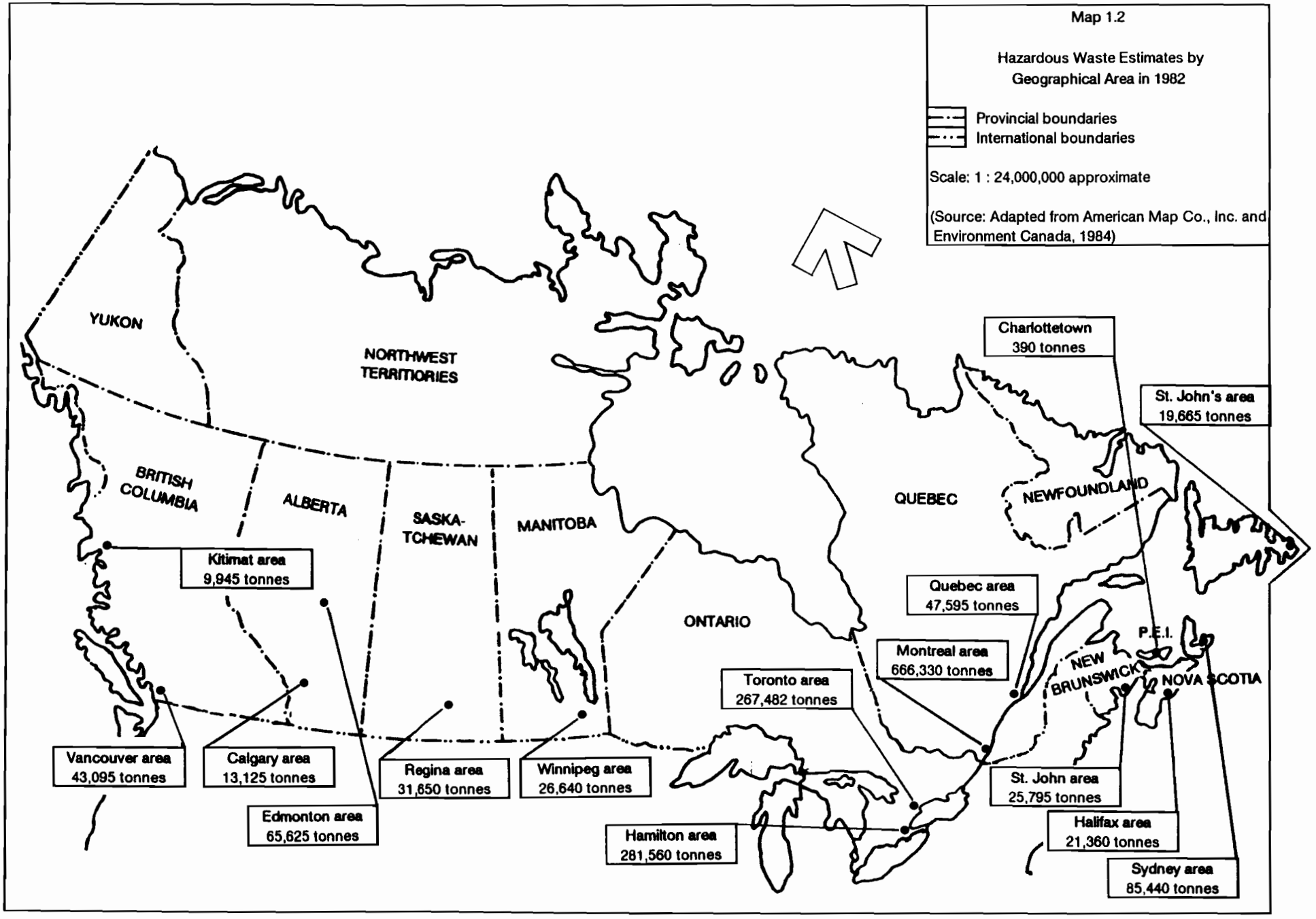
Other major hazardous waste streams (Table 1.4) include Oils and Greases (9.3%), Solvents and Organic Solutions (8.9%) and Organic and Oily Residues (7.8%).

By Geographical Source

Hazardous waste generation, as stated previously, is a direct function of industrial manufacturing and the type and location of industry. To pinpoint the sources of industrial waste generation one would typically look for areas of high industrial concentration. The main areas of hazardous waste generation, within the various provinces, are shown (Map 1.2).

Not surprisingly, only one or two areas in each province account for the majority of the hazardous waste generated by that province. The lower British Columbia mainland, primarily the Vancouver area, accounts for 65% or 43,095 tonnes of the 66,300 tonnes generated annually.

Between the Toronto Regional area and Hamilton area, 40% of the provinces hazardous waste can be found. This province


Map 1.2
Hazardous Waste Estimates by Geographical Area in 1982
Provincial boundaries
International boundaries
Scale: 1 : 24,000,000 approximate
(Source: Adapted from American Map Co., Inc. and Environment Canada, 1984)
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASKA-TCHEWAN
MANITOBA
ONTARIO
QUEBEC
NEWFOUNDLAND
P.E.I.
NEW BRUNSWICK
NOVA SCOTIA
Charlottetown 390 tonnes
St. John's area 19,665 tonnes
Kitimat area 9,945 tonnes
Quebec area 47,595 tonnes
Montreal area 666,330 tonnes
Toronto area 267,482 tonnes
Vancouver area 43,095 tonnes
Calgary area 13,125 tonnes
Regina area 31,650 tonnes
Winnipeg area 26,640 tonnes
Edmonton area 65,625 tonnes
Hamilton area 281,560 tonnes
St. John area 25,795 tonnes
Halifax area 21,360 tonnes
Sydney area 85,440 tonnes

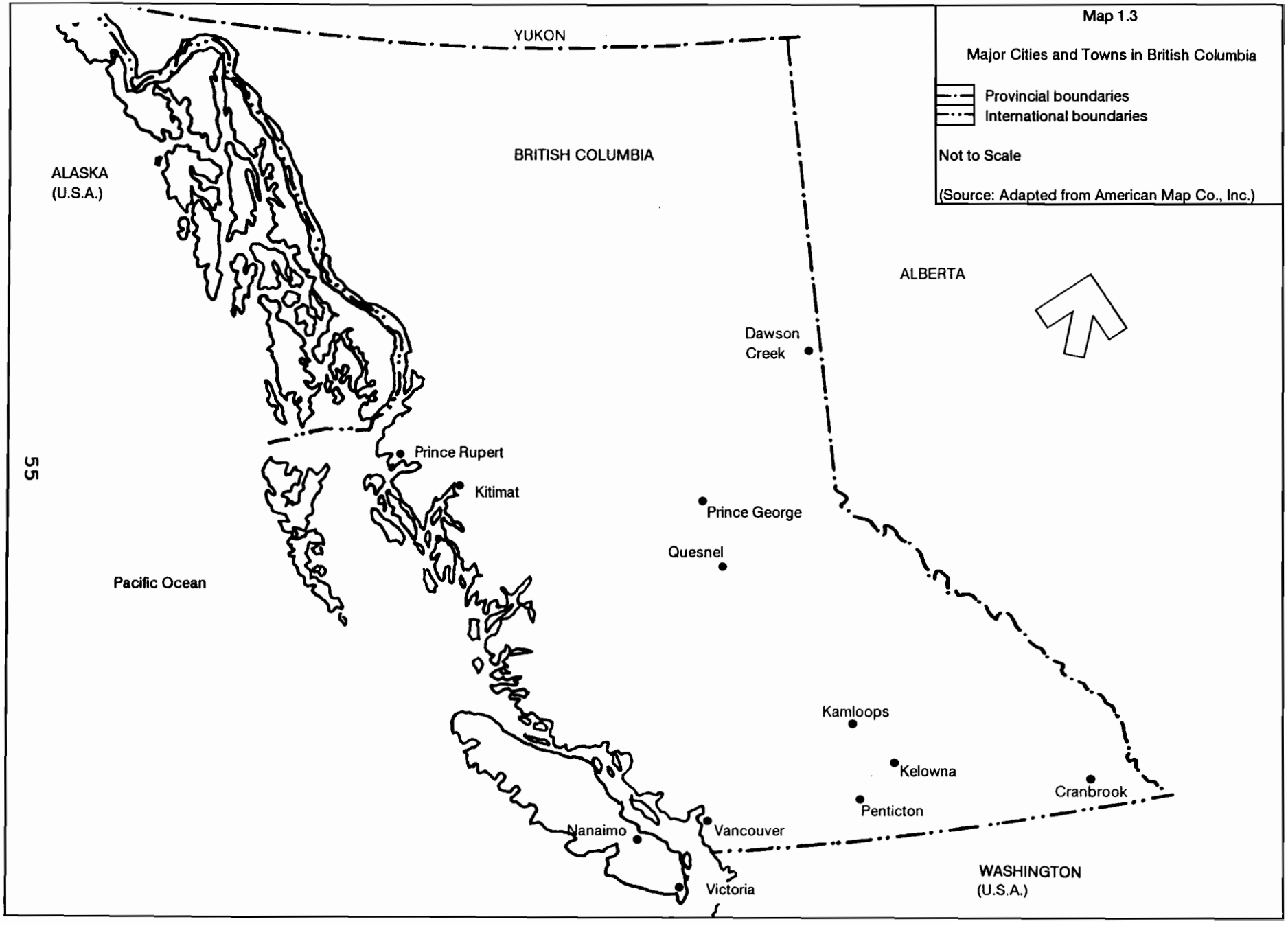
does fall out of the norm compared to the rest of Canada because there are several other areas of high industrial concentration spread throughout the province. These areas include Windsor (heavy manufacturing), Sarnia (petro-chemical), Cornwall (pulp and paper), and St. Catharines (heavy manufacturing).

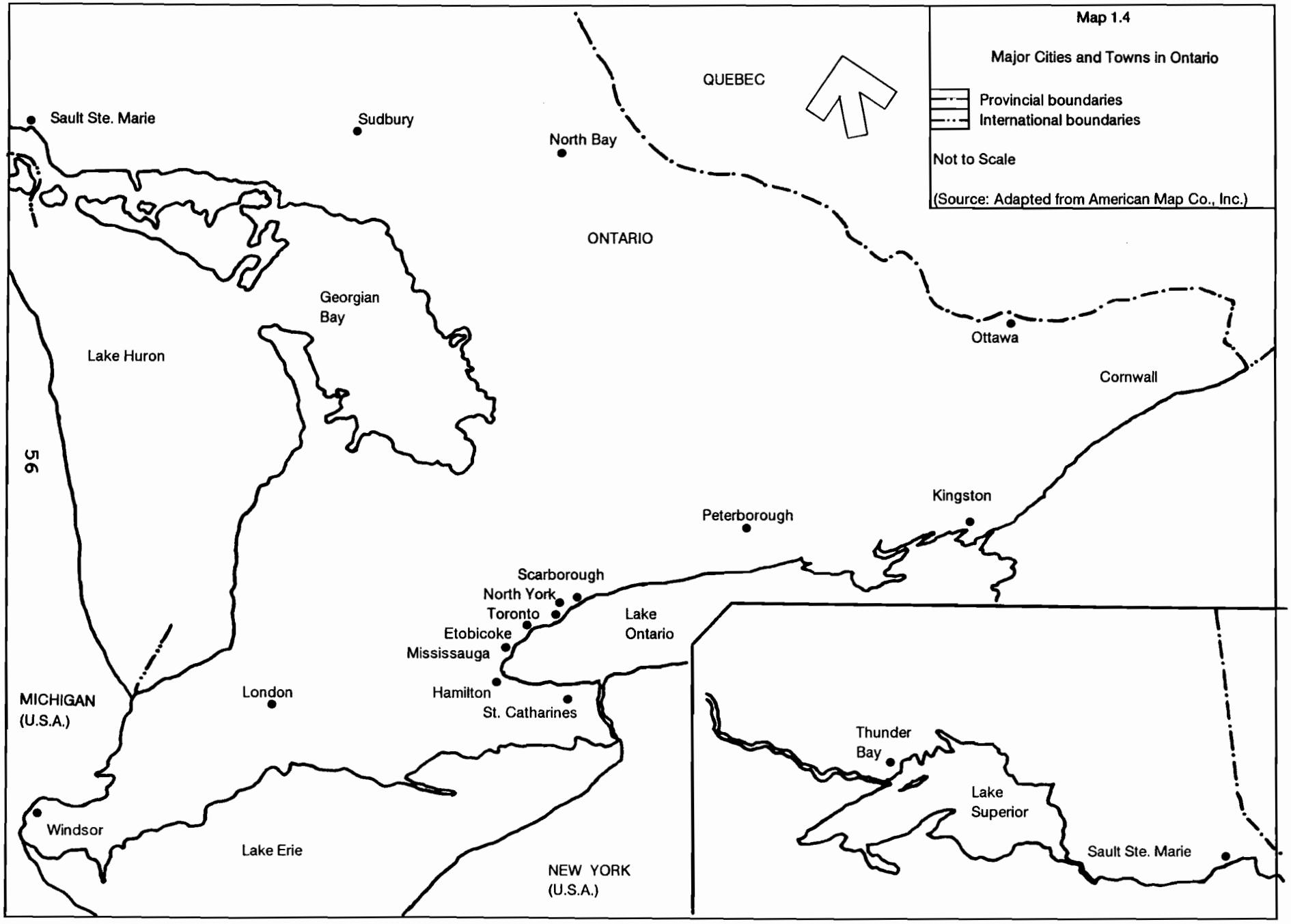
For an individual area in Canada, the Montreal Regional area generates 666,300 tonnes or almost 25% of the hazardous waste generated in Canada. Toronto and Hamilton each account for about 10% of the generation in Canada.

1.5 The Rationale for Selecting British Columbia and Ontario

British Columbia (Map 1.3), Canada's third largest province in total land area and population, and Ontario (Map 1.4), Canada's largest province in both categories, constitute the provincial hazardous waste management analysis. The selection of these two provinces is key to this study as the two provinces operate within a different regulatory environment and under a different political climate. The following four factors were key in selecting these two provinces:

1. Hazardous waste management was a developing field and concern in British Columbia in 1985. The Government of British Columbia was in the midst of establishing or finalizing programs, policies and regulations for hazardous waste management. The Province of Ontario, on the other hand, had numerous programs, policies and regulations already addressing hazardous waste management. Citizen concern and criticism over the mismanagement of hazardous wastes was escalating rapidly in both provinces;


Map 1.3
Major Cities and Towns in British Columbia
Provincial boundaries
International boundaries
Not to Scale
(Source: Adapted from American Map Co., Inc.)
YUKON
BRITISH COLUMBIA
ALASKA
(U.S.A.)
ALBERTA
Dawson
Creek
Prince Rupert
Kitimat
Prince George
Quesnel
Pacific Ocean
Kamloops
Kelowna
Cranbrook
Penticton
Nanaimo
Vancouver
Victoria
WASHINGTON
(U.S.A.)


Map 1.4
Major Cities and Towns in Ontario
Provincial boundaries
International boundaries
Not to Scale
(Source: Adapted from American Map Co., Inc.)
QUEBEC
ONTARIO
Sault Ste. Marie
Sudbury
North Bay
Georgian Bay
Lake Huron
Ottawa
Cornwall
Kingston
Peterborough
Scarborough
North York
Toronto
Etobicoke
Mississauga
Lake Ontario
London
Hamilton
St. Catharines
MICHIGAN (U.S.A.)
Windsor
Lake Erie
NEW YORK (U.S.A.)
Thunder Bay
Lake Superior
Sault Ste. Marie
56

2. The Social Credit Party had been the party in control of British Columbia since the mid-1970s, however Ontario experienced a change of government in 1985 when the Liberal Party won control from the Progressive Conservative Party. The Progressive Conservatives had been in power since 1943. Environmental protection and regulation were two of several key political platform issues that influenced the change in government;

3. Economic activities in both provinces are categorically similar (e.g. manufacturing, agriculture, mining, transportation, etc.) however differences exist in the percent of gross domestic product produced (i.e. the total value of goods and services produced in the province in a year) and number of persons employed by economic activity;

4. Ontario's population in 1982 (8,854,700) was approximately three-times greater than British Columbia's population (2,837,700) however 1982 estimates show that Ontario generated approximately twenty-seven times more hazardous waste than British Columbia.

Simply stated, the above four factors indicate first, an established regulatory environment with an emerging one, second, long-standing political control with a switch in political power and, last, two different economic environments resulting in different hazardous waste outputs. Relevant statistical data for the two provinces are presented in Appendix B[6].

2.0 THE EXISTING CONTROL REGIME IN CANADA

As a result of the problems posed by toxic chemicals and hazardous wastes, all levels of government have made attempts to control the problems through past and present laws, policies and programs. The Constitution Act of 1867 set the ground rules for interaction between the federal and provincial governments. Within the Act, environmental matters are assigned to the different levels of government by areas affecting the environment (e.g. seacoast and inland fisheries; property and civil rights) rather than mention being explicitly given to the management of the environment. Sections 91, 92, 92A, 95 and 109 (Box 2.1) outline the areas that may affect the environment and which government has legislative authority (Environment Canada, 1980b).

The constitutional division exhibited in Box 2.1 provides provincial legislatures with greater control over, and influence on, environmental matters. This includes the regulation and management of toxic chemicals and hazardous wastes, however the federal government still has an important role. The remaining sections of this chapter will discuss the roles and legislative responsibilities of the various governments.

2.1 The Federal Government Role

In the early 1970's federal environmental legislation was aimed at controlling water and air pollution by limiting the emission or discharge of certain industrial contaminants. There was no requirement for the testing of new or existing chemicals to determine environmental or human health effects.

Reuse, reduction and recovery was also absent from early legislation as well as mechanisms for disposal on land of such wastes (Canadian Environmental Advisory Council, 1978).

BOX 2.1

SECTIONS OF THE CONSTITUTION ACT WHICH ASSIGN AUTHORITY TO THE FEDERAL AND PROVINCIAL GOVERNMENTS CONCERNING THE ENVIRONMENT

Section 91 of the Constitution Act, 1867 grants the federal federal Parliament exclusive powers to legislate in some specific environment-related areas: navigation and shipping; seacoast and inland fisheries; Indian lands; federal property; taxation and the spending of its own revenues; statistics; criminal law; federal works and undertakings; interprovincial and international trade; and general emergency and other powers not specifically assigned to the provinces under the peace, orders and good government clause.

Section 92 gives exclusive legislative authority to provincial legislatures in essentially local matters, many of which can bear on the environment: the management of public lands and forests and the natural resources therein; regulation of local works and undertakings including mining and manufacturing; direct taxation within the province; the power to spend revenues for provincial purposes; property and civil; and all matters of a local or private nature in the province. Section 92A, added in 1982, gives the provinces the right to make laws in relation to nonrenewable resources, forestry and electrical energy.

Section 95 vests concurrent powers to legislate in relation to agriculture the federal and provincial legislatures.

Section 109 vests ownership of all lands, mines and minerals in a province to the provincial government (Environment Canada, 1980b).

In June, 1971, the Department of the Environment (DOE), commonly known as Environment Canada, was established under the Government Organization Act, 1970. The broad responsibilities given to the Minister of the Environment included the encouragement of practices to preserve the environment; cooperation with provincial governments on similar objectives; the adoption of pollution control objectives and standards; and mitigative efforts for environmental impacts associated with new federal projects.

Environment Canada is the federal agency primarily responsible for activities in the hazardous waste management area through the Environmental Protection Service (EPS) and the Waste Management Division. Several other federal departments work in cooperation with Environment Canada (Transport; Energy, Mines and Resources; and Health and Welfare) to develop, establish and carry out its waste management activities (Glenn and Orchard, 1986).

At present, the federal government does not have comprehensive legislation in place dealing solely with hazardous waste management. Instead it uses specific pieces of legislation from other acts to limit and control hazardous substances in the Canadian environment. The list includes, with dates in parentheses showing the year of promulgation of the statute or its incorporation into the Revised Statutes, the Environmental Contaminants Act, (1975); Transportation Dangerous Goods Regulation (1985) under the Transportation of Dangerous Goods Act, (1980); Arctic Waters Pollution Prevention Act, (1970); Oil Pollution Prevention Regulations (1978) under the Canada Shipping Act, (1970); Fisheries act, (1970); and the Ocean Dumping Control Act, (1975). These acts and regulations are detailed below.

2.1.1 Environmental Contaminants Act

On April 1, 1976, the Environmental Contaminants Act came into force with the purpose of the Act "to protect human health and the environment from substances that contaminate the environment" (Environmental Contaminants Act, S.C. 1974-75 C.72). The Act is the joint responsibility of the Departments of the Environment and of National Health and Welfare. Under the Act the Ministers of the two departments "are given the authority to ban or restrict by order and regulation the import, manufacture, processing, sale, commercial use or release of a substance (or class of substances) that they are satisfied does or will constitute" a significant danger to human health or the environment (Castrilli, 1981).

The Act requires that the use of designated substances must be reported to the Department of the Environment and all records kept concerning amounts used. This includes calling upon industry for information concerning the substance and providing requirements for testing. Periodically, the Canada Gazette receives notices concerning substances whose use must be reported to the department. At present this list includes halogenated substances, polychlorinated biphenyls (PCB) and chlorobiphenyl.

Other key provisions under the Act include a) Section 6, mandatory reporting of the first time manufacture or import of a chemical compound in excess of five hundred kilograms; b) Section 10 where Minister inspectors may enter any place to examine any substance, products, books, reports or records of all kinds for the purpose of enforcing the Act; and c) Section 8, the related offenses and punishments could include up to two years imprisonment.

Three regulations have come into effect under the Environmental Contaminants Act aimed at further tightening controls on PCB. The Chlorobiphenyl Regulation No. 1 came into effect in 1977 banning the use of PCB in new equipment, processes, etc. The import, sale or manufacture of certain types of industrial equipment containing more than 50 parts per million PCB was banned in 1985 under Chlorobiphenyl Regulations Number 2 and 3. At the same time bans were put on the willful release of PCB into the environment and limited the amount of PCB in oil applied to road surfaces as a dust suppressant to 5 parts per million (Glenn and Orchard, 1986).

2.1.2 Transportation of Dangerous Goods Act

The transportation of hazardous waste between provinces and internationally is a federal responsibility and controlled by the Transportation of Dangerous Goods Act which became law November 1, 1980. Under this Act, all shipments of hazardous waste must be accompanied by a manifest. When completed the manifest provides information on the types and amounts of hazardous waste being shipped; a record of individuals or firms involved in the shipment; and information concerning the final destination including treatment, storage, and disposal of hazardous wastes. In short, the above information falls under three headings on the manifest: generator, carrier and receiver.

Between 1980 and 1985, government, industry and other concerned parties worked under the directorship of Transport Canada's Transport Dangerous Goods Directorate in preparing the draft regulations under the Act. On July 1, 1985 the majority of the Transportation of Dangerous Goods Regulations

took effect. Broken into thirteen parts, the regulations cover the following areas: application and exemptions, classification, documentation, safety marks, safety standards and requirements, safety requirements for the training of persons and for reporting, directories, permits, appointment of agents and inspectors. Schedules pertaining to the individual parts include classification criteria, packaging and labeling instructions and exempted goods or wastes. The regulations apply to all persons who generate, handle, transport, treat, store, or dispose of hazardous wastes.

For intraprovincial transport of dangerous goods including hazardous wastes, most provinces have adopted some or all of the federal Transport of Dangerous Goods Regulations. Ontario, Quebec, Manitoba and Alberta are the provinces which reference the federal legislation in their own provincial legislation allowing for suitable changes deemed necessary for that province.

2.1.3 Other Federal Laws

Other federal legislation tends to have a more limited application to the problem of hazardous wastes but when applied may influence the management of such wastes. They are also all water related, both ocean and inland waterways.

Both the Arctic Waters Pollution Prevention Act and the Fisheries Act set out offenses and penalties regarding the discharge of pollutants into water. Section 33(2) of the Fisheries Act prohibits the deposit of any type of deleterious substance in water frequented by fish and subsection (10)

places complete onus with the owner of the substance with the possibility of a fine up to five thousand dollars for a first offense.

The Oil Pollution Prevention Regulations under the Canada Shipping Act apply only to ships in Canadian waters including loading and unloading facilities. Provisions in the regulations include the design and equipping of ships; for fuel, cargo and ballast handling; and any emergency procedures (Glen and Orchard, 1986).

The requirements for obtaining permits to dump at sea from ships, aircraft, platforms or other man-made structures are set out under the Ocean Dumping Control Act. Schedules under the Act list prohibited and restricted substances including the necessary factors for granting permits (Glenn and Orchard, 1986).

2.1.4 The Canadian Environmental Protection Act

The Canadian Environmental Protection Act (CEPA), Bill C-74, was passed by the House of Commons, May 5, 1988. Under CEPA, the federal government will assume a broader and more assertive role in environmental matters than has previously existed. The wide scope and comprehensive nature of CEPA plus fines of up to $1,000,000 per day and jail terms for corporate officers and directors, may serve to ensure that corporate decision-making includes a more significant role for environmental considerations.

The federal Minister of the Environment (Environment Canada) will administer CEPA with support on human health aspects from the Minister of National Health and Welfare. Responsibility for enforcement of CEPA lies solely with the Minister of the Environment. As part of the administrative duties of CEPA, the Government of Canada shall:

> (a) take both preventive and remedial measures in protecting the environment;
> (b) take the necessity of protection the environment into account in making social and economic decisions;
> (c) endeavour to act in cooperation with the governments of the provinces to protect the environment;
> (d) encourage the participation of the people of Canada in the making of decisions that affect the environment;
> (f) endeavour to establish nationally consistent levels of environmental quality;
> (g) provide information to the people of Canada on the state of the Canadian environment;
> (h) apply knowledge, science and technology to resolve environmental problems;
> (i) endeavour to protect the environment from the release of toxic substances; and
> (j) endeavour to act expeditiously to assess whether substances in use in Canada are toxic or capable of becoming toxic. (CEPA, 1988 s.2)

CEPA has repealed the Environmental Contaminants Act, the Clean Air Act, the Ocean Dumping Control Act and Part III of the Canada Water Act. Other federal legislation such as the Transportation of Dangerous Goods ACt, the Fisheries Act, the Pest Control Products Act, and the Canada Shipping Act are not included in CEPA and thus remain intact.

Prior to promulgation CEPA, Environment Canada published in June 1987 it draft Enforcement and Compliance Policy and invited comments from interested parties. Written submissions

were received from government officials, industry and native groups. In addition, four ENGOs; the Canadian Environmental Law Research Foundation, the Environmental Law Centre of Alberta, the West Coast Environmental Law Association and the Conservation Council of New Brunswick, held workshops on the draft policy. These consultations were used to develop the final policy document, released when CEPA was promulgated in 1988. Two main objectives were fulfilled by the policy:

- it sets out the principles for fair and consistent enforcement and tells everyone who shares a responsibility for the protection of the environment -- Governments, industry, organized labour and individuals -- what it is expected of them; and

- it tells everyone what to expect from Environment Canada officials who enforce the Act and its regulations (Weese, 1988: F-3).

Four strengths of CEPA are immediately evident upon a review of the Act: stronger enforcement powers, a life cycle approach to chemicals, tougher penalties and jail terms and a clarified commitment to set national standards. These strengths are further supported by the federal government's attempt to provide an integrative, cooperative and preventative approach among all parties who are exposed to the problem of toxic chemical pollution in Canada. The operational impact of CEPA will not be known until Environment Canada establishes the various regulations, and the mechanisms behind the monitoring and enforcement programs are known.

Apart from the inputs of the above acts and regulations and the potential input from CEPA, hazardous waste management is mainly a provincial responsibility in Canada. Across Canada, numerous pieces of provincial legislation govern hazardous waste management and toxic chemicals from identification and

classification to transportation and disposal. The legislation pertaining to the British Columbia and Ontario is discussed in the next section.

2.2 The Provincial Government Role

Under the Constitution Act of 1867, provincial governments have substantial constitutional authority in the fields of hazardous waste management and toxic chemical management with respect to property and civil rights including matters of a local or private nature. Similar to federal law, early provincial legislative schemes were mainly directed at general air and water pollution discharges. More recent efforts have seen the provincial initiative branch out into the various categories of the hazardous waste problem:

> The areas of provincial concern have included defining hazardous wastes; the siting of new facilities; control of existing and abandoned sites; spills and compensation; hazardous waste transportation; reduction, recovery and re-use of hazardous wastes; improved enforcement; and the role of the public (Castrilli, 1982: 46).

At the provincial level, specific legislation for toxic chemical control is practically non-existent with the exception of the Hazardous Chemicals Act in Alberta. Within provincial environmental legislation, clauses can be found regulating the discharge of contaminants but no pre-manufacture or pre-market tests are required for designated chemicals. The management of toxic chemicals generally begins with the application of emission control programs which becomes the management of toxic waste, a class within hazardous waste.

The following two subsections will briefly outline the legislative mechanisms for the management of hazardous wastes in British Columbia and Ontario. The discussion of their application and adequacy will be reserved for chapters 3.0 and 5.0.

2.2.1 British Columbia

Legislation, regulation and objectives for hazardous waste management in the province include:

Pollution Control Act (S.B.C. 1967, c.332)
- Pollution Control Objectives for the Mining, Smelting and Industries, 1973
- Pollution Control Objectives for the Chemical and Petroleum Industries, 1974
- Pollution Control Objectives for Food-Processing, Agriculturally Oriented, and Other Miscellaneous Industries, 1975
- Pollution Control Objectives for Municipal Type Waste Discharges, 1975
- Pollution Control Objectives for the Forest Products Industry, 1977

Minimum Requirements for Refuse Disposal to Land
Environment Management Act (S.B.C. 1981, c. 14, as amended)
Waste Management Act (S.B.C. 1982, c. 41, as amended)
- Waste Management Regulation (B.C. Reg 432/82, as amended)
- Special Waste Regulation (B.C. Reg. 42/84, not in force)

Pesticide Control Act (R.S.B.C. 1979, c.322, as amended)
- Pesticide Control Regulation (B.C. Reg. 319/81, as amended)

Transport of Dangerous Goods Act (S.B.C. 1985, c.17)
- Transport of Dangerous Goods Regulation (B.C. Reg. 203/85)

The Pollution Control Act became law in 1967 and was administered by the Department of Lands, Forests, and Water Resources. In accordance with Section 4, subsection (a) and (b) of the Act, four manuals of industry related and one municipal related pollution control objectives were printed by the Pollution Control Branch in the mid-70's. The objectives are to be reviewed every five years.

The Ministry of Environment was created in 1979 and the Pollution Control Branch became one of its responsibilities. However, in the same year this branch became known as the Waste Management Branch which includes a section called the Environmental Safety Program set up to assure responsibility in the management of special wastes.

Similar to the Pollution Control Objectives, the Minimum Requirements for Refuse Disposal to Land established guidelines for disposal of waste on land. Within the requirements, Sections 1 and 2 pertained to industrial waste including toxic and hazardous wastes, "when disposed of on land by landfill operations serving a population or population equivalent of over 5,000, shall not create a nuisance or health hazard" (Currie, 1985). Both the objectives and requirements contained no clauses concerning monitoring and enforcement.

Section 5 of the Environment Management Act allows for the Minister to declare an environmental emergency if a spill or leakage of oil or a poisonous or dangerous substance occurs. The Minister also has the power to order any person to provide services, labour, equipment, materials or other necessities to prevent, lessen or control the environmental hazard.

The Waste Management Act of 1982 replaced the Pollution Control Act which was repealed. The standards and requirements set out in the Minimum Requirements for Refuse Disposal to Land were incorporated into the new Act which became the primary piece of legislation for the management of hazardous wastes (commonly known as "special" wastes in this province) in British Columbia.

Several sections of the Act deal specifically with the disposal, storage and transportation of special wastes as provided by the terms and conditions set under the sections for permits, approvals, and waste management plans. The Act provides for direct participation of the provincial government with the municipalities involving waste management plans that may contain provisions or requirements for special wastes within the whole or a specified part of the municipality.

The Waste Management Regulation, pursuant to Section 35 of the Waste Management Act, sets forth permit application requirements, duties of the applicant, the publication of the application in the British Columbia Gazette by a manager within the Ministry, application requirements for amendments to permits and approvals, and any classifications and exemptions of waste and operations that exist. If the manager requires, the applicant must meet with a person or persons who may be adversely affected by the discharge or storage of the waste or wastes.

The proposed Special Waste Regulation of 1984 would have provided British Columbia with regulatory controls designed specifically for the registration of special waste generators and the handling, treatment and disposal of such wastes. The draft Regulation was withdrawn and only was used as an administrative tool while being rewritten to ensure uniformity with the federal Transportation of Dangerous Goods Act.

The Special Waste Regulation for became effective April 1, 1988. This Regulation, under the Waste Management Act, and the Waste Management Amendment Act, 1987, have significantly changed the manner in which special wastes must be managed in British Columbia.

The following points provide an overview of the different Parts of the Special Waste Regulation:

- Part 1: Interpretation and Application - addresses definitions for key words used in the Regulation and other generalities;
- Part 2: Minimum Siting Standards for All Special Waste Facilities - addresses siting standards and other requirements;
- Part 3: Operational Requirements for All Special Waste Facilities - addresses plans; waste information; waste record; weather protection; access security; prevention of fire, explosion and accidental reactions; spill protection and reporting; contingency plan; emergency system testing; personnel training; and closure;
- Part 4: Additional Requirements - including (1) recycle facilities; (2) short term storage facilities; (3) requirements for treatment facilities; (4) retirements for incinerators and thermal facilities; (5) mobile facilities; (6) secure landfills; (7) waste piles, surface impoundments and land treatment facilities; and (8) long term storage facility;
- Part 5: Prohibited Management Practices - including mixing and dilution; underground injection; floating facilities and prohibition;
- Part 6: Management of Specific Special Wastes - only management of waste asbestos (British Columbia, 1988b).

In addition, the Special Waste Regulation provides a series of strengthened or new offenses that were previously not possible under the Waste Management Regulation, also under the Waste Management Act. A review of this new Regulation definitely shows many similarities to Ontario Regulation 309 under the

Ontario Environmental Protection Act, in particular generator registration and facility certification requirements. Uniformity with the federal Transportation of Dangerous Goods Act is also evident under the Regulation's manifest system.

The provincial Transport of Dangerous Goods Act, passed in February of 1985, adopted the federal Transportation of Dangerous Goods Regulation in July of the same year. This provided British Columbia with provisions for manifest and classification concerning intraprovincial transport of special wastes.

The Pesticide Control Act and its regulations cover all aspects of pesticides and herbicides from their use through transportation to disposal offenses and penalties for non-compliance.

2.2.2 Ontario

Legislation, regulation and guidelines for hazardous waste management in the province includes:

Classification Guideline for Hauled Liquid Industrial Wastes in Ontario, 1978.
Environmental Protection Act (R.S.O. 1980, c. 141, as amended)
  Waste Management - General Regulation (R.R.B. 1980, Reg. 309, as amended)
  Waste Management - PCBs Regulation (Reg., 11/82, as amended)
  Spills Regulation (0.Reg. 618/85)
Dangerous Goods Transportation Act (S.O. 1981, C. 69)
  Dangerous Goods Transportation - General Regulation (O.Reg. 363/85)
Environment Assessment Act (R.S.O. 1980, c. 140)
Ontario Water Resources Act (R.S.O. 1980, c. 361, as amended)
Ontario Waste Management Corporation Act (S.O. 1981, c.21)
Pesticide Act (R.S.O. 1980, c. 376, as amended)

The Ontario Ministry of the Environment (MOE) was established in 1972 from the consolidation of two government agencies, the Department of the Environment and the Ontario Water Resources Commission. The purpose of the merger was to form one single government agency responsible for all aspects of environmental protection, enhancement and restoration.

Part V, Waste Management, of the Environmental Protection Act is the principal piece of legislation governing waste management in Ontario. It provides definitions, procedures and requirements for acquiring certificates of approval for both existing waste management systems as well as proposed systems, sites, alterations or expansion. Part V also specifies when public hearings are to be held prior to the issuing of, or refusing to issue, a certificate of approval. Also, there may be a requirement to submit to the Director plans and specifications of the work to be undertaken, and provisions for compensation to both the owner of the waste management system and to persons suffering from damage to water resources due to improper waste management practices (Glenn and Orchard, 1986).

Under the Environmental Protection Act, the primary regulation for control of hazardous wastes is the General Regulation - Waste Management, often referred to as simply Regulation 309. In 1983, MOE engaged in extensive consultations for the purpose of introducing a comprehensive set of policies and proposals for the management of all wastes in the Province known as the Blueprint for Waste Management. Regulation 309 underwent significant changes after amendments were passed in 1985 stemming largely from proposals found in the Blueprint for Waste Management. The revised version of Regulation 309 included generator and registration requirements, improved

waste definitions and classes, an improved manifest system and specific standards and requirements for carriers of hazardous wastes. The amendments also replaced the 1978 Classification Guideline for Hauled Liquid Industrial Wastes in Ontario.

Two other regulations under the Environmental Protection Act govern hazardous waste management in Ontario. The Waste Management - PCBs Regulation provides provisions for the disposal of PCB. A new set of guidelines, Origin and Management of PCB Waste, was printed in 1984, replacing a similar document of 1978. The other regulation, the Spills Regulation, was issued in December, 1985, effective retroactive to November 29, 1985. Commonly known as the "Spills Bill", the legislation embraces three major principles according to the Environment Minister James Bradley:

> (1) owners, handlers and carriers of hazardous materials must take all precautions to prevent spills, (2) once a spill has taken place, those same parties bear full and absolute responsibility for its immediate control and cleanup and restoration measures to undo and damage to the environment, and (3) any innocent victims who bear costs or suffer damage from a spill are entitled to prompt reimbursement and compensation (Glenn and Orchard, 1986: 98).

The Environmental Compensation Corporation, established under Section 99 of the Environmental Protection Act, has the power to receive and assess applications for compensation, authorize payments and to commence proceedings to recover the money from the persons responsible for the spill. To avoid lengthy delays before cleanup commences, Ontario has set up a $10 million Environmental Security Fund to deal immediately with spills and compensate any victims.

Ontario's Dangerous Good Transportation Act and regulation were proclaimed in force July 1, 1985. Under the Act, the federal Transpiration of Dangerous Goods Regulation was adopted for provincial use.

Working in conjunction with the Environmental Protection Act, the Environmental Assessment Act requires that any person proposing a waste management scheme may be subject to hearings and assessment by the Environmental Assessment Board before the Minister gives final approval. Until the project has received that approval, no license will be issued. Extensive environmental impact studies are often required for large undertakings such as a landfill operation.

The Ontario Water Resources Act provides extensive powers to regulate water supply, sewage disposal and the control of water pollution. All discharges of polluting material by a municipality or person are prohibited unless a permit has been obtained and, if not, would result in penalties and fines.

Establishing a comprehensive management scheme for liquid industrial and hazardous wastes was the main purpose behind the Ontario Waste Management Corporation Act. The crown corporation is to develop a central facility for the treatment and disposal of wastes. Several candidate sites were identified in southern Ontario before a final candidate site was selected in the Township of West Lincoln.

The Pesticides Act and regulations set out provisions for handling, storage, sale, use, transportation and disposal of pesticides. Professional exterminators are licensed by the

MOE which maintains a classification system to ensure that hazardous chemical pesticides are not handled or used by unqualified people.

2.3 The Municipal Government Role

Under the British North America Act, municipalities are established by the provinces and gain their authority through provincial legislation. Municipal governments are often the most immediately effective level of government because of their proximity to particular hazardous waste problems. Three traditional types of provincial legislation provide municipal authorities with the necessary powers to address problems posed by hazardous wastes. These are the enactment of by-laws, local boards of health and the municipality's official plan (Castrilli, 1982).

First, provincial legislation grants local governments the power to enact by-laws to address such matters as waste disposal, industrial use of sewers and controlling nuisances. Secondly, local boards of health are often called in on hazardous waste matters to address local health issues. Their investigations can range from a few people exposed to a toxic substance for the first time to uncovering the history of an entire neighbourhood built beside a recently discovered dump site. Door-to-door blood tests may be administered or questions concerning unusual family illnesses may be asked to determine the extent of damage caused by a contaminant or group of contaminants. Finally, through provincial planning law, municipalities are responsible for developing the official plan for a local area. Thus, zoning by-laws can

determine where a hazardous waste facility could be built in the planning area or prevent one from being established in the first place.

Some municipal governments have tried to strengthen their position in controlling hazardous wastes within their boundaries. Three types of mechanisms have been established:

> (1) improved municipal by-laws controlling hazardous waste transport, packaging and disposal within urban boundaries; (2) authority to require disclosure of information respecting types and quantities of chemicals and wastes manufactured, used or stored in the municipality; and (3) by-laws restricting or prohibiting establishment of facilities or activities deemed harmful to the local population (Castrilli, 1982: 69).

The application of these mechanisms and the traditional types of provincial legislation used to control hazardous wastes go beyond the scope of this study because of the number of municipalities in British Columbia and Ontario that would have to be included. In addition, very little governmental information exists on the application of these mechanisms at the municipal level and few studies have been published for public consumption. It was the intent of this subsection, the role of the municipal government, only to bring to the reader's attention the third level of government that does become involved in hazardous waste management. The remainder of this paper will involve only federal and provincial laws.

3.0 AN OVERVIEW OF FEDERAL AND PROVINCIAL REGULATORY APPROACHES

3.1 Introduction

Legislative powers in Canada, as previously discussed, are divided between the federal parliament and the provincial legislatures. Between these two levels, a number of existing laws, policies and programs are available to address the difficult issues presented by hazardous wastes and to assist with environmental risk management. These approaches are necessary because of industry's failure to deal with the hazardous waste problem themselves. Consequently, government has been forced to establish monitoring and enforcement programs to ensure environmental standards are being met. However, environmental standards may be deemed useless if there are no mechanisms for assuring compliance. Basically, what has occurred over the last decade are two main approaches to hazardous waste management characterized as the bargaining/self-management approach and the enforcement/ prosecution approach.[7]

The bargaining/self-management approach had its beginnings with law makers, regulators and the public assuming that the laws would enforce themselves. It was found they usually did not. This lead into other areas for government regulators such as friendly persuasion, voluntary compliance programs, negotiation/bargaining, and terms and conditions on permits and licenses. Industry was basically responsible for managing its own environmental responsibilities with little on-going influence exerted by government.

When the bargaining/self-management approach did not appear to be working effectively and the environment was in fact being violated by an industry, government would step in with various enforcement procedures, with the most severest being prosecution. The evolution of this enforcement/prosecution approach has been a direct result of the inadequacies of the former approach, however many practitioners of law believe in today's society there is need for both approaches.

This chapter focuses on the enforcement/prosecution approach through an overview of federal and provincial regulatory approaches based on available information. In general, very little statistical data has been collected at either the federal or provincial (British Columbia or Ontario) government level solely dealing with hazardous wastes. Consequently, information presented in this study is often at a broader level, such as waste management or environmental violations, rather then specific to hazardous waste violations and compliance statistics.

The bargaining/self-management approach, although usually based on regulations, will not be discussed because information is generally compiled only on specific cases with little comparative data available. Objectives 1 and 2, described in Chapter 1.0, are addressed.

3.2 Licensing Options

Broadly speaking, licenses (often referred to as permits) convey authorization, and may be issued to any person, thing or activity for specified terms. The owner of the license ("the licensee") is governed both by generally applicable

legislated standards and by any specific conditions built into the license. Occupations, trades and activities can all be regulated by licenses. A number of licensing sanctions including suspension, revocation or refusal to renew, are available to licensing authorities (Law Reform Commission of Canada, 1986).

Licensing in relation to hazardous waste is generally a provincial responsibility, therefore the discussion in this section will deal only with this level of government.

3.2.1 Permits and Approvals

In British Columbia, a permit must be obtained under the Waste Management Act "to introduce waste[8] into the environment or to store special (hazardous) waste[9]" (s.8). Also, an approval could be obtained under the same act for "the introduction of waste into the environment or the storage of a special waste for a period of 12 months or less without issuing a permit" (s.9). For special wastes, a permit does not authorize the introduction of this waste type into the environment unless it specifies the quantities and characteristics of such waste. Under section 23, the Minister (of Environment) may suspend the permit or approval for any length of time, or entirely cancel a permit or approval.

Under the Environmental Protection Act (EPA), Part V Waste Management in Ontario, a certificate of approval (or provisional certificate) must be obtained to "use, operate, establish, alter, enlarge or extend a waste[10] management system[11] or a waste disposal site[12]" (s.27). The Director (of Environmental Approvals and Project Engineering Branch) may

suspend, refuse to renew or revoke terms and conditions in a certificate (or provisional certificate) of approval at his discretion.

Essentially, the licensing requirements for both provinces are very similar, however an enormous difference occurs in the two statutes' applicability to their respective provincial situations. In British Columbia, there are no regulatory controls explicitly covering the registration of special waste generators including the handling, treatment and disposal of such wastes. The proposed Special Waste Regulation was intended to fill this void, however it was withdrawn in 1985 and is slated to be rewritten. Consequently, British Columbia is basically powerless when dealing with special wastes and must rely solely on the restrictions imposed under the Waste Management Act. The situation is much different in Ontario as described in the next section.

3.2.2 Generator Registration

In 1985, Regulation 309, under the Environmental Protection Act, underwent significant revisions, one of which was the expansion of the existing program of requirements for generators of liquid industrial[13] and hazardous wastes[14]. Under the new requirements, generators must:

- Register wastes with Environment Ontario.
- Ensure that carriers are certified.
- Use a manifest for each waste transaction.
- Select a waste treatment or disposal site.
- Follow up if the sixth copy of the manifest is not received.
- Accept any returned loads of waste. (MOE, 1985)

Waste generators were required to evaluate their wastes and, if found to be hazardous or liquid industrial, register them with MOE by September 17, 1986. MOE has established two major waste groups; Inorganic Wastes and Organic Wastes, with 5 categories under inorganic and 10 under organic. In all, 53 waste classes have been identified under the two major waste groups. Under each waste class, MOE has provided examples of wastes that are registerable. This registration program assumes that the waste generator can identify each waste type with or without having an analysis done on a representative sample. Consequently, there has been no allowance given for waste that may have been inappropriately stored, not marked or mixed with other waste and, as a result, clearly do not fall under any one specific waste class. The task to register these 'orphan' wastes is often time consuming and costly to the waste generator or, as is often the case, the inheritor of waste through land acquisition or bankruptcy.

Upon registration, MOE issues a Generator Registration Number which enables the recipient to legally store, process, dispose or transport such wastes in Ontario. The following explanation of a waste generator is provided in "Registration Guidance Manual for Generators of Liquid Industrial and Hazardous Waste," distributed by MOE in 1985:

> The Regulation (309) defines generator and waste generating facility (site). The intent is to include any person, by site, who through ownership, management, operation or control, creates or stores wastes. Generators include operators of commercial and manufacturing facilities that produce wastes as well as operators of waste transfer, bulking, treatment or processing facilities that forward materials off-site for subsequent management. (MOE, 1985: 6)

Therefore, as a result of the amendments to Regulation 309, all hazardous waste generators, carriers and receivers must have their wastes registered. If new hazardous wastes are to be generated or transported or received, additional applications must be filed.

3.3 Monitoring Hazardous Waste

In an effort to ensure that hazardous wastes are safely handled, two government options are available; the manifest system (federal and provincial) and routine monitoring of disposal facilities. The manifest system is intended to allow for provincial, and where applicable, federal tracking of where industry sends its wastes. The recipients of the waste (i.e. government approved facilities), are monitored to ensure that they are obeying the conditions set out in their permits.

3.3.1 Manifests

The federal Transportation of Dangerous Goods Act applies to all international and interprovincial transportation of dangerous goods including hazardous wastes. The provinces are responsible for enacting complementary legislation within its own boundaries. The net result should be a comprehensive federal/provincial program for tracking hazardous wastes. Unfortunately, this comprehensive program is far from complete for a number of reasons:

- as of September 9, 1987, federal involvement relied heavily on the educational thrust of the program with little operational emphasis placed on monitoring and enforcement;[15]

- several provinces do not have a provincial manifest system that is comparable to the federal system;
- Ontario has been given permission to use their provincial manifest both in the province and for interprovincial and international shipments if they require (Glenn and Orchard, 1986).

Only Ontario offers a complete manifest system 'on paper', with specific responsibilities outlined for generators, as previously discussed, and carriers and receivers. 'On paper' refers to the fact that limited information is available on the number of people who are actually registered and the overall ability to really track the waste. For example, there are currently no accurate records as to the number of registered carriers of specific waste classes in Ontario because the computer program to achieve this function has not been implemented yet. A MOE representative estimated that there were about 1,500 registered carriers, including Canadian and American firms, operating in Ontario[16].

Transportation of hazardous waste in British Columbia is currently accomplished by consultation between provincial and federal authorities. This is due to the absence of a uniform provincial/federal tracking system including legislated responsibilities for generators, carriers and receivers. The results are lengthy shipment delays, improperly completed federal manifest forms and a tremendous number of shipments that are not monitored. For example, between April, 1986 and March 31, 1987, 830 manifests were received by Ministry personnel illustrating the transportation of 5,549 tonnes of hazardous waste[17]. However, hazardous waste generation estimates from Table 1.2 in Chapter 1.0 show that

approximately 66,300 tonnes are generated annually. Based on these figures and this time period, the Ministry was only able to track about 8% of the waste generated in British Columbia.

3.3.2 Disposal Sites

Monitoring of waste disposal facilities is a provincial responsibility, however this responsibility is often passed on to the facility operators through permit conditions. As a result, Ministry personnel in both British Columbia and Ontario rely heavily on the private sector to abide by permit conditions, and are generally only called on for an inspection when a complaint is lodged against a facility.

3.4 Investigations, Enforcement and Compliance

The licensing options and monitoring programs described are meaningless unless they are accompanied by on-going investigations to ensure compliance standards are being met. The Law Reform Commission of Canada suggests the word compliance implies:

> that conduct can be objectively measured, usually in relation to legal standards. However, direct measurement of compliance if often difficult; instead, administrators may resort to secondary, measurable indicia, such as numbers of prosecutions, suspensions of licenses, and expenditures for enforcement actions. Such numbers may indicate that administrators are using the legal instruments provided to them, but they tell little about the extent to which compliance has occurred. (Law Reform Commission of Canada, 1986: 11)

This difficulty is quite prominent for environmental enforcement programs and techniques dealing with hazardous waste and, more generally, the field of waste management. The programs and techniques exist at federal and provincial levels, however inconsistencies arise during their application.

3.4.1 Environmental Investigation Branches

To enforce the multitude of environmental regulations that exist, governments have established specific branches to perform the necessary investigatory work. At the federal level there are three branches in two Departments that include among their activities, hazardous waste enforcement, and at the provincial level, there is an 'investigation branch' in both British Columbia and Ontario.

3.4.1.1 Federal Level

The Enforcement and Compliance Division of the Management and Emergencies Branch, Environment Canada, enforces the principal federal water pollution control statute, the Fisheries Act. The charges laid under Section 33 of the Act in 1985 and 1986 are shown (Table 3.1). In 1985, the average fine per charge was $2,414 with the largest being $7,500. In 1986, the largest fine was $30,000 with the average being $4,270 per charge. The average fine per charge is extremely low compared to the $50,000 maximum fine for a first offense and $100,000 for a subsequent offense as stated in the Act. From the available data, it is impossible to ascertain whether or not these charges were in fact hazardous waste related.

Table 3.1

Charges Laid Under Section 33 of the Fisheries Act

	Total Number of Cases Prosecuted	Total Number of Separate Charges	Convicted Cases (charges)	Acquitted/ Stayed/With drawn Cases	Pending Cases	Fine Levied
1986	18	33	12(22)	1	5	$93,900
1985	18	48	9(14)	5(a)	4	$33,800

(a) Charges laid for one case were stayed when the defendant pleaded guilty to provincial charges and fined $10,000

(Source: Enforcement and Compliance Division, Management and Emergencies Branch, Environment Canada, 1987).

The enforcement of the Environmental Contaminants Act is the responsibility of the Controls Implementation Section, Commercial Chemicals Branch, Environment Canada. This section has developed an enforcement strategy that "is aimed at the development and implementation of plans and investigative techniques to gather information in order to ensure enforcement of the objectives of the Environmental Contaminants Act". Three main areas of the compliance program are:

- Environmental Contaminants Act compliance,
- PCB regulation compliance,
- Non-regulatory compliance activities (McDonald, 1987).[18]

Enforcing the regulations under the Transportation of Dangerous Goods Act is the responsibility of the Operations and Compliance Branch, Transport Dangerous Goods Directorate,

Transport Canada. As mentioned previously (section 3.3.1), this branch is still working on the educational phase of their program. As a result, there have been no convictions under the Act with respect to hazardous waste. When fully enforced, violators can face up to $50,000 for a first offense and $100,000 for a subsequent offense including up to two years imprisonment.

3.4.1.2 Provincial Level

In British Columbia the Conservation Officer Service within the Ministry of Environment is responsible to ensure compliance with ministry legislation by:

1. providing a viable prevention program through public education and involvement,
2. providing an environmental surveillance and protection program,
3. providing a patrol and investigative capability to apprehend violators, deter would-be violators and to institute proceedings for prosecution under legislation for which this Ministry has responsibility,
4. providing for the protection of the public and property from problem wildlife. (Province of British Columbia, 1984/85: 62)

In 1984 the Conservation Officer Service consisted of 86 field officers, 13 senior conservation officers, 5 regional conservation officers and 5 headquarters staff. The division of the Service's operational time is shown in Table 3.2. As noted, waste management enforcement accounted for only 2.0% of total time and 3.0% (2.0% by 62.6%) of total enforcement time. Compared to the Wildlife and Fisheries Programs, the Waste Management Program appears to have a very low profile.

Table 3.2

Division of Conservation Officer Service Responsibilities

Program/Activity	Operational Time Spent on Enforcement	Operational Time Spent on Other Activities
Waste Management	2.0%	
Wildlife	43.0%	
Fisheries	17.0%	
Water Management	0.6%	
Administration		31.4%
Prevention/Education		3.0%
Training		3.0%
	62.6%	37.4%

(Source: Compiled from the 1984/85 Province of British Columbia Ministry of Environment Annual Report.)

A number of statistics associated with the activities of the Conservation Officer Service under the Waste Management Program are identified on Table 3.3. Based on the figures, the prosecution rate (conviction divided by court proceedings) was quite low; 53% (1982), 66% (1983) and 53% (1984). The percentage of cases unsolved (cases divided by violations) rose dramatically during the three years from 23% in 1982 to 52% in 1984. The maximum fine that can be assessed under the Waste Management Act is $50,000 (i.e. illegal dumping), however the average fine levied from Table 3.3 is $223 (1982), $618 (1983) and $259 (1984). From the available data, it is not possible to determine whether any of the fines were associated with illegal dumping of hazardous wastes (Table 3.4)[19].

Table 3.3

Conservation Officer Service Enforcement Statistics- Waste Management Program

	Complaints Reported by Public	Violations Found	Court Proceedings Instituted	Convictions Registered	Warnings Issued	Cases Solved	Fines Levied
1984	327	106	57	30	133	55	$7,770
1983	280	171	50	33	134	70	$20,385
1982	252	195	64	34	84	45	$7,580

(Source: Compiled from the Province of British Columbia, Ministry of Environment Annual Reports; 1982/83, 1983/84, 1984/85.)

Table 3.4

Conservation Officer Service- Lower Mainland Region Activities Only

Accused	Section of Waste Management Act	# of Charges	Offense Date	Fine Levied
Waldum Forest Products	34(5)	6	March-July 1985	$1,800
Stadco Forest Products	3(1a)	1	November 1984	$2,000
Karl Johansson	3(1a)	1	July/August 1984	$1,000

(Source: Conservation Officer Service, Mainland Region Office, British Columbia Ministry of Environment, 1987.)

The $2,000 and $1,000 fines imposed upon Stadco Forest Products and Karl Johansson (private entrepreneur) are but a fraction of the $50,000 fine that could be imposed (Table 3.4). Even further discouraging is the Waldum Forest Products trial from 1985. According to a representative from the Conservation Office Service, this company might have been charged under special waste legislation had it existed. Instead this company is allowed to slip away with a nominal fine ($300 per charge).

In 1981, the Province of Ontario saw the need to establish the Special Investigations Unit (SIU) to enforce regulations associated with liquid and hazardous liquid wastes. This group had 13 staff members and was found to be quite understaffed when the Unit's mandate began to include other environmental offenses. Between 1980 and 1986, the SIU managed to bring 357 cases to court (Table 3.5).

Table 3.5

Special Investigations Unit Cases to Court, 1980-1986

Fiscal Year[1]	# of Cases to Court	% Increase/decrease
1980-1981	47	-
1981-1982	59	+ 26%
1982-1983	36	- 38%
1983-1984	75	+108%
1984-1985	54	- 28%
1985-1986[2]	86	+ 59%

1. Fiscal year ends on March 31.
2. The Investigations and Enforcement Branch (IEB) became operational January 1, 1986.

(Source: Adapted from a paper presented by Mark G. McKenney, Task Force Leader IEB, 1987 at the Gordon Group Conference on "Waste Management Practices".)

The SIU was the forerunner of a new 85 member Investigations and Enforcement Branch (IEB) formed in 1985 and operational as of January 1, 1986. The IEB was established to investigate all incidents where violations are apparent and where legal action may be necessary. Concurrent with the formation of the IEB, "the Ministry had redefined it's own internal policies regarding when to enforce the laws. The legislation has also been strengthened since 1986 to reflect the Government's continuing commitment to protecting the environment" (McKenney, 1987).

Prior to 1986, the Provincial Government had been using legislation and respective fines that were established in 1971. The new legislation has substantially increased the penalties available to sanction convicted polluters.

A confidential quarterly report is prepared on the enforcement activities of the IEB however only limited summaries can be obtained from the Communications Branch of the MOE. Available information is identified (Table 3.6), however one discrepancy should be noted. According to the Communication Branch, 179 prosecutions were initiated in 1986/87, however in a paper presented by Mark McKenney, Task Force Leader, IEB, he states that 260 cases were brought to court during the same fiscal year. McKenney's figures are 45% higher than the ones provided by the Communications Branch.

Of the prosecutions initiated (Table 3.6), a very high prosecution rate (convictions divided by prosecutions) is evident; 83% in 1985/86, 77% in 1986/87 and 81% in 1987/88. When comparing the two years of complete IEB operations, an increase is found in all activities.

Table 3.6

Investigations and Enforcement Branch (IEB) - Enforcement Activities

Fiscal Year(a)	# of individuals and Companies Charged	Prosecutions Initiated	Convictions Obtained	Total Fines Imposed	Average Fine Per Case
1985/86(a)	149	86	71	$550,000	$7,746
1986/87	266	179	138	$785,000	$5,688
1987/88	330	211	170	$1,056,038	$6,212

(a) Fiscal year ends on March 31.

(b) The IEB became operational January 1, 1986

(Source: Communications Branch, Ontario Ministry of the Environment, 1987.)

Accurate data is not available to determine whether the new and expanded IEB is in fact superior to the old SIU. Obviously, with the added manpower and expanded territory they now cover, one could assume the IEB are more of a threat to the industrial polluter. However, in the last full year of operation by the 13 member SIU staff, 54 cases were brought to court or 4.2 court cases per staff. In the first full year of operation, the IEB had 63 staff members who initiated 179 prosecutions or 2.84 prosecutions per staff, a number much lower the previous group. More data would need to be collected before an accurate analysis could be provided.

The overall increased involvement in enforcement practices has been supported by an increase in penalties for offending persons, municipalities or corporations under both the Environmental Protection Act and Ontario Water Resources Act. The new fines are highlighted on Table 3.7.

Table 3.7

Minimum and Maximum Hazardous Waste Related Fines- Environmental Protection Act and Ontario Water Resources Act

	Negative Effects May Result		Negative Effects Actually Result	
	First Offense ($/day)	Subsequent Offenses ($/day)	First Offense ($/day)	Subsequent Offenses ($/day)
Person(a)	2,000 - 5,000	4,000 - 15,000	2,000 - 10,000	4,000 - 25,000
Corporation(b)	2,000 - 50,000	4,000 - 100,000	2,000 - 250,000	4,000 - 500,000

(a) "person" includes a municipality, a corporation on behalf of Her Majesty in right of Ontario, and an agent of any of them (EPA, s.1(1), para.(1).)

(b) "corporation" refers to a private sector company

(Source: "Environmental Law and Regulation: Principals and Practice Applied to Industry", Wood, 1987).

Although MOE does not publish a complete list of those persons, municipalities or corporations who have been charged under the various acts, individual cases are often printed in newspaper and magazine articles:

- Imperial Oil was fined $108,000 after a gasoline spill caused the evacuation of 5,000 people in Timmins, including fire damage to six homes;
- Elmira Refiners Ltd. was fined $44,975 after residents in the Town of Paris complained about strong odours being emitted from the plant;
- S.A. Armstrong Ltd, of Belleville, was fined $40,000 for illegally burying 4 drums containing PCBs on its property (Globe & Mail, 1988).

3.4.2 Compliance Statistics for Ontario

The MOE operate an Industrial Monitoring Information System (IMIS) that provides data on more than 154 industrial plants that discharge wastewater directly into water bodies. The majority of Ontario's 12,000 industrial plants are not included in this system because they discharge into municipal sewers, consequently the wastewaters are treated by municipal sewage treatment plants. This group of industries are known as indirect dischargers.

The MOE publish an annual up-date on industrial direct discharges using information obtained from IMIS. This report lists compliance statistics (Table 3.8), among other items, including a breakdown by individual direct dischargers. The compliance statistics are based on effluent limitations (requirements) imposed on a specific industrial discharger. Effluent parameter exceedance limits are also determined on an individual company basis and include such parameters as biochemical oxygen demand, phenols, mercury, lead, etc. MOE employs a variety of measures to achieve compliance with its requirements, including:

- voluntary programs,
- formal programs,
- Control Orders,
- Requirements and Direction Orders,
- Certificate of Approvals,
- prosecution (Ontario MOE, 1987).

Table 3.8

Compliance Statistics for Industrial Direct Dischargers in Ontario

	1984	1985	1986
■ Sources reported	105	147	154
■ in (out) compliance with annual averages	55(45)	86(59)	87(67)
■ in (out) compliance with monthly averages	-	47(98)	53(101)
■ companies with no requirements	5	2	0
■ companies instituting controls	14	15	21
■ control order requiring further reduction beyond current levels	9	28	4

(Sources: Report on the 1985 Industrial Discharges in Ontario, MOE, 1986. Report on the 1986 Industrial Direct Discharges in Ontario, MOE, 1987.)

According to the industrial direct discharges data (Table 3.8), a high percentage of companies are annually out of compliance, (i.e. exceed guideline/requirement); 45(43%) in 1984, 59(40%) in 1985, and 67(44%) in 1986. A larger percentage of companies are monthly out of compliance; 98(67%) in 1985 and 101(66%) in 1986. Of the 101 companies who were out of compliance monthly, 54(53%) exceeded the limit on two or more parameters (Table 3.9). The total number of exceedances listed in the report for the 101 companies is 993. The MOE notes "that exceedance of a monthly average requirement does not necessarily mean that charges are laid" (Ontario MOE, 1987:54).

Table 3.9

Total Number of Effluent Parameters Exceeded by Industrial Plants

Number of Industrial Plants	Total Number of Effluent Parameters Exceeded By Individual Plants					
	1	2	3	4	5	6
101	47	23	16	10	2	3

(Source: Compiled from Report on the 1986 Industrial Direct Discharges in Ontario, MOE, 1987)

In 1986 the MOE laid 10 charges on 8 industrial direct dischargers for water related offenses. Thus, out the 993 effluent parameters exceedancies in 1986 only 1% resulted in charges being laid on the offender. This extremely low number in no way reflects MOE's statement that a monthly exceedance "does not necessarily mean that charges will be laid." For 1986, "does not necessarily" should be replaced with "probably will not."

Fortunately, the MOE is trying to improve this situation. In June 1986, Environment Minister Honorable Jim Bradley announced the Municipal-Industrial Strategy for Abatement (MISA) program. The ultimate goal of MISA is "the virtual elimination of toxic contaminants from all industrial and municipal effluent discharges into the province's waterways" (Ontario MOE, 1987:12). Under MISA, Ontario's industrial direct dischargers will be placed in one of the following categories:

- Petroleum Refineries (0100)
- Organic Chemicals (0200)
- Pulp and Paper (0300)
- Metal Mining and Refining (0400)
- Iron and Steel (0500)
- Electric Power Generation (0600)
- Inorganic Chemicals (0700)
- Metal Casting (0800)
- Industrial Minerals (0900)

Monitoring and compliance regulations for all 9 categories should be enforceable during 1989. In addition, a separate monitoring and compliance regulation will apply to municipal sewage treatment plants in an effort to control the discharges from the 12,000 industrial indirect dischargers.

3.5 Summary of Findings (Objectives 1 and 2)

Hazardous waste management is clearly a provincial responsibility in Canada with the federal government having a much less active but more advisory type role. This is quite evident in Ontario and to a lesser extent in British Columbia where there is less provincial funding for hazardous waste management programs and projects and a need for a strong federal advisory role. Even where the federal government has the option to be forceful, such as with the enforcement of the Environmental Contaminants Act or the Fisheries Act, rarely do we see a prosecution. For those federal cases that have reached prosecution, the amount of the fine rarely reflects the severity of the charge.

Based on available data, it would appear that the federal government has had little operational or regulatory impact on hazardous waste management in Canada. For example, as of September 9, 1987, federal government involvement in administering the Transportation of Dangerous Goods Act has relied heavily on the educational thrust of the program with little operational emphasis placed on monitoring and enforcement. This is further supported by the complete lack of convictions under the Act.

The federal government's role as policy advisors and program coordinators has been quite valuable in the short-term, however long term benefits of programs and projects are not immediately evident. A substantial increase in federal involvement appears to be on the horizon through CEPA, and in particular, the enforcement mechanisms that will follow under the various regulations.

Differences in hazardous waste licensing options and monitoring in British Columbia and Ontario range from minor variations, such as permit and approval systems, to incomparable situations, such as generator registration because of its non-existence in British Columbia. Consequently, non-existent would be an appropriate description of the findings in British Columbia associated specifically with hazardous waste licensing options and monitoring.

Although it is evident that the Government of Ontario is more advanced than the Government of British Columbia in hazardous waste management, Ontario is still far from completing its hazardous waste management commitments. For example, the operational aspects of hazardous waste related legislation, regulations and programs have not been fully implemented.

This is apparent in the mandatory certification program for hazardous waste generators, carriers, and receivers under Regulation 309. The data recording/retrieval system has not been fully designed to accept all the data being submitted to the MOE at the present time and, in addition, a lack of personnel resources to input all the data exists. Another problem with the mandatory registration of waste is the inflexibility in the existing waste classes.

Both provinces have environment-related investigation branches, however the amount of time devoted to all waste management investigations (out of 100%)in British Columbia is substantially lower than their counterparts in Ontario. Neither group draws a clear distinction between hazardous waste related offenses and other environmental violations. The phrase, "you will be prosecuted to the fullest extent of the law," definitely does not apply to either province based on the size of the fine that has been given compared to the maximum fine stated in the regulations. Based on recent reports and public comments from Ontario MOE officials, the Investigations and Enforcement Branch will be exerting a more forceful approach in the latter half of the 1980s to all environment-related investigations and, in particular, the ones directed at corporate polluters. This strengthened enforcement attitude is not expected in British Columbia until new environmental regulations and the mechanisms to enforce them are operable.

Compliance statistics available in Ontario definitely cast some doubt on the overall success of programs to protect the environment and human health from industrial establishments. Even more startling is the minimal number of industrial direct dischargers brought to court who exceeded their monthly

effluent parameter requirements. Based on the recorded statistics and interpretation by the MOE, it would appear that the Industrial Monitoring Information System (IMIS) is extremely "top heavy" with policies, data collection, and monitoring and completely lacking on the investigation and enforcement side. If in fact the monitoring and exceedance data are accurate in the report, a large number of violating industries would have little to no chance of not receiving a sizable fine in court.

4.0 DATA COLLECTION METHODS, PRESENTATION AND LIMITATIONS

4.1 Study Design

Data collection for this study occurred in two phases beginning in May 1986 and ending in August 1987. The two phases are identified as follows:

- Phase One: Regulatory Approaches; May 1986-September 1986.

  Data collection on regulatory approaches included numerous trips to both the Ontario and British Columbia Ministries of the Environment (including Branch Offices), Western and Ontario Regions of Environment Canada and Transport Canada, private sector companies and associations, and ENGOs. Several non-structured interviews were conducted with representatives from the three groups (Appendix C). Additional information was obtained through non-structured telephone interviews, written contact and published and unpublished sources.

- Phase Two: ENGOs' and Private Industrial Sector Perceptions and Attitudes December 1986 - August 1987.

  Data collection involved the design and implementation of a questionnaire to determine the perceptions and attitudes of the environmental non government organizations (ENGOs) and private industrial sector towards government involvement in hazardous waste management in their respective provinces.

Appendix D contains a list of Research Sources that were used throughout the study to obtain additional information, verify existing information and to respond to specific questions.

4.1.1 The Questionnaire Approach

To obtain information on perceptions and attitudes of ENGOs and the private industrial sector towards government involvement in hazardous waste management, consideration was given to distributing a questionnaire to both groups in British Columbia and Ontario. A second consideration in study design was how to solicit the necessary information. Three options existed:

a) hire field workers to collect the information,
b) telephone or visit each of the groups or establishments,
c) mail out questionnaires,

Option c) was selected as options a) and b) would require financial resources well beyond the budget already established for the study. As a result of addressing the two considerations, two questionnaires were designed that were similar in nature with minor variations attributed to the two different groups. The two questionnaires are presented in Appendix E.

Questionnaires were mailed out to the "best contact" obtained by a telephone call to each company or group or through published sources (e.g. telephone directories, trade directories, etc.). The package included a cover letter, questionnaire and a self-addressed stamped envelope. The implementation process included sending the questionnaire followed by a letter two weeks later. Non-respondents were then sent the same questionnaire with a new cover letter six weeks after the original left. This was followed up also with a letter.

Environmental Interest Groups

A list of ENGOs in British Columbia who stated that hazardous wastes are a concern of their group was obtained from the British Columbia Public Interest Research Group (BCPIRG). This list included 21 organizations who were all a part of the Hazardous Waste Advisory Committee. All 21 organizations were sent a questionnaire.

In Ontario, a list of ENGOs was compiled from A Listing of Environmental Groups in Ontario, published by the Ontario Environment Network. The 59 groups selected all stated in the publication that hazardous waste issues were of concern to their group. Due to the relatively small number of organizations in British Columbia and Ontario that were compiled, it was decided that the complete population should receive a questionnaire.

Private Sector Industries

The Canadian Standard Industrial Classification (SIC) system, which defines industry by group as a group of operating units (e.g. companies engaged in the same or similar kind of manufacturing or production activity), was used to select twelve SIC groups:

- SIC 10 Metal Mining
- SIC 14 Mining and Quarrying of Nonmetallic Minerals, except Fuels
- SIC 20 Food and Kindred Products
- SIC 24 Lumber and Wood Products
- SIC 26 Paper and Allied Products

- SIC 28 Chemicals and Allied Products
- SIC 29 Petroleum Refining and Related Industries
- SIC 33 Primary Metal Industries
- SIC 34 Fabricated Metal Products
- SIC 35 Machinery, except Electrical
- SIC 36 Electrical and Electronic Machinery
- SIC 37 Transportation Equipment

The selection of the twelve SIC groups was based on the following considerations:

- identifying SIC groups that generated hazardous waste;
- selecting SIC groups that have been previously identified in Canadian hazardous waste inventories to be as consistent as possible (refer to Table 1.3);
- selecting SIC groups that included specific industries that were identified through the literature review as principal generators of hazardous waste in Canada (e.g. chemical manufacturing, petroleum refining, pulp mills, etc.);
- including those SIC groups that accounted for a significant portion of hazardous waste generated in British Columbia and Ontario. Based on estimates (refer to Table 1.3), the twelve SIC groups account for over 99% of the hazardous waste generated in British Columbia and Ontario.

A list of companies was compiled for British Columbia and Ontario under the twelve SIC groups using the Canadian Key Business Directory 1983, a Dun and Bradstreet publication; Western Manufacturers 8th Edition and Ontario Manufacturers 16th Edition, both publications by Scott's Directories. To increase the number of companies under several SIC groups, the following additional sources were used: Survey of Industrials and Survey of Mines and Energy Resources, both publications by

Maclean Hunter Ltd.; telephone directories for Vancouver, Victoria, Prince Albert, Toronto, Hamilton, St. Catharines, Niagara Falls and Windsor; and Great Lakes Toxic Hot Spots, a map produced by Pollution Probe (Map 4.1).

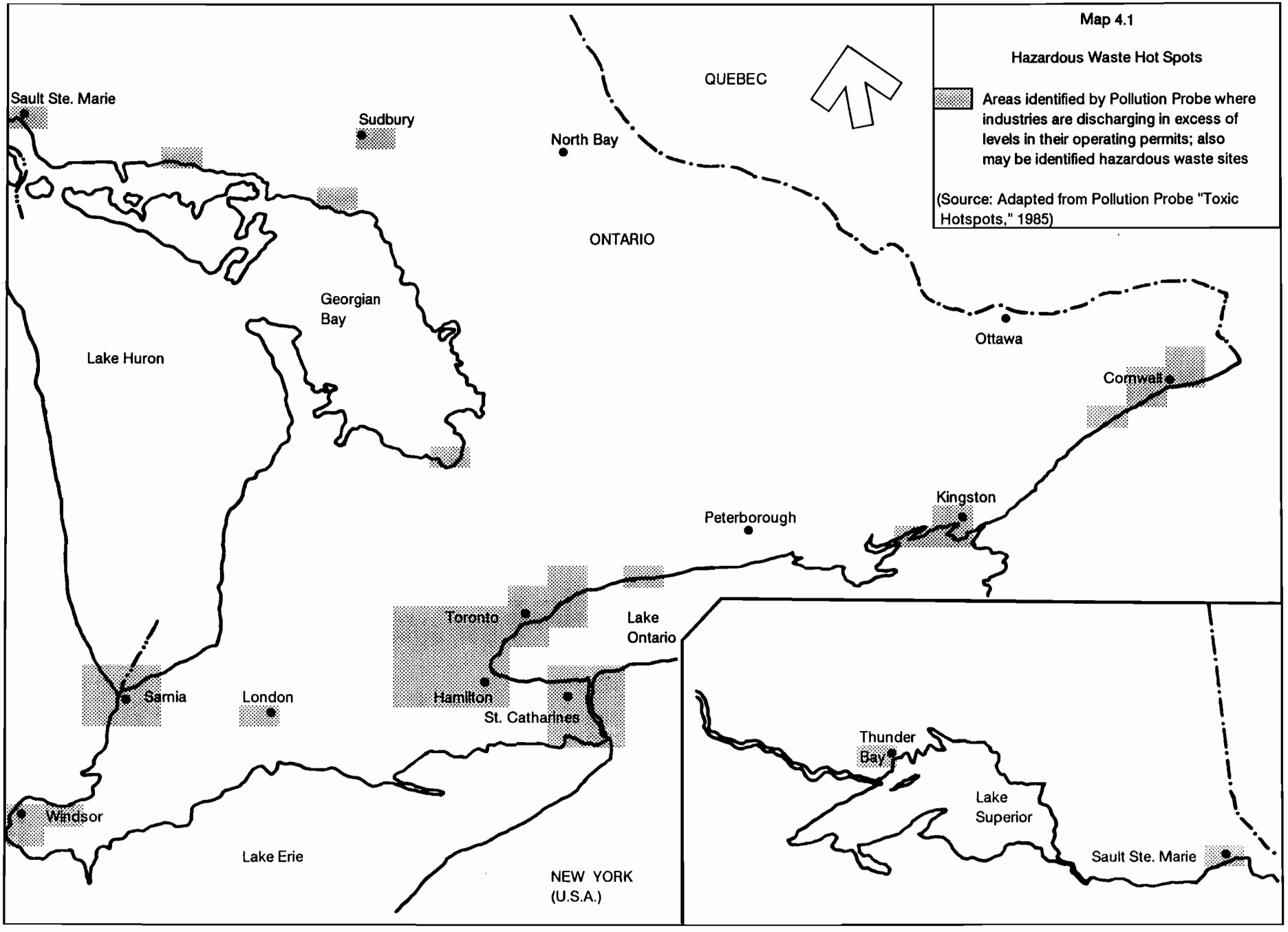
Three-hundred and seventy five companies were compiled for British Columbia of which a one-fifth random sample yielded a questionnaire distribution list of 75 companies. In Ontario 500 companies were amassed and a one-fifth random sample generated a list of 100 companies. The number of SIC groups were reduced to seven generic groups and one "other" group to compensate for the reduction in sample size as follows:

- Pulp and Paper
- Petroleum Refineries
- Chemical
- Food Processing
- Mining
- Steel
- Heavy Manufacturing
- Other (specify)

4.2 Hypotheses

The major focus of this study is to describe and assess the effectiveness and impact of hazardous waste management and policy in Canada. This focus was briefly described in Chapter 1.0, section 1.2 "Objectives of the Study," where three main study areas were identified:

- hazardous waste management at the federal level,
- hazardous waste management at the provincial level in British Columbia and Ontario,
- perceptions and attitudes of ENGO's and the private industrial sector between two provinces.


Map 4.1
Hazardous Waste Hot Spots
Areas identified by Pollution Probe where industries are discharging in excess of levels in their operating permits; also may be identified hazardous waste sites
(Source: Adapted from Pollution Probe "Toxic Hotspots," 1985)
QUEBEC
ONTARIO
Sault Ste. Marie
Sudbury
North Bay
Georgian Bay
Lake Huron
Ottawa
Cornwall
Kingston
Peterborough
Toronto
Lake Ontario
Hamilton
St. Catharines
Sarnia
London
Windsor
Lake Erie
NEW YORK (U.S.A.)
Thunder Bay
Lake Superior
Sault Ste. Marie

Objectives 1 and 2, dealing primarily with the regulatory approaches of government, have been examined in Chapter 3.0. This examination described the variation in the approaches used in British Columbia and Ontario. Objective 3 is addressed through a discussion of perceptions and attitudes of both groups and statistical comparison between the two provinces (Chapter 5.0).

Governments have dealt with hazardous waste management issues since the late 1960s. Their strategies, goals and influence have not always been consistent in nature within a province or between provinces. To be fair, not all provincial situations are alike and, as a result, British Columbia has a far smaller industrial base than Ontario, therefore far less hazardous waste is generated. Consequently, the Ontario MOE should have greater expertise, skills and active participation in the broad field of hazardous waste management than their counterparts in British Columbia. Therefore, it is expected that ENGOs should perceive government effectiveness in hazardous waste management to be different in both provinces. In summary, it is hypothesized that (1) the perceptions and attitudes of ENGOs towards federal and provincial government involvement in hazardous waste management will be significantly different between the two provinces.

Similar to ENGOs, the private industrial sector in British Columbia and Ontario are exposed to different government strategies, regulations and programs for hazardous waste management. In summary, it is hypothesized that (2) the perceptions and attitudes of the private industrial sector towards federal and provincial government involvement in hazardous waste management will be significantly different between the two provinces.

4.3 Study Limitations and Applicability

4.3.1 Data

The majority of Phase One data on the effectiveness of regulatory approaches was solicited from those persons in the two environment ministries and at the federal level involved with investigations or legal counsel. The material available is often incomplete, inconsistent with previous years or generally encompasses all waste management[20] activities in the province as opposed to discrete material applied only to hazardous waste. Consequently, the discussion in Chapter 3.0, "An Overview of Federal and Provincial Regulatory Approaches", is based upon all the information obtained for this study but does not represent all the information available.

Phase Two data, public and private sector perceptions and attitudes, were obtained entirely in response to the questionnaire and any follow-up documentation or conversations with questionnaire recipients. Recipients were asked to respond to questions related to the following categories:

- General Information and Activities
- Provincial Government
- Federal Government
- Municipal Government (only private industrial sector[21])
- Motivation for Compliance
- Protection and Enforcement
- Conflict Resolution
- Legislation/Regulation (only private industrial sector)

Neither the Canadian Environmental Protection Act or the British Columbia Special Waste Regulation will be assessed in this study because these two statutes were not in force during the data collection period which ended August 1987. Both statutes illustrate the federal and provincial commitment to try to anticipate and regulate within the evolving field of hazardous waste management.

4.3.2 Confidentiality

The questionnaire cover letters shown in Appendix E included an assurance that "All responses will be handled confidentially." In addition, each questionnaire recipient was asked to respond to these two questions: "Yes, I give permission for my group's (company's) name to be used in the final report" and "Yes, I give permission for the following personal name to be used in the final report". Based on the responses to these two questions, some names will occur in the text where permission has been granted. Several respondents have asked that neither their name or organization/company be used consequently some quotations in the text could not be identified.

4.3.3 Applicability of Study to Other Geographic Areas

One of the values of a hazardous waste management study such as this, is its potential applicability to other provinces. Section 1.5 of the Introduction Chapter described the two "study provinces" with particular emphasis on the main industrial areas. All provinces across Canada have industrial

areas, most not nearly as concentrated as the case for Ontario, however the potential for hazardous waste problems still exist.

At the federal level, the regulatory approaches used to govern hazardous waste management apply to all provinces and territories, therefore discussion and evaluation of federal action is directly applicable. Although provincial legislation, regulation and policy vary from province to province, this study demonstrates how discussion and analysis of two completely different political regimes provides useful information on which approaches have a good chance of succeeding compared to those that do not. Consequently, other provinces could be added to this study or analyzed separately for the purpose of providing more complete information and a clearer picture of Canada's hazardous waste situation.

The perceptions and attitudes demonstrated by ENGOs and the private industrial sector may be representative of situations that occur in other provinces because this study deals with many common components such as environmental protection, government liaison, and conflict resolution. These components are not isolated specifically to British Columbia or Ontario, rather they have the potential for occurring when any undertaking may impact the environment or human health. Perceptions and attitudes that may not be quite as applicable are the ones that deal with site specific issues (e.g. contamination of an aquifer), however the public and private sector may still find these useful in a generic sense by having a better understanding of the broad picture.

5.0 PERCEPTIONS AND ATTITUDES TOWARDS GOVERNMENT INVOLVEMENT IN HAZARDOUS WASTE MANAGEMENT

Hazardous waste management policies, regulations and programs can be seen as having impacts on two groups: the industries that generate the waste and the self-appointed representatives of the public's interest, the ENGOs. This chapter assesses how these two groups perceive government involvement in their respective provinces. The results of the questionnaire concerning ENGOs and the private industrial sector's response to government involvement in hazardous waste management are presented and discussed under three headings:

- Characteristics of Questionnaire Respondents
- Questionnaire Interpretation, Discussion and Findings
- Statistical Analysis: Testing the Hypotheses

The text focuses on differences in perceptions exhibited by respondents from British Columbia and Ontario. This discussion is supported by the results of a statistical analysis on twenty-three independent variables addressed by ENGOs and twenty-seven independent variables addressed by private firms. The test, the independent variables, descriptive statistics and the results are displayed in Appendix F (ENGOs) and Appendix G (private industrial sector).

5.1 Characteristics of Questionnaire Respondents

Eighty ENGO's were identified as stating that hazardous waste management issues are a concern of their organization. Each ENGO was mailed a questionnaire, 21 in British Columbia and 59

in Ontario. Of those questionnaires distributed in British Columbia, 1 organization disbanded and 10 failed to respond, resulting in a response rate of 48%. In Ontario, 5 organizations moved without leaving a forwarding address, 3 explained that they did not want to participate in writing and 24 failed to respond, resulting in a response rate of 46% (Table 5.1).

Table 5.1

Questionnaire Response Rates

	British Columbia	Ontario	Total
Environmental Interest Groups:			
Number of questionnaires sent	21	59	80
Number of groups that moved or did not want to be included	1	8	9
Number of completed questionnaires	10	27	37
RESPONSE RATE (completed questionnaires)[1]	48%	46%	46%
RESPONSE RATE (overall)[2]	52%	59%	58%
Private Sector Industries:			
Number of questionnaires sent	75	100	175
Number of companies that responded but did not want to be included	10	12	22
Number of completed questionnaires	36	62	98
RESPONSE RATE (completed questionnaire)[1]	48%	62%	56%
RESPONSE RATE (overall)[2]	61%	74%	69%

1. Refers to a completed, returned questionnaires.
2. In addition to completed, returned questionnaires several recipients responded by stating they would not take part in the study for a number of reasons and, in the case of environmental interest groups, several had moved and left no forwarding address.

One hundred and seventy-five questionnaires were mailed to private sector companies: 75 in British Columbia and 100 in Ontario. In British Columbia, 10 firms responded by stating that they did not want to be included in the study while 29 firms failed to respond, resulting in a response of 48%. Of those questionnaires distributed to companies in Ontario, 12 firms explained that they did not want to participate and 26 failed to respond, resulting in a response rate of 62% (Table 5.1).

Characteristics of questionnaire respondents for both groups are described in the next two sections. This information serves only as background information for questionnaire interpretation and subsequent analysis.

5.1.1 Environmental Non Government Organizations

For descriptive purposes only, questionnaire respondents were categorized based on their responses to three characteristical questions: year organization formed (prior to 1980 or after); number of members (under or over 500); and length of involvement in dealing with hazardous waste issues (intervals of 5 years) (Table 5.2).

In British Columbia, respondents are almost equally distributed across the categories for all three statements. Two large organizations are worth mentioning: the Sierra Club of Western Canada established in 1969 with a membership of 1,300, and Greenpeace, established in 1971 with a membership of 80,000 worldwide, are active in British Columbia as well as other parts of the world. Insight provided by related hazardous waste issues both nationally and globally enhance

these two groups' awareness of the situation in British Columbia and Canada. It would appear that hazardous waste issues have only surfaced in British Columbia since 1976.

Table 5.2

Characteristics of ENGOs Respondents

	British Columbia		Ontario	
	Number of Organizations	% of Total Organizations	Number of Organizations	% of Total Organizations
• Year organization formed:				
- established in 1980 or later	4	40.0	13	48.1
- established in 1979 or earlier	6	60.0	14	51.9
• Number of members:				
- under 500 members	4	40.0	16	59.3
- 500 members or over	6	60.0	11	40.7
• Number of years hazardous waste management issues have been a major concern of your organization				
- 5 years or less	6	60.0	10	37.0
- 6 to 10 years	4	40.0	11	40.8
- 11 years or more	0	0.0	6	22.2

Ontario ENGOs demonstrate a comparable breakdown across the three questions and categories as their counterparts in British Columbia with only one main exception. Twenty two percent of the ENGOs in Ontario have been concerned with hazardous waste issues for 11 years or more. This difference may be attributed to the increased economic activity and government involvement in general pollution control objectives in Ontario in the mid 1970s. For example, Pollution Probe, with a worldwide membership of about 20,000, have been tackling these issues for at least 18 years. Similarly,

Preserve Our Water Resources based in Stouffville, have only 30 members but have been battling the hazardous waste management problem for more than 13 years.

During 1986, all questionnaire recipients were asked to provide numeric responses for a number of hazardous waste management related activities that they held or participated in (Table 5.3). In British Columbia, the majority of organizations requested at least 1 public hearing in 1986, however in Ontario most organizations did not request any. Attendance at public hearings also showed differences between the two provinces as 60% of British Columbia ENGOs did not attend compare with only 33% in Ontario. Of particular interest in British Columbia is the difference between requesting (60%) and attending (30%) public hearings, possibly suggesting either a backlog of public hearings or a request being denied.

ENGOs in British Columbia were generally more active as a group in holding workshops/information meetings and conferences than in Ontario, however attendance at activities of this nature was similar in both provinces. Eight ENGOs in Ontario had representation at 10 or more workshops/information meetings/conferences during 1986 possibly signifying an organization with adequate financial resources and active involvement with hazardous waste issues.

The Province of British Columbia saw proportionately more protests staged by ENGOs than Ontario, however 52% of the organizations in Ontario attended negotiation/mediation meetings compared with only 20% in British Columbia.

Table 5.3

Activities of ENGO Respondents in 1986

In 1986, Estimate Numbers for the Following:	British Columbia		Ontario	
	Number of Organizations	% of Total Organizations	Number of Organizations	% of Total Organizations
• Public hearings requested by your group:				
- 0 requested	3	30.0	16	59.3
- 1 to 4 requested	6	60.0	9	33.3
- 5 or more requested	1	10.0	2	7.4
• Public hearings attended by your group:				
- 0 attended	6	70.0	9	33.4
- 1 to 4 attended	3	30.0	13	48.1
- 5 or more attended	1	10.0	5	18.5
• Workshops/information meetings/ conferences held by your group				
- 0 held	3	30.0	14	51.9
- 1 to 9 held	7	70.0	11	40.7
- 10 or more held	0	0.0	2	7.4
• Workshops/information meetings/ conferences attended by your group:				
- 0 attended	1	10.0	5	18.5
- 1 to 9 attended	8	80.0	14	51.9
- 10 or more attended	1	10.0	8	29.6
• Protests staged by your group:				
- 0 staged	5	50.0	24	88.9
- 1 to 4 staged	4	40.0	3	11.1
- 5 or more staged	1	10.0	0	0.0
• Negotiation/mediation meetings attended by your group:				
- 0 attended	8	80.0	10	37.0
- 1 to 9 attended	2	20.0	14	51.9
- 10 or more attended	0	0.0	3	11.1

5.1.2 Private Industrial Sector

For descriptive purposes only, questionnaire respondents were categorized based on their response to four characteristical questions: which private industrial sector category; number employees and the firm's contact with hazardous materials and/or waste (Table 5.4).

Table 5.4

Characteristics of Private Industrial Sector Respondents

	British Columbia		Ontario	
	Number of Companies	% of Total Companies	Number of Companies	% of Total Companies
• Industrial sector:				
- pulp and paper	13	36.1	8	12.9
- petroleum refineries	1	2.8	3	4.8
- chemical	7	19.4	16	25.8
- food processing	2	5.6	8	12.9
- mining	2	5.6	6	9.8
- steel	5	13.9	5	8.1
- heavy manufacturing	3	8.3	13	20.9
- other	3	8.3	3	4.8
• Number of employees:				
- less than 500 employees	24	66.7	30	48.4
- 500 or more employees	12	33.3	32	51.6
• Does your company use industrial processes that require the use of potentially hazardous materials?				
- Yes	27	75.0	55	88.7
- No	9	25.0	7	11.3
• Does your company use industrial processes that generate hazardous waste?				
- Yes	21	58.3	48	77.4
- No	15	41.7	14	22.6

Companies have identified themselves with one of the eight industrial categories provided on the questionnaire. In British Columbia, where pulp and paper is a dominant industry, it is not surprising to find a high response rate for this category. Of the approximately 18 questionnaires sent to pulp and paper related industries, 13 or 72% of them completed the questionnaire. Approximately 24 questionnaires were sent to chemical manufacturing firms in Ontario of which 16 (67%) were returned. Other manufacturing also received a large percentage of overall respondents, however it is not clear what percentage this represents of all the manufacturing recipients in the study as this category is fairly broad. The "other" category was made up by waste management companies that hauled hazardous waste, 3 in each province.

Companies were classified as either being less or more than 500 employees. In British Columbia, about two-thirds of the firms had less than 500 employees while in Ontario about half did. Several firms in both provinces had in excess of 3,000 employees, mainly in the pulp and paper and mining categories.

Eight-four percent of the firms in both provinces had industrial processes that require the use of potentially hazardous materials. If the six hazardous waste handlers/haulers are included with this groups, the percentage increases to 90%. It is not clear why companies that utilize potentially hazardous materials would not generate hazardous waste but this is how several companies answered the generation question. Two possibilities exist; first, that all hazardous materials used are consumed by the end product which does not seem that likely or a second possibility, the reluctance of a company to answer this question truthfully.

All questionnaire recipients were asked to provide numeric responses for a number of hazardous waste management related activities their company may have been involved with in 1986 (Table 5.5).

Table 5.5

Activities of Private Industrial Sector Respondents in 1986

In 1986, Estimate Numbers for the Following	British Columbia		Ontario	
	Number of Companies	% of Total Companies	Number of Companies	% of Total Companies
• Public hearings requested by your company:				
- 0 requested	33	91.7	60	96.8
- 1 to 4 requested	2	5.5	2	3.2
- 5 or more requested	1	2.8	0	0.0
• Public hearings attended by your company:				
- 0 attended	21	58.3	47	75.8
- 1 to 4 attended	13	36.1	14	22.6
- 5 or more attended	2	5.6	1	1.6
• Workshops/information meetings/ conferences held by your company:				
- 0 held	24	66.6	42	67.7
- 1 to 9 held	11	30.6	13	21.0
- 10 or more held	1	2.8	7	11.3
• Workshops/information meetings/ conferences attended by your company				
- 0 attended	15	41.7	23	37.1
- 1 to 9 attended	16	44.4	29	46.8
- 10 or more attended	5	13.9	10	16.1
• Negotiation/mediation meetings attended by your company:				
- 0 attended	26	72.2	48	77.4
- 1 to 9 attended	7	19.5	9	14.5
- 10 or more attended	3	8.3	5	8.1
• Is your company a member of any associations?:				
- Yes	26	72.2	45	72.6
- No	10	27.8	17	27.4

Responses to the six activities are strikingly similar across almost all categories suggesting that the private industrial sector is being subjected to comparable conditions in both provinces. These activities and responses suggest that:

- private firms rarely request public hearings;
- over 27% of the private firms attended hearings in 1986;
- almost 25% of the private firms held activities to either educated their own employees or the public;
- over 60% of the private firms attended various activities with 15% attending more than 10 events;
- negotiation/mediation had no role to play for 76% of the firms;
- over 70% are members of associations.

5.2 Questionnaire Interpretation, Discussion and Findings

The role Environment Canada has principally carved itself with respect to hazardous waste management is an advisory one, while provincial authorities are both advisors and regulators. This distinction has been previously described (Chapter 2.0) and discussed (Chapter 3.0). ENGOs and private industrial companies have their own perceptions and attitudes towards government involvement and practice in hazardous waste management, referred to in this study as hazardous waste risk perception (section 1.1.1). This section documents (Tables 5.6 through 5.13) and discusses questionnaire respondents' perceptions and attitudes towards a full range of federal and provincial government initiatives in hazardous waste management. Statistical analyses (section 5.3) are used to compare responses between the two provinces in an effort to draw supported provincial comparisons.

5.2.1 The Role of Government

The questions asked to ENGOs and the private industrial sector concerning federal government involvement in both provinces are illustrated on Tables 5.6 and 5.7. Questions vary slightly for both groups but cover the following general areas: legislation and regulation, enforcement, communication, monitoring, and impacts on or as a result of an organization or company.

ENGOs find government legislation and enforcement inadequate and that the existing enforcement practices do not reflect an understanding of their group's concerns. This attitude is far from a new one as ENGOs have traditionally argued with federal officials over their involvement. That is not to say that this attitude is not justified by numerous examples. Perhaps a case could be made that many ENGOs would not exist if all citizens felt that government was adequately active.

Ontario ENGOs are not quite as critical of federal government involvement in hazardous waste management as their counterparts in British Columbia (Table 5.6). However, a large percentage of the respondents signaled an overall need for federal level improvement. For questions FG6 and FG7, both provinces were divided on the impact their group had on federal legislation or a local issue.

For the most part, private firms in both provinces have similar perceptions of federal involvement. Private firms generally agreed that legislation/regulation and enforcement practices are protecting the environment from hazardous waste; that government personnel are helpful and that federal hazardous waste policies have had a positive impact on their

Table 5.6

ENGO's Perception of Federal Government Involvement in Hazardous Waste Management

Code	Do you agree that:	Strong Agreement		General Agreement		General Disagreement		Strong Disagreement		Not Applicable	
		B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario
FG1:	the legislation is sufficient?	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.7%)	3 (30.0%)	7 (25.9%)	7 (70.0%)	16 (59.3%)	0 (0.0%)	3 (11.1%)
FG2:	the enforcement is sufficient?	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (10.0%)	6 (22.2%)	9 (90.0%)	18 (66.7%)	0 (0.0%)	3 (11.1%)
FG3:	government personnel are helpful to your group?	0 (0.0%)	4 (14.8%)	5 (50.0%)	5 (18.5%)	5 (50.0%)	10 (37.0%)	0 (0.0%)	5 (18.5%)	0 (0.0%)	3 (11.1%)
FG4:	the legislation/regulation reflects an understanding of your group's concerns	0 (0.0%)	2 (7.4%)	0 (0.0%)	3 (11.1%)	5 (50.0%)	11 (40.7%)	5 (50.0%)	7 (25.9%)	0 (0.0%)	4 (14.8%)
FG5:	the enforcement reflects an understanding of your group's concerns?	0 (0.0%)	2 (7.4%)	1 (10.0%)	1 (3.7%)	0 (0.0%)	10 (37.0%)	9 (90.0%)	10 (37.0%)	0 (0.0%)	4 (14.8%)
FG6:	your group has had an impact on the legislation?	0 (0.0%)	4 (14.8%)	2 (20.0%)	5 (18.5%)	3 (30.0%)	6 (22.2%)	5 (50.0%)	8 (29.6%)	0 (0.0%)	4 (14.8%)
FG7:	your group has had an impact on a local issue?	3 (30.0%)	4 (14.8%)	3 (30.0%)	7 (25.9%)	1 (10.0%)	3 (11.1%)	2 (20.0%)	6 (22.2%)	1 (10.0%)	7 (25.9%)

Note: Number of respondents in British Columbia is 10
Number of respondents in Ontario is 27

Table 5.7

Private Industrial Sector's Perception of Federal Government Involvement in Hazardous Waste Management

Code	Do you agree that:	Strongly Agree		Agree		No Opinion		Disagree		Strongly Disagree		Not Applicable	
		B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C	Ontario	B.C.	Ontario
FG1:	the legislation/regulation is protecting the environment from hazardous wastes?	1 (2.8%)	3 (4.8%)	21 (58.3%)	38 (61.3%)	4 (11.1%)	7 (11.3%)	9 (25.0%)	12 (19.4%)	1 (2.8%)	1 (1.6%)	0 (0.0%)	1 (1.6%)
FG2:	the enforcement practises in use are protecting the environment from hazardous wastes?	0 (0.0%)	2 (3.2%)	19 (52.8%)	30 (48.4%)	5 (13.9%)	9 (14.5%)	10 (27.8%)	18 (29.0%)	1 (2.8%)	1 (1.6%)	1 (2.8%)	2 (3.2%)
FG3:	government monitoring is protecting the environment from hazardous wastes?	1 (2.8%)	1 (1.6%)	11 (30.6%)	24 (38.7%)	6 (16.7%)	10 (16.1%)	16 (44.4%)	21 (33.9%)	2 (5.6%)	3 (4.8%)	0 (0.0%)	3 (4.8%)
FG4:	government personnel are helpful to your company?	0 (0.0%)	6 (9.7%)	18 (50.0%)	31 (50.0%)	6 (16.7%)	9 (14.5%)	8 (22.2%)	8 (12.9%)	1 (2.8%)	6 (9.7%)	3 (8.3%)	2 (3.2%)
FG5:	the legislation/regulation reflects an understanding of the business world?	0 (0.0%)	0 (0.0%)	8 (22.2%)	23 (37.1%)	11 (30.6%)	13 (21.0%)	14 (38.9%)	22 (35.5%)	3 (8.3%)	2 (3.2%)	0 (0.0%)	2 (3.2%)
FG6:	existing legislation/regulation has placed a constraint on the company's output?	1 (2.8%)	1 (1.6%)	9 (25.0%)	11 (17.7%)	5 (13.9%)	10 (16.1%)	17 (47.2%)	29 (46.8%)	1 (2.8%)	7 (11.3%)	3 (8.3%)	4 (6.5%)
FG7:	government policies have had a positive impact on your company's hazardous waste policies?	0 (0.0%)	1 (1.6%)	15 (41.7%)	29 (46.8%)	8 (22.2%)	17 (27.4%)	8 (22.2%)	11 (17.7%)	1 (2.8%)	0 (0.0%)	4 (11.1%)	4 (6.5%)

Note: Number of respondents in British Columbia s 36
Number of respondents in Ontario is 62

own policies. As for monitoring and an understanding of the business world, both provinces were approximately split between agreeing and disagreeing with government involvement.

Responses concerning the provincial government role for both groups (Tables 5.8 and 5.9) show several similarities in responses between attributes. For ENGOs, there is still 'strong disagreement' with provincial legislation and enforcement being sufficient as well as enforcement reflecting an understanding of groups' concerns in both provinces. However, their appears to be differences in the distribution of responses across the categories (e.g. 'general agreement') for both provinces for all the questions except PG2: the enforcement is sufficient. The wider distribution of responses in Ontario could result from:

- the overall number of years many of these organizations have been dealing with the provincial government;
- the respect they have earned based on this persistence and experience gained over the years;
- learning from other organizations mistakes to improve their own situation.

A very positive similarity both provinces share is the high percentage of ENGOs that agree they have had an impact on a local issue, 90% in British Columbia and 81% in Ontario.

Although two different provincial governments (environment ministries) are being compared, the responses from the private industrial sector are very similar in both provinces. Also, responses associated with provincial government are similar to those concerning the federal government. Almost 60% of the respondents in British Columbia 'agree' that legislation/

Table 5.8

ENGO's Perception of Provincial Government Involvement in Hazardous Waste Management

		Strong Agreement		General Agreement		General Disagreement		Strong Disagreement		Not Applicable	
Code	Do you agree that:	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario
PG1:	the legislation is sufficient?	0 (0.0%)	1 (3.7%)	0 (0.0%)	3 (11.1%)	2 (20.0%)	10 (37.0%)	8 (80.0%)	12 (44.4%)	0 (0.0%)	1 (3.7%)
PG2:	the enforcement is sufficient?	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.7%)	1 (10.0%)	8 (29.6%)	9 (90.0%)	18 (66.7%)	0 (0.0%)	0 (0.0%)
PG3:	government personnel are helpful to your group?	0 (0.0%)	4 (14.8%)	3 (30.0%)	10 (37.0%)	6 (60.0%)	9 (33.3%)	1 (10.0%)	4 (14.8%)	0 (0.0%)	0 (0.0%)
PG4:	the legislation/regulation reflects an understanding of your group's concerns?	0 (0.0%)	3 (11.1%)	0 (0.0%)	8 (29.6%)	2 (20.0%)	11 (40.7%)	8 (80.0%)	4 (14.8%)	0 (0.0%)	1 (3.7%)
PG5:	the enforcement reflects an understanding of your group's concerns?	0 (0.0%)	3 (11.1%)	0 (0.0%)	1 (3.7%)	1 (10.0%)	15 (55.6%)	9 (90.0%)	7 (25.9%)	0 (0.0%)	1 (3.7%)
PG6:	your group has had an impact on the legislation?	0 (0.0%)	7 (25.9%)	0 (0.0%)	9 (33.3%)	2 (20.0%)	4 (14.8%)	8 (80.0%)	5 (18.5%)	0 (0.0%)	2 (7.4%)
PG7:	your group has had an impact on a local issue?	4 (40.0%)	16 (59.3%)	5 (50.0%)	6 (22.2%)	0 (0.0%)	2 (7.4%)	1 (10.0%)	1 (3.7%)	0 (0.0%)	2 (7.4%)

Note: Number of respondents in British Columbia is 10
Number of respondents in Ontario is 37

Table 5.9

Private Industrial Sector's Perception of Provincial Government Involvement in Hazardous Waste Management

		Strongly Agree		Agree		No Opinion		Disagree		Strongly Disagree		Not Applicable	
Code	Do you agree that:	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C	Ontario	B.C.	Ontario
PG1:	the legislation/regulation is protecting the environment from hazardous wastes?	3 (8.3%)	4 (6.5%)	19 (52.8%)	45 (72.6%)	5 (13.9%)	4 (6.5%)	8 (22.2%)	7 (11.3%)	1 (2.8%)	1 (1.6%)	0 (0.0%)	1 (1.6%)
PG2:	the enforcement practises in use are protecting the environment from hazardous wastes?	1 (2.8%)	2 (3.2%)	21 (58.3%)	36 (58.1%)	6 (16.7%)	6 (9.7%)	7 (19.4%)	15 (24.2%)	1 (2.8%)	2 (3.2%)	0 (0.0%)	1 (1.6%)
PG3:	government monitoring is protecting the environment from hazardous wastes?	1 (2.8%)	1 (1.6%)	14 (38.9%)	35 (56.5%)	7 (19.4%)	7 (11.3%)	13 (36.1%)	16 (25.8%)	1 (2.8%)	2 (3.2%)	0 (0.0%)	1 (1.6%)
PG4:	government personnel are helpful to your company?	2 (5.6%)	6 (9.7%)	24 (66.7%)	36 (58.1%)	2 (5.6%)	8 (12.9%)	3 (8.3%)	6 (9.7%)	2 (5.6%)	4 (6.5%)	3 (8.3%)	2 (3.2%)
PG5:	the legislation/regulation reflects an understanding of the business world?	0 (0.0%)	1 (1.6%)	15 (41.7%)	19 (30.6%)	10 (27.8%)	9 (14.5%)	10 (27.8%)	29 (46.8%)	1 (2.8%)	3 (4.8%)	0 (0.0%)	1 (1.6%)
PG6:	existing legislation/regulation has placed a constraint on the company's output?	0 (0.0%)	3 (4.8%)	9 (25.0%)	16 (25.8%)	5 (13.9%)	5 (8.1%)	18 (50.0%)	32 (51.6%)	1 (2.8%)	2 (3.2%)	3 (8.3%)	4 (6.5%)
PG7:	government policies have had a positive impact on your company's hazardous waste policies?	2 (5.6%)	4 (6.5%)	18 (50.0%)	39 (62.9%)	7 (19.4%)	7 (11.3%)	6 (16.7%)	8 (12.9%)	0 (0.0%)	0 (0.0%)	3 (8.3%)	4 (6.5%)

Note: Number of respondents in British Columbia is 36
Number of respondents in Ontario is 62

regulation and enforcement practices are protecting the environment and in Ontario 70% 'agree' with the first point and 60% with the second. Other similarities are as follows:

- a large percentage of respondents agreeing, often strongly that government personnel are helpful to their company;
- half the firms 'disagree' that existing legislation/regulation has placed a constraint on their company's output;
- between 50% and 63% 'agree' that provincial government policies have had a positive impact on their company's hazardous waste policies.

5.2.2 Perceived Effectiveness of Government Legislation, Regulations and Related Strategies

How effective are the present government statutes and strategies for hazardous waste management? This was the underlying theme of a series of nine statements addressed by ENGOs and the private industrial sector. The private industrial sector was also asked to rate how well they thought a series of legislation and regulations (federal and provincial) applied to hazardous waste management. The nine statements were divided into three specific activities; Motivation for Compliance, Protection and Enforcement and Conflict Resolution (Tables 5.10 and 5.11). Although similar statements are addressed by both groups, statistical comparisons between the sectors are not possible because of the different response choices provided to the questionnaire recipients for the statements. However, general comparisons are possible.

Table 5.10

ENGO's Opinion on the Perceived Effectiveness of Hazardous Waste Management Legislation/Regulation

Code	Would you support the statement that:	Strong Agreement		General Agreement		General Disagreement		Strong Disagreement	
		B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario
	A: MOTIVATION FOR COMPIANCE								
PE1:	Hazardous waste legislation/regulation is necessary to ensure that companies protect the environment.	6 (60.0%)	26 (96.3%)	4 (40.0%)	1 (3.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
PE2:	Governments should generally subsidize costs for hazardous waste planning, reduction, monitoring and protection.	1 (10.0%)	8 (29.6%)	8 (80.0%)	8 (29.6%)	0 (0.0%)	10 (37.0%)	1 (10.0%)	1 (3.7%)
PE3:	The polluter must pay.	9 (90.0%)	17 (63.0%)	1 (10.0%)	9 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.7%)
	B: PROTECTION AND ENFORCEMENT								
PE4:	Existing hazardous waste legislation/reglation does not adequately protect the environment.	9 (90.0%)	13 (48.1%)	1 (10.0%)	9 (33.3%)	0 (0.0%)	5 (18.5%)	0 (0.0%)	0 (0.0%)
PE5:	Governments are not diligent enough when it comes to enforcement procedures.	9 (90.0%)	18 (66.7%)	1 (10.0%)	6 (22.2%)	0 (0.0%)	2 (7.4%)	0 (0.0%)	1 (3.7%)
PE6:	Punishments are too low to have a significant impact.	9 (90.0%)	18 (66.7%)	1 (10.0%)	7 (25.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (7.4%)
	C: CONFLICT RESOLUTION								
PE7:	Calling for a public inquiry is the best forum to achieve results when dealing with government or the private sector	2 (20.0%)	6 (22.2%)	2 (20.0%)	10 (37.0%)	6 (60.0%)	7 (25.9%)	0 (0.0%)	4 (14.8%)
PE8:	The techniques of negotiation and mediation should be used more often in hazardous waste management.	1 (10.0%)	11 (40.7%)	7 (70.0%)	13 (48.1%)	2 (20.0%)	3 (11.1%)	0 (0.0%)	0 (0.0%)
PE9:	Public participation must be improved in hazardous waste management.	9 (90.0%)	26 (96.3%)	1 (10.0%)	1 (3.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Note: Number of respondents is British Columbia is 10
Number of respondents in Ontario is 27

Table 5.11

Private Industrial Sector's Opinion on the Perceived Effectiveness of Hazardous Waste Management Legislation/Regulation

Code	Would you support the statement that:	Strongly Agree		Agree		No Opinion		Disagree		Strongly Disagree		Not Applicable	
		B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C.	Ontario	B.C	Ontario	B.C.	Ontario
	A: MOTIVATION FOR COMPLIANCE												
PE1:	Hazardous waste legislation/regulation is necessary to ensure that companies protect the environment.	10 (27.8%)	20 (32.3%)	25 (69.4%)	38 (61.3%)	1 (2.8%)	3 (4.8%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
PE2:	Governments should generally subsidize costs for hazardous waste planning, reduction, monitoring, and protection of the environment.	3 (8.3%)	2 (3.2%)	15 (41.7%)	22 (35.5%)	2 (5.6%)	6 (9.7%)	14 (38.9%)	28 (45.2%)	2 (5.6%)	4 (6.5%)	0 (0.0%)	0 (0.0%)
PE3:	The polluter must pay.	3 (8.3%)	10 (16.1%)	31 (86.1%)	35 (56.5%)	1 (2.8%)	12 (19.4%)	0 (0.0%)	4 (6.5%)	1 (2.8%)	1 (1.6%)	0 (0.0%)	0 (0.0%)
	B: PROTECTION AND ENFORCEMENT												
PE4:	Existing hazardous waste legislation/ regulation does not adequately protect the environment.	2 (5.6%)	1 (1.6%)	8 (22.2%)	18 (29.0%)	8 (22.2%)	9 (14.5%)	17 (47.2%)	32 (51.6%)	1 (2.8%)	1 (1.6%)	0 (0.0%)	1 (1.6%)
PE5:	Governments are not diligent enough when it comes to enforcement procedures.	1 (2.8%)	4 (6.5%)	14 (38.9%)	13 (21.0%)	7 (19.4%)	13 (21.0%)	13 (36.1%)	29 (46.8%)	1 (2.8%)	2 (3.2%)	0 (0.0%)	1 (1.6%)
PE6:	Punishments are too low to have a significant impact.	2 (5.6%)	4 (6.5%)	5 (13.9%)	14 (22.6%)	11 (30.6%)	17 (27.4%)	16 (44.4%)	21 (33.9%)	1 (2.8%)	5 (8.1%)	1 (2.8%)	1 (1.6%)
	C: CONFLICT RESOLUTION												
PE7:	Calling for a public inquiry is the best forum to achieve results when dealing with government.	0 (0.0%)	0 (0.0%)	2 (5.6%)	8 (12.9%)	7 (19.4%)	20 (32.3%)	21 (58.3%)	24 (38.7%)	6 (16.7%)	9 (14.5%)	0 (0.0%)	1 (1.6%)
PE8:	The techniques of negotiation and mediation should be used more in hazardous waste management.	4 (11.1%)	5 (8.1%)	21 (58.3%)	31 (50.0%)	5 (13.9%)	15 (24.2%)	6 (16.7%)	9 (14.5%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	1 (1.6%)
PE9:	Public participation must be improved in hazardous waste management.	1 (2.8%)	5 (8.1%)	17 (47.2%)	18 (29.0%)	5 (13.9%)	14 (22.6%)	12 (33.3%)	22 (35.5%)	1 (2.8%)	3 (4.8%)	0 (0.0%)	0 (0.0%)

Note: Number of respondents in British Columbia is 36
Number of respondents in Ontario is 62

As part of the structured statements associated with effectiveness of government statutes and strategies, ENGOs were invited to provide comments on any statement. Only ENGOs in Ontario took advantage of this suggestion and their comments will be included in the next three sections. The private industrial sector were invited to provide comments only at the end of the questionnaire, however very few did and none that are relevant to the next three sections.

5.2.2.1 Motivation for Compliance

As discussed in Chapter 3.0, compliance refers to action in response to government requests or commands (i.e. compliance standard). When establishing a compliance standard, government often state how the standard shall be met. This may be accomplished through legislation, conditions on a permit or possibly through friendly persuasion. These strategies can also be seen as methods to motivate the private industrial sector to comply with environmental standards. Other methods government have been known to use include subsidies, enforcement and prosecution.

Part A (Tables 5.10 and 5.11) displays in statement format three methods to motivate private firms to comply with environmental standards. These include formal procedures, incentives and prosecution. In response to the first statement concerning legislation/regulation as necessary formal procedures to ensure that companies protect the environment, the majority of ENGOs and the private industrial sector in both provinces agreed generally or strongly.

As for the government incentive of subsidizing costs for hazardous waste management activities, a fairly even split occurred for both ENGOs and the private industrial sector between agreeing and disagreeing with this type of incentive. A representative from West Lincoln Citizens Against Landfill suggested that "it should be the responsibility of government to help assist or subsidize industry to put their environmental houses in order if they can not afford to on their own."

The prosecution method addressed by the statement that the polluter must pay was answered similarly for both sectors with ENGOs tending to 'strongly agree' compared to the general agreement expressed by the private industrial sector. About 6% of all private firms disagreed with this method.

"The polluter must pay for any damages caused to the environment" states a representative from an ENGO, "but the Government must be responsible for establishing disposal facilities, with industry paying for use of facilities. The Government must develop an over all plan to assist in recycling, reduction and disposal, backed by required monitoring and legislation."

Leslie Daniels, a representative of a southern Ontario ENGO, agrees with the above comment but ties it back to the statement on subsidies. "Whether our tax dollars subsidize pollution abatement or the companies pay the costs themselves, it all eventually comes from one source - the taxpayer. Companies will charge more for products to recover costs and they will take forever to clean up their collective acts. Ontario needs action now!"

5.2.2.2 Protection and Enforcement

When compliance standards have been established, government must ensure they are being met or, if not, report that the standards are not being complied with. In part, this activity has similar methods to the previous one, however this time government action to protect the environment is scrutinized as opposed to government policy. These action methods include formal procedures, enforcing formal procedures and prosecution. This information is displayed in Part B (Tables 5.10 and 5.11).

The first statement concerning the adequacy of existing legislation and regulation was answered similarly in both British Columbia and Ontario however ENGOs felt the environment was not being protected while the private industrial sector believe the protection is adequate. This discrepancy is a common one as ENGOs are known to be continuously critical of government activity while private firms tend to react to a given situation and then get back to regular business.

Concerning the diligence of government employees, ENGOs perceive government as strongly inept in most hazardous waste related instances. Mike Dickman of Niagara Ecosystems Taskforce sees this as the "pivotal point" in Ontario. "MOE does not have the manpower to police industries and municipalities which discharge illegally to the natural environment."

This opinion is not shared by the private industrial sector. In British Columbia and Ontario, 46% of the private firms perceive government as hard workers while 32% do not. The remaining percentage represents firms who had no opinion on this matter. Punishments associated with government prosecution also drew different opinions from the two groups. ENGOs agreed, and often strongly, that punishments are too low to have a significant impact while the private industrial sector were more or less split on whether they agreed or disagreed with this aspect of prosecution.

5.2.2.3 Conflict Resolution

For use in this report, the term conflict resolution refers collectively to a variety of approaches that allow the parties to meet face to face to reach a mutually acceptable resolution. Three approaches to resolve conflicts were presented in statement format to both groups and their responses are displayed in Part C (Tables 5.10 and 5.11). The first two approaches, public inquiry and negotiation/ mediation, are basically techniques used to involve the public. Therefore, public participation becomes the third approach addressed under conflict resolution.

A mixed reply was received from respondents for the public inquiry approach as being the best forum to achieve results. Sixty percent of the ENGOs in British Columbia generally disagreed while 60% in Ontario either agreed generally or strongly with the statement. A representative for Omagh United Taxpayers found that public inquiries are sometimes "over emotional and non-productive but in the long run leaders emerge who can constructively produce resolutions." The

disagreement among ENGOs in British Columbia was also supported by 75% of the private industrial sector with 20% stating 'no opinion'. In Ontario, 'no opinion' was recorded by 32% of the private industrial sector respondents while 39% disagreed with this approach.

Agreement with increased use of the techniques of negotiation and mediation was exhibited by approximately 86% of ENGOs and 62% of the private industrial sector. About 20% of the latter sector responded 'no opinion'.

In response to the need for improved public participation, 100% of ENGOs in both provinces were in agreement with all but one organization in each province responding 'strong agreement'. Surprisingly, only 3% of the private industrial sector in British Columbia strongly agreed with the statement and 33% disagreed with the need for improvement. A similar private industrial sector response was found in Ontario.

5.2.2.4 Application of Legislation and Regulation

The private industrial sector were asked how well it thought selected federal and provincial legislation and regulation applied to hazardous waste management. Responses from both provinces for federal statutes (Table 5.12) and their respective provincial statutes (Table 5.13) are displayed. The following points are identifiable:

- a large percentage of private firms in both provinces do not have knowledge of the applicability of the Environmental Contaminants Act. Of those that do, approximately 35% responded 'good';

Table 5.12

Private Industrial Sector's Opinion of Selected Federal Legislation and Regulation

How well do you think the following pieces of legislation/regulation apply to hazardous waste management:	Excellent		Very Good		Good		Fair		Poor		Don't Know	
	B.C.	Ont	B.C.	Ont	B.C.	Ont	B.C.	Ont	B.C.	Ont	B.C.	Ont
Environmental Contaminants Act	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (8.1%)	12 (33.3%)	18 (29.0%)	5 (13.9%)	10 (16.1%)	4 (11.1%)	3 (4.8%)	15 (41.7%)	26 (41.9%)
Fisheries Act	0 (0.0%)	0 (0.0%)	5 (13.9%)	2 (3.2%)	15 (41.7%)	12 (19.4%)	5 (13.9%)	10 (16.1%)	2 (5.6%)	3 (4.8%)	9 (25.0%)	35 (56.5%)
Transportation of Dangerous Goods Act (manifest)	0 (0.0%)	7 (11.3%)	7 (19.4%)	23 (37.1%)	15 (41.7%)	19 (30.6%)	6 (16.7%)	5 (8.1%)	1 (2.8%)	3 (4.8%)	7 (19.4%)	5 (8.1%)
Transportation of Dangerous Goods Regulation (classification)	0 (0.0%)	4 (6.5%)	9 (25.0%)	20 (32.3%)	13 (36.1%)	24 (38.7%)	6 (16.7%)	7 (11.3%)	3 (8.3%)	3 (4.8%)	5 (13.9%)	4 (6.5%)

Note: Number of respondents in British Columbia is 36
Number of respondents in Ontario is 62

Table 5.13

Private Industrial Sector's Opinion of Selected Provincial Legilsation and Regulation

How well do you think the following pieces of legislation/regulation apply to hazardous waste management:	Excellent		Very Good		Good		Fair		Poor		Don't Know	
	B.C.	Ont	B.C.	Ont	B.C.	Ont	B.C.	Ont	B.C.	Ont	B.C.	Ont
Waste Management Act	0 (0.0%)		6 (16.7%)		15 (41.7%)		3 (8.3%)		4 (11.1%)		8 (22.2%)	
Waste Management Regulation	0 (0.0%)		10 (27.8%)		8 (22.2%)		9 (25.0%)		3 (8.3%)		6 (16.7%)	
Special Waste Regulation (not in force)	0 (0.0%)		1 (2.8%)		6 (16.7%)		3 (8.3%)		2 (5.6%)		24 (66.7%)	
Transport of Dangerous Goods Act	0 (0.0%)		3 (8.3%)		13 (36.1%)		7 (19.4%)		1 (2.8%)		12 (33.3%)	
Environment Management Act	0 (0.0%)		2 (5.6%)		7 (19.4%)		9 (25.0%)		0 (0.0%)		18 (50.0%)	
Environmental Protection Act (Part V, Waste Management)		5 (8.1%)		14 (22.6%)		26 (41.9%)		5 (8.1%)		2 (3.2%)		10 (16.1%)
Waste Management - General Regulation 309		4 (6.5%)		22 (35.5%)		18 (29.0%)		7 (11.3%)		1 (1.6%)		10 (16.1%)
Waste Management - PCBs Regulation		2 (3.2%)		20 (32.3%)		14 (22.6%)		8 (12.9%)		4 (6.5%)		14 (22.6%)
Spills Regulation		1 (1.6%)		11 (17.7%)		18 (29.0%)		11 (17.7%)		7 (11.3%)		14 (22.6%)
Environmental Assessment Act		0 (0.0%)		8 (12.9%)		13 (21.0%)		6 (9.7%)		7 (11.3%)		28 (45.2%)
Dangerous Goods Transportation Act		2 (3.2%)		18 (29.0%)		22 (35.5%)		5 (8.1%)		3 (4.8%)		12 (19.4%)
Ontario Water Resources Act		0 (0.0%)		11 (17.7%)		21 (33.9%)		6 (9.7%)		4 (6.5%)		20 (32.3%)
Ontario Waste Management Corporation Act		2 (3.2%)		7 (11.3%)		10 (16.1%)		7 (11.3%)		9 (14.5%)		27 (43.5%)

Note: Number of respondents in British Columbia is 36
Number of respondents in Ontario is 62

- the Fisheries Act has little applicability in Ontario as evidenced by the 57% who responded 'don't know' compared with 25% in British Columbia. The coastal characteristics of British Columbia would account for most of this variation. Forty-two percent of British Columbia respondents rated the applicability of the Fisheries Act as 'good';
- Both the Transportation of Dangerous Good Act and Regulation were found to rate 'good' or better on the applicability scale by almost 80% of all private firms.
- Due to the large number of respondents answering 'don't know', the fact that hazardous waste management is primarily a provincial matter is quite evident.

Private industrial sector responses for British Columbia (shaded area) and Ontario, concerning the applicability of provincial statutes, are displayed on Table 5.13. In British Columbia the validity of the information may pose a problem due to the high number of respondents who marked 'don't know', especially for the Waste Management Act and Waste Management Regulation. These two statutes are pivotal in directing the province's waste management activities, therefore one would assume that companies would be quite familiar with these statutes. The following possibilities may explain the 'don't know' responses:

- respondents may have misunderstood the purpose of this question;
- respondents have answered the question truthfully and, in fact, are not familiar with these important statutes;
- respondents may be reluctant to provide their honest opinion and use the 'don't know, category as an 'escape route'.

The high percentage of respondents who 'don't know, about the applicability of the Special Waste Regulation is understandable because this statute was only in the draft stage at the time the questionnaire was distributed. The Transportation of Dangerous Goods Act had only been in force for two years at the time this study was conducted and was basically in its infant stage with respect to the Ministry of Environment enforcing the regulations under it. This is reflected in the 33% 'don't know' response. Only 50% offered an opinion of the Environment Management Act which is not surprising as the only reference to waste in this statute is in the case of an emergency spill and the powers of the Environment Minister. The majority of those who provided an opinion on provincial legislation and regulation stated 'fair' or 'good' on the applicability scale.

Similar to respondents in British Columbia, a high percentage in Ontario marked 'don't know' for the key waste management statutes particularly the Environmental Protection Act (EPA) and three regulations under it. The same possibilities as British Columbia for the 'don't know' response are also valid for Ontario. The following are summary points of the Ontario half of Table 5.12:

- the EPA, Part V Waste Management was rated 'good' or better by 87% of those who are familiar with it;
- with the exception of the Spills Regulation, the other two regulations rated similar to the EPA;
- a high percentage of respondents 'don't know' about the applicability of the Environmental Assessment Act (EA Act) primarily because private firms have rarely been designated to comply with the requirements of the EA Act;

- the Dangerous Goods Transportation Act and the Ontario Water Resources Act (OWRA) are similarly rated between 'fair' and 'very good' with the OWRA receiving more 'don't know' responses;
- the Ontario Waste Management Corporation Act received a full range of opinions including a large number of 'don't know' responses signifying the private industrial sector unfamiliarity with this Act.

5.2.3 Additional Comments from Environmental Non Government Organizations

The last section of the questionnaire distributed to ENGOs only invited them to comment on selected topics specific to their province. Their comments are discussed in the following two sections.

5.2.3.1 British Columbia

A) Provincial adoption of the federal manifest system (TDGA)

The province adopted the federal Transportation of Dangerous Goods Regulation in July of 1985 for the purpose of tracking intraprovincial movements of special waste. The British Columbia Public Interest Research Group (BCPIRG) stated that this was a "step in the right direction" however another organization commented that the program was "understaffed".

During the first year of the manifest program little progress was evident. In July of 1986, one person had been assigned the task of inputting manifest data into a recently developed computer program. Although numbers were not available, very few manifests were being received.[22]

B) Regional special waste storage facility system

In 1986, eight regional special waste storage sites were operated in each of the Ministry's regional centres; Nanaimo, Victoria, Penticton, Prince George, Kamloops, Surrey, Nelson and Smithers. This program was the first of its kind in Canada when it started in 1978.

Surprisingly, ENGOs comments were quite negative towards the program. BCPIRG knocked the program because it is "so disposal focused" and does not encourage reducing the volume of hazardous waste that enters the municipal waste stream. Beverly Pinnegar stated that "Greenpeace is opposed to regional facilities because economically it would mean the necessity of importing U.S. waste to keep it (program) profitable." Another organization summarized the program as "inadequate."

C) Waste Management Act Regulation (Effective?)

This draft Regulation, focusing on special wastes, received wide distribution before being withdrawn by the Ministry in early 1986. ENGOs were extremely critical of the regulation with Beverly Pinnegar stating "Absolutely not - enforcement provisions hopelessly inadequate." Also, BCPIRG suggested

that the "regulations do not support any management (option) other than disposal by incineration and storage in special landfills."

D) Genstar/IT Corporation's withdrawal from a treatment and disposal network

In 1985, Genstar/IT Corporation withdrew its proposal to design, own and operate a treatment and disposal network for hazardous waste. This consortium concluded that British Columbia generated insufficient quantities of waste to justify a project of this nature. This decision was a serious setback for the provincial government whose four year program to reach this stage was severely criticized by ENGOs.

Michael Doherty of the Sierra Club of Western Canada found Genstar/IT Corporation's decision to be a "wonderful surprise which left the provincial government with their pants around their ankles." BCPIRG warned that the "government does not have the trust of the people - they do not believe MOE will monitor or enforce" however, if government does follow its own regulations "companies may find it cheaper to dump illegally."

Beverly Pinnegar was critical of the consortium as "they were in it for profit and tied to Chemical Waste Management in the U.S., with known organized crime connections and very, very dirty operations." Cathy Walker of B.C. Council of the Confederation of Canadian Unions was "glad they withdrew. There should be public consultation before any treatment and disposal facility is allowed to proceed so that a hazardous waste strategy similar to Ontario or Manitoba is developed."

5.2.3.2 Ontario

A) Environmental Protection Act Part IX ("Spills Bill")

This controversial statute was proclaimed in December 1985 after first being passed in 1980. During the five year period, the Spills Bill lay dormant for a long time before being resurrected by the new Liberal government and subsequently altered. The proclaimed version has been well received many by ENGOs. The following list of comments support this notion as well as providing their ideas for further improvements:

- "An improvement, a good piece of legislation;"
- "Good", "Support;"
- "A great improvement - still loopholes," Fran Sainbury, Preserve Our Water Resources;
- "More public education needs to be provided to explain the significance of the Spills Bill," Leslie Daniels;
- "It is doubtful that anyone (other than some industries) is not pleased with having the Spills Bill in place finally. However there are some sections and areas, as pointed out by CELA (Canadian Environmental Law Association) and Pollution Probe, that require improvement and further strengthening;"
- "Much needed legislation but enforcement of legislation more important than legislation itself," Milton Environmental Advisory Group;
- "Good piece of legislation. Worked hard to get - still needs to be tougher on enforcement;"

Not all ENGOs are as pleased. One ENGO representative states that "it is unconstitutional and holds people guilty until they prove their innocence." Lillian Tomen of Citizens Rebelling Against Waste is worried that there has not been "enough research done on the regulations (e.g. impact on farmers)." One member of an ENGO is concerned about firms taking advantage of, or looking for, "loopholes for technicalities - is it a product or is it a waste?" Similar to other government statutes, a member of the West Lincoln Citizens Against Landfill feels it is good "if it is adhered (enforced) to by MOE."

B) Regulation 309

Regulation 309 is the main statute governing hazardous waste management in the province and considered "a step in the right direction" by Fran Sainsbury of Preserve Our Water Resources. However, one organization feels Regulation 309 "needs major improvements to better regulate waste management."

Several ENGOs found interpreting Regulation 309 to be difficult at times and Leslie Daniels believes "explanations should be required." This could be achieved through an interpretation manual including examples of how parts of the regulation have actually been applied. At the very least MOE could prepare a brochure explaining Regulation 309 similar to the way they handled the Environmental Assessment Act in a "Citizens' Guide to Environmental Assessment."

Looking at the long term use of this regulation, Barry Randall of the Guelph Environmental Council believes it "requires refinement and compulsory use of sophisticated computer listing of inputs/outputs of products/waste and reduction/

recycling opportunities with active research into these real alternatives." According to MOE, improving the use of computers associated with generator registration, waste registration, carrier registration, etc. is taking place already.

C) Manifest system

As part of the comprehensive changes to Regulation 309, the manifest system (formerly known as the waybill system) underwent a number of modifications to provide procedures for improved waste tracking. Details of the changes under the amended regulation are provided in Chapter 3.0.

The changes have received a lukewarm reception from most ENGOs. In general, they are quick to acknowledge that it is definitely improved over the waybill system, however they are still skeptical of how MOE will hold up to their monitoring and enforcement commitments. This skepticism is further exemplified by the following comments:

- "Ineffective," Leslie Daniels;
- "An improvement over waybill system but still can be improved by tracking waste that does not leave a site;"
- "Great idea, administration of it is the pits," Lillian Tomen and Diane Jacobs, Citizens Rebelling Against Waste;
- "Generally positive; still does not address unlicensed haulers or the issue of co-disposal of semi-solid waste into landfills," Barry Randall, Guelph Environmental Council;
- "Good if properly enforced;"
- "A generally good tracking system for hazardous material. The problem arises when disposal occurs - they treat what-

ever the code stands for - testing is not done on every transport;"

- "To easy to elude. Depends on honest compliance," Leeds County Conserver Society;
- "Will work if maintained properly," Fran Sainsbury, Preserve Our Water Resources;
- "A good system providing it is used as it was intended," West Lincoln Citizens Against Landfill.

D) Municipal - Industrial Strategy for Abatement (MISA)

In June 1986, Ontario's Municipal-Industrial Strategy for Abatement had its beginning by outlining a program to clean up the province's waterways. By the end of 1989, MISA will affect about 200 direct dischargers and almost 12,000 other Ontario industries (indirect dischargers) discharging into 400 municipal sewer systems. For each of the eight industrial sectors, two regulations are being developed: monitoring and effluent limits. Municipalities will be handled in a similar manner.

ENGOs have greeted this strategy very positively, however they are skeptical of MOE's commitment to monitor and enforce the regulations. The following comments highlight this uncertainty:

- "More public education required for support and use," Leslie Daniels;
- "Has possibility," "Support;"
- "MISA is an encouraging step forward; it requires further work and clarification, "Al Olesuik, Canadians for a Clean Environment;
- "Good-some specific weaknesses - i.e. what about waste

flushed out of trucks into parking lots and into storm sewers?"

- "Should be extended to include non point source discharges and municipal services; not just those discharging into natural watercourses," Barry Randall, Guelph Environmental Council;
- "Remains to be seen," Margherita Howe, Operation Clean Niagara;
- "Good system-if monitored," Fran Sainsbury, Preserve Our Water Resources;
- "Needs to take into consideration these discharges not on line to a sewage treatment plant;"
- "Very weak if it is not addressed to by MOE," West Lincoln Citizens Against Landfill.

MISA is a unique initiative in Canada and one that is being watched closely by other provinces. Perhaps more unique is the fact that the cost burden of MISA will be borne mostly by industry. To identify the potential consequences, a number of studies are being carried out to assess the potential costs and economic disruption of industries.

E) Other Comments

Several ENGOs addressed additional topics on the questionnaire. According to Barry Randall of Guelph Environmental Council, "municipal sewer bylaws need more power and have some relationship to provincial regulatory bodies." The MISA program touches on this aspect by regulating discharges from municipal sewage treatment plants, however the program is currently weak with respect to dealing with dischargers to the sewer.

The importance of intervenor funding was highlighted by one organization. "If the public is to participate in environmental issues (e.g. hearings, waste management seminars, etc.) then there should be some provisions (funding) made to interested parties." Currently, intervenor funding is often difficult to obtain from MOE and is generally only associated with hearings.

A representative of the Milton Environmental Advisory Group suggests there is a "need to increase the consciousness of the general public at the domestic level through (household hazardous waste) recycling schemes. This will increase pressure for more industrial recycling." Unlike British Columbia who have eight special waste disposal facilities, Ontario currently relies mainly on designated household hazardous waste days for residents to dispose of their hazardous materials. Educating the public on hazardous waste management, whether it is through increased recycling or not, will definitely result in the public becoming more fully aware of unacceptable industrial practices.

Perhaps the most appropriate comment to summarize the situation in Ontario and Canada is one by Al Olesuik of Canadians for a Clean Environment; "only recently has the political will developed in this province/country, to deal with these (hazardous waste) issues. We are a short way on a long road to repairing the damage already done. Education on all levels is more vital now than ever."

5.3 Statistical Analysis: Testing the Hypotheses

Two hypotheses concerning the responses of ENGOs and the private industrial sector were identified in Chapter 4.0. To test these hypotheses, a non parametric significance test, the Mann-Whitney U test, was applied to the data.

The Mann-Whitney U test[23] (also known as the Wilcoxon Test) is a test of significance of a difference between the medians of two samples. It is a nonparametric test, therefore it is not restricted by any assumptions about the nature of the populations from which the groups have been sampled. The null hypothesis is that the two samples are taken from a common population, so that there should be no consistent difference between the two sets of data. SPSSx, a statistical software package for managing, analyzing and displaying information, was used for this study. Under procedure NPAR TESTS (nonparametric), SPSSx can engage subcommand M-W (Mann-Whitney), for two independent samples on one variable.[24]

Only the independent variables that resulted in statistically significant differences are discussed below for the two hypotheses. The following points have been taken into consideration for hypothesis testing:

- the hypotheses listed below are the alternative hypotheses;
- a hypothesis of no difference (i.e. null hypotheses or H_o) is actually tested;
- the two hypotheses actually represent a group of hypotheses, that is one for each independent variable tested. This 'grouped' hypothesis approach was used to avoid the repetition associated with having to state each individual hypothesis;

- the Mann-Whitney test statistic is calculated for each independent variable;
- a significance level of 0.05 has been selected for all critical values;
- critical value tables are used to reject the null hypotheses: reject H_o if calculated value of U (Mann-Whitney) is less than or equal to critical value at 0.05 significance level.

(1) It is hypothesized that, the perceptions and attitudes of ENGOs towards federal and provincial government involvement in hazardous waste management will be significantly different between the two provinces.

The Mann-Whitney U test was used to compare ENGO responses between British Columbia and Ontario (Appendix F) for twenty-three independent variables under three categories; federal government, provincial government and perceived effectiveness of hazardous waste legislation/regulation.

There were no significant differences in the perceptions of federal government involvement in hazardous waste management between the two provinces. This result is not surprising because of the advisory role the federal government has in hazardous waste management compared with the regulatory role held by the provincial government. Supporting this fact are the significant differences between the two provinces concerning provincial government involvement for these three variables:

- PG4: the legislation/regulation reflects an understanding of your group's concerns?;

- PG5: the enforcement reflects and understanding of your group's concerns?;
- PG6: your group has had an impact on a local issue?

The variation in all three variables is associated with British Columbia ENGOs negative perception compared with a varying perception (from 'strong disagreement' to 'strong agreement') held by their counterparts in Ontario (refer to Table 5.8). Differences are evident in the other four variables, however none are significant at the 0.05 significance level.

Only one of nine independent variables under the category of perceived effectiveness of hazardous waste legislation/ regulation resulted in significant differences:

- PE4: Existing hazardous waste legislation/regulation does not adequately protect the environment.

Once again the variation is a result of British Columbia ENGOs responding identically to the variable ('strong agreement') as opposed to Ontario ENGOs who perceive the effectiveness more positively.

In summary, four of the twenty-three variables provided results that were significantly different using the Mann-Whitney U test, therefore the null hypothesis (i.e. no difference) is rejected for these four variables only and the alternative hypothesis can not be rejected. The significant differences in variables PG4 and PG5 illustrate a provincial government in Ontario that better reflects ENGOs concerns through legislation, regulation and enforcement. In British Columbia, it would appear that little consensus is ever

reached between ENGOs and the provincial government. This is further supported by the significant differences in PG6 where Ontario ENGOs have had an impact on legislation signifying the willingness of the provincial government to involve the public and include their decisions. Variable PE4 serves somewhat as a summary to the other three variables as it captures the ENGOs perceived effectiveness of existing legislation/ regulation. Evidence supports a more favourable view of the existing situation in Ontario.

(2) It is hypothesized that, the perceptions and attitudes of the private industrial sector towards federal and provincial government involvement in hazardous waste management will be significantly different between the two provinces.

The Mann-Whitney U Test was used to compare private industrial sector responses from British Columbia and Ontario (Appendix G) for twenty-seven independent variables under four categories; federal government, provincial government, perceived effectiveness of hazardous waste legislation/ regulation and federal statutes.

There were no significant differences between either province for the first three categories. Under the fourth category, one independent variable resulted in significant differences:

- TDGA: Transportation of Dangerous Goods Act (manifest)

The variation is associated with Ontario firms rating the applicability of this statute much higher than their counterparts in British Columbia (refer to Table 5.12). Over 11% of the respondents from Ontario rated the Transportation

of Dangerous Goods Act as 'excellent'. This difference is probably associated with Ontario firms having to meet the requirements of the Act more often than firms in British Columbia due to the amount of waste that is shipped interprovincially and internationally from Ontario. In summary, except for variable TDGA, the null hypothesis that there are no significant differences in the perceptions and attitudes between the two provinces can not be rejected.

5.4 Summary of Findings (Objective 3)

Characteristics and activities of ENGO respondents from British Columbia and Ontario show many similar attributes. Private sector respondents reported almost identical characteristics and activities between both provinces even though there is quite a difference in industrial activity. For example, a large number of respondents from British Columbia were industrially categorized as pulp and paper, while in Ontario chemical and heavy manufacturing were the dominant industrial categories.

Similarities and differences in responses between British Columbia and Ontario for both groups have been discussed (section 5.2) and statistically tested (section 5.3). The Mann-Whitney U test suggested that only 5 independent variables out of 50 (both groups) have statistically significant differences. Four out of 5 independent variables that showed significant differences belonged to ENGOs.

Although there are notable differences in government involvement between British Columbia and Ontario, as a whole the private industrial sector would appear to conduct

"business as usual" regardless of external influences. As with any group, anomalies are also evident within the questionnaire respondents, however these companies were few in number and did not affect the results. In summary, the inputs, perceptions and attitudes of the private industrial sector towards: legislation, regulation and policy; corporate responsibilities; and activities of government departments, between British Columbia and Ontario, suggest a similar interpretation and understanding although two different government regimes are in power.

Statistical tests on ENGO questionnaire respondents identified 4 independent variables that were significantly different. Three of the 4 independent variables are directly related to provincial government involvement while the fourth simply refers to government. As a result of the Government of British Columbia's inability to provide any substantial and enforceable hazardous waste regulations, the majority of ENGOs have taken an extremely negative attitude towards government involvement. This negative attitude is not shared with Ontario as organizations there have a varying opinion on provincial government initiatives. In summary, inputs, perceptions and attitudes of ENGOs show similarities for citizen responsibilities however differences occur for: provincial legislation, regulation and policy; and the activities of government departments (predominately at the provincial level) between British Columbia and Ontario.

6.0 CONCLUSIONS AND DIRECTIONS

Government involvement in hazardous waste management and control of hazardous wastes in general has become a focus of major public (e.g. ENGOs) and private (e.g. firms) concern in Canada in recent years. The mismanagement of hazardous wastes, both past and present, is clearly evident as well as the potential for considerable degradation of the environment and human health.

In response to the concern, federal and provincial governments have tabled new legislation and regulations, revised old ones, established new programs and task forces, as well as other administrative undertakings. Unfortunately, the response has not been smooth, as suggested by Castrilli (1982), Jackson, Weller & WPIRG (1982) and Franson (1982), as new government legislation and policy initiatives have often been hampered in a number of ways including:

- narrow readings of constitutional authority, particularly with federal government initiatives;
- competing socioeconomic concerns (e.g. jobs vs the environment) such as ignoring existing regulations for the perceived benefits of a community;
- inadequate, conflicting or unenforceable scientific criteria for regulation development such as what happened to the British Columbia Special Wastes Regulation;
- a legacy of public and private mistrust including lack of cooperation, prolonged and/or needless hearing and court appearances and insufficient fines;
- inconsistent treatment and application of existing regulations and policies.

It is clear from this analysis and supported through the literature review that the role of government in environmental risk management and, in particular, hazardous waste management, is one that requires much needed improvement in the areas of developing effective legislation and regulation, enforcing the regulations, and defining clear goals, objectives and policies. Generally ENGOs have a much more negative view towards government involvement and related accomplishments compared to the private industrial sector. However, individual comments from several ENGOs in Ontario indicate that the provincial government is making some headway through recent hazardous waste management initiatives such as the Municipal-Industrial Strategy for Abatement (MISA).

Similar to the findings of Castrilli (1982), ENGO respondents have pointed out critical gaps and inconsistencies in government legislation and policy development. These have ranged from specific points such as disposal oriented regulations, lack of recycling/recovery requirements, and the need for sophisticated computer listings to broad points including an overall need for greater public education and involvement, and improved government administration and communication skills.

Industry itself would appear to be either quite concerned or ambivalent about potential burdens associated with existing, new or prospective regulatory initiatives in hazardous waste management. Governments must ensure uniform treatment of regulations and policies directed at the private industrial sector to guarantee that no company, or an industrial category, gains a competitive advantage as a result of not having to comply with stated requirements and standards. Governments must carefully determine if companies placed at a

competitive disadvantage warrant any financial or other incentives to remain competitive. A company that has been competitive in the past, due in part to ignoring environmental considerations, should not be able to acquire any government assistance without a full investigation into its previous practices to ascertain the full extent of existing environmental damage.

The major hazardous waste management issues and concerns of both groups appear to be similar across jurisdictions. Significant differences in perception and attitudinal variables exist for only 4 of twenty-three variables for ENGOs and only 1 of twenty-seven variables for the private industrial sector. Consequently the statistical investigation of this study suggests that public and private perceptions and attitudes towards government involvement in hazardous waste management does not vary under different political and regulatory regimes. However, the 'perception of risk' among ENGOs for hazardous waste management initiatives (e.g. monitoring, enforcement, remedial action, new facilities, etc.) continues to increase as more 'risks' are now being associated with, or attributed to, hazardous wastes.

During the course of this study, a number of actions or directions that either complement existing government, ENGO or private initiatives, or suggest new ones, became evident. The following nine directions or recommendations represent the final conclusions and summary of this study.

1. Public information on government monitoring programs must be greatly increased and documented using an appropriate mix of technical and non-technical information. In ad-

dition, these reports must go beyond just reporting numbers and should include meaningful interpretation of the enforcement approaches used and the current state of the environment.

2. Government reporting requirements, especially concerning violators, must be stepped up and made more consistent and credible. This will allow for a quicker passage of information between government and public concerning corporate polluters which may serve as a deterrent if public reaction is quick and directed.

3. More financial and personnel resources must be provided at both the federal and provincial levels, predominately in environment ministries/departments, to assist with hazardous waste management initiatives.

4. Governments must ensure consistent treatment of all hazardous waste/environment related legislation, regulations and policies to remain fully credible and accountable. This includes consistent and documented treatment of environmental risk management options: direct regulation (enforecment/prosecution); self regulation (bargaining/self-management); and permits and approvals.

5. Public participation must be provided at all stages in policy making or project development, from concept to approval.

6. Acknowledging the public's 'perception of risk' with hazardous wastes is essential. This will greatly assist in establishing appropriate areas to be studied which will ensure that public concern is fully addressed. Citizens that are informed and confident in the project development process should provide less resistance to a proposed undertaking.

7. Clearly established goals and objectives must accompany all public participation efforts and, just as important, goals and objectives must be observed to ensure that the "project" does not become delayed for unduly reasons.

8. Government awards or achievements should be publicly awarded to private industrial companies who 'pass a test' associated with being a good corporate neighbour for environmental reasons in a community.

9. A greater need and understanding is required to determine the appropriate mix of economic development and environmental protection, often referred to as economically and environmentally sustained development.

APPENDIX "A"

CASE EXAMPLES OF GLOBAL CHEMICAL CONTAMINATION

1. Unexpected Consequences of Hazardous Waste Disposal (Mercury Poisonings; Minamata Bay, Japan)

In 1953, large scale poisonings of humans who ate fish contaminated with methlmercury occurred in Japan at Minamata Bay. For years, Chisso, an industrial chemical and fertilizer company was responsible for dumping inorganic mercury compounds into the Bay which were converted to alkyl compounds by anaerobic bacteria (Kruus and Valeriote, 1984). Through bioaccumulation, fish flesh attained high levels of mercury. About 700 cases of human poisoning were recorded along with a 38% mortality rate. Many children born to infected mothers were reported as having brain damage, manifested as mental retardation, spasticity, chronic seizures and blindness. Follow-up studies from 1955-1959 showed that 6% of the children in one area developed cerebral palsy (Kurzel and Cetrulo, 1981).

2. Accidental Release of Chemical Substances, (Dioxin Release; Seveso, Italy)

On Saturday, July 10, 1976, a safety disc in a reactor ruptured at the ICMESA (Industrie Chimice Meda Societa Anonyma) plant in Seveso, Italy. The plant was responsible for the production of disinfectants, herbicides and wood preservatives. The cloud of poisonous gas released in the explosion included sodium hydroxide, trichlorophenol and an estimated 0.5 to 5.0 kilograms of dioxin, commonly known as TCDD (2,3,7,8-tetrachlorodibenzo-para-dioxin). The town was evacuated leaving behind many dead or dying animals. Many people experienced headaches, nausea and skin irritations with the worst infected developing a disfiguring rash called chloracne. Fortunately, no lives were lost (Dagani, 1981).

During the ten years following the accident at Seveso, 300,000 people living downwind from the plant were given regular checkups. Tumor development has also been monitored through a cancer registry. United States and Italian scientists conducted one of the first studies of the effects of dioxin on children during this same period. Of the 1,500 children studied, only those exposed to the highest concentrations of TCDD have slight abnormalities in liver function and fat metabolism, however these symptoms

disappeared over time. "While we can say that in children of Seveso the acute phase of intoxication by TCDD passed with no appreciable consequences, it remains to be established whether over a longer period of time there will be a higher incidence of tumors," the scientists wrote in the Journal of the American Medical Association (The London Free Press, 1986).

3. Improper Disposal of Hazardous Waste, (Love Canal; Niagara Falls, New York, U.S.A)

Niagara Falls, on the United States side of the border, is the home of one of the largest U.S. chemical manufacturers, the Hooker Chemical and Plastics Corporation. It is also the home of the Love Canal, a chemical dump site owned by Hooker until it was sold to the Board of Education and the City of Niagara Falls in 1953. The canal is a sixteen acre landfill and spans a large residential community of approximately one thousand small, closely knit single-family homes. An elementary school was built on the actual canal site:

> On August 2, 1978 in an unprecedented move, New York state officials ordered the emergency evacuation of 240 families living within two blocks of an old abandoned canal, the Love Canal...Dangerous concentrations of highly toxic and carcinogenic chemicals had been discovered oozing from the canal. Headlines throughout the nation declared the Love Canal the largest manmade environmental disaster in decades (Epstein, Brown and Pope, 1982: 89).

What emerged in the short period that followed the evacuation was the history of the use of the canal by Hooker including its chemical contents; the sale of the land and the lack of knowledge of what lay beneath the parcel; and finally the years of frustration exhibited by the area residents in dealing with the company and government officials before the evacuation.

More important to many residents were the numerous surveys and tests done which determined increased numbers of miscarriages, deformities at birth and severe nervous disorders among adults all thought to be related in some way to the contents of the canal. As a result of this mishap, the Love Canal became a focal point for comparative purposes concerning the safe disposal of hazardous wastes (Freudenberg, 1984; Epstein, Brown and Pope, 1982).

4. Negligence, (Dioxin Contamination; Times Beach, Missouri, U.S.A.)

Just before Christmas, 1982, marks the time when a complete evacuation of Times Beach, Missouri was ordered. The residents had been advised that their town was drenched in dioxin with the source being traced back to the early 1970s. The town had hired for a couple of summers a person to spread oil on ten miles of unpaved streets; oil which contained dioxin because the oilman also filled his truck with waste sludge from a downstate chemical factory.

The United States Environmental Protection Agency (EPA) agreed to pay off all homeowners between $8,800 and $98,000 apiece and allowed the town to die. It is unsure what future implications will arise for those who had daily exposure to dioxin, some for the full ten years. What has materialized to date is a list of miscarriages, one lung removal, a woman dying during childbirth and one little girl developing stomach and bladder problems (Anderson, 1985, Time).

5. Accidental Release of Intermediary Chemicals (Methyl Isocyanate Release; Bhopal, India)

The world's worst industrial accident occurred in Bhopal, India on December 3, 1984. For close to an hour, gas leaked from an underground tank containing 45 tons (41 tonnes) of methyl isocyanate, a deadly chemical used to make pesticides. The vast, dense cloud of gas drifted towards the city of Bhopal, killing on its way more than 2,500 people before it finally dispersed. A total of 150,000 people were treated at nearby hospitals and clinics.

The underground tank belonged to Union Carbide, a large United States corporation with factories in 38 countries and products sold in more than 130 nations. The incident sparked new and old concerns from the safety of other Union Carbide plants to the reduced safety laws found in many third world countries. As a result, the accident at Bhopal became a global worry (Iyer, 1984).

APPENDIX "B"

STATISTICAL DATA FOR BRITISH COLUMBIA AND ONTARIO

	British Columbia			Ontario		
Population (1986)	2,926,000		**Population (1986)**	9,273,000	
Density	3 persons/square kilometre		**Density**	21 persons/square kilometre	
Distribution	78% urban, 22% rural		**Distribution**	82% urban, 18% rural	
Largest Cities and Towns	Vancouver	431,147	**Largest Cities and Towns**	Toronto	612,289
	Prince George	67,621		North York	556,297
	Victoria	66,303		Scarborough	484,676
	Kamloops	61,773		Mississauga	374,005
	Kelowna	61,213		Hamilton	306,728
	Nanaimo	49,029		Etobicoke	302,973
Gross Domestic Product (1985)	$54 billion		**Gross Domestic Product (1985)**	$184.3 billion	
Per Capita Income	$18,665.00		**Per Capita Income**	$20,183.00	
Employment Distribution (1986)	services	35%	**Employment Distribution (1986)**	services	31%
	trade	19%		manufacturing	22%
	manufacturing	12%		trade	17%
	transportation, communication, & utilities	9%		transportation, communication, & utilities	7%
	government	7%		government	6%
	finance	7%		finance	6%
	construction	5%		construction	5%
	primary indust.	4%		agriculture	3%
	agriculture	2%		primary indust.	1%
Total Area	947,800 square kilometres		**Total Area**	1,068,580 square kilometres	
Land Area	929,730 square kilometres		**Land Area**	891,190 square kilometres	
Forested Land	663,000 square kilometres		**Forested Area**	807,000 square kilometres	

(Sources: Compiled from Filion, 1987, The Canadian World Almanac & Book of Facts)

APPENDIX "C"

INTERVIEWS IN PERSON

British Columbia:

- Ministry of the Environment (Waste Management Branch, Victoria)
  - Lanny Hubbard, Head Environmental Safety Program
  - Kelvin Hicke, Spill Response Officer
  - John Ward, Toxicology Officer
  - K. Ali Keshvani, Special Projects Officer July 28,29, 1986
- Ministry of the Environment (Conservation Officer Service, Vancouver)
  - Mark Hayden, Conservation Officer July 31, 1986
- Environment Canada (Environment Protection Service, West Vancouver)
  - Ken Wile, Program Officer July 31, 1986
- Canada Tungsten Mining Corporation Ltd.
  - Rick Killam, Environmental Affairs July 25, 1986
- West Coast Environmental Law Association
  - Bill Andrew, Director July 25, 1986

Ontario:

- Ministry of the Environment (Environmental Approvals and Project Engineering Branch, Toronto)
  - Lawrence Wilcox, Senior Approvals Engineer June 16, 1986
- Ministry of the Environment (Southwestern Region, London)
  - John Manuel, District Officer August 19, 1986
- Ministry of the Environment (Southwestern Region, Sarnia)
  - Dan Gaudenzi, Waste Management Engineer August 21, 1986
  - John Scarterfield, Investigator August 21, 1986
- Canadian Environmental Law Association
  - Frank Giorini, Researcher May 22, 1986
- Pollution Probe
  - Kai Millyard, Researcher May 21, 1986
- Ontario Environment Network
  - Kirk Roberts, Coordinator May 21, 1986
- Polysar Ltd.
  - C.J. (Bud) West, Manager, Technical & Environmental Services June 17, 1987

Conferences Attended:

- Negotiation as a Technique for Conflict Resolution; April, 1986, Montreal, Quebec
- Canadian Association of Chemical Engineers; June, 1986, Sarnia, Ontario
- Protecting Both Jobs and the Environment; November, 1986, Hamilton, Ontario
- Ontario Ministry of the Environment Technology Transfer December, 1986 Toronto, Ontario
- Hazardous Materials Conference and Exhibition; September, 1987, Toronto, Ontario

APPENDIX "D"

RESEARCH SOURCES

Alberta Environment
Alberta Hazardous Waste Management Corporation
British Columbia Ministry of the Environment
British Columbia Public Interest Research Group
Canadian Environmental Law Association (Ontario)
Environment Canada (British Columbia and Ontario)
Environment Quebec
Manitoba Department of the Environment and Workplace Safety and Health
Manitoba Hazardous Waste Management Corporation
Ontario Environment Network
Ontario Ministry of the Environment
Ontario Waste Management Corporation
Pollution Probe (Ontario)
Proctor & Redfern Group (Ontario)
Saskatchewan Department of the Environment and Public Health and Safety
Waterloo Public Interest Research Group
West Coast Environment Law Association (British Columbia)

APPENDIX "E"

QUESTIONNAIRE SURVEY

1) Environmental Non Government Organization Questionnaire

2) Private Industrial Sector Questionnaire

1) ENVIRONMENTAL NON GOVERNMENT ORGANIZATION QUESTIONNAIRE

RESPONSE TO REGULATIONS: HAZARDOUS WASTE MANAGEMENT QUESTIONNAIRE

Introduction

This questionnaire has been designed to get help from environmental interest groups on the important subject of hazardous waste management. It will become one chapter of my graduate thesis which I am completing in the geography department at McGill University in Montreal, Quebec.

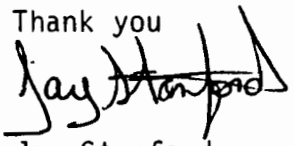
I would like to know about your group's activities concerning hazardous waste related matters, your response to hazardous waste legislation/regulation, what results you have achieved, and your opinions on past and present issues.

I appreciate that you are volunteering your time and so have designed the questions to be simple and quick to answer. Your response will be a great addition to my research and I would like to thank you in advance for your time and consideration in this matter.

A copy of the questionnaire results will be made available for those who are interested. Please see SECTION D for details. If you have any questions about my research, please write or call. Your personal interest and support will be very rewarding for myself.

If possible could you complete the questionnaire by January 27, 1987, and place it in the self-addressed stamped envelope.

Thank you



Jay Stanford
961 Wonderland Road South
Apt. #806
London, Ontario
N6K 2X9
(519) 473-4815

General Instructions

The questionnaire is divided into four sections. Questions should be answered on the sheet, either by circling the appropriate response or by filling in a space with numbers, percentages or comments. Additional sheets may be added if needed.

Please note that where a question asks for a numeric response (i.e. "How long has hazardous waste management been a major concern of your group?"), and you are unsure of the exact amount or value, a "best guess" marked with a question mark (?) is of much greater value to my research than a blank space.

RESPONSE TO REGULATIONS: HAZARDOUS WASTE MANAGEMENT QUESTIONNAIRE

Definitions

The following definitions apply to this questionnaire:

Hazardous waste management: is planning, regulating, monitoring and/or protection of the environment.

Legislation/regulation: refers to laws that govern hazardous waste management; (this includes existing laws or ones that are pending).

SECTION A

General Information

Groups obtained from published information or telephone inquiry. If any changes are to be made, please make them in the appropriate spaces.

Group name: _____

Address: _____

_____ Tel: (____) _____

Contact: _____

Group Information

To be completed by a group representative.

Contact (person who may be contacted if questions arise): _____

Tel: (____) _____ Year Group Formed: _____

Number of Members: _____ and/or Number of Member Groups: _____

Brief Description of Group's Primary Concern(s) (i.e. government legislation/regulation, industrial sector, local issue, multi issues, policy making, etc.):

Group's Activities

1) How long have hazardous waste management issues been a major concern of your group?

(number of years) ____

2) How many group members were involved on a full or part time basis with hazardous waste management issues? (part time refers to a member working for the group as a volunteer; full time refers to a group member working approximately eight hours a day, paid or unpaid.)

full time (number)		part time (number)	
this year	____ (1987)	this year	____ (1987)
last year	____	last year	____
5 years ago	____	5 years ago	____
10 years ago	____	10 years ago	____

If your group is involved with more than hazardous waste management issues, please skip to question 4.

3) In the past years roughly what percentage of group time was spent on each of the following?

	(percentage)
research	____%
monitoring	____%
administration	____%
public education/involvement	____%
policy formulation	____%
attending public hearings/information meetings	____%
other (specify under comment)	____%
TOTAL	100%

Comment:

4) In the past year roughly what percentage of group time belonged only to hazardous waste management issues? (total would represent some portion of all the group's activities)

TOTAL ____% can be broken down as follows:

	(percentage)
research	____%
monitoring	____%
administration	____%
public education/involvement	____%
policy formulation	____%
attending public hearings/information meetings	____%
other (specify under comment)	____%

Comment:

5) Please estimate numeric responses for each of the following hazardous waste management related activities.

In the past year, what has been the number of: (number)

- public hearings requested by your group? ____
- public hearings attended by your group? ____
- workshops/information meetings/conferences held by your group? ____
- workshops/information meetings/conferences attended by your group? ____
- protests staged by your group? ____
- negotiation/mediation meetings attended by your group? ____

Please describe other important activities of your group. Any supportive literature (newspaper articles, titles, reprints, publication lists, etc.) would be greatly appreciated.

SECTION C

Instructions

In this section you are asked to indicate the strength of your agreement or disagreement with a list of statements concerning hazardous waste management: 1 means strong agreement, 2 means general agreement, 3 means general disagreement, 4 means strong disagreement. If the question is not relevant (n/a) to your situation, please circle 9.

Response to Regulations

1) Communication with the provincial government

1.0 In the past 12 months, how many times has your group dealt with the provincial government (telephone, mail, face-to-face, etc.) with reference to hazardous waste legislation/regulation, studies, inquiries, etc.

(number)

initiated by your group ____

initiated by the government/crown corporation ____

Which provincial ministry(s) do you deal with the most?

Which provincial law(s) concern you the most?

Instructions: 1 strong agreement, 2 general agreement, 3 general disagreement
4 strong disagreement, 9 n/a. (Circle One)

Do you agree that :	agreement			disagreement	n/a
1.1 -the legislation is sufficient.	1	2	3	4	9
1.2 -the enforcement is sufficient.	1	2	3	4	9
1.3 -government personnel are helpful to your group.	1	2	3	4	9
1.4 -the legislation/regulation reflects an understanding of your group's concerns.	1	2	3	4	9
1.5 -the enforcement reflects an understanding of your group's concerns.	1	2	3	4	9
1.6 -your group has had an impact on the legislation.	1	2	3	4	9
1.7 -your group has had an impact on a local issue.	1	2	3	4	9

2) Communication with the federal government

2.0 In the past 12 months, how many times has your group dealt with the federal government (telephone, mail, face-to-face, etc.) with reference to hazardous waste legislation/regulation, studies, inquiries, etc.

(number)

initiated by your group ____

initiated by the government/crown corporation ____

Which federal ministry(s) do you deal with most?

Which federal law(s) concern you the most?

Do you agree that:	agreement			disagreement	n/a
2.1 -the legislation is sufficient.	1	2	3	4	9
2.2 -the enforcement is sufficient.	1	2	3	4	9
2.3 -government personnel are helpful to your group.	1	2	3	4	9
2.4 -the legislation/regulation reflects an understanding of your group's concerns.	1	2	3	4	9
2.5 -the enforcement reflects an understanding of your group's concerns.	1	2	3	4	9
2.6 -your group has had an impact on the legislation.	1	2	3	4	9
2.7 -your group has had an impact on a local issue.	1	2	3	4	9

3) Communication with other environmental interest groups

3.0 In the past 12 months, how many times has your group dealt with other environmental groups (telephone, mail, face-to-face, etc.) with reference to hazardous waste legislation/regulation, studies, inquiries, etc.

(✓) less than 5 ____, 5 to 10 ____, 11 to 49 ____, more than 50 ____.

Which group(s) do you deal with most often?

4) The following statements attempt to gauge the perceived effectiveness of hazardous waste legislation/regulation. As previously stated, 1 means strong agreement, 2 means general agreement, 3 means general disagreement, and 4 means strong disagreement.

Would you support the statements that:

		agreement		disagreement	
A:	Motivation for Compliance				
4.1	Hazardous waste legislation/regulation is necessary to ensure that companies protect the enviroment.	1	2	3	4
4.2	Governments should generally subsidize costs for hazardous waste planning, reduction, monitoring and protection.	1	2	3	4
4.3	The polluter must pay	1	2	3	4
B:	Enforcement				
4.4	Existing hazardous waste legislation/regulation does not adequately protect the environment.	1	2	3	4
4.5	Governments are not diligent enough when it comes to enforcement procedures.	1	2	3	4
4.6	Punishments are too low to have a significant impact.	1	2	3	4
C:	Conflict Resolution				
4.7	Calling for a public inquiry is the best forum to achieve results when dealing with government or the private sector.	1	2	3	4
4.8	The new techniques of negotiation and mediation should be used more often in hazardous waste management.	1	2	3	4
4.9	Public participation must be improved in hazardous waste management.	1	2	3	4

Comments:

SECTION D

Additional Comments

This section is for British Columbia environmental groups only. I would appreciate your comments on the following selected topics. If more room is needed, please use the back of the sheet or attach additional sheets.

A) Provincial adoption of the Federal Manifest System (TDGA)

B) Regional Special Waste Storage Facility System

C) Waste Management Act Regulation (Effective ___?___)

D) Genstar/IT Corporation's withdrawal from a treatment and disposal network

E) Other (please specify)

Thank you once again for completing this questionnaire. Please check (✓) the appropriate spaces below.

____ Yes, I would like a copy of the questionnaire results.

____ Yes, I give permission for my group's name to be used in the final report.

____ Yes, I give permission for the following personal name to be used in the final report.

Name: _____

SECTION D

Additional Comments

This section is for Ontario environmental groups only. I would appreciate your comments on the following selected topics. If more room is needed, please use the back of the sheet or attach additional sheets.

A) Environmental Protection Act Part IX (Spills Bill)

B) Regulation 309

C) Manifest System (6 copies)

D) Municipal-Industrial Strategy for Abatement (MISA)

E) Other (please specify)

Thank you once again for completing this questionnaire. Please check (✓) the appropriate spaces below.

____ Yes, I would like a copy of the questionnaire results.

____ Yes, I give permission for my group's name to be used in the final report.

____ Yes, I give permission for the following personal name to be used in the final report. Name: _____

2) PRIVATE INDUSTRIAL SECTOR QUESTIONNAIRE

RESPONSE TO REGULATIONS: HAZARDOUS WASTE MANAGEMENT QUESTIONNAIRE

March 17, 1987

Dear Questionnaire Recipient:

This questionnaire has been designed to get help from industry on the important subject of hazardous waste management and, more specifically, on your company's response to government legislation/regulation. This information will become one chapter of my graduate thesis which I am completing at McGill University in Montreal.

I would like to know about your company's activities concerning hazardous waste related matters, your response to hazardous waste legislation/regulation, what results your company has achieved and your opinion on past and present issues.

Please remember that your company's response to legislation/regulation is the focus of this questionnaire. If you come across any question that you feel may be offensive to your company, please cross it out and go on to the next. All responses will be handled confidentially.

Your response is of great importance to my research and I would like to thank you in advance for your time and consideration in this matter. A copy of the questionnaire results will be made available for those who are interested. Please see the last page for details. If you have any questions about my research, please write or call. Your personal interest and support will be very rewarding for myself.

If possible could you complete the questionnaire by April 24, 1987, and place it in the self-addressed stamped envelope.

Thank you,

Jay Stanford
961 Wonderland Road South
Apt. #806
London, Ontario
N6K 2X9
(519) 473-4815

General Instructions

The questionnaire is divided into four sections. Questions should be answered on the sheet, either by circling the appropriate response or by filling in a space with numbers, percentages or comments. Additional sheets may be added if needed.

Please note that where a question asks for a numeric response and you are unsure of the exact amount or value, a 'best guess' marked with a question mark (?) is of much greater value to my research than a blank space.

Definitions

The following definitions apply to this questionnaire:

Hazardous waste management: is planning, regulating, monitoring and/or protection of the environment from hazardous wastes.

Legislation/regulation refers to laws that govern hazardous waste management; (this includes existing laws, past laws or ones that are pending).

Hazardous waste: includes those wastes which are potentially hazardous to human health and/or the environment due to their nature and quantity, and require special disposal techniques. Seven basic categories of hazardous waste are: corrosive, toxic, reactive, ignitable, infectious, bioaccumulative, and carcinogenic, teratogenic or mutagenic.

- -

SECTION A

General Information

Companies obtained from published information or telephone inquiry. If any changes are to be made, please make them under Company Information.

Company Information

To be completed by the recipient of this questionnaire or by the person responsible for hazardous waste management affairs.

Contact (person who may be contacted if questions arise): _____

Title: _____ Tel: ( ) _____

Please circle the number corresponding with first, the total number of employees working for the company and, second, the number corresponding with the industrial sector to which your company (or division) belongs or is closely related to.

TOTAL NUMBER OF EMPLOYEES		INDUSTRIAL SECTOR	
under 25	1	Pulp and Paper	1
25 - 99	2	Petroleum Refineries	2
100 - 499	3	Chemical	3
500 - 999	4	Food Processing	4
over 1000	5	Mining	5
		Steel	6
		Heavy Manufacturing	7
		Other (specify) _____	

SECTION B

Company's Activities

1) Does your company use industrial processes that require the use of potentially hazardous materials?

(circle one)

Yes	1
No	2
Don't Know	9

2) Does your company use industrial processes that generate hazardous wastes?

(circle one)

Yes	1
No	2
Don't Know	9

3) In the past year roughly what percentage of employee time was spent on each of the following areas with reference only to hazardous waste related management issues? (This total will equal 100%; i.e. research 80%, government liaison 20%)

	(percentage)
research	____%
routine monitoring	____%
equipment maintenance	____%
administration	____%
public education/involvement	____%
attending public hearings/information meetings	____%
policy formulation	____%
government liaison	____%
other (specify under comment)	____%
	100%

Comment: _____

_____

4) Please estimate numeric responses for each of the following hazardous waste management related activities.

In the past year, what has been the number of:	(number)
- public hearings attended by your company?	____
- public hearings requested by your company?	____
- workshops/information meetings/conferences held by your company?	____
- workshops/information meetings/conferences attended by your company?	____
- negotiation/mediation meetings attended by your company?	____

5) Is your company a member of any associations (i.e. PACE, CCPA, etc.)? If yes, which ones?

_____

_____

SECTION C

Instructions

This section is divided into four parts: federal government, provincial government, municipal government and overall effectiveness of hazardous waste legislation/regulation. You are asked to write in the space provided the number from the rectangle that corresponds with your agreement or disagreement pertaining to the list of statements. Please note that although the first three parts contain similar statements, they do apply to the different levels of government and should be answered accordingly.

Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Not applicable
1	2	3	4	5	8

Response to Regulations

1) Federal Government

Do you agree that:

1.1 -the legislation/regulation is protecting the environment from hazardous wastes. ____

1.2 -the enforcement practises in use are protecting the environment from hazardous wastes. ____

1.3 -government monitoring is protecting the environment from hazardous wastes. ____

1.4 -government personnel are helpful to your company. ____

1.5 -the legislation/regulation reflects an understanding of the business world. ____

1.6 -existing legislation/regulation has placed a constraint on the company's output. ____

1.7 -government policies have had a positive impact on your company's hazardous waste policies. ____

2) Provincial Government

Do you agree that:

2.1 -the legislation/regulation is protecting the environment from hazardous wastes. ____

2.2 -the enforcement practises in use are protecting the environment from hazardous wastes. ____

2.3 -government monitoring is protecting the environment from hazardous wastes. ____

2.4 -government personnel are helpful to your company. ____

2.5 -the legislation/regulation reflects an understanding of the business world. ____

2.6 -existing legislation/regulation has placed a constraint on the company's output. ____

2.7 -government policies have had a positive impact on your company's hazardous waste policies. ____

Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Not applicable
1	2	3	4	5	8

3) Municipal Government

Do you agree that:

3.1 -the local by-laws are protecting the environment from hazardous wastes. ____

3.2 -the local enforcement practises in use are protecting the environment from hazardous wastes. ____

3.3 -local monitoring is protecting the environment from hazardous wastes. ____

3.4 -government personnel are helpful to your company. ____

3.5 -the local by-laws reflect an understanding of the business world. ____

3.6 -existing by-laws have placed a constraint on the company's output. ____

3.7 -local policies have had a positive impact on your company's hazardous waste policies. ____

4a) The following statements attempt to gauge the perceived effectiveness of hazardous waste legislation/regulation. The nine statements have been divided into three categories; motivation for compliance, enforcement and conflict resolution. The same rectangle will be used to state your agreement or disagreement with the statements.

Would you support the statements that:

A: Motivation for Compliance

4a.1 Hazardous waste legislation/regulation is necessary to ensure that companies protect the environment. ____

4a.2 Governments should generally subsidize costs for hazardous waste planning, reduction, monitoring and protection of the environment. ____

4a.3 The polluter must pay. ____

B: Enforcement

4a.4 Existing hazardous waste legislation/regulation does not adequately protect the environment. ____

4a.5 Governments are not diligent enough when it comes to enforcement procedures. ____

4a.6 Punishments are too low to have a significant impact. ____

C: Conflict Resolution

4a.7 Calling for a public inquiry is the best forum to achieve results when dealing with the government. ____

4a.8 The techniques of negotiation and mediation should be used more often in hazardous waste management. ____

4a.9 Public participation must be improved in hazardous waste management.

4b) You are asked to write in the space provided the number from the new rectangle below that corresponds with how well you think each of the following pieces of legislation/ regulation apply to hazardous waste management.

Excellent	Very good	Good	Fair	Poor	Don't know
1	2	3	4	5	8

A: Federal Legislation/Regulation

4b.1 Canada Shipping Act (Oil Pollution Prevention Regulations) ____

4b.2 Environmental Contaminants Act ____

4b.3 Fisheries Act ____

4b.4 Ocean Dumping Control Act ____

4b.5 Transportation of Dangerous Goods Act (Manifest system) ____

4b.6 Transportation of Dangerous Goods Regulation (Classification) ____

4b.7 Environmental Protection Act (not in force) ____

B: Provincial Legislation Regulation

4b.8 Waste Management Act ____

4b.9 Waste Management Regulation (Permit application) ____

4b.10 Special Waste Regulation (not in force) ____

4b.11 Pesticide Control Act (Pesticide Control Regulation) ____

4b.12 Transport of Dangerous Goods Act ____

4b.13 Environment Management Act ____

Thank you once again for completing this questionnaire. If you have any comments, please use the space below or attach additional sheets if necessary. Please check (✓) the appropriate spaces below.

____ Yes, I would like a copy of the questionnaire results.

____ Yes, I give permission for my company's name to be used in the final report.

____ Yes, I give permission for the following personal name to be used in the final report. Name: _____

4b) You are asked to write in the space provided the number from the new rectangle below that corresponds with how well you think each of the following pieces of legislation/ regulation apply to hazardous waste management.

Excellent	Very good	Good	Fair	Poor	Don't know
1	2	3	4	5	8

A: Federal Legislation/Regulation

4b.1 Canada Shipping Act (Oil Pollution Prevention Regulations) ____

4b.2 Environmental Contaminants Act ____

4b.3 Fisheries Act ____

4b.4 Ocean Dumping Control Act ____

4b.5 Transportation of Dangerous Goods Act (Manifest system) ____

4b.6 Transportation of Dangerous Goods Regulation (Classification) ____

4b.7 Environmental Protection Act (not in force) ____

B: Provincial Legislation/Regulation

4b.8 Environmental Protection Act (Part V, Waste Managment) ____

4b.9 Waste Management - General Regulation 309 ____

4b.10 Waste Management - PCBs Regulation ____

4b.11 Spills Regulation ____

4b.12 Environmental Assessment Act ____

4b.13 Dangerous Goods Transportation Act ____

4b.14 Ontario Water Resources Act ____

4b.15 Ontario Waste Management Corporation Act ____

4b.16 Pesticides Act ____

Thank you once again for completing this questionnaire. If you have any comments please use the back of this sheet or attach additional sheets if necessary. Please check (✓) the appropriate spaces below.

____ Yes, I would like a copy of the questionnaire results.

____ Yes, I give permission for my company's name to be used in the final report.

____ Yes, I give permission for the following personal name to be used in the final report. Name: _____

APPENDIX "F"

RESULTS OF STATISTICAL ANALYSES FOR ENVIRONMENTAL NON GOVERNMENT ORGANIZATIONS

VARIABLE CODE LIST

CODE	QUESTION OR STATEMENT
	Federal Government
	Do you agree that:
FG1	- the legislation is sufficient?
FG2	- the enforcement is sufficient?
FG3	- government personnel are helpful to your group?
FG4	- the legislation/regulation reflects an understanding of your group's concerns?
FG5	- the enforcement reflects an understanding of your group's concerns?
FG6	- your group has had an impact on the legislation?
FG7	- your group has had an impact on a local issue?
	Provincial Government
	Do you agree that:
PG1	- the legislation is sufficient?
PG2	- the enforcement is sufficient?
PG3	- government personnel are helpful to your group?
PG4	- the legislation/regulation reflects an understanding of your group's concerns?
PG5	- the enforcement reflects an understanding of your groups concerns?
PG6	- your group has had an impact on the legislation?
PG7	- your group has had an impact on a local issue?
	Perceived Effectiveness of Hazardous Waste Legislation/Regulation
	Would you support the statements that:
PE1	- Hazardous waste legislation/regulation is necessary to ensure that companies protect the environment.
PE2	- Governments should generally subsidize costs for hazardous waste planning, reduction, monitoring and protection.

PE3 - The polluter must pay.
PE4 - Existing hazardous waste legislation/regulation does not adequately protect the environment.
PE5 - Governments are not diligent enough when it comes to enforcement procedures.
PE6 - Punishments are too low to have a significant impact.
PE7 - Calling for a public inquiry is the best forum to achieve results when dealing with government or the private sector.
PE8 - The new techniques of negotiation and mediation should be used more often in hazardous waste management.
PE9 - Public participation must be improved in hazardous waste management.

DESCRIPTIVE STATISTICS

	British Columbia			Ontario		
	Number	Mean	S.D.	Number	Mean	S.D.
FG1	10	3.70	0.48	24	3.63	0.58
FG2	10	3.90	0.32	24	3.75	0.44
FG3	10	2.50	0.53	24	2.67	1.01
FG4	10	3.50	0.53	23	3.00	0.91
FG5	10	3.80	0.63	23	3.28	0.90
FG6	10	3.30	0.82	23	2.78	1.13
FG7	9	2.22	1.20	20	2.55	1.15
PG1	10	3.80	0.42	26	3.27	0.83
PG2	10	3.90	0.32	27	3.63	0.57
PG3	10	2.80	0.63	27	2.48	0.94
PG4	10	3.80	0.42	26	2.62	0.90
PG5	10	3.90	0.32	26	3.00	0.89
PG6	10	3.80	0.42	25	2.28	1.10
PG7	10	1.80	0.92	25	1.52	0.82
PE1	10	1.40	0.52	27	1.07	0.39
PE2	10	2.10	0.74	27	2.15	0.91
PE3	10	1.10	0.32	27	1.44	0.70
PE4	10	1.10	0.32	27	1.70	0.78
PE5	10	1.10	0.32	27	1.48	0.85
PE6	10	1.10	0.32	27	1.48	0.85
PE7	10	2.40	0.84	27	2.33	1.00
PE8	10	2.10	0.57	27	1.70	0.67
PE9	10	1.10	0.32	27	1.04	0.19

COMPARISON OF QUESTIONNAIRE RESPONSES BETWEEN THE TWO PROVINCES USING A MANN-WHITNEY SIGNIFICANCE TEST

Variable[a]	Ucal.[b]	n_x[c], n_y[d]	Uc.v.[e]
FG1	114.5	10,24	68
FG2	102.0	10,24	68
FG3	102.5	10,24	68
FG4	80.0	10,23	65
FG5	65.5	10,23	65
FG6	86.0	10,23	65
FG7	75.0	9,20	48
PG1	82.0	10,26	75
PG2	103.0	10,27	78
PG3	107.0	10,27	78
PG4	35.0	10,26	75
PG5	46.0	10,26	75
PG6	34.0	10,25	71
PG7	98.5	10,25	71
PE1	88.0	10,27	78
PE2	126.5	10,27	78
PE3	98.0	10,27	78
PE4	76.0	10,27	78
PE5	102.0	10,27	78
PE6	102.5	10,27	78
PE7	125.0	10,27	78
PE8	91.0	10,27	78
PE9	126.5	10,27	78

a. see Variable Code List for complete variable title (question)
b. calculated U after correction for tied ranks (SPSSx)
c. n_x - number of respondents from British Columbia
d. n_y - number of respondents from Ontario
e. critical value of U for n_x and n_y

APPENDIX "G"

RESULTS OF STATISTICAL ANALYSES FOR THE PRIVATE INDUSTRIAL SECTOR

VARIABLE CODE LIST

CODE	QUESTION OR STATEMENT
	Federal Government
	Do you agree that:
FG1	- the legislation/regulation is protecting the environment from hazardous wastes?
FG2	- the enforcement practices in use are protecting the environment from hazardous wastes?
FG3	- government monitoring is protecting the environment from hazardous wastes?
FG4	- government personnel are helpful to your company?
FG5	- the legislation regulation reflects an understanding of the business world?
FG6	- the existing legislation/regulation has placed a constraint the company's output?
FG7	- government policies have had a positive impact on your company's hazardous waste policies?
	Provincial Government
	Do you agree that:
PG1	- the legislation/regulation is protecting the environment from hazardous wastes?
PG2	- the enforcement practices in use are protecting the environment from hazardous wastes?
PG3	- government monitoring is protecting the environment from hazardous wastes?
PG4	- government personnel are helpful to your company?
PG5	- the legislation/regulation reflects an understanding of the business world?
PG6	- existing legislation/regulation has placed a constraint on the company's output?
PG7	- government policies have had a positive impact on your company's hazardous waste policies?

Perceived Effectiveness of Hazardous Waste Legislation/regulation

Would you support statements that:

PE1 - Hazardous waste legislation/regulation is necessary to ensure that companies protect the environment.

PE2 - Governments should generally subsidize costs for hazardous waste planning, reduction, monitoring and protection of the environment.

PE3 - The polluter must pay.

PE4 - Existing hazardous waste legislation/regulation does not adequately protect the environment.

PE5 - Governments are not diligent enough when it comes to enforcement procedures.

PE6 - Punishments are too low to have a significant impact.

PE7 - Calling for a public inquiry is the best forum to achieve results when dealing with the government.

PE8 - The techniques of negotiation and mediation should be used more often in hazardous waste management.

PE9 - Public participation must be improved in hazardous waste management.

Federal Legislation/Regulation

ENCONACT - Environmental Contaminants Act

FISHACT - Fisheries Act

TDGA - Transportation of Dangerous Goods Act

TDGREG - Transportation of Dangerous Goods Regulation

DESCRIPTIVE STATISTICS

	British Columbia			Ontario		
	Number	Mean	S.D.	Number	Mean	S.D.
FG1	36	2.67	0.97	61	2.51	0.92
FG2	35	2.80	0.96	60	2.77	0.98
FG3	36	3.19	1.04	59	3.02	1.03
FG4	33	2.76	0.94	60	2.62	1.15
FG5	36	3.33	0.93	60	3.05	0.95
FG6	33	3.24	1.00	58	3.52	1.00
FG7	32	2.84	0.92	58	2.66	0.81
PG1	36	2.58	1.03	61	2.28	0.82
PG2	36	2.61	0.93	61	2.66	1.00
PG3	36	2.97	1.00	61	2.72	0.99
PG4	33	2.36	0.96	60	2.43	1.03
PG5	36	2.92	0.91	61	3.23	1.01
PG6	33	3.33	0.92	58	3.24	1.07
PG7	33	2.52	0.87	58	2.33	0.80
PE1	36	1.75	0.50	62	1.76	0.62
PE2	36	2.92	1.18	62	3.16	1.09
PE3	35	2.00	0.59	62	2.21	0.85
PE4	36	3.19	1.01	61	3.23	0.96
PE5	36	2.97	1.00	61	3.20	1.03
PE6	35	3.26	0.95	61	3.15	1.08
PE7	36	3.86	0.76	61	3.55	0.90
PE8	36	2.36	0.90	61	2.51	0.91
PE9	36	2.86	1.02	62	3.00	1.09
ENCONACT	21	3.62	0.81	36	3.31	0.82
FISHACT	27	3.15	0.82	27	3.52	0.80
TDGA	29	3.03	0.78	57	2.54	1.00
TDGREG	31	3.10	0.94	58	2.74	0.95

COMPARISON OF QUESTIONNAIRE RESPONSES BETWEEN THE TWO PROVINCES USING A MANN-WHITNEY SIGNIFICANCE TEST

Variable[a]	Ucal[b]	nx[c],ny[d]	Uc.v.[e]
FG1	1000.8	36,61	836
FG2	1035.0	35,60	796
FG3	957.5	36,59	807
FG4	887.0	33,60	746
FG5	908.5	36,60	821
FG6	819.0	33,58	720
FG7	837.5	32,58	695
PG1	919.0	36,61	836
PG2	1087.5	36,61	836
PG3	944.0	36,61	836
PG4	949.0	33,60	746
PG5	897.0	36,61	836
PG6	930.5	33,58	720
PG7	837.5	33,58	720
PE1	1097.5	36,62	850
PE2	988.0	36,62	850
PE3	944.5	35,62	824
PE4	1077.5	36,61	836
PE5	952.0	36,61	836
PE6	998.0	35,61	810
PE7	883.0	36,61	836
PE8	991.0	36,61	836
PE9	1027.0	36,62	850
ENCONACT	310.0	21,36	260
FISHACT	271.0	27,27	252
TDGA	552.0	29,56	601
TDGREG	725.5	31,58	671

a. see Variable Code List for complete variable title (question).
b. calculated U after correction for tied ranks (SPSSX).
c. n_x-number of respondents from British Columbia.
d. n_y-number of respondents from Ontario.
e. critical value of U for n_x and n_y

NOTES

1. This partial list can be found in: Peeter Kruus and Mary Valeriote, ed., Controversial Chemicals: A Citizen's Guide (Montreal: Multiscience Publications Ltd., 1984), p.227. A thorough listing of all the various toxic effects can be obtained from the following reference used for LD_{50} oral data: Lewis, J.R. Sr. and Tatken, R.L., "Registry of Toxic Effects of Chemical Substances" 1980 ed. U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, Feb. 1982.

2. Case example information obtained from British Columbia Ministry of Environment files in Victoria, B.C. Contact person: Mr. Kelvin Hicke Spill Response Officer, File No. 10-6-20.

3. These include the Maritimes Hazardous Wastes Inventory Report (Environment Canada, 1980); Hazardous Wastes in Northern Canada and Western Canada: The Need for a Waste Management Strategy, prepared by Reid, Crowther and Partners for Environment Canada and the governments of British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, the Yukon and Northwest Territories (Reid and Crowther, 1980); The Siting of Facilities and the Management of Liquid Industrial and Hazardous Wastes in Ontario, prepared by MacLaren Engineers, Planners & Scientists (Ontario Ministry of the Environment, 1980); Canadian National Inventory of Hazardous and Toxic Wastes prepared for Environment Canada (Gore and Storrie Ltd., 1982) and the Ontario Waste Management Corporation's Waste Quantity Study prepared for the Ontario Waste Management Corporation (Proctor & Redfern Ltd., 1982).

4. "An October 1984 unpublished report, "Data on Hazardous Wastes, Rubber Wastes, and Oil Wastes in Canada - 1983", prepared by the Waste Management Branch of Environment Canada's Environmental Protection Service, provides an overview of various studies on hazardous wastes by federal and provincial authorities. This report, based on published information, includes an attempt to determine the annual quantities of waste generated for each of a number of consolidated waste types. The report addresses primarily only those wastes requiring off-site management. The review identified gaps in the data and a large measure of inconsistency in the manner of data gathering and reporting.

Nevertheless, efforts were made to standardize the available data and consolidate it in a common format" (Environment Canada, 1986b).

5. It is recommended that for specific provinces and issues concerning hazardous waste generation that the individual inventory reports mentioned in Note 3 also be consulted.

6. The World Book Encyclopedia (1988) and The Canadian World Almanac & Book of Facts (1988) were used to compile statistics for British Columbia and Ontario. Statistics only relevant to this study are displayed.

7. Environmental Enforcement (1985a), The Proceedings of the National Conference on the Enforcement of Environmental Law, prepared for The Alberta Law Foundation by the Environmental Law Centre (Editor: Linda Duncan) uses these two approaches as the central theme to this conference:

> Along side these laws have also emerged two distinctive approaches towards enforcement. One school of thought holds that to be effective, environmental laws must be strictly enforced in the courts. The other approach supports a more flexible and cooperative bargaining process with would-be offenders. Both approaches have drawn considerable criticism from the opposing camp (Duncan, 1985).

In addition, the last section of the Proceedings provides an extensive speaker and participant list that includes many notable environmental law-makers, environmental lawyers, policy advisors and company representatives from Canada and the United States.

8. "Waste," as defined under the British Columbia Waste Management Act, includes:

> "(a) air contaminants,
> (b) litter,
> (c) effluent,
> (d) refuse,
> (e) special wastes, and
> (f) any other substance designated by the Lieutenant Governor in Council, whether or not the type of waste referred to in paragraphs (a) to (e) or designated under paragraph (f) has any commercial value or is capable of being used for a useful purpose;"

9. "Special waste" under the British Columbia Waste Management Act means:

> "(a) a substance that is prescribed as a special waste by the Lieutenant Governor in Council, and
> (b) where the Lieutenant Governor in Council prescribes circumstances in which a substance is a special waste, a substance that is present in those circumstances;"

10. "Waste" under the Ontario Environmental Protection Act includes "ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and such other wastes as are designated in the regulations;"

11. "Waste management system" under the Ontario Environmental Protection Act means "all facilities, equipment and operations for the complete management of waste, including the collection, handling, transportation, storage, processing and disposal thereof, and may include one or more waste disposal sites."

12. "Waste disposal site" under the Ontario Environmental Protection Act means "any land or land covered by water upon, into, in or through which, or building or structure in which, waste is deposited or processed and any machinery or equipment or operation required for the treatment or disposal of waste."

13. "liquid industrial waste" under Ontario Regulation 309 of the EPA means "waste that is both liquid waste and industrial waste." Please refer directly to Ontario Regulation 309 for a description of the nine different exemptions to this paragraph.

14. "Hazardous waste" under Ontario Regulation 309 of the EPA means "a waste that is a,

> i. hazardous industrial waste,
> ii. acute hazardous waste chemical,
> iii. hazardous waste chemical,
> iv. severely toxic waste,
> v. ignitable waste,
> vi. corrosive waste,
> vii. reactive waste,
> viii. radioactive waste,
> ix. pathological waste,
> x. leachate toxic waste, or
> xi. PCB waste,"

Please refer directly to Ontario Regulation 309 for a description of each of the eleven waste types and the ten exemptions to this paragraph.

15. Correspondence from Roger G. Thomason, Chief of Compliance, Transport Dangerous Goods Directorate, Transport Canada, dated September 9, 1987.

16. Personal communication with Donald Earle, Ontario Ministry of the Environment, Regulation 309 Officer, Waste Sites and Systems, Approvals Unit, Environmental Approvals Section, Environmental Approvals and Land Use Planning Branch, on July 13, 1988.

17. Correspondence from Lanny T. Hubbard, P. Eng. Manager, Environmental Safety Program, British Columbia Ministry of Environment and Parks, Waste Management Branch, dated September 23, 1987.

18. Campbell McDonald, Head, Controls Implementation Section, Commercial Chemicals Branch, Environment Canada, presented his paper entitled "PCBs and Government Regulation" at the Industry and PCBs conference held by the Canadian Electricity Forum in 1987.

19. Correspondence from M.A. Hayden, Coordinator Environmental Enforcement, Conservation Officer Services, British Columbia Ministry of Environment and Parks, Lower Mainland Region, dated November 3, 1986.

20. Hazardous waste management has only recently (1980s) begun to have its own body of legislation and regulation. In the past, hazardous waste management regulations were considered under general waste management regulations throughout Canada. Alberta and Ontario were the first provinces to have specific enforceable regulations for hazardous waste.

21. Very few questionnaire respondents provided information on Municipal Government involvement in hazardous waste management, consequently this level of government was not included in questionnaire interpretation or statistical analyses.

22. Conversation with Ali Keshvani, P.Eng. Special Project Officer, Environmental Safety Program, British Columbia Ministry of Environment and Parks, on July 29, 1986.

23. The Mann-Whitney U test is a non-parametric (i.e. not restricted by any assumptions about the nature of the populations(s) from which the samples have been taken) test of whether there is a significant difference between two sample sets of data. It is applicable to ordinal data and is considered a suitable alternative to the (parametric) Student's t test (Ebdon, 1977).

24. Statistical calculations using the SPSSx software package were conducted at the University of Western Ontario, London, Ontario, with permission from Professor L.G. Smith of the Department of Geography.

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