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Environmental Justice and Hazardous Waste: A View from the Canada-United States Border

by

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ABSTRACT

The industrial history of the Great Lakes basin has left its mark on the landscape with more than 4,500 known hazardous waste sites on both sides of the Canada-United States border. The vast majority are closed and no longer accept wastes, but they still pose potential risks to the environment and nearby communities. For the past several years, state and provincial governments have proposed new "state-of-the-art" facilities as a way to allow industries continued access to waste disposal capacity, but with far stricter controls than most older sites have provided. Publicity of contamination incidents at existing waste sites, and also the institution of formal administrative reviews and public hearings for the location of new ones, have complicated the facility siting process considerably and led to the not-in-my-backyard (NIMBY) syndrome. Additionally, issues related to environmental equity and justice often arise, especially in cases where local residents are racial minorities or low-income (social equity). The problem also has a spatial dimension when one region is expected to receive wastes from, and for the benefit of, industries in other areas (spatial equity), or when a heavily industrialized community becomes slated for yet another facility (cumulative equity). Cross-boundary and local autonomy issues heighten the controversies as well. This thesis reviews ten hazardous waste siting disputes in communities on the Canada-U.S. border in terms of their environmental justice implications. In the majority of cases, opponents of new hazardous waste facilities based their concerns on spatial equity and a variety of procedural matters. Racial minority groups tended to base their arguments on cumulative equity rather than social equity. In some cases, local and regional disputes became international matters given the geographic setting along the Canada-U.S. border.

RÉSUMÉ

L'histoire industrielle du bassin des Grands Lacs a laissé des séquelles sur le paysage, sous la forme de plus de 4 500 décharges connues de déchets dangereux dans des localités américaines et canadiennes de cette région. La grande majorité de ces décharges sont fermées et ne reçoivent plus de déchets, mais ceux-ci continuent de présenter des risques pour l'environnement et les communautés riveraines. Les administrations des États et des Provinces touchés ont proposé, depuis de nombreuses années, l'implantation de nouvelles installations ultramodernes permettant aux industries un accès continu à des lieux de dépôt de déchets, mais qui sont régis par des mesures de contrôle beaucoup plus strictes que pour la plupart des anciennes décharges. La publicité accordée aux incidents de contamination survenus dans les installations existantes et la tenue d'audiences publiques pour l'implantation de nouveaux emplacements ont rendu beaucoup plus complexe le processus d'implantation d'installations de ce type et ont contribué à créer le réflexe "Pas dans ma cour!". Ces facteurs soulèvent également des problèmes liés à la justice et à l'équité environnementales, notamment dans des cas où les riverains sont des minorités ethniques ou des groupes à faibles revenus (équité sociale). Le problème peut acquérir en outre une dimension spatiale si une région doit recevoir des déchets provenant d'industries d'autres régions qui en tirent avantage (équité spatiale), ou encore lorsqu'une localité déjà fortement industrialisée doit accueillir une installation de plus (équité cumulative). Des principes d'équité intergénérations et de procédure peuvent également exacerber la controverse. La thèse présentée examine, sous l'angle de leurs répercussions en matière de justice environnementale, dix litiges liés à l'implantation de décharges de déchets dangereux dans des communautés situées à la frontière du Canada et des États-Unis. Dans la majorité des cas, les détracteurs des nouveaux dépôts de déchets dangereux fondent leurs arguments sur l'équité spatiale et autres considérations d'emplacement et de procédure. Les groupes à faibles revenus et les minorités ethniques ont tendance à invoquer l'équité cumulative plutôt que des principes d'équité sociale. Dans certains cas, des différends locaux et régionaux sont devenus des querelles internationales en raison de leur situation géographique le long de la frontière canado-américaine.

FOREWORD

In this thesis, I contribute to knowledge and theory of the connections between environmental justice and hazardous waste within the setting of North America generally and the Great Lakes basin specifically. The study incorporates Canadian and U.S. experiences with hazardous waste facilities and uses them to examine the various dimensions of equity and justice which are often fundamental to industrial-locational disputes over toxic sites. Moreover, it analyzes the stakeholder dynamics surrounding facility siting proceedings at various geographic scales and with regard to governments at all levels. I attempt to represent community, environmental and industrial perspectives on the events and issues presented throughout the thesis.

The study provides a legal, political and urban geographic account of environmental injustices related to hazardous waste. To that end, I draw on diverse bodies of literature from human geography and related disciplines in order to shed light on the complex interactions between industrial activities, environmental problems, government regulation and political behavior. The analysis is both *state centered* and *society centered* in the sense that it incorporates the role of the state at various levels of federalism (e.g., national, provincial/state, local) as well as the roles of local agents and other stakeholders (e.g., communities, environmentalists, industrialists). The result of this approach, combined with the use of Canada-U.S. border cases, is a comparative study of environmental justice and hazardous waste from differing points of view and at various geographic scales. I hope that my interpretations of these stories will contribute to our understanding of the social and environmental implications of hazardous waste.

ACKNOWLEDGEMENTS

I would like to thank a number of people for their inspiration and support in my attempts with this thesis. The field work could not have been possible without the kind efforts of many people who shared information with me, including community activists and government and industry officials from: the Niagara and Detroit-Windsor/Sarnia regions on the Canada-United States border; Ottawa, Toronto, Washington, D.C. and elsewhere. Though they are too numerous to list here, their support was critical to the realization of this project. I benefitted tremendously from exposing myself to the diversity of their situations, knowledge, and perspectives. Though not all of them will agree with my interpretations, each provided important and useful input. Their stories reveal the difficulties hazardous waste facilities present to communities and groups who want to promote economic affairs and protect the environment in ways that are socially just.

My committee members--Gordon Ewing, Thom Meredith, Simon Milne and Richard Schultz--were most helpful and I owe them many thanks for their support. Gordon, my supervisor, gave me expert advice on urban-environmental planning and selflessly allowed me to approach the work according to my own interests. He offered most helpful assistance on the writing, analysis and maps that improved my representation of events significantly. I benefitted from Thom for his expertise in ecology, his collegial commitment to the environment, and the friendly demeanour and pot of tea he had ready for meetings, though I drank soda mostly! His ideas on restructuring the thesis were extremely helpful at a critical time. Simon advised me on economic aspects of environmental policy and gave me great advice about conducting interviews. Richard

Schultz served as an external committee member from the Department of Political Science. He advised me on matters of Canadian public policy and gave me very helpful feedback on the thesis. Sherry Olson and Audrey Kobayashi, though they were not on the committee, had insightful suggestions about my research that inspired me in many ways. Sherry's advice on language and structure was superb and her enthusiasm about the first draft gave me the energy and outlook I needed to get through the revisions.

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LIST OF ACRONYMS

CCPA	Canadian Chemical Producers Association
CEAG	Citizen's Environmental Action Group (Ontario)
CEC	Commission for Environmental Cooperation
CEPA	Canadian Environmental Protection Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (U.S.)
CMA	Chemcial Manufacturers Association
CMVA	Canadian Motor Vehicle Manufacturers Association
CWM	Chemical Waste Management
DOE	Department of Environment (Canada)
EAB	Environmental Assessment Board (Ontario)
ECL	Environmental Contaminants Law (New York State)
EDS	Environmental Disposal Systems
EFC	Environmental Facilities Corporation (New York State)
EMS	Environmental Management Systems
EPA	Environmental Protection Agency (U.S.)
ERES	Energy Recovery Systems
DEC	Department of Environmental Conservation (New York State)
DNR	Department of Natural Resources (Michigan)
GAO	General Accounting Office (U.S.)
IJC	International Joint Commission
LAND	Lasalle and Niagara Demand (New York State)
MOEE	Ministry of Environment and Energy (Ontario)
NAAEC	North American Agreement on Environmental Cooperation
NAFTA	North American Free Trade Agreement
NAS	National Academy of Sciences (U.S.)
NCS	National Chemical Services
NIABY	Not-in-anyone's-backyard
NIMBY	Not-in-my-backyard
NRC	National Research Council (U.S.)
OEPA	Ontario Environmental Protection Act
OTA	Office of Technology Assessment (U.S.)
OWMC	Ontario Waste Management Corporation
PTS	Persistent Toxic Substance
RCRA	Resource Conservation and Recovery Act (U.S.)
SRB	Site Review Board
TSCA	Toxic Substances Control Act (TSCA)
TSDF	Treatment Storage and Disposal Facility
UCCCRJ	United Church of Christ Commission for Racial Justice
UMass	University of Massachusetts

PART I: THEMES

HAZARDOUS WASTE AND ENVIRONMENTAL JUSTICE

Introduction

> In advanced modernity the social production of *wealth* is systematically accompanied by the social production of *risks*. Accordingly, the problems and conflicts relating to distribution in a society of scarcity overlap with the problems and conflicts that arise from the production, definition and distribution of techno-scientifically produced risks. ... The concepts of "industrial" or "class society", in the broadest sense of Marx or Weber, revolved around the issue of how socially produced wealth could be distributed in a socially unequal and also "legitimate" way. This overlaps with the new *paradigm of risk society* which is based on the solution of a similar and yet quite different problem. How can the risks and hazards systematically produced as a part of modernization be prevented, minimized, dramatized, or channeled? Where they do finally see the light of day in the shape of "latent side effects", how can they be limited and distributed away so that they neither hamper the modernization process nor exceed the limits of that which is "tolerable" -- ecologically, medically, psychologically and socially? (Ulrich Beck, *Risk Society: Towards a New Modernity*, emphasis original)

Environmental justice and social justice are "similar and yet quite different problems" that overlap in much the same way as Ulrich Beck (1992) describes regarding the connections between *risk* and *wealth* or, alternatively, between *hazards* and *production*. Moreover, just as conceptions of social justice are relevant to the production and distribution of wealth, so too is environmental justice an important framework for understanding the production and distribution of hazards and risk. Hazardous waste, a common form of technological hazard, has become an increasingly complex and controversial problem during the last two decades, largely due to the potential risks it presents, but also and increasingly because of its inequitable and unjust distribution throughout society. Historically and to the present, industrial societies have "distributed away" what seem to be the worst of these technological hazards by localizing them in place and have

attempted to "limit" the risks associated with them through containment in landfills and other kinds of facilities. As a result, the risks and other burdens associated with hazardous waste often are concentrated locally, at least in the present, and intensified with time if facility containments begin to fail.

The economic and other benefits of production generally are distributed more broadly across society, though far from evenly, as compared to the burden of waste. Industrial societies rely on the availability of numerous products that contribute to the generation of wastes. Manufacturing provides economic benefits through commodity exchange, employment and revenue generation, just as it improves our standard of living with the creation of everything from time-saving appliances to life-saving pharmaceuticals. Yet toxic residuals generated during production processes present many negative consequences for the communities where they are transported, treated, stored and disposed. These include increased public health and ecological risks from pollution in the environment, threats of accidents such as spills and explosions, and psychological distress over the perception of risks.

The hazardous waste "life-cycle" begins with the generation of waste (or birth, to follow the analogy), through the many phases of and possibilities for its handling, and ending (or perhaps dying) with its management in a treatment, storage, or disposal facility (TSDF). The life-cycle analogy is somewhat synonymous to the *cradle to grave* hazardous waste management systems used, at least in theory, by many countries. Canada and the United States both have management systems of this type, again, at least in theory. I will explain, however, that hazardous waste regulatory programs tend to neglect

the beginning phase of the life-cycle, generation, and pay the most attention to the latter phase, management in a TSDF.

Another problem with the cradle to grave approach is that environmental threats from waste do not end (or die) with final placement in a landfill, for example. Rather, potential threat of leaching is present for hundreds of years (Allenby, et. al., 1994; Gordon 1986; Jelenski, et. al., 1992). Despite this, federal and state/provincial authorities in both countries justify the siting of new facilities as a way to provide industry with "capacity assurance" for hazardous waste disposal and, in effect, promote the generation of waste. With the rising cost of waste management services, industries do have a direct incentive to minimize waste as a cost consideration, but only to the point that the company benefits economically.

Environmental justice, a form of social justice concerned with equity and fairness in environmental management, has emerged as an important consideration in public policy, particularly in the U.S. Much evidence supports the hypothesis that hazardous waste and other industrial pollutants disproportionately burden racial minority and low-income groups (GAO 1983; UCCCRJ 1987; Bullard 1990; Goldman and Fitton 1994). Also, federal and state/provincial policies fail to control or regulate the generation of waste at the point of production, but rather come into effect only after its creation. Hazardous waste regulations are thus limited to standard setting, implementation, and enforcement of rules pertaining to TSDFs, transport methods and the remediation of contaminated sites. Environmental regulatory agencies promote pollution prevention to reduce demand on existing facilities and the need for new ones, but largely through

voluntary programs rather than specific requirements, except in isolated circumstances related to particular enforcement actions.

The structural or legal context of hazardous waste regulation, as well as government and industry support of proposals for new waste sites and expansions of existing ones, often result in contentious disputes in the communities where they are (or are to be) located. Environmental justice implications of the siting process are revealed especially in cases involving racial minority and low-income communities, particularly since the early 1990s when the movement became well known. But as the case studies reviewed in this thesis will show, questions about the fairness of hazardous waste policy figure prominently in locational disputes involving TSDFs in all kinds of communities, not only in the U.S. but in Canada as well. I argue that the facility siting process, and the environmental justice implications of hazardous waste that it reveals, reflect a fundamental contradiction in policy between capacity assurance objectives (which largely benefit industry) and waste reduction or pollution prevention initiatives (which could benefit society and the environment). Both countries made this "end-of-pipe" choice to emphasize waste management over waste minimization beginning with their initial legislative and regulatory responses to the industrial waste problem in the late 1970s, and this emphasis is still largely in place.

This thesis explores the environmental justice implications of hazardous waste facilities in communities in Canada and the United States. In Part I of the thesis (Themes), I explore the two issues most central to the study--hazardous waste and environmental justice--and their relationship to one another. Chapter 1 (Hazardous Waste

Regulation) describes hazardous waste policies in Canada and the U.S. based on the history of problems, the development of statutes and programs, regulatory style, and the limits of regulation. This chapter attempts to demonstrate the number and scale of problems associated with hazardous waste and how they manifest themselves socially and politically. It provides a background and context for the following conceptual chapters on environmental justice and "industrial ecology."

Chapter 2 (Environment and Social Justice) builds on the limits of regulation by describing the various issues of fairness that often become intertwined with toxic waste policies (e.g., cradle to grave management) and decision-making (facility siting). It surveys various theories of justice, as well as their relationship to hazardous waste, in order to illustrate the various dimensions of distributive and procedural environmental justice as forms of social justice. This chapter develops a framework of environmental justice to give the reader a sense of how to judge what is, in fact, fair in an environmental sense.

Chapter 3 (Environmental Justice and the "Industrial Ecology" of Hazardous Waste) reviews empirical evidence of hazardous waste inequities and injustices, starting with research findings regarding the distribution of benefits and burdens, and continues with a review of waste generation within industrial processes. This chapter attempts to link the problem of distributive inequities associated with hazardous waste to the problem of production engineering in order to demonstrate the importance of waste reduction and pollution prevention in our attempts to promote environmental justice. After all, for every

unit of hazardous waste avoided by industry through process and other changes within production, there is one less unit to distribute, however equitably or inequitably.

Part II (View Points) presents a series of Canadian-American border regional case studies in Chapter 4 (The Niagara Region) and Chapter 5 (Detroit and Sarnia). It reviews ten hazardous waste facility siting disputes in all, each of which is set in one of the two border regions. The chapters describe the cases in terms of varying stakeholder views about equity and justice, how these considerations are treated procedurally, and the ways in which structural dimensions of hazardous waste policies impact locational decisions about waste facilities in Canada and the U.S. I analyze the events with an emphasis on three aspects of hazardous waste siting that are particularly associated with dimensions of environmental justice: the definition of facility need; the selection of facility locations, sizes and types; and the promotion of fairness in facility locational decision-making.

The definition of facility need was fundamental to each of the disputes, with provincial and state governments, as well as industrial interests, arguing for additional hazardous waste treatment and disposal capacity. Community opposition groups often pointed to the need for pollution prevention to reduce demand on existing facilities. Particular aspects of specific facilities were also debated by opposing groups, with large-scale incinerators, landfills, and, in one case a deep-well injection facility, generating greater controversy than treatment facilities. Fairness concerns were also raised in numerous cases, particularly over the issue of spatial equity.

Part III (Interpretations), starting with Chapter 6, seeks to broaden the analyses developed in Part II through a comparison of the ten cases in terms of the regulatory

problems they presented, as demonstrated in Chapter 1, as well as the various questions of distributive and procedural justice they posed, as conceived in Chapter 2. It also draws on the issues made evident in Chapter 3 regarding the relationship between production decisions on the one hand and hazardous waste generation and distribution decisions on the other. In Chapter 7, I conclude with a theoretical interpretation of the themes, viewpoints and policies reviewed throughout the thesis.

The purpose of this thesis is to seek a greater understanding of the environmental justice implications of hazardous waste in Canada and the U.S. Environmental justice is an important framework for understanding hazardous waste because questions of fairness and equity are often central to disputes over decision-making such as facility siting. Because the majority of studies in the field of environmental equity and justice have focused on the toxic waste problem in the U.S., this research seeks to build on that work with a somewhat broader North American view of national and state/provincial environmental policy. The study explores these issues with regard to hazardous waste planning at the local and regional levels, and in a cross-border setting. The result is a local, regional, national and international representation of events from a range of perspectives including governments, industries and communities. Moreover, while Canada and the United States regulate hazardous waste quite similarly in most respects, their differing regulatory styles and approaches to facility siting have resulted in some interesting contrasts and controversies which this thesis will highlight.

One of the biggest differences between the Canadian and U.S. cases had to do with the role of government in facility siting. In the Canadian cases, the question of

whether hazardous waste management should be a public or private sector responsibility was hotly contested and a central source of dispute between parties to the siting proceedings. The Ontario government argued a crown corporation would promote public interest and fairness better than a private company but received heated opposition from the waste management industry as well as the community involved. New York State, which had previously attempted but failed to site a public sector facility, and Michigan, which explored but rejected the idea, relied instead on the private sector to propose new TSDFs. These differing approaches to siting also led the Ontario government to officially oppose the New York State proposals leading to some fairly contentious cross-border disputes. In the end, only one of the ten facilities was partially approved and built. Two others were approved but never built and one more is pending a final decision. The other five proposals were ultimately denied the permits necessary to build the projects.

CHAPTER 1: HAZARDOUS WASTE REGULATION

1.1 Introduction

North American governmental involvement in hazardous waste management begins with the enactment, implementation and enforcement of highly complex statutes and regulations operating at both the federal and provincial/state levels. These laws and policies impose a number of requirements on industries that generate hazardous waste as well as those in the business of waste treatment, storage and disposal (TSD). They apply to virtually all aspects of waste management from cradle to grave, beginning with the point at which it is generated and ending with its ultimate fate in a hazardous waste management facility.

Toxic waste programs involve a series of regulations that define hazardous waste to make distinctions between wastes which are and are not to be regulated as such. Other regulations impose restrictions on such management methods as land-disposal, incineration, deep-well injection, and dilution and mixing. Further, "corrective action" programs clean up abandoned or otherwise uncontrolled waste sites. Finally, facility siting programs are used to avoid the creation of future uncontrolled waste sites by assisting waste generation and management industries in their attempts to build new facilities or expand existing ones.

Environment Canada and the United States Environmental Protection Agency have expressed concern about the large volumes of hazardous waste being generated in both

countries. Annually, the U.S. generates just over 200 million tonnes[1] of hazardous waste and Canada generates nearly 6 million tonnes (U.S. EPA 1995; Environment Canada 1995a). American hazardous waste generation has risen nearly 13 percent since 1987 when EPA counted nearly 178 million tonnes. Canada's generation rate is approximately the same as it was in 1986 (Environment Canada 1988). The State of Michigan generates about fifteen million tonnes of hazardous waste each year, the fourth highest amount of any American jurisdiction. New York State generates about one million tonnes annually, and ranks sixteenth. The Province of Ontario generates over 1.8 million tonnes annually, more than any other Canadian jurisdiction.

The Canadian Green Plan (1990) and Environment Canada's Pollution Prevention Program promote life-cycle management of toxic substances in order to prevent waste before it occurs, and funds research and development (R&D) to support technological innovations to reduce waste. Likewise, U.S. EPA's Pollution Prevention Program seeks voluntary compliance from industries to decrease their use and emissions of toxic substances. What is common to both the Canadian and U.S. waste reduction programs is that they are non-regulatory; rather than imposing specific requirements, they operate technical assistance, R&D, and other programs to promote voluntary reductions in pollution emissions by industry. Industries participating in pollution prevention programs often receive favorable press as environmentally-friendly industries in exchange for their

[1] Tonnages are shown in metric measurements (tonnes), unless otherwise noted in some of the U.S. examples (tons).

efforts. Also, many industries have reported cost savings due to more efficient use of costly toxic chemicals and lower pollution control fees.

1.2 American and Canadian Hazardous Waste Policy and Politics

Hazardous waste regulations vary in style and content among North American jurisdictions, especially internationally. The United States government uses strong federal statutes and regulations that specify requirements for nearly all conceivable circumstances. The Canadian government gives far greater discretion to the provinces which often rely on general policies made explicit only as written into operating permits for particular facilities (Ilgen 1985). The "spatial homogeneity" of U.S. environmental policy has been fostered by Supreme Court interpretations of the Constitution, particularly of Article 1, Section 8, clause 3, widely known as the Commerce Clause (Clark 1981). The Court has consistently denied states the ability to restrict access to their own treatment and disposal facilities by out-of-state generators based on the interpretation that waste is technically a commodity (Lake and Johns 1990). The Canadian provinces, on the other hand, have the fully legal right to restrict the importation of waste.

Environmental disputes over locally unwanted land-uses (LULUs) have become a common feature of community planning in North America (Lake 1993, 1987; Popper 1987). These locational conflicts between communities and higher levels of government (especially provincial/state) often amount to differing interpretations of local autonomy (Clark 1984, 1985, 1986; Lake and Johns 1990; Lake 1994). They also arise from the "indeterminacy" of law as written and interpreted (Blomley 1989; Clark 1985, 1989).

These indeterminacies greatly increase controversy and lengthen the time spent trying to site and permit new industrial facilities because of the varying interests and perspectives of "interpretive communities" (Blomley 1989; Clark 1985; Fish 1980). These "communities" refer to not only local governments, but also to higher tiers of the state and with variation among branches (e.g., executive, legislative, judicial), as well as levels, of government, depending on function (e.g., statutory and regulatory development, enforcement, and adjudication). Moreover, disagreements among interpretive communities highlight contradictions in policy and lead toward a "politics of interpretation" that exerts pressure on decision-making bodies, whether in the judiciary, legislature, or bureaucracy at any level of government.

Political scientists, Harrison and Hoberg have found in both countries, but more recently in Canada, the rise of "legalism," an environmental policy style that has increased the role of the judiciary (Harrison and Hoberg 1994; Hoberg 1993). Also interest groups representing industry, the environment, and communities now enjoy greater access to policy making processes. As the judiciary becomes more active in challenging administrative discretion, existing pro-environment decisions become more susceptible to challenges from industrial interests, and industrial projects become more vulnerable to community and environmental opposition. This complicates the problem of determinacy still further, often in conflicting and unpredictable directions. Nonetheless, community interests still face steep obstacles when government agencies and the courts narrowly interpret local autonomy in favor of state and provincial goals (Clark 1985, 1986; Clark and Dear 1984; Lake 1994; Lake and Johns 1990).

Both countries have made capacity assurance a very central goal of their hazardous waste policies, especially the U.S. which has the statutory authority to withhold Superfund cleanup monies from states that do not have existing or planned facilities in-state or an agreement with a nearby jurisdiction. Canada does not threaten its provinces with these kinds of restrictions on transfer payments; however, capacity assurance is a prominent feature of the country's hazardous waste policy and it has been an important justification for facility siting. This kind of direct governmental promotion of facility siting as an overall priority of hazardous waste policy places states and provinces in a strong position *vis-a-vis* local governments over decisions about whether and where to locate them. As well, state and provincial authorities exert control over administrative proceedings where facility locational decisions are made.

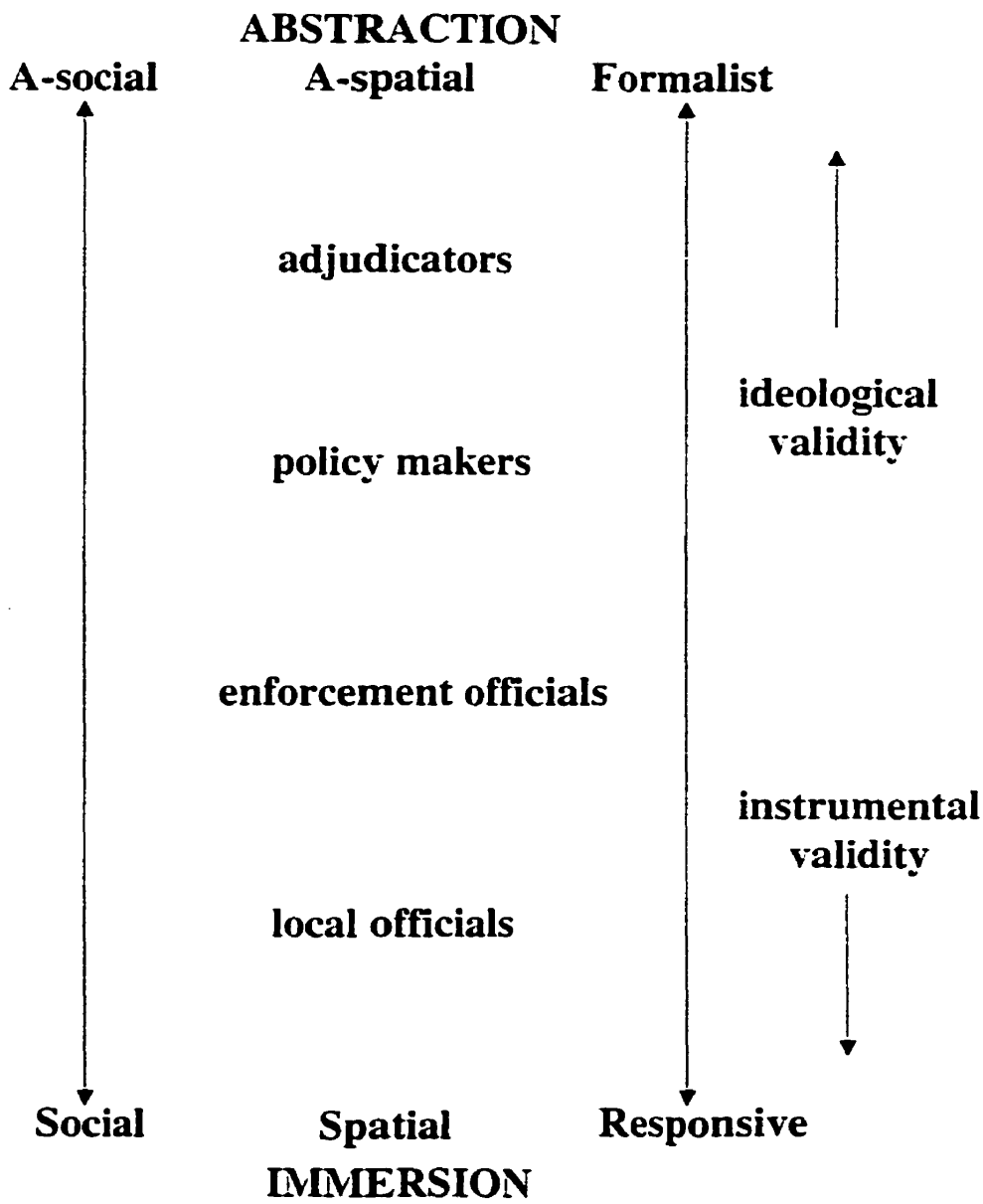
A related trend is the rise of "legal formalism," a doctrine used to justify American and Canadian judicial decision-making as based on noncontextual, neutral rules; that is, determinations made from universal (at least within the nation, province or state) legal principles as opposed to contingent circumstances (Blomley 1989; Clark 1985, 1986, 1989). Clark (1985, 1986), in his comparative studies of urban law in Chicago and Toronto, and following the legal scholar Unger (1983), describes legal formalism as having two main characteristics: objectivism and formalism. Unger defined objectivism as: "the belief that the authoritative legal materials--the system of statutes, cases, and accepted legal ideas--embody and sustain a defensible scheme of human association" (quoted in Clark 1986, 65). The related concept of formalism refers to decision-making

which "invokes impersonal purposes, policies, and principles as an indispensable component of legal reasoning" using Unger's language.

Judicial bodies (including quasi-judicial facility siting boards) use the theoretical position of objectivism, along with the legal practice of formalism, to bolster their legitimacy as they attempt to "manufacture" determinacy from indeterminate rules stipulated in law. While policy makers (legislative and executive) and adjudicators, especially in higher tiers of the state, typically rely on abstract concepts to justify their actions and positions, enforcement officials, and especially local government officials, often position themselves in opposition to abstraction by explaining their views in terms of social and spatial context as they attempt to respond to specific needs. Each extreme of this "interpretive continuum" has its own basis for internal validity, with proponents of abstract legal arguments relying on ideology to justify particular actions, and "immersed" local (and locally concerned) agents relying on instrumental forms of validity that are given meaning through lived communities (see Figure 1). The result is a "territorial politics of location" that reflects a variety of perspectives on the role of the state at every level and that of space (incorporating a variety of community and environmental interests and concerns), particularly at the local level (Cox 1989).

The relationship between local politics on the one hand and those representing larger spatial scales on the other can be conceptualized either in absolutist or relational terms. An absolutist view of the politics of scale is to make discrete distinctions among the local, the state/provincial, and the national, for example. Such an approach is necessary to a point, if for nothing else than to remind ourselves of the real differences

Figure 1
The Interpretive Continuum



Source: Adapted from Blomley (1989, 183)

among these various levels of federalism and their associated constituencies at different scales. Alternatively, a relational approach treats the "local" and the "global" as competing forces that play out at various and shifting scales. Cox (1997a, 1997b), following Harvey (1982, 1985a, 1985b), argues in favor of this relational view in certain circumstances, some of which are directly relevant to hazardous waste disputes between communities and higher tiers of the state.

One example where Cox argues a relational perspective is in order is when local government and other community agents are forced to engage in formal proceedings controlled by higher levels of government. In these instances, it probably matters less to local actors that provincial and state authorities make hazardous waste facility siting decisions in Canada and the United States than the fact that environmental statutes and regulations in both countries are designed to promote industrial-environmental goals that are larger than local (e.g., capacity assurance, the U.S. Commerce Clause). Under such arrangements, local interests are subsumed to "spaces of dependence" whereby broader events and forces exert controlling influences (Cox 1997a).

Another instance where Cox argues a relational view becomes useful is where local politics, through networks of various sorts, become interconnected among multiple communities. The NIMBY syndrome has not become a critical local obstacle to hazardous waste facility siting across North America by chance. Rather, these environmental struggles are preceded by the examples set forth through other local protests and their associated networks (e.g., the environmental justice movement, the anti-toxics movement). It is through these locally initiated but broadly applied arrangements

that communities facing hazardous waste problems are able to transform their "spaces of dependence" into "spaces of engagement" with other communities facing similar obstacles. The result is that local land-use politics are enabled to "jump scales" and thereby address global environmental problems (Cox 1997a).

Local stakeholders still face considerable obstacles when confronting spaces of dependence and engagement of the sort Cox describes. This is particularly true in cases where local interests are not coupled with and represented by local governments, the smallest, yet most numerous, of agencies in federal political systems such as Canada and the United States (Judd 1997). Additionally, in the absence of local and regional land-use planning corresponding to the goals of national or provincial/state environmental objectives, implementation remains "fractured" (Robertson and Judd 1989; Willis and Powe 1995) and also hindered by "structural constraints" (Lake and Disch 1992; Lake and Johns 1990) and a lack of democracy (Pulido 1994) within the legal system, making spatial homogeneity of the sort Clark (1981) describes an elusive as well as indeterminate goal. Similarly, non-decision-making can be as powerful as decision-making at all spatial scales, so long as the issues surrounding these policies are kept out of the political arena (Bachrach and Baratz 1962). A good example of this is when waste facility siting debates are restricted to the relative merits of various locations at the expense of discussing larger policy questions such as whether expanded pollution prevention could obviate the need for additional capacity.

Local groups opposed to facility siting proposals face high hurdles when local politicians and bureaucracies in higher levels of government choose to either support the

developments or offer no formal opinion about them. Alternatively, groups who support plans for new or expanded facilities are hindered in cases where local governments choose to formally oppose them. In either case, local governments facing hazardous waste facility siting proceedings must deal with external forces over which they have little direct control, while negotiating with various and often competing interests within their communities (e.g., economic competition, environmental protection, labor rights).

1.3 Love Canal: Historical Legacy and Locus for Action

Love Canal is in many respects the birthplace of the anti-toxics and environmental justice movements as well as the beginning of hazardous waste policies as we know them today in North America. The now infamous environmental disaster, located in Niagara Falls, New York and on the Canadian border, dramatically illustrated the problems with disposal of toxic residuals from chemical production.[2] Moreover, it started a local grassroots protest that spread to countless other communities over local incidents, especially in the United States. The dispute also generated a national movement to reform hazardous waste policy with a Superfund to clean up contaminated communities and the implementation of a long-delayed cradle-to-grave management system designed to prevent further problems. Canadians took serious notice of Love Canal because of its proximity to the Canada-U.S. border and its contribution to the contamination of Lake

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[2] For a complete review of the Love Canal story, see A. Gordon Levine, *Love Canal: Science, Politics, and People* (1982); Gerald B. Silverman, "Love Canal: a retrospective," *Environment Reporter, BNR*, vol. 20, no. 20, part II (1989); Lois Gibbs, *Love Canal: My Story* (1988).

Ontario, a major source of drinking water and recreational use for southern Ontarians. The controversies surrounding Love Canal continue, as do the effects on public environmental consciousness, especially in communities that have their own hazardous waste problems.

Hooker Chemical and Plastics Corporation, now Occidental Chemical Corporation, dumped approximately 20,000 tons of toxic wastes into Love Canal from 1942 to 1953. Also, the City of Niagara Falls used it as a municipal waste facility for many years. Typical of the era, the dump site was unlined, used no leachate control or detection equipment and, when completely filled, was capped with only a thin layer of clay. In 1953, Hooker sold the property to the Niagara Falls Board of Education for $1. The deed stipulated that chemical wastes were buried there and claimed to absolve the company of future liability related to the property. In 1954, the city built an elementary school on top of the canal and nearby home construction began to accelerate, even directly adjacent to the site. Throughout the 1960s, nearby residents complained of fumes and minor explosions, but the worst trouble began in the mid-1970s when heavy snowfalls, followed by spring thaws and rain, caused the chemicals to seep to the surface, and laterally through surface soils, into yards and basements of nearby homes.

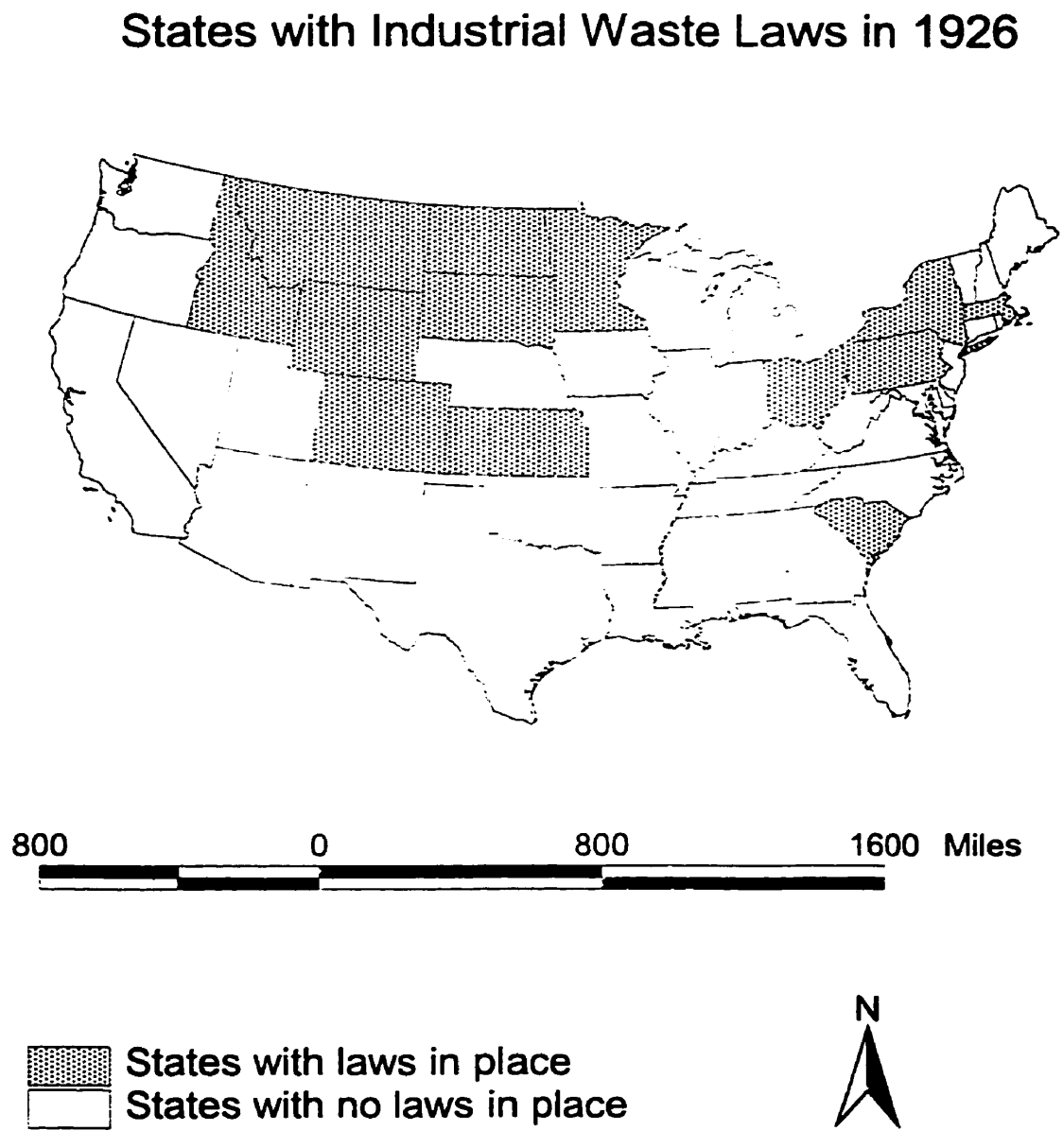
By 1978, the contamination reached a level of severity that forced New York's Commissioner of Health to declare a State of Emergency and recommend evacuation of local residents. The evacuations began with an initial recommendation for relocation of pregnant women and children under two years of age residing in homes adjacent to the canal. That same year, New York Governor Carey expanded the relocation order to

include all residents of these same homes and later expanded the zone of relocation twice. President Carter eventually declared the site a federal emergency.

Dumping chemical wastes into such a crudely designed landfill and then building schools and homes on and around it seem foolish and doomed to fail by today's environmental standards. But Love Canal was not at all atypical of industrial waste management practices of the chemicals, metals, and other heavy industries in the war, and early post-war, years. As well, legal and administrative frameworks of the day were relatively new and insufficient for preventing disasters like Love Canal. As of 1926, only 13 American states, including New York State, had adopted "nuisance" laws specific to industrial wastes and by 1939 the number had only grown to 31 (see Figures 2 and 3). This regulatory context, combined with dramatic increases in post-war industrialization, led to an increased incidence of ground water contamination throughout the U.S. By 1958, virtually every industrialized American state had discovered cases of toxic contamination of ground water (see Figure 4).

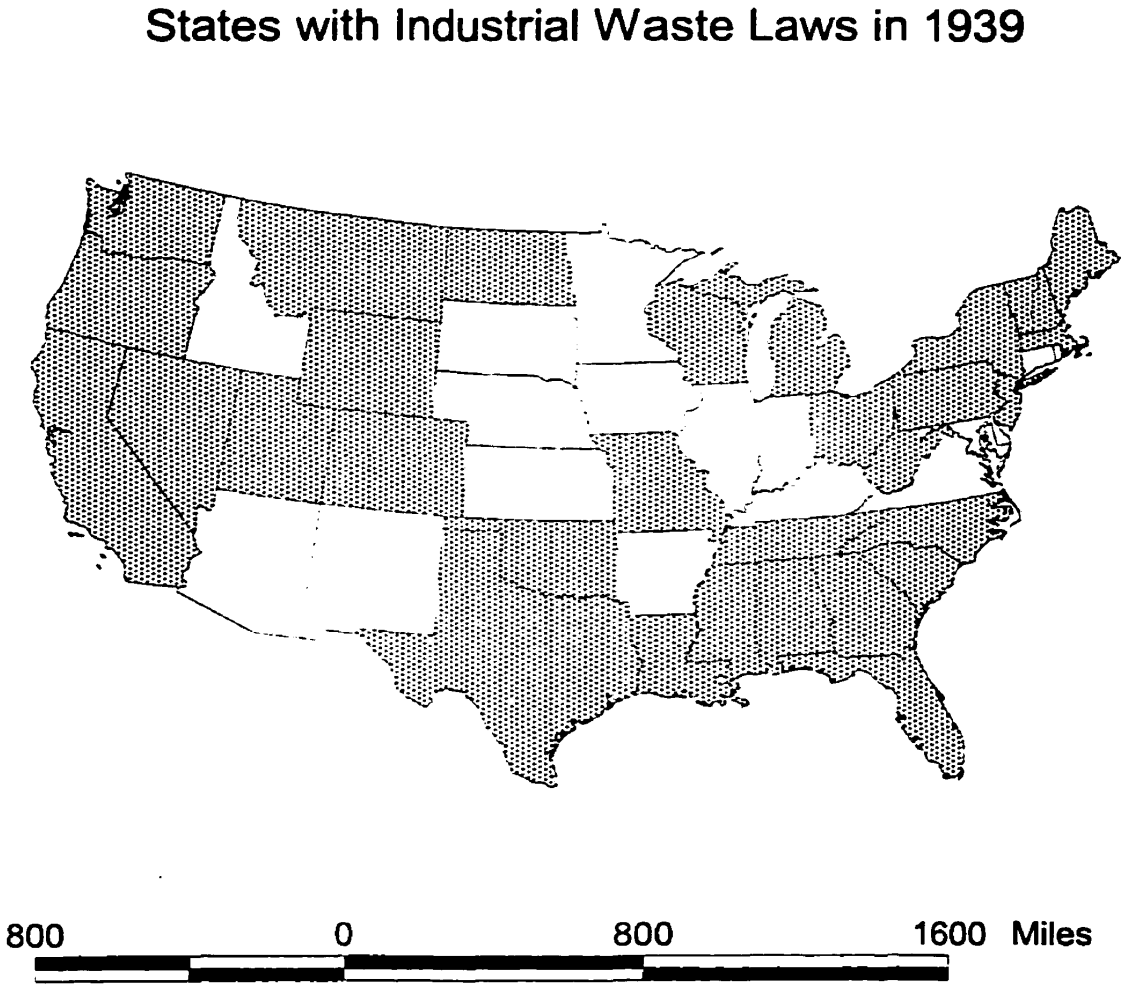
Love Canal's effect on public perception of hazardous waste has been remarkable. In 1973, before the disaster in Niagara Falls, New York had been revealed, U.S. EPA conducted a survey of people's attitudes about living near a toxic waste facility. The results indicated little concern about such land uses. Sixty percent of survey respondents reported to favor or strongly favor having a hazardous waste facility in their own county and 58 percent believed it would leave their property values unchanged or even increase them. Fifty-eight percent also said they were willing to live within 5 miles of one (see Figure 5). By 1980, just two years after wide national publicity of Love Canal, public

Figure 2



Source: Colten and Skinner (1996, 72)

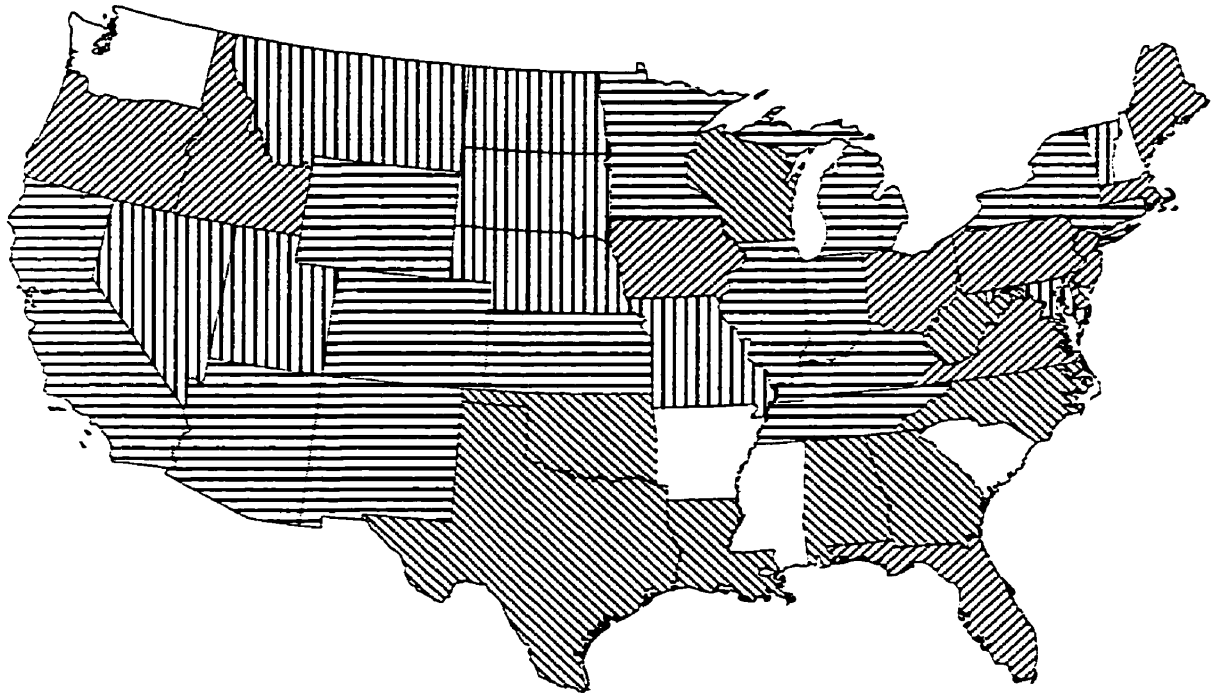
Figure 3



Source: Colten and Skinner (1996, 72)

Figure 4

States with Ground Water
Contamination Incidents
(up to 1958)



700 0 700 1400 Miles

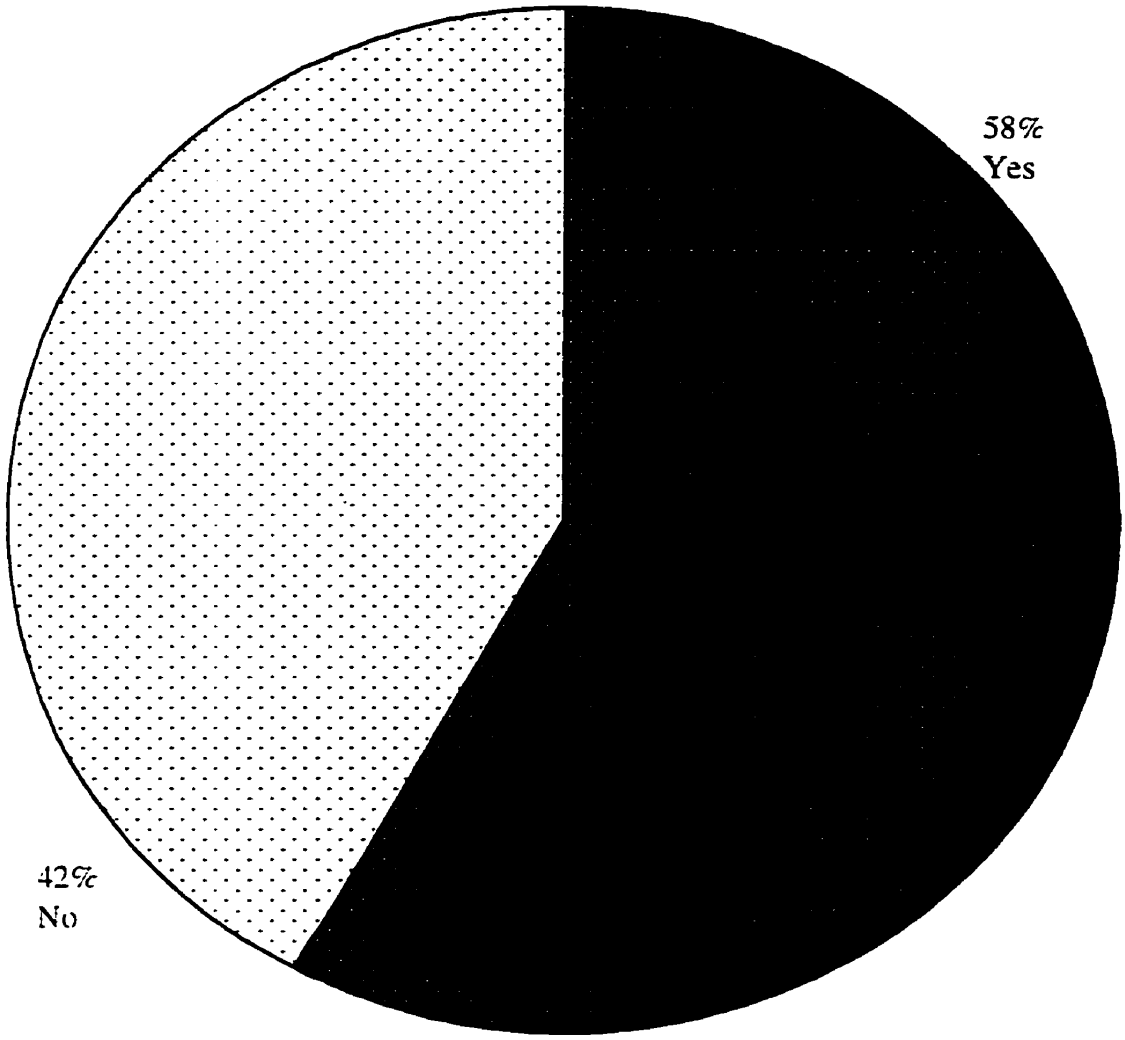
No Contamination
Chemical-Industrial Wastes
Oil & Gas Field Wastes
Chemical-Industrial & Oil-Gas Field Wastes
Other Wastes

N

Source: Colten and Skinner (1996, 40)

Figure 5

Willingness to Accept a Hazardous Waste Facility Within 5 Miles (US 1973)



Source: Szasz (1994)

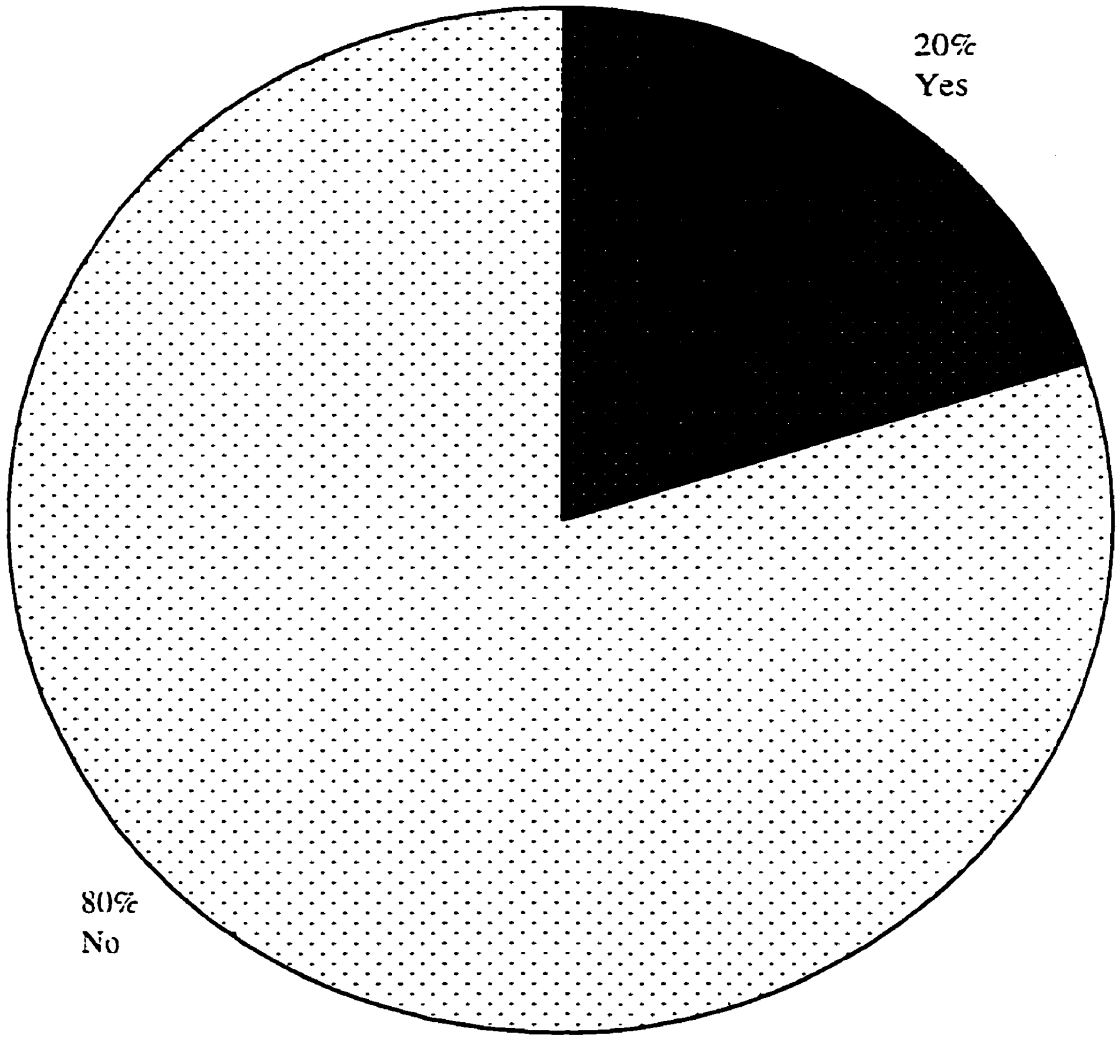
acceptance of hazardous waste facilities within five miles had dropped to twenty percent as shown in Figure 6 (U.S. Council on Environmental Quality 1980; Mitchel and Carson 1986). The 60 percent acceptance level was reached only at the distance of 100 miles in the 1980 survey (see Figure 7) and again in a similar national survey conducted in 1989 (Kasperson, et. al. 1992).

Canadian acceptance of toxic waste facilities is as low as in the U.S. A 1985 poll of Canadian opinion on current events asked the public to respond to the following statement: "No matter what the circumstance or how safe they said it was, I am unwilling to have a hazardous waste disposal site located near my community" (Gregg and Posner 1990). 68 percent of respondents agreed with the statement, 27 percent disagreed, and 5 percent said "it depends" or had no opinion. When asked to respond to the same statement in a second poll conducted in 1989, Canadian unacceptance appeared to soften slightly. That time, 56 percent agreed, 33 percent disagreed, and 11 percent said it depends or had no opinion (see Figure 8).

A much more remarkable difference of opinion was found between the level of acceptance for toxic waste sites at the national level, as compared to the notion of having a facility in or near one's own community. In addition to asking the public to respond to the locally oriented statement, the 1989 poll also asked: "Would you support the establishment of a facility for the disposal of toxic waste produced in Canada?" As shown in Figure 9, an overwhelming 75 percent of respondents supported or strongly supported the idea (50 percent and 25 percent, respectively), while only 25 percent were opposed or strongly opposed (15 percent and 10 percent, respectively).

Figure 6

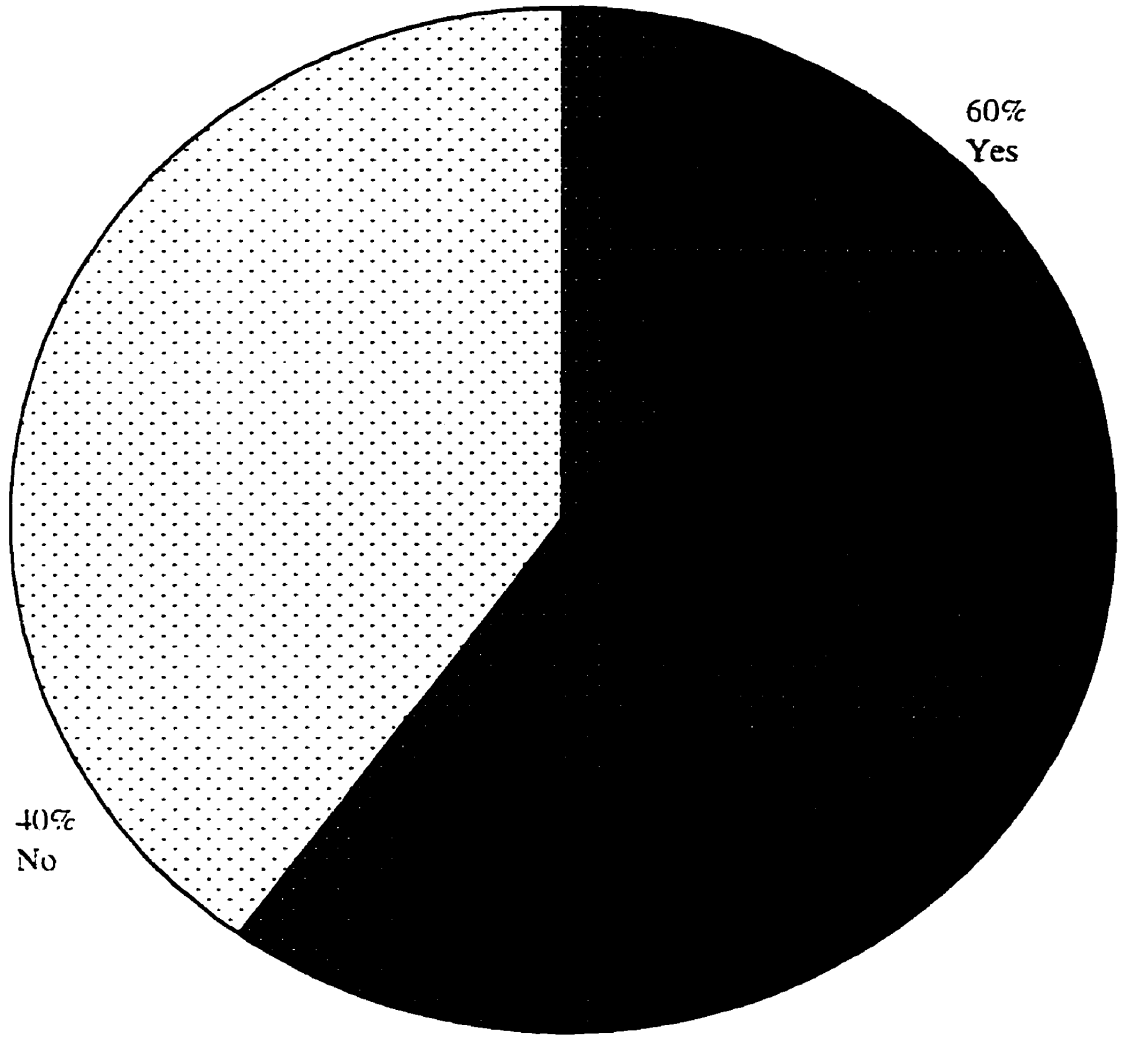
Willingness to Accept a Hazardous Waste Facility Within 5 Miles (US 1980)



Source: U.S. Council on Environmental Quality (1980)

Figure 7

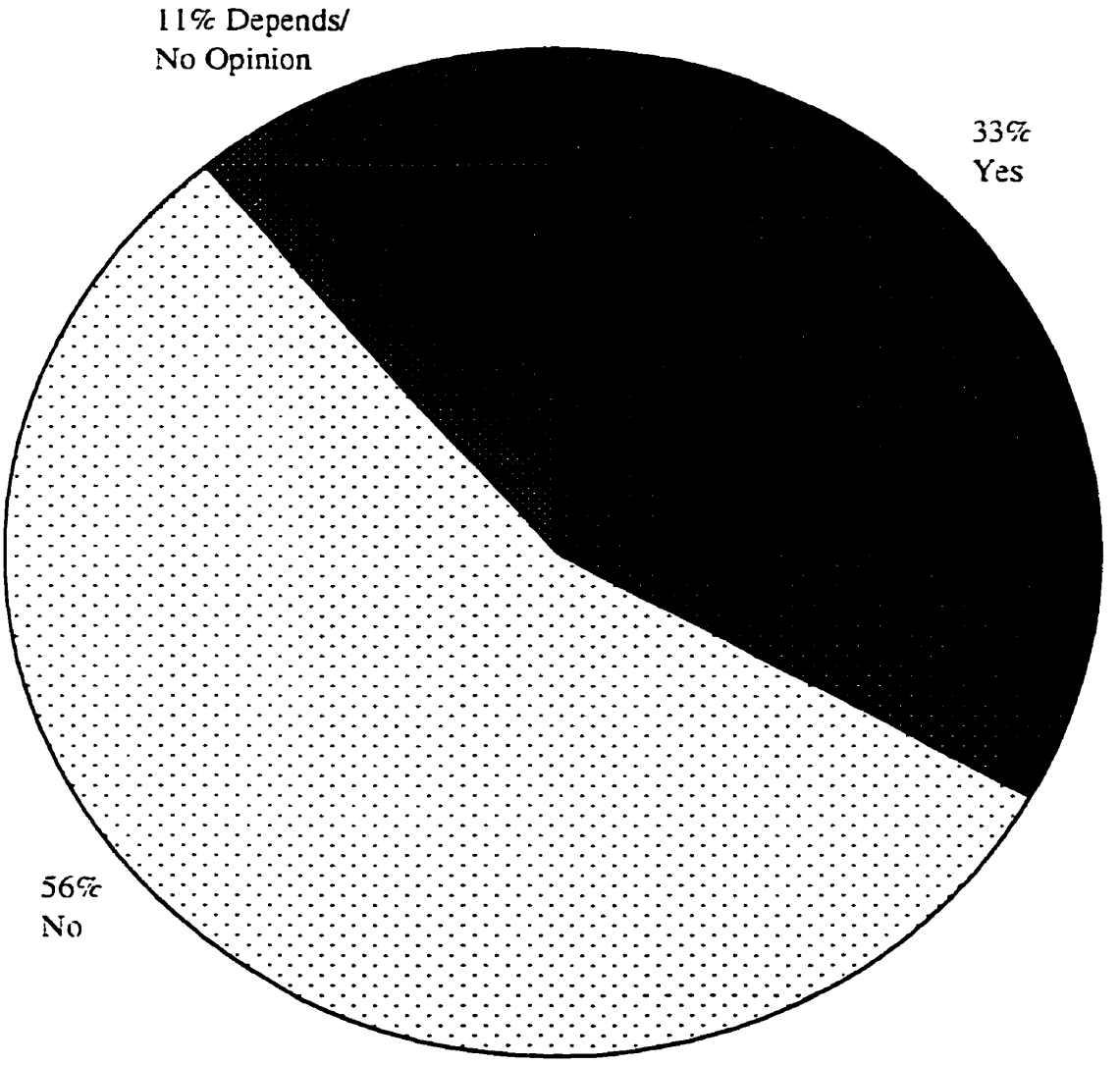
Willingness to Accept a Hazardous Waste Facility at 100 Miles (US 1980)



Source: U.S. Council on Environmental Quality (1980)

Figure 8

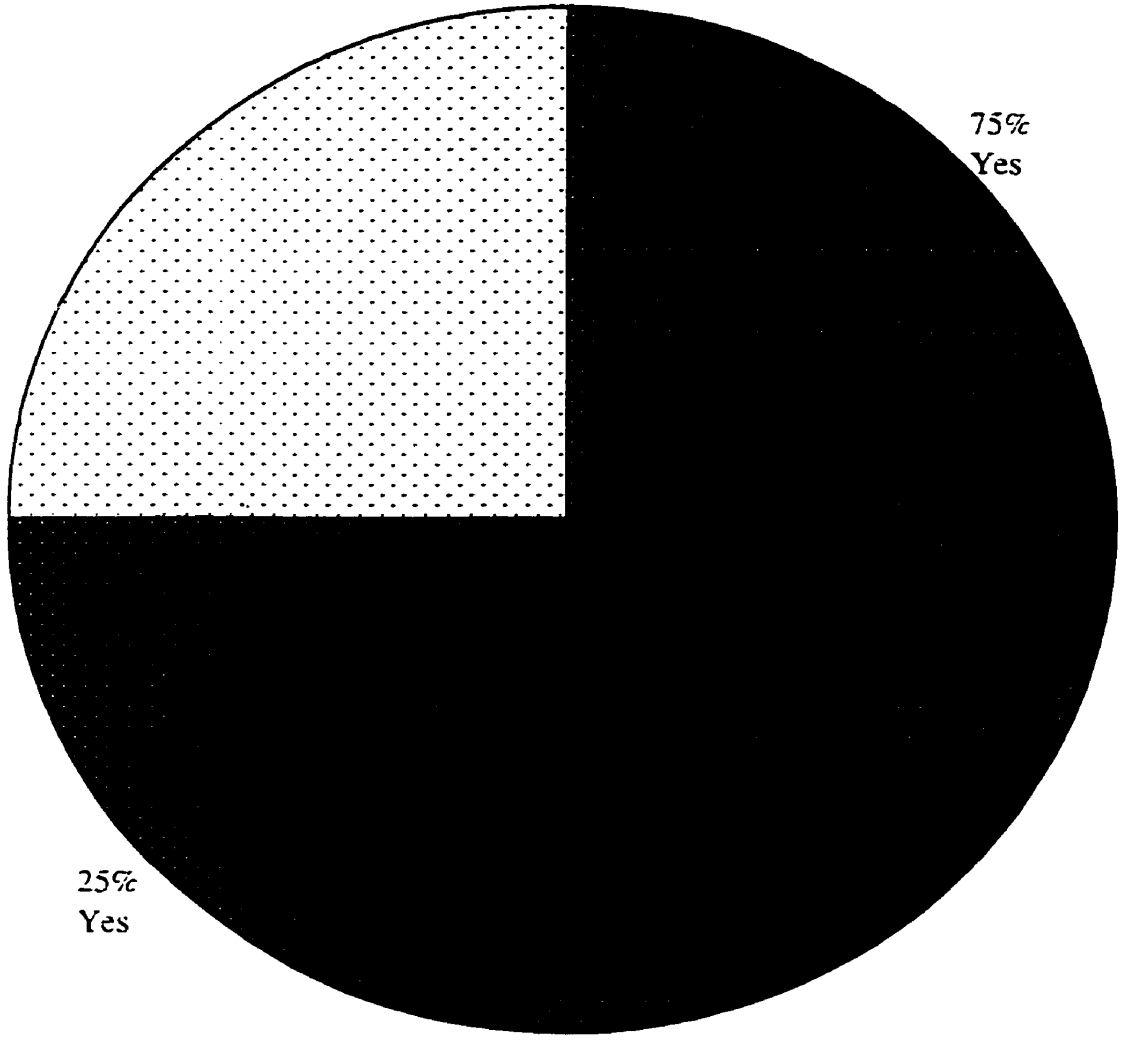
Willingness to Support a Hazardous Waste Facility "Near My Community" in Canada



Source: Gregg and Posner (1990)

Figure 9

Willingness to Support a Hazardous Waste Facility "Somewhere" in Canada



Source: Gregg and Posner (1990)

Clearly, public concern about Love Canal and problems like it has "amplified"[3] North American concern about toxic waste significantly. Canadians as well as Americans have strong reservations about locating waste facilities in their own communities, but for the majority of Canadians, at least, the idea of placing one "somewhere" in their country seems to be desirable, provided it is not in their backyard. This pattern is at least roughly consistent with that of American public response shown in Figures 6 and 7. Partly, this contradiction reflects cost trade-offs inherent to waste management locational decisions. These occur somewhere between the disbenefits of proximity to waste facilities and the expense of moving wastes "elsewhere" (see Figure 10). Additionally, the concentration of risks and burdens near hazardous waste facilities, when compared with diffuse spatial patterns of benefits, leads to a particularly large degree of social distrust of siting proposals (Kasperson, et. al. 1992), as well as a corresponding increase in risk concerns (Vaughan and Seifert 1992), in local communities. These conditions have provided the necessary context for anti-toxics and environmental justice grassroots activism, especially among women (Brown and Ferguson 1995).

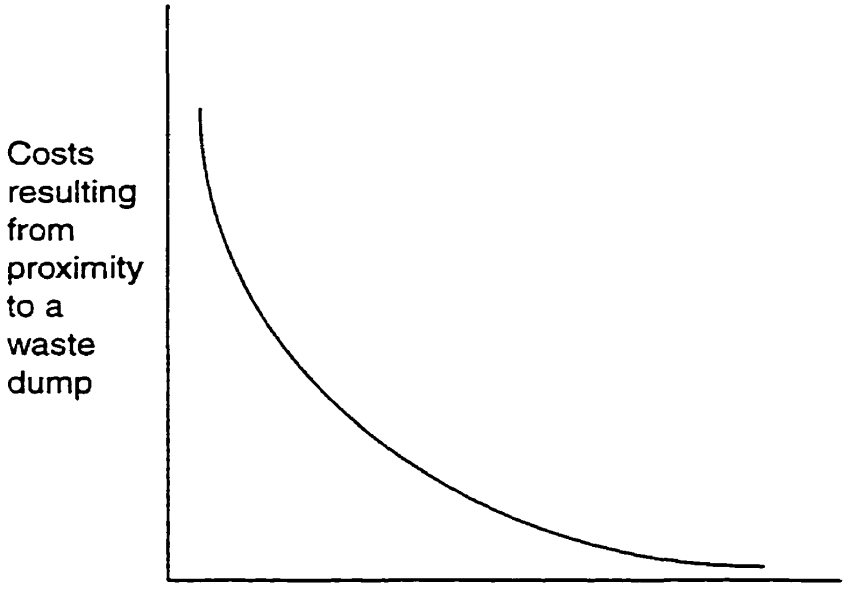
1.4 The Environmental Protection Agency and Hazardous Waste Regulation

The creation of the U.S. Environmental Protection Agency on the heels of Earth Day in 1970 marks the beginning of the formalized environmental policies and regulations

[3] See Kasperson, R.E., et. al. (1988) The social amplification of risk: a conceptual framework. *Risk Analysis* 8: 177-187.

Figure 10

Cost Trade-offs in Waste Facility Location



Source: Adapted from Butler (1980, 124)

we see in America today. President Nixon created it as an independent agency[4] by merging several disparate water, air, and waste programs previously located within various Cabinet-level departments (Landy, et. al 1990). Still, the U.S. had no federal statute dealing with toxic waste until 1976 when Congress amended the Resource Conservation and Recovery Act (RCRA) to specifically address the issue. Coincidentally, this was about the same time that the Love Canal tragedy began to emerge. 1976 was also the year that New York State officials began inspecting the site and collecting samples of chemical sludge from sewers and basement sump pumps in the area.

1.4.1 Developing RCRA: EPA, Industry and Congress

The Resource Conservation and Recovery Act (RCRA) is a complex statute that deals with solid and hazardous waste management, theoretically from "cradle to grave," or from the time at which it is generated until its ultimate and final treatment or disposal. The original version of the law, the Resource Recovery Act of 1970, dealt only with non-hazardous solid wastes. By the time the law was amended in 1976 to add a separate section (Subtitle C) respecting hazardous wastes, industry still managed its toxic residuals very informally. Most were kept on-site at the same industrial locations where they were generated and simply dumped on the land in lagoons or ponds, in itself a practice that still

[4] EPA's "independent" status distinguishes it from most federal agencies which are administratively located within, and under the jurisdiction of, a specific Cabinet-level department. The agency's structure was designed to give it a degree of autonomy over the environmental mission without granting its Administrator the symbolic significance of Cabinet Secretary. In recent years, the Congress has debated "elevating" the agency to departmental status.

holds true today, though with many more regulations in place to ensure better environmental protection.

While national attention to Love Canal was not to occur for a full two years, some environmentalists and legislators were very aware of the disasters waiting to happen from standard industrial hazardous waste practices of the day. In general, however, very little was known about the issue since industries never discussed it or publicly reported anything about it. Colten and Skinner (1996), using historical analysis, have documented numerous instances that many chemical and other companies were well aware of the dangers as indicated in internal memoranda. Nonetheless, the issue of hazardous waste had not yet become politically charged when the 1976 Subtitle C provisions were written into law.

One of the first and most crucial decisions to be made regarding RCRA was whether to regulate production or to regulate disposal; that is, should the government require industries to change their industrial processes so that less volume or toxicity is generated or simply develop rules regarding how and where to manage and dispose of toxic wastes. The U.S. Congress was the first to deal with this fundamental choice in strategy during its many deliberations which started in 1974 and ended in 1976 when RCRA Subtitle C was enacted. In a critical report to Congress on hazardous waste, the EPA admitted that "control of toxic materials before they become toxic wastes could greatly reduce the size of the overall hazardous waste management problem," yet concluded that the Toxic Substances Control Act (TSCA), also pending Congressional action, would "dovetail neatly" with RCRA (U.S. EPA 1974, quoted in Szasz 1994, 17).

Such a strategy would separate the regulation of production, through TSCA, from the regulation of disposal, through RCRA.

Both Democrats and Republicans in the House and Senate agreed with EPA that RCRA should regulate disposal, but some Democrats introduced bills that would regulate certain hazardous or potentially hazardous products, thus, in effect, regulating production as well. Some proposals even went so far as to suggest requiring permits not only for waste treatment and disposal, but also for production processes that generate hazardous wastes. As Szasz demonstrates, industrial interests, particularly the chemical, oil and plastics sectors, testified to Congress and EPA their adamant objections to the regulation of production or any other government control of private economic decision making. The DuPont Corporation testified:

> We believe that the disposal of wastes ought to be regulated instead of regulating the nature and use of the product or the type of manufacturing process used ... greatest emphasis should be placed on establishing standards which assure that the ultimate disposal method is satisfactory. ... [I]t is unreasonable in most instances to require the use of certain types of processes solely based on the waste generated. ... [P]roduct standards could have severe economic effects, ... [would] not be in the overall interest of the consumer, ... [and may have] a detrimental effect on the development of new materials and innovative uses of existing materials (quoted in Szasz 1994, 19).

With respect to the issue of generator permitting as compared to disposal permitting, Dow Chemical argued:

> The permit system for disposal facilities for hazardous waste seems appropriate. However, we strongly maintain that a permit system for generators of waste would unduly restrict American capacity to respond to needed changes by tending to "lock in" processes according to the technology available at the time the permit was issued ... The regulatory program should concentrate on standards for the actual disposal of wastes

> ... regulation of manufacturing processes must be avoided (quoted in Szasz 1994, 20).

Union representatives at the time were very concerned about potential job losses so they tended to agree with industrialists on the basic question of regulating production or disposal. One union official suggested that "the entire concept of source reduction ... may be premature at this time" and another testified:

> I object to any standardization of products or packaging if it is going to eliminate jobs ... We do not want to accept in any manner the elimination of our good jobs at the expense of the litter and solid waste problems, no matter how it comes about, whether it be standardization of products or what. We object to that. There have to be other ways and means in which we can do this without knocking our people out of work (quoted in Szasz 1994, 19).

Ultimately, Congress was very sympathetic to these concerns in its decision regarding RCRA's regulatory focus. The House Commerce Committee concluded:

> Rather than place restrictions on the generation of hazardous waste, which in many instances would amount to interference with productive processes itself, the Committee has limited the responsibility of the generator for hazardous waste to one of providing information ... ***there will be no requirement of the generator to modify the production process to reduce or eliminate the volume of hazardous waste*** [emphasis added] (quoted in Szasz 1994, 21-22).

With these and other important words of caution against what it regarded as over-regulation of industry, both houses of Congress passed the treatment and disposal bill with overwhelming majorities and President Ford signed it into law in October 1976 (Kovacs and Klucsik 1977). In 1984, the statute was amended to strengthen some of the existing provisions and add new ones, most notably a requirement to pre-treat hazardous waste before landfilling (Mazmanian and Morell 1992; Soesilo 1995). RCRA still has no legal or regulatory basis for requiring industries to reduce their generation of waste.

1.4.2 RCRA and Superfund: *Cradle-to-Grave* Management and *Capacity Assurance*

If U.S. EPA's and Congress' concerns about regulating industry too heavily were not apparent before the passage of RCRA, they became increasingly obvious during early attempts to implement the hazardous waste provisions of the statute. Despite EPA's statutory obligation to write new regulations pursuant to the law, the agency made little progress and the Congress failed to actively question them about it during oversight hearings until 1978 when an explosion at a Rollins Environmental hazardous waste facility in New Jersey received wide news coverage (Szasz 1994). Also in 1978, the Love Canal story began receiving widespread national attention, forever changing the way North Americans think about toxic substances (Levine 1982). In what seemed like an instant, the environmental community and Congress became keenly interested in EPA's progress at implementing a national hazardous waste program. The General Accounting Office (GAO), a Congressional investigatory agency, started a series of studies that were very critical of EPA's attempts to implement Subtitle C. In December of 1978, the agency released its first draft hazardous waste rules, hoping finally to gain favor with its critics, only to receive 1,200 sets of highly critical comments from industry. EPA finally issued its first set of formal hazardous waste regulations in 1980, four years after the new law had been enacted.

The RCRA Subtitle C hazardous waste program which emerged from these initial efforts involves a series of regulations and program elements which are given statutory authority through RCRA Sections 1004 and 3001 through 3005. This enabling legislation, in turn, gives U.S. EPA the authority to write specific regulations in the American *Code*

of Federal Regulations (40 CFR Parts 260 through 265). 40 CFR Part 261, under statutory authority delineated in RCRA Section 3001, seeks to operationalize the definitions of "solid waste" and "hazardous waste," the latter being a sub-set of the former which is itself defined in opposition to non-waste items such as products and industrial feedstocks. The regulation builds from Congress' basic definition of "solid waste" as:

> [A]ny garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities (RCRA Section 1004[27]).

40 CFR Part 261 also uses the statutory definition of "hazardous waste" which includes:

> solid waste, or [a] combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
>
> A. cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
>
> B. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed (RCRA Section 1004[5]).

Thus, "hazardous wastes" are considered a subset of "solid wastes" that are to be specially regulated because of their dangerous characteristics. Any wastes displaying such characteristics (e.g., toxicity, reactivity, corrosivity, ignitability) are designated as "characteristic" hazardous wastes. As well, other wastes not necessarily exhibiting these characteristics are regulated as "listed" hazardous wastes by virtue of their inclusion in Subtitle C regulations.

RCRA also establishes a manifest system to track hazardous wastes destined for off-site treatment or disposal from the point of generation to the point of ultimate disposal, or from cradle to grave. Hazardous waste generators are required to designate the permitted TSDF that will receive any shipment before the transport can occur. This information is specified on a uniform manifest document which is also used to track any and all movements of the shipment, including all modes of transport. For international shipments, generators must submit a notice of export to the receiving country and wait for a notice of consent from that country before transport can take place, according to the Basel Convention, the United Nations agreement which governs most of the world's international hazardous waste shipments (United Nations Environment Programme 1994). Since it is not a signatory to the Basel Convention, the U.S. has developed bilateral agreements with Canada and Mexico, the two countries with which it conducts 99.6 percent of its trade (Environment Canada 1996). The Canada-U.S. agreement allows American and Canadian companies to ship hazardous wastes across the border without first receiving a prior notice of consent, making it one of the least regulated international trade routes for hazardous waste (Handley 1989, 1990).

In 1995, the U.S. shipped 53.5 percent of its volume of international toxic waste exports to Canada and 46.1 percent to Mexico, according to U.S. EPA data. By contrast, the overwhelming majority of Canada's 1995 international shipments head for the U.S. (99 percent of all exports) or come from the U.S. (97 percent of all imports), according to Environment Canada. American exports to Canada exceeded 12 million tonnes as compared to Canadian exports to the U.S. which were nearly 8 million tonnes

(Environment Canada 1995b, 1996). Because both countries reserve the right to object to particular imports, Canada refused nearly 90 thousand tons from the Americans and the U.S. refused 650 tonnes coming from Canada, according to Environment Canada data.

TSDFs, the facilities used to manage hazardous wastes, are regulated under RCRA Sections 3004 and 3005 but the main statutory basis for their existence comes from 1986 amendments to the original Superfund law (Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980). CERCLA established a $1.6 billion[5] trust fund to clean up abandoned or uncontrolled hazardous waste sites like Love Canal. The program is unique in its liability and cost-recovery provisions. It uses the power of joint-and-severable liability to require that responsible parties (i.e., waste generators, TSDF operators) pay for as much as the full cost of cleanup. This gives U.S. EPA, through the Justice Department, a legal basis to sue companies or individuals for damages, even beyond those for which they are found to be personally responsible. As a result, if the evidence implicates only one of several responsible parties, the American government can sue that individual or firm for up to the full cost of cleanup.

The CERCLA amendments, known as the Superfund Amendments and Reauthorization Act of 1986 (SARA), increased the trust fund by $9 billion and added a number of new provisions to the program, including a community right-to-know program which allows the public to access a Toxic Release Inventory database on industrial discharges of certain chemicals. In addition, SARA imposed a requirement on

[5] American and Canadian funding examples are stated in their respective currencies without further notation.

states that would dramatically affect their implementation of RCRA generally and their use of TSDFs specifically. The law required that states develop, and submit to U.S. EPA, capacity assurance plans (CAPs) that demonstrate an ability to safely dispose projected hazardous waste generation or risk losing federal Superfund dollars. This has been the prime justification for building new TSDFs in the U.S. and has given this responsibility to the states.

1.5 Canadian Hazardous Waste Policy: Ottawa and the Provinces

Ilgen (1985) has described Canada's approach to environmental management generally, and toxic waste regulation specifically, as being somewhere "between Europe and America." Historically, Canadian public officials have preferred to rely on British- and European-style case-by-case negotiations among government and industry to shape policy, but the country has increasingly begun to develop a more legalistic approach similar to the U.S., complete with federal and provincial regulations as well as an expansion of the courts' powers at both governmental levels to resolve disputes (Harrison and Hoberg 1994). Still, the federal role in environmental policy is much more limited in Canada than in the U.S. Also, while volumes of American regulations are written to deal with nearly every conceivable environmental circumstance, Canada continues to keep its regulations at both the federal and provincial levels relatively general, relying on operating permits for particular facilities to delineate specific standards and other requirements.

1.5.1 The Department of Environment and CEPA

Canadian hazardous waste policy is governed most broadly by legislative provisions set out in the Canadian Environmental Protection Act of 1988 (CEPA). CEPA is a broad environmental statute based partly on the "peace, order, and good government" clause of the British North America Act of 1867 and designed to deal with a "national concern over toxic substances and the environment" as well as to clarify federal/provincial authorities and responsibilities for environmental protection (Macdonald 1991, 51-52). Historically, the Canadian provinces have taken the lead on environmental protection because of their legal ownership of public lands and natural resources (particularly minerals and forests) within their own borders as one aspect of the country's confederation. But in the years following the creation of Canada's Department of Environment (DOE) in 1970, the provinces had become increasingly concerned about a federal encroachment on their environmental and natural resource management rights.

1.5.2 CEPA and the Environmental Contaminants Act

CEPA reflected complex negotiations between Ottawa and the provinces that had become necessary because of jurisdictional disputes over natural resources and energy rights resulting from federal environmental legislation established during the early 1970s and leading up to the patriation of the Canadian constitution in 1982. Among these statutes was the federal Environmental Contaminants Act (ECA) of 1975 which had been enacted because of a similar U.S. bill that was later passed into law as the Toxic Substances Control Act (TSCA) of 1976. Jack Davis, Canada's Minister of Environment

at the time had insisted ECA was needed to prevent the country from becoming a pollution haven for multinational corporations based in both countries.

Notwithstanding ECA's enactment, the federal government largely patterned their toxics policies on the American TSCA (toxic substances) and RCRA (hazardous waste) programs in the years following (Doern and Conway 1994). The provinces became increasingly frustrated with this lack of implementation progress. CEPA represented a compromise between the federal and provincial governments by establishing the concept of "equivalency." This provision holds that provincial regulations are to be considered equivalent to federal regulations, and thus to take precedence, unless DOE finds a lack of provincial enforcement of environmental regulations.

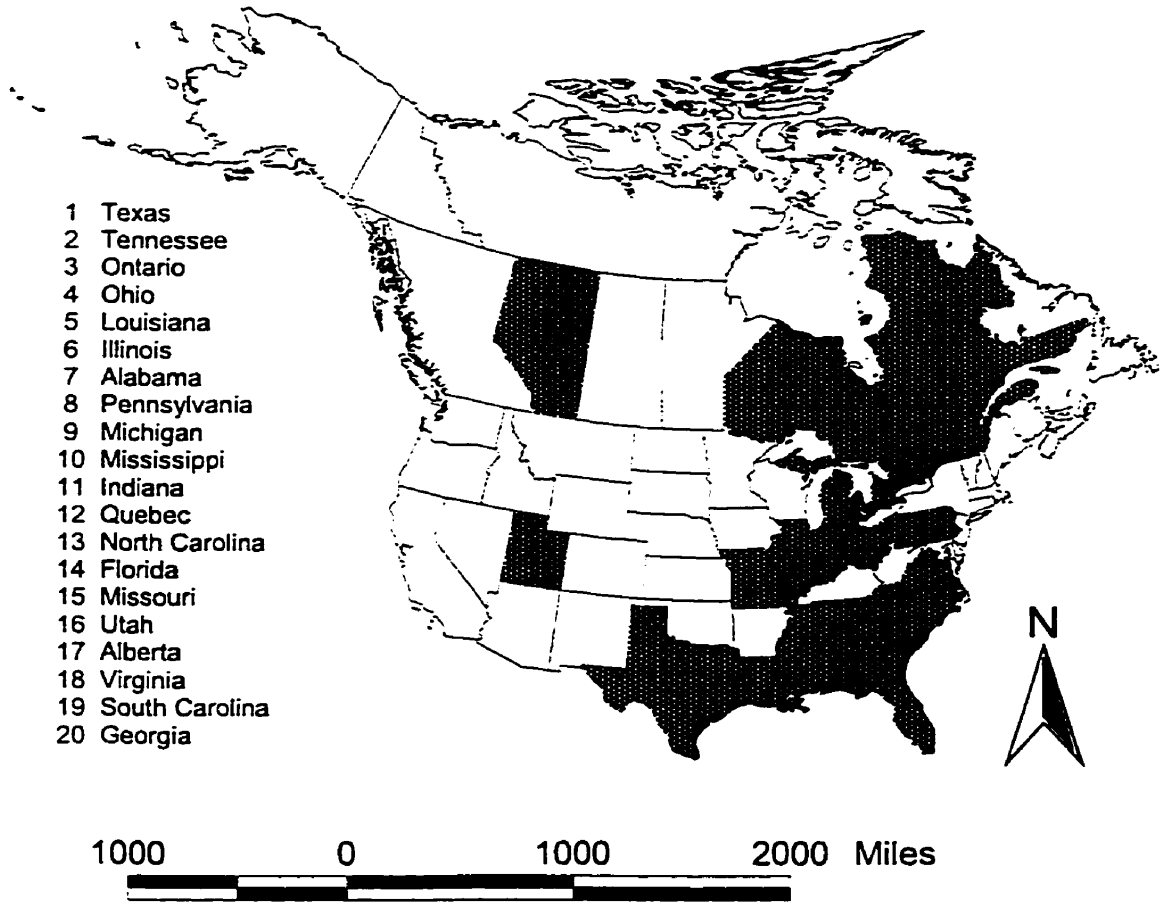
Still, Canadian toxic waste regulation at both levels of government has much in common with the American approach in the use of manifests to provide cradle-to-grave management, the development of siting and operation standards for TSDFs and the allocation of funds for cleaning up uncontrolled or abandoned waste sites. Also, while there is no federal statutory requirement that the provinces build new TSDFs as is the case in the U.S., the concept of capacity assurance has been promoted at both levels of government so as to allow industry continued access to disposal sites.

1.5.3 Controlling Toxics in Ontario

Ontario, Canada's largest and most industrial province, has traditionally been a leader in the development of environmental protection standards north of the border. It is also the country's most polluted province, exceeded in industrial pollution releases and transfers by only the American states of Texas and Tennessee (See Figure 10), according

Figure 10

Total Industrial Pollution Releases and Transfers:
Top 20 States and Provinces in 1994



Source: Commission for Environmental Cooperation (1997)

to a study of Canadian and U.S. industrial discharges in 1994 conducted by the Commission for Environmental Cooperation (CEC), an agency established pursuant to the North American Agreement on Environmental Cooperation (NAAEC), commonly known as the environmental "side agreement" of the North American Free Trade Agreement (NAFTA) (CEC 1997). The sheer size and scale of Ontario is partly responsible for its ranking. When listed according to pollution releases and transfers per capita and per km^2, the province ranked much lower in the 15th and 35th positions, respectively (CEC 1997). Ontario's status as a "big" polluter and a proactive environmental regulator makes it an important jurisdiction to study in the Canadian context.

The province established its Ministry of Environment (MOE) in 1972, but its record of pollution control dates back to 1957, when it enacted the Ontario Water Resources Act to control air and water pollution, and to 1967, when it established Canada's first industrial discharge standards for particular pollutants under the Air Pollution Control Act. In 1972, the same year it created its MOE, the province passed the Ontario Environmental Protection Act which has been used as the statutory authority for a variety of rules, including Regulation 309 (General--Waste Management Regulation) which establishes requirements for waste (including hazardous) generators and TSDFs. Regulation 309 also defines hazardous waste (in much the same way as do the Americans in RCRA) as either characteristic wastes (e.g., toxicity, reactivity, corrosivity and ignitability) or listed wastes which are specified by either a chemical name or as a

particular industrial process. The main distinction between the American and Ontarian definitions is that the latter includes PCBs whereas the former does not.[6]

Ontario is the only Canadian province which has developed a contamination clean-up program. In 1986, it established a $10 million Environmental Security Fund and increased it to $20 million the following year. The program is much more limited than the American Superfund program in that the provincial government has only made funds available on a case-by-case basis, rather than establishing a trust fund, and there are no cost-recovery or liability provisions to shift the financial burden onto responsible parties such as waste generators or TSDF operators. Nonetheless, it has been an important mechanism for initiating cleanups when responsible parties are not able or willing to do it themselves.

1.6 The Limits to Hazardous Waste Regulation in Canada and the U.S.

Governmental hazardous waste regulations have been criticized for their emphasis on hazardous waste management and their relative neglect of pollution prevention. Lake (1993) and Lake and Disch (1992) argue that the authority of these regulations begins when the waste is generated, and thus fails to deal directly with the question of how industries might generate less. Further, Lake and Disch submit that governmental incentives to build new TSDFs (e.g., capacity assurance objectives) create disincentives for industries to invest in waste minimization or pollution prevention strategies. Rather

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[6] Instead, the U.S. regulates PCBs as a toxic substance through TSCA rather than as a toxic waste through RCRA.

than dealing with hazardous waste as an externality of production to be reduced wherever possible (whether cost-effective in the short-run or not), government policies take it as given that industries will generate increasing amounts of hazardous waste that will continue to require proper management somehow and some place. As it stands, the only direct incentive for industries to reduce the volume or toxicity of their waste is if they find it reduces their operating or capital costs, either through efficiencies in the use of chemical feedstocks or through lower waste management costs (Gordon 1986; Gottlieb et al. 1995; Mazurek et al 1995).

Another problem with facility siting as a means of achieving capacity assurance relates to the problem of NIMBY (not-in-my-backyard). While the debate continues as to whether NIMBY, or perhaps NIABY (not-in-anyone's-backyard), is a good or bad thing, it is increasingly clear that some degree of community opposition to hazardous waste facilities can nearly always be found (Heiman 1990). Thus, it is a force to be reckoned with, whether or not one believes there is ever a fair or just way to decide which kinds of TSDFs should go where. Often, these decisions pit communities against one another and limit public discourse to the relative merits of facility sites rather than overall policy objectives (such as whether to regulate waste at the point of production or after the fact).

Still another issue for hazardous waste policy generally, as well as for facility siting decision-making specifically, relates to the problem of environmental inequity or injustice. I will demonstrate in the next chapter that a plethora of research has found that issues of race and class often are associated with hazardous waste facilities. As capacity

assurance objectives often result in facility siting processes, and as facility siting tends to create locational conflicts, so too do these disputes often lead to debates about fairness. This is often the case when actual or proposed TSDFs are located in low-income or racial minority areas (social equity); or when communities with no economic ties to industries which manufacture or use toxic substances in large quantities are expected to bear the burden of waste disposal (spatial equity); or when industrial neighborhoods already overly burdened with toxic emissions are asked to put up with yet another dump in their midst (cumulative equity); or when past or present decision makers set policies which unnecessarily transfer risk to future generations (intergenerational equity); or when decision making processes give preference to industrial interests over community or environmental interests (procedural equity).

CHAPTER 2: ENVIRONMENT AND SOCIAL JUSTICE

2.1 Introduction

The struggle for environmental equity has emerged from a combination of local activism and academic research in the context of the environmental justice movement. It has become a strong political force in the United States, arising out of grassroots struggles over hazardous waste sites, especially in African American and other marginalized communities. Much of this activism and research has focused on the distributional and procedural equity considerations of hazardous waste management. The U.S. government has attempted to meet these demands by creating an Office of Environmental Justice within the Environmental Protection Agency (U.S. EPA) and a National Environmental Justice Advisory Council. President Clinton has issued an executive order (12898) affirming the importance of the issue in environmental management decisions.

But recent achievements toward addressing environmental injustices have been a long time coming. Goldman (1996) cites the 1982 civil disobedience in Warren County, North Carolina over the siting of a PCB landfill in a black community as a seminal moment in the environmental justice movement and an important impetus for this area of research. The protest involved hundreds of people, including prominent civil rights leaders, and led to the first study on environmental equity and hazardous waste. William Fontroy, former Congressional Delegate to the District of Columbia, commissioned the U.S. General Accounting Office (U.S. GAO) to conduct the investigation which found that of the four commercial toxic waste landfills in the

southeastern U.S., three were located in poor black areas (U.S. GAO 1983). In 1987, the United Church of Christ Commission for Racial Justice (UCCCRJ) released its own study which addressed the issue at the national level (UCCCRJ 1987). It found that race was the strongest predictive factor in commercial TSDF location as compared to income and other measures. Since these initial studies were released a rapidly growing body of research on the issue has emerged, prompting a heated debate over the question of whether race or class is the most predictive factor in waste location, among other issues (See Anderton, et al. 1994; Goldman and Fitton 1994; US GAO 1995). Chapter 3 reviews these and other empirical studies on environmental equity in detail.

This chapter attempts to make the link between environmental problems and social justice as a theoretical basis for environmental justice. The next section examines theories of social justice, starting with a discussion of utilitarian notions of efficiency, which form the basis of many cost-benefit or risk-benefit approaches to environmental policy analysis, and which tend to ignore or underestimate problems of inequity. The following sections describe various theories of distributive and procedural justice generally, and environmental justice in particular. The chapter continues with discussions of U.S. EPA activities on environmental equity, as well as how the particular problem of hazardous waste intersects with environmental justice issues.

2.2 Social Justice and the Environment

Environmental equity and justice issues have a number of wide-ranging theoretical implications for the study of industrial activity and its impacts on ecology. These

implications include moral questions about what constitutes fairness and justice in both a distributive sense as well as in relation to process. They include as well legal and political concerns about the role of government in regulating industry and in fostering public participation in planning. Further, environmental equity involves institutional questions about the role of industry in responding to governmental and public pressures and in implementing waste management programs. The study of these wide-ranging dimensions of environmental equity require a similarly broad selection of social theories. In this thesis, I attempt to develop a theoretical framework based on theories of social justice and theories of environmental justice. With this structure, I will attempt to weave together the complex interactions between industrial activities, the environment, the public, the state, political and policy processes, and value judgements inherent to questions of equity or fairness in environmental management. The result is a perspective that is both *state centered* and *society centered* (Clark and Dear 1984; Dear 1981). Following Lake, et. al. (1990, 1992) I attempt to incorporate the role of the state at various levels of federalism as a part of structural relations of capitalism (i.e., the relationship between state and capital). Following Cox (1989, 1997a, 1997b) I also seek to integrate the role of local agents and other stakeholders representing industry, the environment, and social justice.

2.2.1 Theories of Social Justice

Social justice is a moral issue which is fundamental to the determination of fairness and equity. It has been explored by philosophers and social scientists in several ways, with some concluding that the distribution of social welfare, however defined, must

be determined by perfectly competitive market economies. The chief responsibility of national governments in terms of maintaining social welfare, according to this libertarian or utilitarian view, is to maintain free and open markets. The result is that benefits as well as burdens in society are distributed according to supply and demand, generally speaking (Fischhoff 1977). Utilitarians do not necessarily object to all forms of "social programs" (e.g., public schools, unemployment insurance) so long as they are seen to allocate benefits broadly across society and not to reinforce "welfare dependency." The movement to replace welfare with "workfare" reflects this concern.

The opposing extreme to the utilitarian view is that social justice cannot be achieved without distributing society's benefits as equally as possible. This egalitarian view holds that governments must establish planning authorities to distribute goods and services, rather than relying on market mechanisms. The result of this arrangement is that society's benefits and harms are allocated according to normative principles, particularly need. There are, as well, many other conceptions of social justice that fall between the extremes of utilitarianism and egalitarianism. Rather than focusing completely on either open competition or need, a balance is sought here. Additional criteria for determining social justice may come into play as well. There is perhaps an endless, though not mutually exclusive, list of options as Harvey (1973, 1996) has shown in his discussions on social justice.

Social justice is, in some respects, synonymous with equity, depending on one's view towards a just distribution. The concept of equity signifies a balancing of benefits and burdens to one another as well as among groups or communities of people. So a

conception of social justice that includes equity considerations will, by definition, seek to balance benefits and burdens in some way. In this respect, only the most purely utilitarian conceptions of social justice exclude equity considerations completely, as they seek no active balancing role for governments. The more egalitarian the conception, the more important and salient this balance becomes.

Utilitarian notions of social justice are rooted in neoclassical welfare economics. The main principle of this perspective is "the greatest good for the greatest number" (Enbar 1983, 6). In its purest form, utilitarianism focuses completely on increasing overall wealth without regard for equity. The conclusion drawn under this approach is that the most efficient distribution of goods is achieved through market mechanisms. Utilitarianism, in its purest form, is most clearly reflected in the standard usage of cost-benefit analysis which seeks only the most efficient distribution with no regard for equity. Cost-benefit analysis is, of course, not a theory in itself, but rather a method which tends to reflect utilitarian principles. Fischhoff (1977) has suggested that it is possible to incorporate equity considerations into cost-benefit analyses of environmental and other issues by valuing equity as a benefit, though determining how to value equity quantitatively relative to other factors is a formidable problem. Consistent with this is the concept of just compensation whereby communities negotiate benefits in return for accepting noxious facilities (Rabe 1994; Rabe et. al. 1996). Similarly, Daly and Cobb (1989) have argued against the use of discounting of environmental costs in cost-benefit analysis, or at least to discount at lower rates. The problem with discounting, they argue, is that it unnecessarily abstracts the reality of environmental costs, a "misplaced

concreteness" which often leads policy-makers to assume environmental degradation will be minimal, and that it undervalues the full cost of the degradation.

Robert Nozick (1974) rejects utilitarian notions of social justice for their lack of attention to equity, among other reasons. His theory does not, however, move very far toward egalitarianism, because of the importance he places on minimal government involvement in people's lives, and on "liberty, freedom, and self-determination." Nozick uses historical principles to determine how a distribution has come to be and, therefore, whether it is socially just. His approach is to apply evaluative criteria to the historical development of a distribution in order to determine social justice. He argues in favor of rectification and compensation in situations where distributions are historically unjust. He criticizes both utilitarians and egalitarians who use "current time-slice principles" to determine whether a distribution is just (Nozick 1974, 153).

Nozick develops an *entitlement theory* of "acquisition and transfer" in order to illustrate his historically-centered arguments about social justice. Despite his preference for open markets and maximum freedom of choice, he expresses grave concerns about the "holding" of social goods through unjust means, and the distribution of social goods (benefits) that are the result of the originally unjust holdings. He uses perhaps universally accepted examples such as theft, fraud, slavery, and also pollution, among others, to illustrate what he means by an unjust acquisition or transfer of economic benefits. He also includes less universally accepted examples such as "lack of open competition" and less clear examples such as "preventing [people] from living as they choose" (Nozick 1974, 152). Nozick sees no universal theory for determining social justice, but simply

stresses the importance of questioning the historical processes in the determination of just distributions.

John Rawls' (1967, 1971) theory of social justice moves farther toward egalitarianism than does Nozick, though it deliberately stops short of such an ideal. Rawls' ultimate concern is with inequality in the distribution of social goods. He puts forth two principles of justice which are central to his theory:

> [F]irst, each person engaged in an institution or affected by it has an equal right to the most extensive liberty compatible with a like liberty for all. [S]econd, inequalities as defined by the institutional structure or fostered by it are arbitrary unless it is reasonable to expect that they will work out to everyone's advantage and provided that the positions and offices to which they attach or from which they may be gained are open to all (Rawls 1967, 61).

The basic positions that Rawls articulates here is that everyone should be granted the same liberties, that inequalities should only be acceptable if they are advantageous to everyone (the difference principle), and that there should be equality of opportunity in seeking positions in society. His theory is built on the assumption that these principles would govern the distribution of social goods by incorporating them into a political constitution and applying them through legislation.

To achieve his two principles of justice, Rawls proposes systems of savings and taxation. He develops a "just savings principle" in order to redistribute social welfare to future generations. Rawls finds the concept important to ensure a degree of intergenerational equity, and it corresponds very closely to the concept of sustainable development (Norton 1989; Penn 1990) which holds that "a development path that makes people better off today but makes people tomorrow have a lower 'standard of living' is

not 'sustainable'" (Pearce, et. al. 1991, 1). He argues for a proportional expenditure tax, rather than an income tax, to impose levies according to how much a person "takes out of the common store of goods and not according to how much he contributes" (Rawls 1967, 72). Rawls adds that his system of taxation could be based on a progressive scale in order not to disproportionately burden the poor, but only if it is necessary to "preserve the justice of the system as a whole" (Rawls 1967, 72). As long as one includes natural resources in the definition of "goods," Rawls proposal for taxation is consistent with conserving natural resources for the benefit of present and future generations (Penn 1990).

David Harvey's early work on social justice in his seminal book *Social Justice and the City* (1973) is based largely on Rawls' distributive and procedural principles of social justice, even though it moves considerably further toward egalitarianism than does Rawls. While Rawls proposed to maintain a capitalist system with open and competitive markets that are regulated by government to redistribute social goods, Harvey argued in favor of "alternatives to the market mechanism ... in which the market is replaced (probably by a decentralized planning process)" (Harvey 1973, 115). He argued that decentralized planning is generally preferable because unless a country has a "benevolent bureaucracy," its more advantaged areas are likely to exploit less advantaged areas. With decentralized planning, each region or territory would have some degree of autonomy when it comes to determining the distribution of benefits and harms. In addition, he contrasts Rawls proposal for social justice with a marxian interpretation that in order to achieve the difference principle the least fortunate must have greater economic and political power.

In more recent work Harvey (1992, 1996) has returned to questions of social justice, primarily as they relate to questions of nature, environment and difference. He draws heavily on the work of Iris M. Young (1990) who, like Harvey, attempts to build a theory of justice that incorporates the distributive conceptions of Rawls and Nozick. Young recognizes the value of balancing benefits and burdens in society. This includes the distribution of social positions (i.e., class) as Rawls emphasizes. Young also observes, however, that the distribution of positions is only one of many procedural factors regarding equity. She outlines five "faces of oppression" to describe various reasons for and processes of injustice: exploitation, marginalization, powerlessness, cultural imperialism, and violence. With respect to oppression and hazardous waste, she points to inadequate community involvement (Young 1983). Even in cases where the local public and community officials are involved, they are generally limited to participation in facility siting processes rather than ongoing waste management. Furthermore, by the time public hearings and other community proceedings even begin, state environmental officials usually have already granted preliminary approvals of the proposals.

Harvey concurs with Young's observations on procedural justice and its consequences, and he offers a sixth principle or face of oppression, "that all social projects are ecological projects and vice versa" (Harvey 1992, 600). He argues that:

> just planning and policy practices will clearly recognize that the necessary ecological consequences of all social projects have impacts on future generations as well as upon distant peoples and take steps to ensure a reasonable mitigation of negative impacts (Harvey 1992, 600).

Social justice, then, is not restricted to distributions and procedures relating to political-economic "goods" or "positions." In fact, economic development is a primary cause of

environmental degradation in industrial societies. Thus, it is imperative that theories of social justice incorporate ecological principles and the human right to a clean environment into conceptions of fairness. The next section seeks to develop these connections between environment and justice.

2.2.2 Theories of Environment and Justice

Industries that generate pollution resulting from their production processes are subject to environmental pressures from concerned interest groups and governments. These pressures and the state of environmental problems they represent for present and future societies have been described as a form of "crisis" by Lipietz (1992a, 1992b). The environmental crisis is but one of many other challenges facing industry during what some have described as a fundamental global shift from mass production and consumption associated with *Fordism* to more flexible practices associated with *post-Fordism* (Piore and Sabel 1984, Scott 1988, Schoenberger 1988). These other crises relate to not only production and consumption practices, but also to inter-firm linkages, global competition, government regulation, and labor relations.

Concerns about environmental equity add to the complexity of environmental pressures by pitting social groups based on class, race, ethnicity, and ultimately, community against one another (U.S. EPA 1992; Kasperson and Dow 1991; Bullard 1990; United Church of Christ 1987; Kasperson 1983). O'Connor (1981), while not referring to environmental conflict specifically, has described such class conflict as a form of crisis facing industry as well. Tickell and Peck identify as one form of crisis, "[s]tructural crises [which] occur when the mode of social regulation is no longer suited to the

accumulation system" (Tickell and Peck 1992, 193). This mode is a "regulation" theory category which refers to "the role of political and social relations (state action and legislature, social institutions, behavioral norms and habits, and political practices)" (Tickle and Peck 1992, 192). Environmental problems fit this category as well considering the social and political implications of natural resource exploitation, industrial production, and product consumption in capitalist economies. Environmental pressures include:

1. ecological concerns regarding global environmental degradation caused by industry;
2. community concerns about how industrial activity affects local environments;
3. social conflict over environmental quality and natural resources.

In his most recent work on social justice, Harvey (1996) specifically addresses the problem of environmental injustice. By weaving together widely ranging discussions of space and time, nature and environment, and justice and difference, Harvey further develops his marxist approach to social justice. A central recurring theme throughout the book is the question of "loyalties" and the highly related problem of "militant particularisms." The issue of loyalties arises in his book in the context of labor struggles especially, based on Raymond Williams' observations on the subject in his novel titled *Loyalties* (Williams 1985). Through various examples, Harvey shows how individuals engaged in political struggles can virtually never avoid expressing loyalties to one side or another of an issue or set of issues. When local communities are involved, as is often the case, the divisions tend to occur between local concerns and larger interests (e.g.,

provincial/state, national, or even global issues). Harvey, following Williams, illustrates the point by explaining how "[e]ven the language changes, shifting from words like 'our community,' and 'our people' ... to the 'organized working class,' the 'proletariate' and the 'masses'" when one compares local interpretations to institutional responses (Harvey 1996, 33). The local terminology is highly personal and quite clear about loyalty to community, sometimes at nearly any cost (i.e., a "militant particularism"), whereas the broader political and institutional language is abstract and rational.

The chief weakness of the "traditional" environmental movement,[7] according to Harvey, is its tendency largely to avoid the politics of class and race even with respect to local ecological issues. Conversely, he finds strength in the environmental justice movement for its ability to face these problems head on. Pulido (1996a) makes this point as well, relating the struggle against environmental racism, in particular, to the politics of "subaltern" movements, by which she refers to the struggles of subordinated groups in response to economic and political marginalization, cultural identity issues, and quality of life problems, including environmental degradation. She argues that "mainstream" environmentalism has failed to address these concerns because of its tendency to isolate environmental issues from related social and cultural problems.

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[7] By the term "traditional" environmental movement, Harvey refers to the leadership of the "Big Ten" environmental groups: Friends of the Earth, Sierra Club, Environmental Defense Fund, Natural Resources Defense Council, etc.).

2.2.3 Hazardous Waste and Social Justice

Hazardous waste regulation is conducted according to both structural constraints as defined by the state and also pluralist politics. Structural constraints include laws, regulations, and policies as written and implemented by governments. The resulting structural or regulatory framework designates what industry can and cannot do with respect to hazardous waste. Also, any important and relevant issues missing from, or at least written too vaguely within, the regulatory framework become in effect sanctioned by the state, resulting in structural limitations. Further limitations result from a lack of government enforcement of environmental laws and regulations, as well as insufficient public and community involvement in environmental decision-making.

As indicated previously, Lake (1993) and Lake and Disch (1992) see structural limitations in the lack of attention paid to hazardous waste minimization and pollution prevention in U.S. laws and regulations. Additionally, they contend U.S. policy makes five critical assumptions about hazardous waste that ignore waste minimization, and perhaps promote waste generation:

> **Assumption 1:** Private industry will, and should, continue to generate hazardous waste.
> **Assumption 2:** Private generators will, and should, continue to externalize the costs of hazardous waste disposal and treatment.
> **Assumption 3:** Providing facilities needed to treat and dispose of these wastes is a public-sector (specifically, a state-level) responsibility.
> **Assumption 4:** By providing the needed treatment capacity, the state is fulfilling its responsibility for protecting the health and safety of the people in the state.
> **Assumption 5:** The scale and technology of needed facilities are dictated by the size and composition of the waste stream (Lake and Disch 1992, 667-671).

These assumptions, implicit in the U.S. regulatory framework, deflect public discourse away from questions of how and why industry generates hazardous waste and toward the more immediate conflict over the location of facilities. The state's approach, according to Lake and Disch, is to "devise a strategy for waste regulation that fends off the impending legitimation crisis while allowing production (accumulation) to continue virtually unabated." In addition, the state argues for new TSDFs to provide 'safe' handling of increasing volumes of hazardous waste generated by industry, facilities that are necessary to provide sufficient capacity assurance. U.S. law, in fact, requires states to develop capacity assurance plans that virtually mandate the siting of new TSDFs. Rather than dealing with the structural aspect of waste as an investment problem for capital (i.e., the need to limit amounts of pollution generated during production processes), the state instead develops a siting strategy that shifts the debate from structure to location. Geographically specific communities representing differences in race, ethnicity, and class are pitted against one another for the location of TSDFs. Typically, communities fight to keep such facilities out, though in many instances some community members support industrial facilities, however noxious, for the purpose of local or regional economic development through tax revenues and job creation.

Industries that generate hazardous waste respond to these crises by developing environmental management programs to comply with regulations, to facilitate public and community relations, and sometimes even to increase the cost-efficiency of production by preventing pollution through efficiencies in the use of feedstocks. But these waste management methods clearly vary in terms of their benefit (or detriment) to the

environment. All hazardous waste producing firms have to comply with regulations, though some clearly fail to do even that. Beyond that, industries develop voluntary pollution prevention strategies, often in concert with trade associations such as the Canadian Chemical Producers Association and the American Chemical Manufacturers Association to reduce operating costs. These include waste minimization, the treatment of waste to reduce toxicity; source reduction, decreases in toxic production feedstocks; and waste reduction, decreases in waste through reuse and recycling.

2.3 U.S. EPA and Environmental Equity and Justice

U.S. EPA's first efforts regarding equity and justice began in July 1990 when the agency established an Environmental Equity Workgroup. William Reilly, the EPA Administrator at the time, directed the Workgroup to review evidence that racial minority and low-income communities bear higher environmental risk burdens than the general American population and to consider how the agency might address these disparities. The initiative resulted most directly from a January 1990 Conference on *Race and the Incidence of Environmental Hazards* sponsored by the University of Michigan School of Natural Resources. A group of social scientists and civil rights leaders organized the meeting and shared research findings regarding environmental inequities. The panelists named themselves the Michigan Coalition and wrote a letter to the Administrator in March 1990 requesting a meeting to discuss the group's findings. After meeting with some of the MI Coalition members, Reilly appointed staff from several EPA offices across the country to form the Workgroup in July of that same year.

After nearly two years of deliberations, the Workgroup issued its final report in June 1992 entitled *Environmental Equity: Reducing Risk For All Communities*. Two of the terms used in the title reflected the agency's focus on equity and its relationship to risk. The report distinguished its emphasis on environmental equity, which addresses distributions of benefits associated with industrial activity and their corresponding environmental burdens, from the related but broader concepts of environmental justice and environmental racism. Environmental racism refers to the various ways in which racial minority groups have been marginalized historically and how they are affected by processes of social inequality and uneven development which have resulted in environmental inequities. Environmental justice is a still broader term which addresses not only the problems of inequity and racism but also how they relate to procedural and structural aspects of public policy.

U.S. EPA's equity report made a number of findings in support of the hypothesis that racial minorities and low-income people face disproportionate health and environmental problems. Rates of exposure to air pollution, hazardous waste facilities, contaminated fish, and agricultural pesticides in the workplace are all higher for these groups as compared to the overall population. The groups also have higher rates of disease and death, though insufficient data were available to establish the environmental contribution to the difference since environmental and public health statistics are not routinely collected by race or income. The one exception is lead poisoning for which data have been collected and analyzed by race, indicating higher rates of unacceptably high blood lead levels in black children as compared to white children. The Equity

Workgroup concluded in its report that the agency should increase its priority on environmental equity by incorporating it into risk assessment, regulatory development, permitting, enforcement and communication.

A variety of groups and individuals submitted public comments regarding the report's recommendations, including the Michigan Coalition. In general, the reactions reflected encouragement that EPA had finally addressed and admitted to the problem. After all, having the nation's environmental regulatory agency document the existence of environmental inequity was a crucial first step toward addressing the problem through public policy, even though it was already well documented, and even if the recommendations were insufficient. The commenters were especially concerned that the language seemed tentative with its use of phrases like "where appropriate" and "to the degree feasible" as well as its lack of time tables (U.S. EPA 1992). Some also criticized the report's focus on equity (as opposed to racism or justice), and especially its explicit connection to risk, on the grounds that risk assessment is more of a political process than a scientific exercise and that inadequate data make the links difficult to prove.

In November 1992, EPA created the Office of Environmental Justice with a broad mandate to serve as a focal point for ensuring that racial minority and low income populations receive full protection under environmental laws. The office is charged with providing oversight on these concerns to all parts of the Agency (U.S. EPA 1993). This involves reviewing how U.S. EPA conducts its business and recommending changes where necessary. The Office Director advises the EPA Administrator on the impact of environmental risks, programs, regulations, and legislation on socio-economically and

politically disadvantaged communities. The Office of Environmental Justice also serves as a clearinghouse and dissemination point for environmental justice information to the public, other federal agencies and EPA staff, consistent with President Clinton's executive order on environmental justice issued in February 1994.

In April 1994, U.S. EPA's solid and hazardous waste program released its own report on environmental justice in which it announced initiatives aimed at addressing environmental justice problems. Much of their focus was the establishment of guidelines for dealing with communities regarding disputes over hazardous waste facilities. Part of this effort is on "brownfields" issues related to cleaning up contaminated sites. Through its Brownfields Action Agenda established in January 1995, EPA grant funds are now available to assist community groups in redeveloping sites upon the completion of cleanup activities and to work with investors, lenders, developers and other affected parties.

Another part of EPA's environmental justice and waste agenda addresses the question of facility siting. Building on the Combustion and Waste Minimization Strategy established in June 1994, EPA encouraged states to develop community participation strategies in efforts to reduce emissions at existing facilities (especially incinerators and other boilers and industrial furnaces that burn hazardous waste) and to examine alternative facility sites when issues of equity and justice arise. The agency clearly recognizes the need to address distributive equity, particularly with regard to racial minorities and low-income groups, as well as procedural equity to some extent. But its conception of procedural issues is still largely limited to community involvement in the location of facilities and the control of their emissions.

To be sure, these are important items that are highly relevant to environmental equity, yet broader environmental justice questions are left unanswered. In a procedural sense, these community participation strategies fail to address land uses other than waste facilities that might be more acceptable to local residents. Instead, EPA's environmental justice strategy for siting is to address community concerns about equity only in the context of specific proposals in particular locations. This is quite understandable given the typical reality of local government control over land-use zoning and corporate ownership of industrial properties. What more, then, should EPA and other environmental regulatory agencies do to promote environmental justice in the context of hazardous waste policy? Part of the answer lies in the reformulation of federal capacity assurance requirements that lead state governments repeatedly toward the siting of new and expanded facilities. This is also true for the Canadian context, even though this particular policy element has no statutory basis at either the federal or provincial level. As it stands, communities facing the prospect of hosting a new incinerator or landfill must either prove the site to be unfit for such a land use (e.g., hydrogeological problems) or demonstrate enough political opposition such that decision-makers will be convinced to try an alternate path of least resistance (i.e., another location). Also, the fact remains that unless and until hazardous waste policies directly address pollution prevention through the regulation of waste generation within the production process, ideally with as much regulatory "teeth" as existing capacity assurance provisions, the issue of where to locate waste sites, however equitably, will not go away.

2.4 Distributive Justice and Hazardous Waste

Environmental equity research has found that hazardous waste is often generated in one community and transported to facilities in other communities (Lake 1993, Lake and Disch 1992, Lake and Johns 1990, Bullard 1990, Waldo 1985). One of the chief reasons for this is that hazardous waste regulations and disposal fees vary among jurisdictions. Also, not all communities that generate hazardous waste have the capacity to manage it. Waste generators will often ship their wastes off-site, even across international borders, to minimize their costs. This phenomenon has implications for *geographical equity*, the physical or spatial location of benefits and burdens. The case studies presented in Part II will demonstrate that geographical equity is central to disputes over hazardous waste facilities when industrial waste generators in locations other than the host community are expected to benefit most from the additional capacity. This occurred in five of the ten cases presented, three of which involved proposals to expand existing facilities so as to attract larger and more geographically dispersed markets. Two of the cases involved non-industrial "greenfield" sites.

A second finding in equity research is that waste facilities tend to be located in communities inhabited by racial minorities and low income groups (Bryant and Mohai 1992; Bullard 1990; United Church of Christ 1987; U.S. General Accounting Office 1983, 1995). Like the industries it serves, the hazardous waste industry attempts to lower its costs wherever possible. As a result, firms often choose areas with low property values and residents who are less likely to launch protests. These findings have implications for *social equity*, the distribution of benefits and burdens among social groups. Only three

of the ten facility siting cases presented in Part II occurred in black or poor communities, whereas the remaining seven cases occurred in white middle-class suburban areas. This thesis, therefore, finds no evidence to suggest or refute the possibility that proposals for new sites may have been driven by racism or class discrimination in either of the two border regions investigated.

A third aspect of hazardous waste management is that our society's reliance on products that contribute to the hazardous waste stream disproportionately burdens communities which currently have hazardous waste facilities (*cumulative equity*). This is particularly a problem given present difficulties in siting new TSDFs. The result is that proposals for new facilities often are for the same locations as existing facilities. As with spatial equity, cumulative equity concerns were raised in five of the ten cases presented in Part II. The emphasis here is on how environmental risks accrue over time.

Another temporal dimension of environmental equity has to do with the environmental burden that present industrial activities and waste management decisions will have on future generations (*intergenerational equity*). This concern is especially present with regard to landfills since they have the potential to leak and possibly contaminate ground and surface waters in perpetuity. Likewise, underground injection facilities which pump liquid wastes into deep subsurface caverns, are criticized for the same reasons. In each of the five cases involving landfills and the one underground injection proposal presented in Part II, community residents expressed concern about the likelihood that the "natural" (e.g., geological) or "engineered" (e.g., synthetic liners) containments would eventually fail to contain the wastes *in situ*.

A fifth aspect of hazardous waste relates to procedural equity questions of how political and policy processes affect the aforementioned distributions of economic benefits and environmental burdens. Research on hazardous waste equity issues typically finds that inequitable access to decision making processes, and also inequitable power and authority among interest groups, leads to inequitable distributions of benefits and burdens (U.S. EPA 1992; Kasperson and Dow 1991; Bullard 1990; United Church of Christ 1987; Kasperson 1983; Young 1983). These studies have concluded that individual communities typically have relatively little input, and even less power and authority, with respect to issues of hazardous waste planning (including not only hazardous waste siting, but also issues of waste reduction and pollution prevention that relate more to production processes than waste facilities).

One measure to overcome local opposition is to provide financial support to host communities so that they can hire legal and/or technical advisors, as was done in one of the cases presented in Part II. A voluntary process which leads to facility proposals only in communities that agree to them up-front is far preferable and less likely to receive local opposition (Rabe 1994; Rabe, et. al. 1996; Richards 1996, Keunreuther 1996; Ziess 1996). None of the cases reviewed in Part II involved such an approach.

Regarding hazardous waste generators, U.S. EPA is working with the states to develop a new policy (the Combustion and Waste Minimization Strategy) that emphasizes the reduction of emissions from existing TSDFs over the siting of new ones, as well as more explicit waste reduction standards for industries (U.S. EPA 1993). Yet despite these reforms, communities face steep obstacles in attempting local control because of U.S.

constitutional interpretations that waste is merely a commodity with its own rights to free interstate movement (Lake and Johns 1990). In Canada, there has been little political or academic interest in the issue of environmental justice as defined by Americans, perhaps because of historic national differences from the U.S. in the relationship between race and class, and because provinces have the legal right to ban waste imports. Nonetheless, the case studies reviewed in Part II will show that principles of equity are prominent concerns of community and environmental activists as well as government regulators in Canada as well as the U.S.

2.5 Beyond Distributive Justice

Environmental justice research is by no means uniformly concerned with distributive justice and equity issues such as the race versus class debate. Pulido (1996b) cautions that the question, while important, is but one of many related to an extremely complex and pervasive problem. The specific focus on proving and disproving the significance of race and class as demographic variables, she argues, promotes a "monolithic understanding of racism" that fails to account for its relationship with socioeconomic forces such as relations of production and regimes of accumulation that are themselves responsible for creating oppression in various forms. (Pulido 1996, 148). Robert Bullard, who has written more extensively on this subject than perhaps any other social scientist, has argued similarly that we must get "beyond the race versus class trap," suggesting that the issue can backfire in either direction if it is the only one the movement makes salient (Bullard 1993). With respect to the question of environmental

justice and its relationship to NIMBY, Lake (1996), following Young (1983, 1990), has argued for a broader conception of equity that "entails full democratic participation not only in decisions affecting distributive outcomes but also, and more importantly, in the gamut of prior decisions affecting the production of costs and benefits to be distributed (Lake 1996, 165).

Procedural equity, then, must not be narrowly conceived as the opportunity for targeted communities to participate in facility siting hearings. Instead, we will have to "transcend the siting debates and participate in a prior process that eliminates the production of environmental problems" (Lake 1996). With respect to TSDFs specifically, hazardous waste policy is limited by a number of "structural constraints" that serve to perpetuate an unnecessary emphasis on capacity assurance, leading to a discourse on toxics as a locational problem for communities and a site review process problem for state and provincial governments rather than an investment problem for capital (Lake 1993; Lake and Disch 1992; Heiman 1990). In other words, the regulatory emphasis on waste management after the source, rather than during the production process, prioritizes the siting of facilities over the internalization of waste through recycling and recovery.

The relative emphasis on waste management structures the various distributive equity problems associated with toxics in that industrial waste generators and waste management firms reap economic benefits through business activity, while state and provincial governments, as well as communities, must absorb the costs. State and provincial governments subsidize what are often long, controversial, and costly siting processes with public funds. Local governments and non-governmental groups that

choose to fight against facility proposals, or at least involve themselves in the formal process in order to ensure community or environmental interests are represented, often have to absorb the associated legal and administrative costs on their own. Some local governments prefer to support the projects in order to take a larger share of the economic benefits, particularly through tax revenues.

In either case, local governments involved in siting processes must deal with external forces that are directed from higher tiers of the state, and over which they have little direct control, while balancing varying interests within their communities. These differing "loyalties" can lead to a number of reactions to waste facilities, but the strongest protests tend to come from people who live nearest them, while community support is more typical among those who may anticipate personal benefits. Still others may remain indecisive or simply apathetic if they foresee no particular stake. The case studies presented in Part II tell a series of these kinds of stories involving ten facility siting cases in Canada and the U.S.

Before telling these stories, I would like to demonstrate further the connections between environmental justice and hazardous waste, the two central themes of this thesis. Chapter 3 presents empirical findings regarding these relationships from social science research on distributive and procedural equity dimensions of the environmental justice problem. The research demonstrates that race and class are often, but not always, highly predictive factors in the geography of existing waste facilities and other industrial pollution sources. These findings are highly relevant to questions about spatial equity (where the waste comes from and where it goes) and social equity (whether racial

minority and low-income groups are disproportionately burdened). They are also important in the context of cumulative equity to the degree that disproportionate burdens only increase with time as long as the same facilities remain in operation and expand. In highly industrial areas where risks from inactive facilities are compounded with new facility siting proposals, the problem of cumulative inequity is particularly problematic.

Intergenerational equity, the balancing of benefits and burdens between generations, is harder to test empirically than other dimensions of distributive justice, however clear its existence may seem in a conceptual, theoretical, or philosophical sense. Predicting whether a facility will one day fail to contain wastes is difficult. Waste generation is also pertinent in this context since the prevention of pollution before it occurs also prevents future generations from ever having to deal with it.

The second section of Chapter 3 seeks to address the problem of avoidance, or at least limitation, of the need for future waste facilities from present industrial practices. It describes the concept of "industrial ecology" which has been advanced by environmental scientists and "green engineers" who are interested in fundamentally rethinking industrial production with human needs such as worker safety, community health, and environmental protection in mind. The chapter continues with a review of government and industry pollution prevention programs which are aimed at reducing volumes and toxicity of hazardous waste and other industrial pollutants. It concludes with a discussion of findings on these matters in the context of the Great Lakes basin, the region in which the case studies presented in Part II are located.

CHAPTER 3: ENVIRONMENTAL JUSTICE AND THE "INDUSTRIAL ECOLOGY" OF HAZARDOUS WASTE

3.1 Introduction

Hazardous waste management is a complex and multi-dimensional problem, as indicated by the regulatory frameworks described in Chapter 1 and their social justice implications illustrated in Chapter 2. Distributive equity, though it is not entirely representative of the connections between hazardous waste and environmental justice, is an important aspect of the overall problem. The social, spatial, and temporal arraying of hazardous waste facilities and their associated benefits and burdens, described conceptually in Chapters 1 and 2, set much of the context for how and why communities and groups react to siting proposals. This chapter reviews, in detail, the findings of a number of empirical studies on hazardous waste and distributive equity in order to more fully establish this background to the relations between toxics, facilities, and communities.

I argued in Chapters 1 and 2 that distributive inequities and injustices are not the only important aspects of the hazardous waste problem. Structural limitations of environmental regulatory frameworks in Canada and the United States also influence many of the differences of opinion over facility siting. Capacity assurance objectives at the national and provincial/state levels lead to proposals for new and expanded facilities. Moreover, the lack of integration of such policies and proposals with local land-use planning, combined with the distribution of existing waste facilities, often bolsters community opposition.

These underlying factors in the relations between governments at all levels with companies that generate or manage hazardous wastes reflect what has been termed an "industrial ecology" in recent literature in the field of environmental engineering. Rather than emphasizing the location and character of wastes and facilities, as is typical in environmental equity and justice research, "industrial ecology" or "green design" research seeks to address the problem from within production processes that generate hazardous waste. This chapter describes some of the conceptual arguments and empirical findings of this emerging body of research in order to further develop the background for the case studies presented in Part II, Chapters 4 and 5. But first, I will present empirical findings from a variety of studies on distributive justice and hazardous waste.

3.2 Distributive Justice and Hazardous Waste: Race, Class, and Spatial Scale

A variety of empirical studies have investigated the distributive equity dimensions of hazardous waste. In general, this research has questioned the extent to which race and class are associated with the location of hazardous waste facilities. A sometimes heated debate has ensued from the question of which factor is most predictive of facility location. Spatial and temporal scale have factored heavily in the methods employed and the research findings. Spatial scale is important because the results differ depending on the geographic units used in the analysis. Studies using U.S. five-digit zip code areas have found class, and especially race, to be strongly associated with waste facility location (UCCCRJ 1987; Goldman and Fitton 1994), whereas studies using census tracts found neither variable to be a significant factor (Anderson et al. 1994; Anderton et al. 1994a,

1994b). Temporal scale is relevant to the degree that demographic changes occur in communities with hazardous waste facilities, particularly if the racial or class structure of an area changes after new facilities are sited. A "chicken or egg" debate has thus emerged as to whether hazardous waste facilities are attracted to racial minority and low-income areas, or whether minorities and the poor tend to move to locations near these land uses.

Race and class are both associated with the location of hazardous waste facilities. The first study to find this relationship was conducted by the United States General Accounting Office (GAO). It found that of the four commercial hazardous waste facilities in the southeastern U.S., three were located in areas with mostly poor black residents and all four had lower than average incomes (GAO 1983). Without a larger sample size, or a comparison between the four communities and others with no sites, it is hard to determine the broader national significance of the findings (Cutter 1995). Despite its limitations, however, the GAO study was an important starting point for empirical research into the distributive equity dimensions of hazardous waste. Together with Robert Bullard's research on the politics of waste siting in African American communities (Bullard 1983, 1990; Bullard and Wright 1986) problems of environmental equity and racism have been established for well over a decade, at least for the Southern U.S.

3.2.1 The United Church of Christ Commission for Racial Justice Studies

The United Church of Christ Commission for Racial Justice (UCCCRJ) conducted the first national study to investigate environmental inequities associated with hazardous waste in the United States (UCCCRJ 1987). It compared communities (defined as five-

digit zip code areas) with and without commercial hazardous waste treatment, storage or disposal facilities (TSDFs) in terms of their racial and socioeconomic compositions based on 1980 census data. The Center for Policy Alternatives, the National Association for the Advancement of Colored People and UCCCRJ updated the original study in 1994 using 1990 census data (Goldman and Fitton 1994).

The first UCCCRJ study found that communities with two or more commercial TSDFs or one of the five largest U.S. commercial hazardous waste landfills had minority[1] populations of 37.6 percent on average (UCCCRJ 1987). Communities with no such sites had average minority populations of 12.3 percent, slightly less than a third of that found in communities with large numbers or sizes of TSDFs. Zip code areas with one facility had between 22 and 24 percent minority residents on average, depending on the type of TSDF. The study found that racial differences between the communities with and without TSDFs were statistically significant at the .01 level. The report concluded that race was a stronger and more predictive factor than income, though it did not present data to substantiate this claim.

The second UCCCRJ-sponsored study found an even stronger relationship between facility location and race at least partly because it looked at communities with larger numbers of sites than did the first study (Goldman and Fitton 1994). The research compared communities with three commercial TSDFs, an incinerator, or one of the largest U.S. landfills (45.6 percent minorities) with other communities (14.4 percent minorities), a statistically significant difference at the .01 level. Zip code areas with one or more

[1] Minority population was defined as all persons except non-Hispanic whites.

TSDFs had 30.8 percent minorities. Poverty rates in the communities with TSDFs were found to be 35 percent higher, and income levels 19 percent lower, than the U.S. average, though the differences were not statistically significant. Again, the study found race to be a stronger predictive factor than class in determining hazardous waste facility location.

3.2.2 The University of Massachusetts Studies

Anderton et al. (1994a, 1994b) and Anderson et al. (1994) published findings from a second set of national studies of race, class and hazardous waste in the United States. Waste Management, Incorporated and the Institute for Chemical Waste Management, whose loyalties clearly are to industry, sponsored and funded the research. The study was inspired and conceived from quite a different perspective than that of the UCCCRJ whose loyalties are to civil rights. These differing points of view are made clear by comparing the methodologies employed by the two groups. The size of geographic units and the definition of comparison groups diverged between the two sets of studies.

The industry-funded researchers, based at University of Massachusetts-Amherst (UMass), Social and Demographic Research Institute, used census tracts, which are smaller geographic units of analysis than zip code areas, to reduce the "ecological fallacy" problem which increases with spatial scale generally. Another difference between the UMass and UCCCRJ methodologies is that they used different comparison groups. Instead of comparing all areas of the U.S. with and without TSDFs as did UCCCRJ, the UMass group compared census tracts with TSDFs to those without, but only if they were within a metropolitan area that has at least one facility within its borders. The researchers justified their choice on the basis that tracts without TSDFs are relevant as comparisons

only if they are located in a metropolitan area with at least one TSDF (Anderton et al. 1994b).

The UMass group found no statistically significant association between race, class and waste at even the 0.10 level. Blacks and Hispanics represented 23.9 percent of the population in census tracts with TSDFs as compared to 22.9 percent in the control areas, a rather small difference. Similarly, mean poverty rates were only slightly higher in tracts with hazardous waste facilities (14.5 percent) compared to those without (13.9 percent). The only variable found to have had a strong relationship with TSDF location was the number of persons employed in manufacturing and industry, or what the U.S. Census Bureau terms Precision Manufacturing Occupations. In the tracts with TSDFs, 38.6 percent of employed persons age 16 and over worked in Precision Manufacturing, as compared to 30.6 percent in tracts with no facility, a statistically significant association at the .01 level.

The UMass research also investigated the relationship between race, class and waste in larger geographic units or "surrounding areas" by aggregating clusters of census tracts within a 2.5 mile radius of TSDFs. Blacks and Hispanics in these areas were 35.4 percent of the population on average as compared to 20.9 percent in other census tracts. The percentage of families below the poverty line was 19.0 percent on average within a 2.5 mile radius of TSDFs as compared to 13.1 percent in other areas. These patterns are more similar to the UCCCRJ results than to the UMass census tract findings. Average employment in Precision Manufacturing was again higher in the cluster areas surrounding

TSDFs (35.7 percent) as compared to other areas (29.9 percent), similar to the census tract results.

3.2.3 The UMass and UCCCRJ Studies Compared

The UMass and UCCCRJ researchers interpreted their results very differently despite the similarities between the zip code area and geographic cluster findings. Anderton et al. (1994) concluded that census tracts were a more appropriate unit of analysis than larger spatial scales such as zip codes or aggregated census tract clusters:

> [The] aggregated results are very similar to those reported from prior analyses of zip code areas. ... If one could find some clear rationale (that is, an epidemiological demonstration that a particular hazard is characteristically distributed over a particular, larger area), perhaps these larger areas could be accepted as a more appropriate unit of analysis than census tracts. To this point, however, the proof is lacking.

This proof is lacking for two principle reasons. One is that environmental and health statistics are not routinely collected by race, income or census tract in the United States (U.S. EPA 1992). The other reason has to do with scientific debate as to the relative contribution of environmental and behavioral factors of public health problems among various racial and income groups (Colborn et al. 1990, 1996; Gibbons 1991; Gladwell 1990; Okie 1991). The result is that an epidemiological connection between waste location, public health and socioeconomics will be hard to demonstrate.

Goldman, one of the researchers on both UCCCRJ studies, emphasizes the similarities between their findings and those of the UMass group. Even the UMass census tract analysis (which found lower minority percentages than the aggregated cluster analysis) indicated that average black and Hispanic populations were 23.9 percent in tracts

with TSDFs. Their census tract clusters with TSDFs had average black and Hispanic populations of 35.4 percent. These results are not dissimilar to the UCCCRJ findings which ranged from 22 percent to 45.6 percent for all racial minority groups (a somewhat larger demographic category), depending on the number, size and type of facility. In response to the UMass research Goldman (1996) submits:

> So where's the beef? They doubled the percentage of people of color in their comparison group. Always watch a magician's other hand! ... Instead of comparing their waste site tracts to the 12 percent people of color average for the country, they compared them only to other tracts in metropolitan areas with commercial toxic waste sites, which, on average, have roughly 26 percent people of color (eliminating the disparity).

In other words, the difference in results between the UCCCRJ and UMass studies has more to do with comparison groups than with units of analysis, according to Goldman.

Certainly, the UMass group's decision to count census tracts without hazardous waste facilities only if there is at least one TSDF in the same metropolitan area biases the results toward comparisons among industrialized urban and suburban areas. Their methodology ignores all rural tracts except for those where at least one TSDF is located. On average, this also makes for a comparison group with more than double the minority population than the U.S. as a whole (Goldman 1996). Moreover, while the two sets of studies are roughly similar with regard to their findings on average minority populations in areas with TSDFs, depending on geographic scale and the types of facilities counted, the findings for the comparison groups are quite dissimilar. The result is that the UCCCRJ studies indicated large racial and socioeconomic differences between areas with and without TSDFs, whereas the UMass group found more similarities between the two groups.

The question, then, is whether comparisons with TSDF areas at any scale of analysis should be made with all other areas or only those in metropolitan areas with at least one TSDF. The first approach, advocated by UCCCRJ, seems more reasonable for a national comparison. The second approach, advocated by the UMass group, could be a useful way of exploring urban/rural differences, but only if the TSDF areas were compared to non-TSDF areas separately for metropolitan and non-metropolitan areas. As it stands, the UMass approach seems to compare apples with oranges by including all TSDF areas on the one hand, while counting only certain kinds of non-TSDF areas on the other.

3.2.4 Distributive Equity and Hazardous Waste in the Detroit Area

Mohai and Bryant (1992) have empirically measured environmental inequities related to commercial TSDFs in the three counties of metropolitan Detroit, Michigan. The Detroit area is part of the regional focus of Part II, Chapter 5 in this thesis. Mohai and Bryant compared white, minority, and low-income populations at various distances from commercial facilities and found that racial differences were statistically significant at the .01 level whereas socioeconomic differences were not significant at even the .05 level.

They examined the demographics of waste within metropolitan Detroit, the City of Detroit, and suburban Detroit by comparing racial and income breakdowns at three distances from TSDFs: less than 1 mile away; 1 to 1.5 miles away; and greater than 1.5 miles away. The average percentage of minorities increased consistently with proximity to facilities in the central city, the suburbs, and in the region as a whole, whereas the

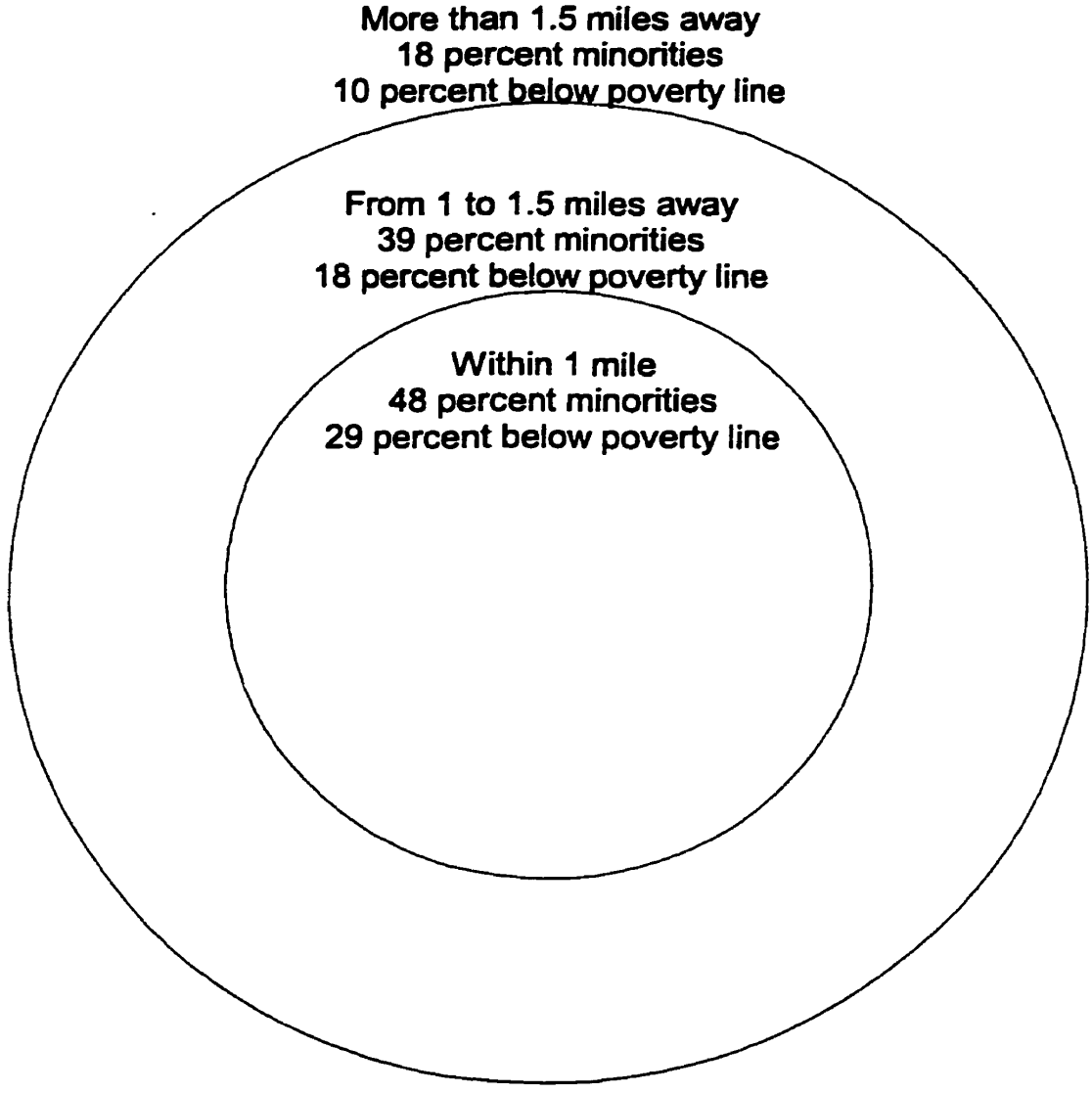
trend for white populations was consistently the opposite. The average percentage of persons below the poverty line also increased with proximity to TSDFs in the metropolitan area as a whole (see Figure 11), but the results were mixed for central and suburban Detroit.

3.2.5 Distributive Equity and Toxics in Ontario

Jerrett et al. (1997) conducted an empirical study of distributive environmental equity in Ontario using Canadian National Pollutant Release Inventory data on industry emissions and transfers (including hazardous waste generation) of 178 toxic substances. The analysis differs from the others in that its analysis is based on industrial pollution emissions, including hazardous waste generation, rather than hazardous waste sites. The study used census divisions as geographic units of analysis, which generally are delineated along county borders, though in some cases the boundaries correspond to regional municipalities or districts. Canadian census data do not allow for the kinds of racial comparisons seen in empirical studies of environmental equity in the U.S. so the researchers restricted their analysis to socioeconomic factors such as income, dwelling values, manufacturing employment and population. Environmental inequities are likely to be less racialized in Canada than in the U.S. given the differences in minority residential patterns between the two countries. Race composition is one of the most significant differences between Canadian and U.S. cities (Ewing 1992; Goldberg and Mercer 1986). Additionally, 75 percent of blacks in the U.S. live in census tracts that are 30 percent white, whereas about 70 percent of Canadian blacks live in neighborhoods that are 40 to 70 percent white (Fong 1994).

Figure 11

Percentage of Racial Minority and Low-Income Residents by Distance from Commercial TSDFs in Metropolitan Detroit



Source: Adapted from Mohai and Bryant (1992, 171)

Their findings corresponded more to the UMass studies than the UCCCRJ research. Jerrett and associates found a positive relationship between pollution emissions and three factors: total population, median household income, and manufacturing employment. Only one variable, dwelling value, had a negative relationship with pollution emissions. This indicates that industrial pollution emissions are higher in areas with larger populations, higher household incomes, greater employment in manufacturing, and lower dwelling values. Together, these factors accounted for 62.6 percent of the variation in pollution levels at the .01 level, and individually, each was statistically significant at the .05 level. The researchers estimated that the positive relationship between total population and pollution emissions accounted for most of the variation (23.4 percent), followed by the negative relationship with dwelling value (16.7 percent), and the positive relationships with income (12.2 percent) and employment (10 percent).

The model held true for most of the census division areas when measured individually. Forty-five of 49 such regions in Ontario were within the range of -1.5 to 1.5 variation (standardized regression residuals) from the mean values predicted by the model. Two census divisions were below this range, suggesting that the model overestimated the relationship between the four variables and pollution levels, whereas two other areas were above the range, indicating the model underestimated the relationships. Lambton County was the most extreme case in the latter category. This area is just across the border from Michigan and, like metropolitan Detroit, is also part of the regional focus of Part II, Chapter 5 of this thesis. The researchers concluded that the large number of pollution sources in Lambton County, mostly in the Sarnia area,

accounted for the deviation from predicted values. Each of the four areas that differed most from the model had among the highest or lowest pollution emissions, depending on whether the model underestimated or overestimated the strength of the relationships. Another Ontario community of interest in this thesis, the Regional Municipality of Niagara (from Part II, Chapter 4), followed the model as well as any other census division area, falling between -1.0 to 1.0 variation from the mean values. This is consistent with the fact that the emissions rate for the region was roughly the same as the provincial average (about 450 tonnes annually).

3.2.6 Distributive Justice and Hazardous Waste: Assessing the Results

The distributive environmental justice implications of hazardous waste are revealed in a number of ways by the research presented in this section. Three of the four U.S. studies found race to be strongly related to hazardous waste facility location, though the relative strength of each varies with methodology. The UCCCRJ and UMass researchers used different geographic units of analysis and comparison groups. They found fairly similar average minority populations in areas with TSDFs, but rather dissimilar racial compositions in areas without facilities. The UCCCRJ studies concluded that racial minorities and low-income groups are more likely to live in areas with hazardous waste facilities. They further concluded that race is a stronger predictive factor of waste location than class since the differences between communities with and without TSDFs were statistically significant in the first instance but not the second.

The two regional studies differed from one another as well. Consistent with the UCCCRJ research, Mohai and Bryant found race to be strongly associated with facility

location in the Detroit metropolitan area. Income differences showed the same general trend, though the relationship was not statistically significant. Jerrett et al. found no relationships between income and pollution in the Province of Ontario, similar to the UMass research findings. The Ontario study differed from the others in that it did not look at race and it used toxic emissions data rather than waste facility location data. Another unique aspect of the research was that it used counties as geographic units of analysis, a larger spatial scale than used in the other studies.

Been (1993, 1994) has criticized these kinds of studies as "snapshots" in time that fail to incorporate demographic changes that might occur after facilities are sited. Without incorporating a temporal dimension to distributive environmental equity research, they argue, there is no proof that siting processes are discriminatory. Been (1994) took the GAO findings, based on the 1980 census, and compared them to population data from 1970 and 1990. She found that African American populations decreased in each of the four Southern communities with commercial TSDFs studied by GAO. In two of the cases, this decrease was considerable--about one-third. Been conducted a similar re-analysis of research conducted by Bullard (1983) in Houston, Texas and found exactly the opposite findings. The percentage of African Americans in nine of ten Houston neighborhoods with commercial TSDFs increased from 1970 to 1990 and the percentage of persons below the poverty line increased in seven of the ten cases over the same period. She concludes that while the results of her analysis are mixed, the Houston findings suggest that low property values in neighborhoods with TSDFs may attract racial

minorities and poor people as much as facility siting proposals are drawn to minority and low-income areas.

Bullard (1994b) and Pulido (1996b) have both argued that the "chicken or egg" debate (i.e., which came first, the TSDF or the racial minorities) is "irrelevant" since a strong spatial relationship between race and waste adds up to discriminatory pattern, whatever demographic changes that may occur subsequent to the siting of a facility. But for Pulido, at least, the arguments of Been and others are symptomatic of a narrow conception of racism that incorporates only intentionally racist acts:

> While I concur with Bullard from an activist perspective that the ["chicken or egg"] question is moot, it is important for what it reveals in terms of conceptualizations of racism as a specific, conscious act of discrimination, which much of the [distributive environmental equity] literature presumes. According to this reasoning, only conscious targeting constitutes racism. Taking this a step further, if residents came to the nuisance voluntarily, does this mean that a racist act did not occur? Does it mean that no corrective action need be taken (Pulido 1996b)?

These forceful statements reveal the importance of tackling problems of environmental racism, regardless of whether they result from discriminatory intent. Following this line of reasoning, I argue that distributive environmental inequities in all forms (distributive and procedural) should be remedied to the degree possible, regardless of whether the patterns were intentional. Much of this work falls within the domain of contaminated site remediation to transform derelict industrial properties ("brownfields") into useful community spaces, as well as geographically targeted enforcement to deal with locally concentrated accumulations of toxic risks. This is not meant to suggest that a perfectly equitable distribution of environmental hazards is either achievable or necessarily desirable. Simply spreading the waste around is hardly the answer, particularly when

pollution prevention can reduce the overall volume and toxicity of hazardous waste through production changes. Thus, it is important that we also get beyond distributive and procedural equity considerations of hazardous waste and resolve the various structural constraints of existing legal and regulatory frameworks. The next section examines these issues within the context of the "industrial ecology" of hazardous waste.

3.3 The "Industrial Ecology" of Hazardous Waste: Getting Beyond Distributions

In recent years, the Canadian and United States governments have put increasing emphasis on voluntary pollution prevention programs that encourage industries to reduce hazardous waste and other environmental contaminants at the source rather than after the fact. Both countries, as well as several industry groups, subscribe to a preferred management hierarchy that emphasizes substitution of toxics, source reduction, reuse, and recycling over treatment and disposal. This emphasis is consistent with the concept of "industrial ecology" which draws its analogy from natural ecosystems to describe the relationships among industrial production, the generation of residuals, and waste treatment and disposal (Allenby and Richards 1994; Frosch 1994a; Bradshaw, et. al. 1992; Jelenski, et. al. 1992). The concept illustrates the importance of internalizing pollution within production because of the environmental effects of uncontrolled emissions, and also because of the economic inefficiencies in materials usage that waste represents. This section is based on environmental engineering literature and government reports on pollution prevention. I also collected information on individual industry waste reduction programs, though it was difficult to integrate that material into the thesis.

3.3.1 Industrial Ecology

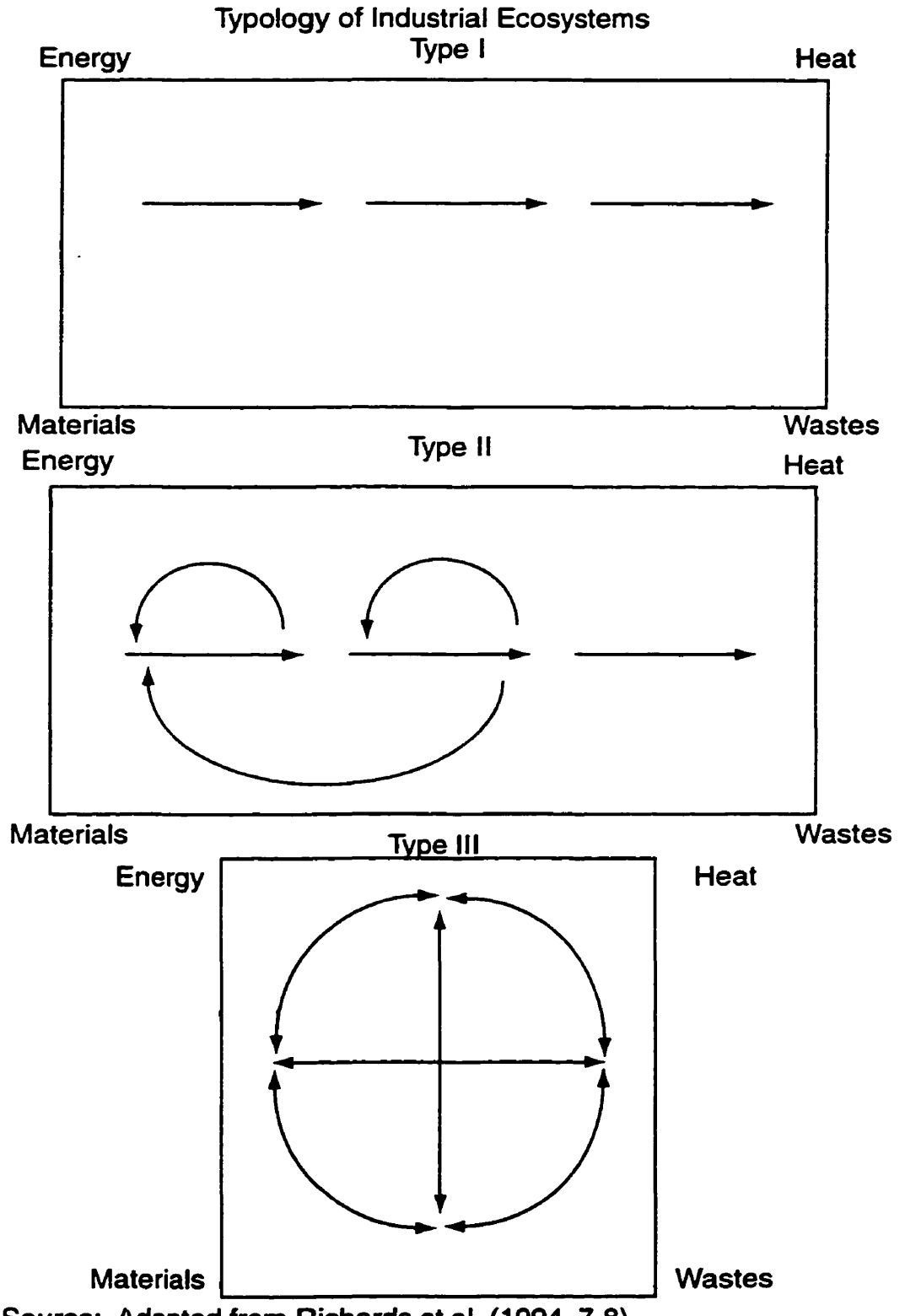
In 1991, the U.S. National Academy of Sciences convened a colloquium entitled "Industrial Ecology" in Washington, D.C. where environmental engineers and scientists from academia and industry presented papers and shared ideas on a "new approach to the industrial design of products and processes and the implementation of sustainable manufacturing strategies" (Jelinski, et. al. 1992, 793). Patel (1992), the conference organizer, described the concept as a "cradle to reincarnation" production philosophy where the "cradle" is expressed as beginning within production and design, rather than after a waste stream is already generated as is the case with "cradle to grave" hazardous waste management. Obviously, recycling is a key element in the "reincarnation" of production residuals into feedstocks (thus avoiding waste disposal), but the idea also includes a more fundamental rethinking of manufacturing base on six elements:

1. materials that have the desired properties and [that] are less harmful to the environment during their extraction or formulation stages;
2. use of just-in-time materials philosophy that would obviate the necessity of storage (and perhaps long-term degradation) of hazardous or nonhazardous feed-stock materials;
3. process substitution that eliminates toxic feed-stock;
4. process modification to contain, remove, and treat toxic materials;
5. engineering controls to assure robust and reliable processes; and
6. the end-of-life recyclability consideration (Patel 1992, 798).

3.3.2 Industrial Ecosystems

Richards, et. al. (1994) have developed a typology of "industrial ecosystems" with three categories representing the history, present and desired future of manufacturing processes (see Figure 12). Type I is completely linear, reflecting historic and many current industrial processes, with one-way flows of materials and energy, and no use of

Figure 12



Source: Adapted from Richards et al. (1994, 7-8)

recycling in production, use, or disposal. Many present industries have advanced to Type II by adopting some internal reuse and recovery strategies, but they still require virgin material inputs and emit pollution and wastes. As a hypothetical ideal, Type III industrial ecosystems would completely, or nearly completely, internally cycle all materials, and thereby avoid the problem of waste generation and management.

There are indications that industry could do a much better job of recovering materials that are presently ending up in hazardous waste management facilities for reuse as manufacturing inputs. Allen and Behmanesh (1994) studied correlations between the market value of various metals and their concentration in available ores and hazardous waste streams. They found that industries frequently discard wastes with higher metals concentrations than are found in virgin supplies. Based on a Sherwood Plot, which has been used to calculate the price of metal based on its concentration in commercial virgin ore since the 1950s (Frosch 1994b), Allen and Behmanesh compared the percentage of metal recycling in the U.S. to that which is economically recoverable from typical American hazardous waste streams (see Table 1). Of the 15 metal wastes included in the analysis, about 15 percent were recycled but over 90 percent could have been recovered given that the percentage of metal within the waste was nearly as high as that found in ores (Allen 1995).

As shown in Table 2, most of the same elements are found in worldwide atmospheric emissions from a variety of industrial activities, including waste incineration (Ayres 1994). Allen and Behmanesh's and Ayres' results, published by the U.S. National Academy of Engineering, show that considerable progress is still necessary to achieve

Table 1

Metal Recovery Potential in U.S. Hazardous Waste Streams

Metal	Percent of Metal Economically Recoverable	Percent Recycled
Antimony	74-87	32
Arsenic	98-99	3
Barium	95-98	4
Beryllium	54-84	31
Cadmium	82-97	7
Chromium	68-89	8
Copper	85-92	10
Lead	84-95	56
Mercury	99	41
Nickel	100	0.1
Selenium	93-95	16
Silver	99-100	1
Thallium	97-99	1
Vanadium	74-98	1
Zinc	96-98	13

Source: Adapted from Allen and Behmanesh (1994, 80)

Table 2

Worldwide Atmospheric Emissions of Trace Metals (1,000 tonnes per year)

Element	Energy	Smelting, Refining, & Manuf.	Manuf. Processes	Waste Incin. & Transport	Total Anthro-pogenic
Antimony	1.3	1.5	--	0.7	3.5
Arsenic	2.2	12.4	2.0	2.3	18.9
Cadmium	0.8	5.4	0.6	0.8	7.6
Chromium	12.7	--	17.0	0.8	30.5
Copper	8.0	23.6	2.0	1.6	35.2
Lead	12.7	49.1	15.7	254.9	332.4
Manganese	12.1	3.2	14.7	8.3	38.3
Mercury	2.3	0.1	--	1.2	3.6
Nickel	42.0	4.8	4.5	0.4	51.7
Selenium	3.9	2.3	--	0.1	6.3
Thallium	1.1	--	4.0	--	5.1
Tin	3.3	1.1	--	0.8	5.2
Vanadium	84.0	0.1	0.7	1.2	86.0
Zinc	16.8	72.5	33.4	9.2	131.9
Totals	203.2	176.1	94.6	283.3	756.2

Source: Adapted from Ayres (1994, 30)

even a Type II industrial ecosystem nationally or internationally. Moreover, movement toward a Type III ideal, where manufacturing and processing industries recover or recycle higher proportions of metals and other toxic substances on-site, could produce several forms of environmental benefit. Not only can a Type III strategy reduce demand for existing hazardous waste TSDFs of all kinds, but production and waste processing plants alike would emit less air and water pollution as a result of progress toward Type II practices on a consistent basis, and also Type III practices where feasible. Reducing pollution at the source also minimizes cross-media transfers from air or water pollutants to hazardous waste. Traditional air and water pollution control measures require industries to install scrubbers and wastewater treatment plants to minimize the volume and toxicity of emissions and effluents. Progress in this regard has been achieved through improvements in treatment technologies that allow for the capture of smaller particulates and lower concentrations of toxic substances. These advances have helped to clean the air and water in industrial cities throughout North America, but they also have generated new sources of hazardous waste, especially incinerator ash and treatment sludge.

3.3.3 Waste as Dissipative Loss

Ayres uses principles of ecology and physics to explain the environmental effects of Type I and II industrial ecologies (with nonexistent or limited recycling) and the value of adopting Type III measures (involving recycling and reuse of all, or nearly all, production-related materials):

> There are only two possible long-run fates for waste materials: recycling and reuse or dissipative loss. (This is a straightforward implication of the law of conservation of mass.) The more materials are recycled, the less

> will be dissipated into the environment, and vice versa. Dissipative losses must be made up by replacement from virgin sources. A strong implication ... is that a long-term (sustainable) steady-state industrial economy would necessarily be characterized by near-total recycling of intrinsically toxic or hazardous materials, as well as a significant degree of recycling of plastics, paper, and other materials whose disposal constitutes an environmental problem. Heavy metals are among the materials that would have to be almost totally recycled to satisfy the sustainability criterion (Ayres 1994, 31).

The *law of conservation of mass* applies to all non-nuclear chemical reactions and states that mass or energy *inputted* is equal to mass or energy *stored* plus mass or energy *outputted* (Soesilo 1995). In other words, the mass of materials that take part in a chemical reaction is the same as the mass of the products and residuals. By way of example, burning coal produces carbon-dioxide gas, water vapor, and ash which, if combined, have a mass equal to the coal in its original state (Lindsay 1984). With regard to heavy metals and other toxic materials, "near-total recycling" (Ayres 1994) is necessary to counter the dissipation or degradation of the original materials during production and consumption, as well as their dispersion into the environment through air emissions, water effluents, and waste streams (see Table 3). Because the combined mass of the pollutants is equal to the toxic substances before they are processed, it is theoretically possible to return a large proportion of many industrial feedstocks to their original state through recycling (see Table 1). Technological and economic limitations are more problematic, so research and development are critical to achieving Type III industrial processes.

The laws of thermodynamics are illustrative of this fundamental problem. The first law of thermodynamics states that matter and energy can be neither created nor destroyed, consistent with the law of conservation of mass (Daly and Cobb 1989).

Table 3

Examples of Dissipative Use

Substance	Tonnes (millions)	Dissipative Uses
Heavy metals		
Copper sulfate	0.10	Fungicide, algicide, wood preservative, catalyst
Sodium bichromate	0.26	Chromic acid (for plating), tanning, algicide
Lead Oxides	0.24	Pigment (glass)
Lithopone	0.46	Pigment
Zinc Oxides	0.42	Pigment (tires)
Titanium Oxide	1.90	Pigment
Tetraethyl lead	?	Gasoline additive
Arsenic	?	Wood preservative, herbicide
Mercury	?	Fungicide, catalyst
Other chemicals		
Chlorine	25.9	Acid, bleach, water treatment, PVC solvents, pesticides, refrigerants
Sulfur	61.5	Sulfuric acid, bleach, chemicals, fertilizers, rubber
Ammonia	24.0	Fertilizers, detergents, chemicals
Phosphoric acid	93.6	Fertilizers, nitric acid, chemicals (nylon, acrylics)
Sodium Hydroxide	35.8	Bleach, soap, chemicals
Sodium Carbonate	29.9	Chemicals (glass)

Source: Adapted from Ayres (1994, 33)

However, the second law of thermodynamics declares that whenever matter or energy is processed and used, the amount of useable materials decreases due to entropy. Entropy, the qualitative degradation of matter, occurs as particles are rearranged or dissipated during their use. Daly and Cobb liken this physical reaction to an hour glass whereby sand in the top chamber (low-entropy matter) looses its ability to fall to the bottom once it has already done so because the transformation changes the sand into high-entropy matter. Returning to the example of burning coal, the reconcentration of heat and gas back into a useable form of energy (i.e., turning the hour glass upside down) would itself require the use of energy, thereby limiting or even nullifying the benefit of such recycling. Thus, a fundamental redesign of production processes often is necessary so that they use less materials more efficiently in the first place. Daly and Cobb argue that a fundamental rethinking of neo-classical economic theory also is necessary so that it recognizes and incorporates the problem of entropy into production decisions.

3.3.4 Incentives and Impediments to Sustainable Industrial Ecosystems

Manufacturing and processing industries, of course, are always keenly interested in improving economic efficiencies, so in one sense they have a vested interest in adopting technologies and techniques that conserve materials and avoid or minimize the need for waste management. Tables 4 and 5 depict the many hidden costs that are associated with pollution control and that could be prevented or reduced through pollution prevention. Yet even these economic realities have not led industries to develop Type II and III technologies and practices on a consistent basis. In 1983, the U.S. National Research Council organized a committee of experts from academia and industry to

Table 4

Hidden Labor Costs Associated with Pollution Treatment

Time to fill drums or storage tanks with waste
Time to properly label waste drums
Time to move waste drums within the plant
Time to load waste drums for shipment
Time to pump out drums or empty a storage tank
Time to schedule waste transportation
Time to fill out waste manifests
Time to file and record manifests
Time to cut checks for waste disposal and transportation firms
Time for waste information training
Time to approve waste disposal invoices
Time to supervise personnel engaged in waste-related activities
Time to select disposal facilities, transporters, consultants, labs
Time to inspect disposal site or sites
Time to obtain waste samples
Time for learning regulatory compliance requirements
Time for all other waste-related activities

Source: Allen (1995, 267), Adapted from Waste Advantage, Inc. (1988).

Table 5

Fifty Environmental Compliance Activities: Hidden Compliance Costs

1. Emergency planning
2. Emergency notification
3. Community right-to-know reporting
4. Toxic chemical release reporting
5. Waste generation reports
6. Apply for construction permits
7. Apply for operating permits
8. Compliance scheduling
9. Conduct testing and monitoring
10. Underground tank requirements
11. Self-monitoring
12. Waste generator surveys
13. Recordkeeping requirements
14. Contingency planning
15. Episode planning
16. Pollution incident prevention planning
17. Employee waste training
18. Federal inspections
19. State/provincial inspections
20. Noncompliance reporting
21. Fire Marshall inspections
22. Completing waste manifests
23. Disposal facility selection
24. Waste transporter selection
25. Waste container labeling
26. Scheduling waste shipments
27. Handling rejected waste shipments
28. Air quality permits
29. Approve invoices
30. Hire consultants
31. Local reporting requirements
32. Worker safety requirements
33. Hazardous substances transportation requirements
34. Waste export reports
35. Report waste information to management
36. Mailing waste manifests
37. Modeling requirements
38. Selection of laboratories for waste analysis
39. Waste sampling
40. Non point-source discharge permits
41. Point-source discharge permits
42. Read & understand new regulations
43. Attend regulatory seminars
44. Waste cleanup activities
45. Inspect waste disposal sites
46. Inspect waste transporters
47. Inspect laboratories
48. Evaluate bids & proposals
49. Manifest exception reporting
50. Supervise waste activities

Source: Allen (1995, 268), Adapted from Waste Advantage, Inc. (1988)

examine factors related to waste generation and possibilities for its reduction (NRC 1985). In 1983 scientists with the U.S. Office of Technology Assessment issued a similar analysis (Office of Technology Assessment 1983). The NAS industrial ecology colloquium in 1992 made comparative findings (Jelinski, et. al. 1992). They identified four incentives for pollution prevention which are presently built into the U.S. regulatory approach and which also apply to Canada:

1. increasing costs of disposal;
2. prospects for incurring substantial financial liability for remedial (clean-up) activities, even where the generator may not have been directly responsible for improper disposal;
3. the risk of third-party liability; and
4. the unpredictability of adverse public reaction or opposition.

NAS and the other groups also outlined deficiencies in regulations as they relate to minimizing waste. One problem is that they have allowed for a heavy reliance on land-disposal, a method which poses longer-term environmental risks than other methods. Cheaper fees for landfilling--about one-half the cost of incineration--account for much of the tendency to landfill. Another limitation is that industries tend to select proven production technologies over less known alternatives that may result in less pollution. Also, as a production process matures firms are even less likely to adopt new methods. A third limitation has to do with confidentiality. When a firm finds a cost-effective way to reduce waste, it can better retain competitive advantage by not divulging information to other firms that could adopt the same process without having to invest the resources to figure it out for themselves. Pollution prevention programs attempt to facilitate corporate exchange of at least generic waste reduction information. However, confidentiality remains an inherent limitation.

3.3.5. Pollution Prevention in Canada and the U.S.

The rhetoric of pollution prevention is a relatively recent phenomenon that permeates the environmental strategies of governments as well as virtually all related interest groups, even those representing industry. The Responsible Care program organized by the Canadian Chemical Producers Association (CCPA) and its American counterpart, the Chemical Manufacturers Association (CMA), is a notable example of the latter. But a major precedent for the approach has a somewhat longer history. Through their work with the International Joint Commission (IJC), the two countries have agreed to these principles since 1972, at least within the Great Lakes ecosystem, when they signed the Great Lakes Water Quality Agreement. In 1987, the Canadian and U.S. governments amended the bilateral agreement to call for the "virtual elimination" of persistent toxic substances, a goal which IJC has continued to support through a policy to ban or sunset their manufacture, use and disposal.

3.3.6. Government Programs

One of the Canadian and Ontario governments' key pollution prevention efforts is waste exchange. The federal program publishes a bi-monthly bulletin that lists industrial wastes being sought or offered for re-use across the country. The bulletin lists materials under the following eleven categories: solvents; other organic chemicals; oils, fats and waxes; acids; alkalis; other inorganic chemicals; metals and metal-containing sludges; plastics and rubber product; textiles and leather; wood and paper products; and laboratory materials and miscellaneous. Environment Canada estimates that the program facilitates nearly 450,000 tonnes of ongoing exchanges annually. The agency considers

this quite a success story for a program with an annual operating budget of $70,000 and a staff of only one full-time person. The Ontario program has a staff of three full-time people and facilitates about 100,000 tons of waste exchanges annually (CEC 1996; U.S. EPA 1994).

Ontario Ministry of Environment and Energy (MOEE) also operates a Pollution Prevention Pledge Program, a voluntary initiative that encourages industries to reduce toxic emissions and advertises success stories by giving awards to companies of varying size that establish innovative recycling programs. The agency also has established Memoranda of Understanding with the Canadian Motor Vehicle Manufacturers Association (CMVA) and CCPA regarding pollution prevention. The CMVA agreement has led to 42 projects at 13 facilities that reduced nearly 4,000 tonnes of toxic emissions annually (MOEE 1995). The agreement with CCPA has led to reductions of over 2,300 tonnes of annual emissions involving 306 chemicals since 1992 (MOEE and CCPA 1995).

The American government's efforts with pollution prevention began when Congress passed the Pollution Prevention Act of 1990. The law does not give U.S. EPA regulatory authority to address the problem, but rather serves as a legislative basis for a preferred hierarchy of environmental management that emphasizes waste reduction at the source as a priority and waste disposal only as a last resort. EPA announced a Pollution Prevention Strategy in 1991 which seeks to institutionalize a "pollution prevention ethic" within the agency, particularly with regard to enforcement actions. The federal government does not operate a waste exchange program, but there is a private national network (which also lists information from the Canadian exchanges) as well as four

private regional and two state-run programs. The national and regional programs across North America are estimated to have facilitated a total of over nine million tons of industrial waste exchanges since they began operating, some dating back to the mid 1970s.

U.S. EPA operates an on-line bulletin known as the Pollution Prevention Information Exchange System that it uses to facilitate voluntary pollution prevention, including hazardous waste minimization (U.S. EPA 1992). Rather than facilitating waste exchanges as in the Canadian program, the EPA database is used by firms to communicate ideas for pollution prevention. The program's chief problem has been the issue of confidentiality. There is an inherent contradiction between freely communicating successful pollution prevention strategies and retaining a strategic cost-efficient position in the market. An illustrative example is an industry which discovers a process change that allows it to reduce its use of toxic chemical feedstocks, thus reducing production costs as well as pollution. The company may not choose to advertise its success if competing firms would be able to adopt the same process without having to expend the resources to figure it out for themselves.

3.3.7 Industry Programs

CCPA and CMA have been attempting to assist the industry in its efforts to respond to environmental pressures and to act in more environmentally responsible ways. To accomplish this task the two groups have worked in concert to develop an environmental strategy known as *Responsible Care*. The program requires CCPA and CMA members to agree to a series of guiding principles, management practice codes, and

self-evaluations. Responsible Care includes six codes of conduct with which member firms must comply: Community awareness and emergency response; Research and development; Manufacturing; Transportation; Distribution; and Hazardous waste management. In addition, members are required to conduct annual self-evaluations based on the principles. The hazardous waste management code is designed to address all issues related to hazardous waste, including minimization. Section Two of the code, Hazardous waste avoidance--material recovery, states that:

> The underlying principle of hazardous waste management is to avoid the generation of hazardous waste. Recovering the value of materials is preferred to their classification, treatment, and disposal as wastes. The hazardous waste management system shall:
>
> 2.1 require consideration of hazardous waste management needs at the initial stages of product research and development or process design and/or modification;
>
> 2.2. continually identify waste sources, evaluate opportunities for hazardous waste elimination and reduction, and hazardous material recycle, recovery or re-use, and take appropriate implementation action (CCPA 1992, 35).

Industry surveys have indeed found considerable voluntary movement toward hazardous waste reduction, though the trend is very uneven with most activity found in larger firms. In a Carnegie Mellon University survey of 450 U.S. corporations, an impressive 100 percent of company representatives responded that pollution prevention is an important aspect of business strategy and nearly 80 percent believed that it could improve economic performance (CEC 1996). But private sector notions of what constitutes pollution prevention are more troubling. Slightly over 50 percent and 20 percent, respectively, identified "waste treatment" (including off-site transfers) and

"pollution control" as forms of prevention. Forty percent were unable to accurately recognize "reduction at the source" as being an important environmental strategy. This reflects an on-going battle over definitions, with industrialists insisting they should receive credit for off-site recycling, and with government regulators and environmentalists only recognizing on-site or "closed-loop" recycling, in addition to reduction at the source, as pollution prevention.

An external audit of 29 chemical companies with active pollution prevention programs conducted in 1985 and 1992 found that 87 percent of the firms' waste reduction projects involved process, operations and equipment changes (Dorfman, et. al. 1992). Only 13 percent of the results were due to chemical substitutions or product changes that are typically more complex to achieve, but nonetheless crucial to realizing continued success in pollution prevention. Since 1990, American chemical companies have reduced emissions of 320 "core" chemicals on EPA's Toxic Release Inventory by 47 percent (Allen 1995). The petrochemical and other large-scale sectors account for most of the present success in corporate pollution prevention. Both Canada and the U.S. have reported that small and medium sized firms have much more room for improvement in this regard as compared to larger companies (CEC 1996).

3.3.8 Pollution Prevention and the Environmental Movement

Greenpeace (1992) characterizes most of these programs as examples of "greenwashing" that are intended to repair industry's image as a major polluter. Regarding Responsible Care, they first criticize the lack of public access to CCPA and CMA members' annual self-evaluations. Second, they see no criteria for what constitutes

a safe product. Related to this point is the organizations' failure to publicly recognize the inherent toxicity of their business, even when they do manage to handle their feedstocks, products, and wastes appropriately. This is particularly the case with regard to the chemical industry. Third, they argue the waste minimization code amounts more to end-of-pipe measures than prevention (Greenpeace 1992). Another criticism of American pollution prevention efforts to date is that many of the industry-reported chemical reductions are due to either changes in emission estimation procedures or plant closings (Allen 1995).

Regarding individual corporate programs, Greenpeace points out the numerous hazardous waste-related accidents many companies have caused, contaminating surface waters and underground aquifers across North America and the world. These types of accidents have continued to occur, they argue, despite the chemical industry's heavy involvement in the Responsible Care program. Great Lakes United, a bi-national environmental organization and Pollution Probe, Canada's largest environmental group, both call for "zero discharge" as the only sensible long-term goal for industries and regulatory agencies. Both groups also criticize Canada and the U.S. for failing to implement the provisions of the Great Lakes Water Quality Agreement.

3.3.9. The International Joint Commission and "Virtual Elimination"

Hazardous waste regulation has come a long way during the twenty years of its evolution as formal policy. But the Great Lakes Water Quality Agreement between Canada and the U.S. is now 25 years old, yet neither country has made very much progress on its implementation. Also, by signing the 1987 amendments to the agreement

the two countries agreed to "virtually eliminate" persistent toxic substances (PTSs) through "a comprehensive, binational program to lessen the uses of, and exposure to persistent toxic chemicals found in the Great Lakes environment" (Environment Canada and U.S. EPA 1996, 3). PTSs are defined as any chemical with a half-life greater than eight weeks or that bioaccumulates in living tissue.

The International Joint Commission (IJC), established to assist Canada and the U.S. in their implementation of the Great Lakes agreement, has commented on the importance of hazardous waste issues relative to the strategy for virtual elimination of PTSs. A 1994 IJC Virtual Elimination Task Force report concludes:

> The assessment and containment/remediation of hazardous waste sites must be considered in a strategy for virtual elimination of persistent toxic substances [PTSs] from the Great Lakes Basin Ecosystem.
>
> Existing land disposal methods cannot guarantee protection of groundwater resources in the long run. Once an aquifer has been contaminated by PTSs, the resource is, for most intents and purposes, lost for generations.
>
> Synthetic organic chemicals, particularly chlorinated organics, are a likely source for many of the chemically induced reproductive failures, birth defects and abnormalities in wildlife and possibly humans. These compounds are prevalent in hazardous waste sites, and chlorinated organics are a part of everyday life, not only for industry but for individuals as well. If we cannot control the fate of these chemicals, then it is time to assess how essential they are to a healthy and productive life, essentially to ask, do their benefits outweigh the risks (IJC 1994, vii)?

IJC has also determined that both Canada and the U.S. currently have sufficient legal authority to implement the virtual elimination strategy. The Canadian Environmental Protection Act (CEPA) and the American Toxic Substances Control Act (TSCA) give regulatory agencies the power to severely restrict and even ban the use and

disposal of particular chemicals. Yet IJC's Virtual Elimination Task Force concludes that there is:

> a broad consensus that the governments have not fully acted on their authority. The implementation of laws in the United States and Canada has been a failure, from the standpoint of developing a comprehensive and effective virtual elimination strategy. Despite progress that has resulted from existing laws, goals such as zero discharge have been overlooked and practically forgotten. TSCA has become, at best, a tool to screen the introduction of new chemicals. It has only been used to limit the use and manufacture of PCBs. CEPA has been incredibly slow and cumbersome, and seemingly ineffective (IJC 1993, 43).

In response to these kinds of criticisms, Canada and the U.S. have developed a draft *Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin* in 1996. Both countries agree to "seek" 50 to 90 percent reductions in the use, generation, or release of 13 *Level I* Substances by at least the year 2005. In 1985, IJC's Great Lakes Water Quality Board identified eleven of these as the most critical to address because of their toxic and bioacumulative properties and their persistence in the Great Lakes environment. Both governments also commit to "promote prevention and reduced releases" of sixteen other *Level II* Substances (Environment Canada and U.S. EPA 1996, 7). The strategy follows the framework outlined in *Agenda 21: A Global Action Plan for the 21st Century* and adopted at the 1992 United Nations Conference on Environment and Development. Both countries and other nations committed, "where appropriate," to:

> undertake concerted activities to reduce risks for toxic chemicals, taking into account the entire lifecycle of the chemicals. These activities could encompass both regulatory and non-regulatory measures, such as promotion of the use of cleaner products and technologies; emission inventories; product labeling; use limitations; economic incentives; and the phasing out or banning of toxic chemicals that pose an unreasonable and

> otherwise unmanageable risk to human health and the environment, including those that are toxic, persistent and bioacumulative and whose use cannot be adequately controlled (Quote from Environment Canada and U.S. EPA 1996, 3).

The American and Canadian governments are making important progress in the implementation of virtual elimination of PTSs by committing to specific reductions in twelve of the more dangerous ones. Yet, in relation to a petrochemical industry that produces approximately 14,000 separate chemical feedstocks and products, this represents a relatively small step. Both countries would also seem to have considerable flexibility in the Agenda 21 provisions on toxic substances, given that the most stringent strategies (chemical bans and clean technology) are only examples among others like product labeling and emission inventories. Phaseout of PTSs is a critical component of an overall strategy for advancing to sustainable Type II and III industrial ecosystems that rely more on pollution prevention than waste treatment and disposal. These kinds of approaches to environmental management are also necessary pre-conditions to achieving fairness and justice (particularly intergenerational equity) with regard to industrial facilities of all kinds, including and especially hazardous waste TSDFs.

3.4 Conclusion

This chapter has explored many of the various problems associated with hazardous waste. The inequitable distribution of TSDFs, described conceptually in Chapters 1 and 2, has been demonstrated empirically and associated with race and class. The debate over the appropriate geographic scale to measure the relationships between race, class and waste notwithstanding, communities that are targeted for new hazardous waste facilities

often feel threatened by the risks and other burdens associated with such land uses. The problem of fairness figures prominently in disputes over facility siting, particularly when local residents are racial minorities or low-income (social equity). Other dimensions of equity and justice come into play as well, such as when there is a spatial disjoint between benefits and burdens (geographic equity) or when an area is disproportionately burdened by numerous industrial hazards (cumulative equity). Intergenerational equity, the balancing of present economic benefits and future environmental burdens is yet another dimension of the problem. Procedural equity is required to ensure that all voices are heard in hazardous waste decision-making, including the communities that are targeted for new facilities.

Structural limitations of hazardous waste laws and regulations, described in Chapter 1, also contribute to environmental injustice. Industries in Canada and the United States are not required to limit their generation of toxic wastes, regardless of the quantity or severity of these substances. Instead, rules of procedure are imposed to provide "cradle to grave" management, but only after the waste is already produced. The second half of the present chapter has demonstrated the difficulties and opportunities associated with limiting the emission of pollutants within production. Federal, provincial and state governments operate voluntary pollution prevention programs to facilitate recycling and reduction, but no public authority in either country can mandate these kinds of activities. Many in the scientific and engineering communities have pointed to the need for research and development to support technological advances that could help reduce pollution through production design changes that approximate Type III industrial ecosystems.

Already, there are indications that wastes contaminated with metals could be recycled about as economically as exploiting virgin ores. Process changes within the chemicals industry could achieve still further progress toward pollution prevention.

Given the nature of environmental injustice in its many distributive, procedural and structural forms, how should we interpret hazardous waste facility siting? Chapters 4 and 5 in Part II review ten commercial TSDF siting cases in two regions on the Canada-U.S. border. Chapter 4 focuses on the Niagara region on the New York-Ontario border and Chapter 5 introduces the Detroit and Sarnia areas on the Michigan-Ontario border. The cases reveal a number of interesting issues related to environmental equity and justice. Stakeholders on varying sides of the disputes each are shown to have their own personal interests and corresponding conceptions of fairness. The result is a complex mix of competing arguments and evidence from different perspectives with which facility siting review boards must contend in order to make final decisions that are not only fair, but also practical. The cases presented in Part II show that often this is quite a difficult balancing act, particularly given the indeterminacies of law when applied to locally contingent circumstances. Moreover, different stakeholders bring widely ranging expectations of fairness, equity, and justice to facility siting proceedings.

PART II: VIEW POINTS

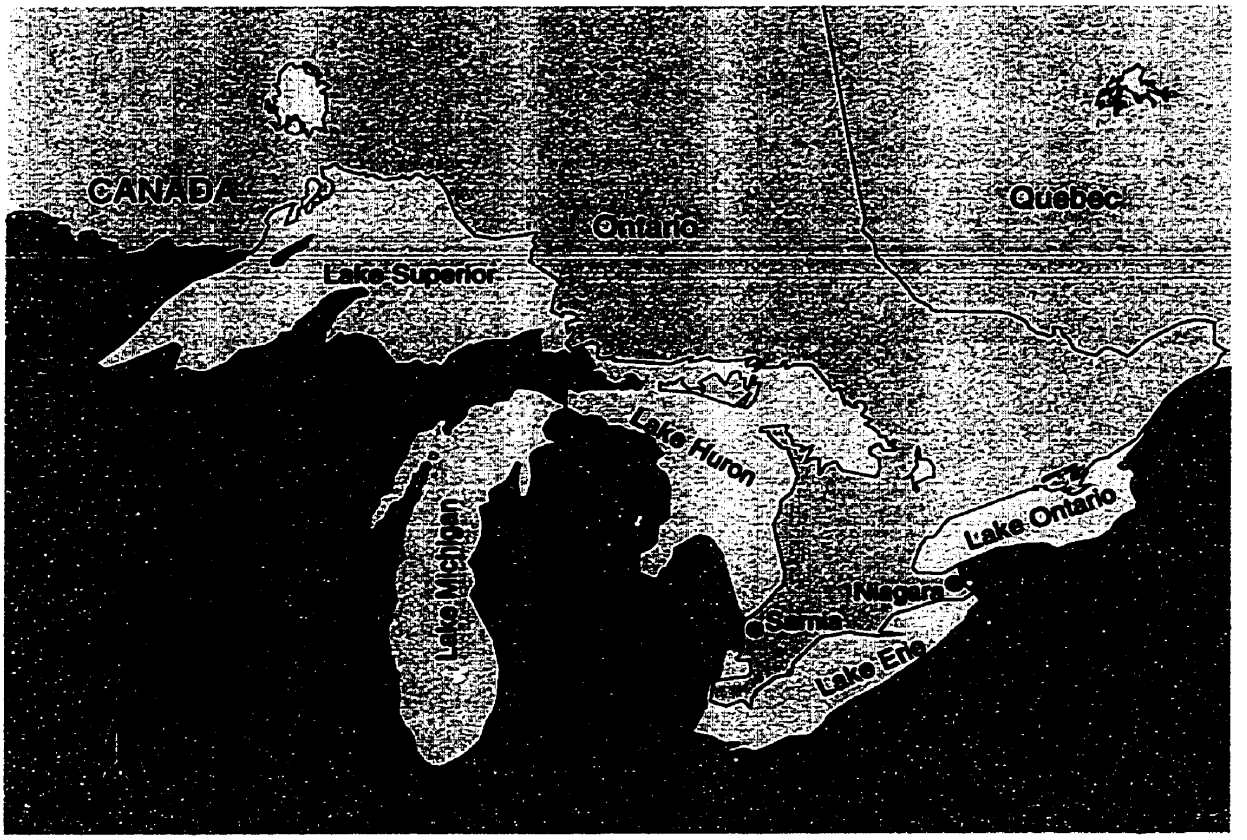
THE NIAGARA REGION
DETROIT AND SARNIA

Introduction

The Great Lakes Region on the Canada-United States border is a highly industrial area encompassing one province (Ontario) and eight states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin) as shown in Figure 13. According to the International Joint Commission (IJC 1994), there are 4,503 hazardous waste sites in the region, 98 percent (4,421) of which are located in the U.S., 2 percent (82) of which are located in Canada, and 94 percent (4,249) of which are closed and no longer accepting new wastes (see Figure 14). I conducted the field work for this thesis in two partly industrial regions within the Great Lakes area: The Niagara region on the New York-Ontario border; and the Detroit and Sarnia communities on the Michigan-Ontario border (see Figure 13). As shown in Figure 14, Detroit and Niagara Falls, NY have among the highest number of hazardous waste sites per square mile (over 0.20) found in the Great Lakes region. The Canadian portions of both study regions have much lower concentrations of facilities. Lambton County, ON (including the Sarnia area) has 0.01 to 0.05 hazardous waste sites per square mile and the Regional Municipality of Niagara, ON has less than 0.01. This relatively lower density of sites in Ontario, as compared to the U.S. Great Lakes states, stands in contrast to the province's rather heavy annual discharge of industrial pollution. As explained in Chapter 1, Ontario has the third highest emissions of any Canadian or U.S. jurisdiction (after Texas and Tennessee). The states of Michigan and New York ranked 9th and 24th, respectively. However, when listed according to pollution releases and transfers per km^2, Ontario ranked much lower

Figure 13

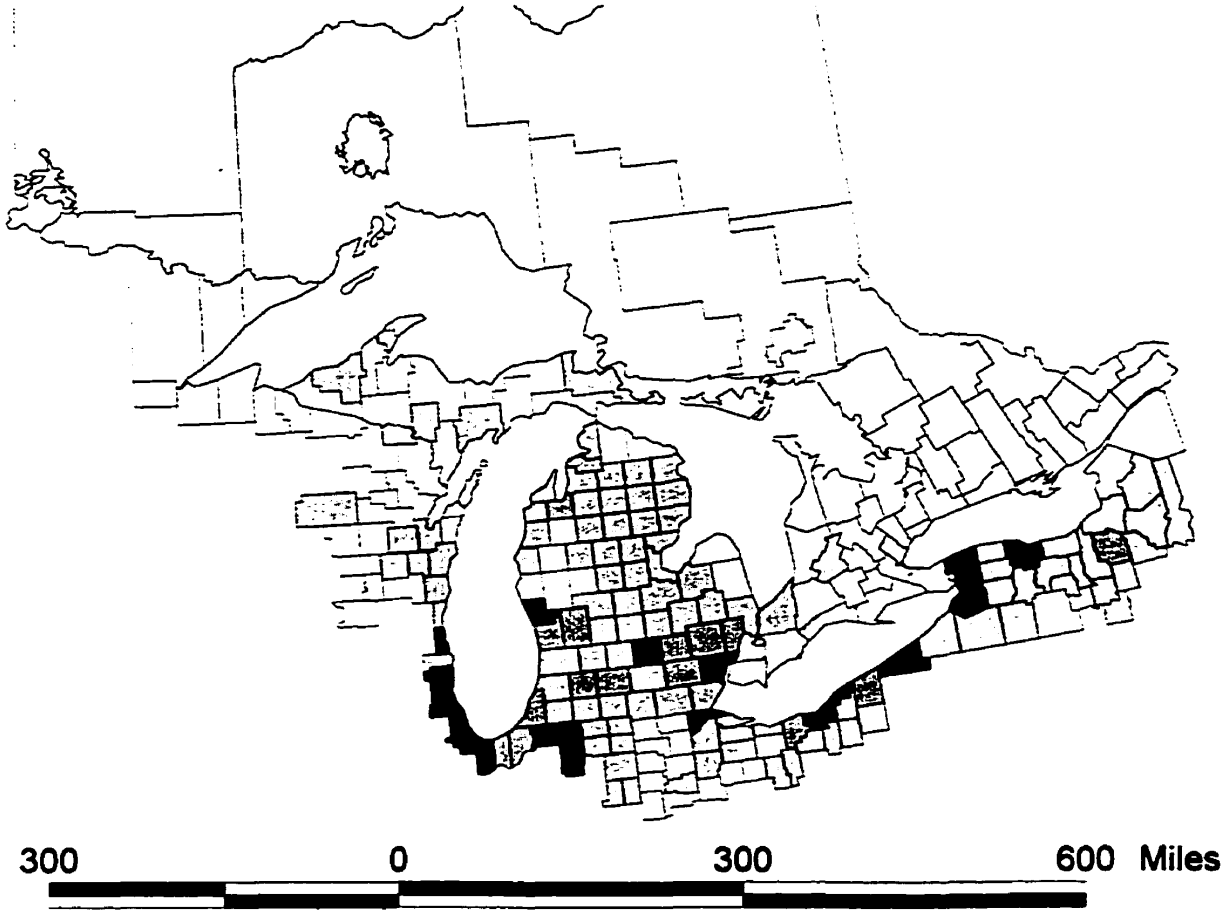
The Great Lakes Region



200 0 200 400 Miles

Figure 14

Distribution of Hazardous Waste Sites
in the Great Lakes Basin



Source: Adapted from the International Joint Commission (1994)

in the 35th position compared to Michigan and New York which ranked in the 16th and 25th positions, respectively (CEC 1997).

The high degree of present and historic industrial activity in the Great Lakes area generally and in the Niagara and Detroit/Sarnia regions specifically provides an obvious advantage for an analysis of hazardous waste management. Also, both study regions include presently operating or proposed treatment, storage or disposal facility (TSDF) sites on both sides of the international border. The Niagara region is heavily industrialized along both sides of the Niagara River frontier, especially in Niagara Falls, New York where proposals were advanced for expanding two TSDFs in the early 1990s. Across the river in Niagara, Ontario, the Ontario Waste Management Corporation (OWMC) attempted to site a new TSDF in two separate communities during the 1980s and early 1990s.

Ontario's only currently operating hazardous waste landfill and incinerator is located just outside of Sarnia where there are numerous petrochemical facilities and where a proposed additional incinerator was to be located in the early 1990s. Across the international border in the Detroit, Michigan area, six separate proposals for new TSDFs were developed for construction and operation in various locations of the "Motor City" during the 1980s and early 1990s. Together, these ten cases comprise the "sample" of data I use to investigate the relationships between hazardous waste facilities and environmental justice in Canada and the U.S. (see Table 6)[8]

[8] This "sample" of ten cases constitutes all of the formally proposed facility siting cases in the Niagara and Detroit-Windsor/Sarnia regions for which public hearings were conducted since the early 1980s when TSDF siting boards and official hearing proceedings were instituted in Michigan, New York and Ontario.

Table 6

HAZARDOUS WASTE FACILITY SITING DISPUTES IN THE NIAGARA, SARNIA AND DETROIT AREAS

Facility	Community	Pre-Existing Site	Facility Type	Opposition	Concerns	Outcome
CECOS 6/87 - 3/90	Niagara Falls, NY (urban)	HW Landfill	Landfills	City; County; Local Group; Ontario	Cumulative & Spatial Equity; Hydrogeology	Denied
CWM 4/89 - 11/89 6/90 - 6/93	Lewiston, NY (suburban)	HW Landfill	Landfill; Incinerator	City; County; School Board; Local Group; Ontario	Cumulative & Spatial Equity; Hydrogeology	Landfills Approved & Built; Incin. Withdrawn
OWMC 1/80 - 11/81 11/81 - 2/95	S. Cayuga/ W. Lincoln, ON (agricultural)	Greenfields	Landfill; Incinerator; Solidification; Treatment	City; Regional Municipality; Local Group; Laidlaw	Spatial Equity; Intrusion on Private Sector	Denied
Laidlaw 12/89 - 10/93	Moore, ON (agricultural)	HW Landfill; Incinerator	Incinerator	Local Groups; Walpole Island	Cumulative & Spatial Equity	Withdrawn
EMS 6/82 - 10/82	Sumpter, MI (suburban)	Municipal Landfill	Landfill	Township	Hydrogeology	Denied
ERES 9/82 - 12/82	Pontiac, MI (suburban)	Municipal Landfill	Incinerator	Township; School Board	Hydrogeology & Proponent	Denied
Stablex 12/82 - 9/83	Groveland, MI (suburban)	Quarry	Landfill	Township	Hydrogeology & Design	Denied
NCS 12/87 - 5/88	Detroit, MI (urban)	Treatment Facility	Treatment	Local Group	Cumulative Equity	Approved, never built
City Env. 2/89 - 9/89	Detroit, MI (urban)	Municipal Incinerator	Treatment	Unorganized Residents	Cumulative Equity	Approved, never built
EDS 8/90 - ?	Romulus, MI (suburban)	Greenfield	Underground Injection	City (after initial support)	Zoning; Spatial Equity	Built, not yet approved

The methodology employed in Part II draws from various research techniques commonly used in the geography of law and related disciplines. Blacksell et al. (1986) have pointed to the importance of the geographical imagination on legal studies as a way of understanding the connections between law and society in terms of spatial patterns and processes. Blomley (1989, 1994) and Clark (1985, 1986, 1989) have both used legal and quasi-legal case studies involving inter-jurisdictional conflicts (among communities and between various levels of government) in Canada, the United States and other countries to examine the politics of legal interpretation. Lake and Johns (1990) have applied this approach to the analysis of hazardous waste facility siting in the United States and its relationship to environmental law. Following a similar approach, I use an interpretive case study method (Lijphart 1971) to review and compare Canadian and American facility siting disputes with an emphasis on their local, regional, and national settings (Eckstein 1963).

For each of the ten TSDF siting cases, I reviewed government files including hearing transcripts, arguments and evidence submitted by parties to the proceedings, and government agency decisions to document the power struggles reflected in the events. I also conducted interviews with community stakeholders, public officials at the state/provincial and local levels, and industry representatives to "ground truth" the information elicited from the government case files and data. The combined information provides a rich body of evidence from which to analyze the environmental justice implications of hazardous waste facilities from a variety of points of view within and across communities on both the American and Canadian sides of the Great Lakes Region.

While the cases are not necessarily representative of either Canada or the U.S., or even of the Great Lakes Region, they do reveal noteworthy issues with both country's approaches to hazardous waste management. The ten cases reflect diversity in proposed facility types such as, for example, expansions of existing facilities as well as new developments at "greenfield" sites; corporate-sponsored and also government-sponsored projects; small designs with only one facility component (e.g., a treatment facility) as well as large developments with as many as four facility components at one location (e.g., a landfill, incinerator, treatment facility, and solidification plant); and "successfully" and unsuccessfully sited facilities. Also, the affected communities varied from case to case in terms of whether they were urban or rural and also the racial and socioeconomic characteristics of residents (e.g., white working class and middle class rural and urban communities; native reservations; urban African American neighborhoods). Moreover, their location on the Canada-U.S. border makes the cases interesting not only in terms of comparison with one another, but also with respect to national differences and cross-boundary issues.

CHAPTER 4: THE NIAGARA REGION

4.1 Introduction

The Niagara Region on the Canada-United States border has been the setting for a number of extraordinary industrial-environmental conflicts, particularly with respect to hazardous waste (see Figure 15). As discussed in Chapter 1, the Love Canal contamination in Niagara Falls, New York transformed the way North Americans think about hazardous waste and forced major environmental policy changes. But Love Canal is by no means the only hazardous waste issue facing the Niagara region. This is especially true of the New York side of the border area which has been dominated by chemical sector production and waste disposal dating back to large war-time efforts and strong early post-war growth. This local industrial history has surfaced in several other contamination discoveries that have been classified as Superfund cleanup sites.

In all there are 132 inactive and contaminated sites in Niagara County, New York (Olsen 1991, 1995) (see Figure 16). Further, the national and state-wide reforms that were originally conceived with Niagara Falls in mind have come back full circle, forcing the community to serve as a host for wastes from throughout North America so that production may continue unabated however badly industry fails to internalize its own noxious byproducts. Capacity assurance policies, for example, have led state environmental officials and private waste management firms to seek approval for expansions of existing facilities in Niagara County repeatedly throughout the 1980s and 1990s. This irony has been at the heart of recent efforts to remediate not only contaminated sites, but also the geographic inequity of being the only community in the

Figure 15: The Niagara Region

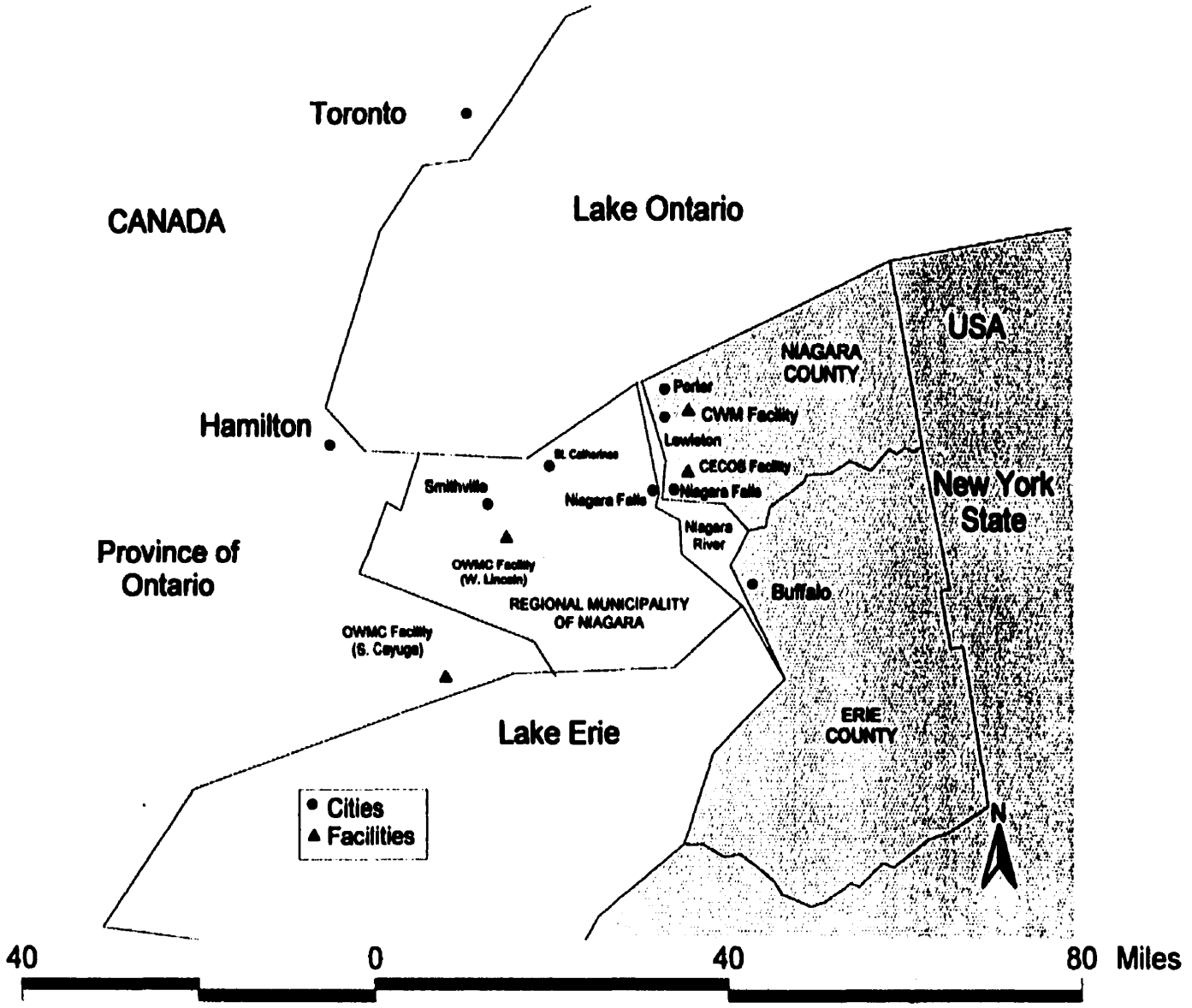


Figure 16

Top Hazardous Waste Producing Counties in New York State by Region

state targeted for new commercial hazardous waste capacity; Niagara County is also the single jurisdiction in the state with an active commercial hazardous waste landfill despite the relatively even spatial distribution of hazardous waste generation in New York (NY DEC 1989, 1995). This issue is discussed further in the last section of this chapter. The CWM facility has its own interesting history as the site of significant Manhattan Project activities from World War II which left radioactive wastes that are still on-site.[9]

The Niagara region of Ontario lies just over the river from New York State. In many respects, its industrial history is very similar to that of its international neighbor. The municipalities of Niagara Falls in New York and Ontario take full advantage of the tourism benefits of the waterfalls and have developed highly commercial riverfront districts (Pitegoff 1991). Also, both regions exploit hydroelectricity from the Falls and have built a number of industries along the river. Each side has rural hinterlands as well that are largely agricultural. It is in these outlying areas that Niagara, Ontario's experience with hazardous waste has become most pronounced. The Niagara peninsula communities of South Cayuga and then West Lincoln were the sites of a fifteen year dispute over attempts to build a large integrated hazardous waste facility with a landfill, incinerator, and physical/chemical treatment capacity on previously agricultural and presently undeveloped land. Rural agricultural communities would seem to be unlikely candidates for such a development, but the region's proximity to industrial waste

[9] Interestingly, the early history of the CWM site (Model City) is tied to that of Love Canal in that the two would have been connected by a series of canals designed to divert water from the upper to lower Niagara River for hydroelectric power. What came to be known as Love Canal was William T. Love's aborted first attempt at digging the southern section. It was only later filled with hazardous waste (McGreevy 1994).

generators in the Hamilton and Toronto areas, as well as its geology with thick clay deposits, made it a prime choice in the eyes of the provincial government, specifically the Ontario Waste Management Corporation (OWMC).

An additional historical contingency is that the proposed facility site was near a small and seemingly harmless light industrial district that was found to be the source of a serious PCB contamination. By the time it was discovered in 1985, the toxic plume had already migrated down to the bedrock and had entered an underground aquifer that served as a drinking water source for the nearby town of Smithville (Ketcheson 1995; O'Neill 1995; Smithville Phase IV Bedrock Remediation Program 1995). Residents were forced to abandon their now useless system and the province paid for a new system that pumps water from Lake Ontario (Macdonald 1991; Packham 1995). Area citizens' experiences with this incident, as well as basic fairness issues related to becoming a provincial (and even continental) *sink* for industrial *sources*, influenced local opposition to the disposal facility in much the same way as occurred in Niagara, New York in response to the Love Canal tragedy.

The similarities and differences between the two halves of this international region make it an interesting point of comparison to uncover the geographies of resistance to hazardous waste and its environmental justice implications. Not only does the area offer a binational view, it also provides a regional and local setting in which to explore the relationships between communities targeted for waste disposal and government agencies at the provincial/state or federal levels. As such, this chapter proceeds with a discussion of hazardous waste and facility siting policies in Ontario and New York. It continues with a review of facility siting case studies from both sides of the Niagara region.

Hearing transcripts, arguments and evidence submitted by parties to the proceedings, siting board decisions, and interviews with stakeholders are used to document the community power struggles reflected in these quasi-judicial cases. I trace the developments and analyze them in terms of environmental justice considerations such as distributive and procedural equity, as well as the structural and historical dimensions of hazardous waste management in Niagara.

This chapter will proceed with discussions of hazardous waste facility siting laws in New York and Ontario, and disputes over particular locational decisions within the Niagara region. The cases are then analyzed in terms of three critical factors: defining facility need, deciding facility size and type, and promoting fairness in facility siting. Stakeholder groups had significant differences of opinion on these issues which shaped the disputes in various ways. The first two issues (facility need, facility size/type) were technical matters to a large degree that led parties to the proceedings to argue over projections and predictions about waste generation rates and risk assessments, among other things. The third issue (fairness) was related to the first two in the sense that the technical matters structured the distributions of benefits and burdens associated with hazardous waste. Whether a facility is needed and, if so, how large and of what type it should be are important questions that formed much of the basis for how stakeholders viewed the overall fairness of the proposals. Ultimately, however, differences of opinion over fairness issues had to do with whether one's loyalties were tied to the promotion of "good" government, a strong economy, community concerns, or some variation of one or more of these different, yet sometimes overlapping, concerns.

4.2 Hazardous Waste Facility Siting in New York

Facility siting policies and practices have varied within the Niagara region, especially, of course, along the international border. In New York, hazardous waste siting is handled pursuant to the state Environmental Conservation Law (ECL) of 1987, as amended (Sections 27-1102, 27-1103, and 27-1105). Among other things, the law requires a hearing with an Administrative Law Judge to run the process and a Siting Board that makes a final recommendation to approve or deny. The ultimate decision rests with the State Commissioner of the Department of Environmental Conservation (DEC). New York State has also attempted to use a public authority, the Environmental Facilities Corporation (EFC), to site a hazardous waste incinerator in Cayuga County in the central portion of the state, though the proposal was dropped in 1983 after three years of planning. Intense local opposition and problems securing ownership of the desired property caused DEC to shift to a regulatory approach relying on private sector proposals and preemption of local control under the authority of ECL as amended in 1987 (Heiman 1990; Rabe 1994).

4.2.1 New York's "Geographic Equity" Policy

In part, the 1987 amendments required DEC to develop a comprehensive hazardous waste facility siting plan that would promote "equitable geographic distribution" [Section 27-1102(2)(f)], due to concerns about Niagara County's disproportionate share of disposal capacity and contaminated sites in need of cleanup. DEC developed drafts of the facility siting plan for public comment in June 1988 and August 1989, but has not produced a final plan or implemented any of its intended provisions (Olsen 1991, 1995).

This lack of action became a central issue for Niagara area voters in the 1990 Governor's campaign when the region's Republican State Senator Daly publicly criticized then Governor Cuomo for failing to deal with the problem (Glynn 1990). The two politicians aired their views in letters mailed to all Niagara County residents and in Op-Ed pieces in the Buffalo News (Daly 1990; Murray 1990).

4.2.2 The Chemical Waste Management (CWM) Proposals

The conflict between Cuomo and Daly never resolved the thorny question of how to interpret (and thus make determinate) the geographic equity provisions of ECL as a matter of policy, but it did raise the political stakes of individual facility siting cases in Niagara. These included Chemical Waste Management's (CWM) June 1990 proposal to build two hazardous waste incinerators with a total capacity of 100,000 tons per year at their existing landfill site in Lewiston, New York just north of Niagara Falls (Gerrard 1994). According to the 1990 U.S. Census, Lewiston is a small community (15,516 population) with a mostly white population (98.9 percent) and a higher than average median household income ($40,327) as compared to the State of New York overall ($32,965). In June 1993, three years later, CWM rescinded its proposal after fierce public opposition in the nearby local communities of Lewiston and Porter.[10] In a negotiated agreement, the community agreed not to object to a 47.1 acre landfill expansion if CWM

[10] Residents Organized for Lewiston-Porter's Environment, Inc. (ROLE) served as the main community opposition group and also participated in negotiations toward the final community agreement with CWM. R. Nils Olsen, Jr., Professor of Law at University of Buffalo served as the chief negotiator. The Lewiston-Porter School District (under a quarter of a mile from the site) and the Niagara County Government were also officially opposed.

would scrap its incinerator plans for at least ten years, even though the same landfill had as recently as November 1989 received approval for another 22 acre expansion (New York State Department of Environmental Conservation, October 1989; New York State Facility Siting Board, November 1989).

For the residents of Niagara County, New York generally, and the Town of Lewiston especially, the prospect of a hazardous waste incinerator was clearly seen as more of a threat than expansions of the existing CWM landfill. After all, a landfill is only open for a given period of time and then capped and closed, whereas an incinerator operates for an indefinite period of time. But this difference in reaction to a landfill versus an incinerator is not evidence of a benign acceptance of landfills. In the earliest CWM case, the 1989 22 acre landfill expansion, party status was denied to all opposition groups who applied on the basis that their stated issues were neither "significant" nor "substantial" (New York State Facility Siting Board, July 1989). The Town of Lewiston and Niagara County both sought to participate in the proceedings based on concerns about the risks from increased truck traffic caused by the facility expansion. The Lewiston-Porter School District opposed the facility because of its close proximity to the site. The Province of Ontario sought party status because of concerns that CWM's proposed landfill design would be potentially insufficient in preventing surface runoff to, and thus contamination of, nearby streams that feed into the Niagara River and from there, Lake Ontario.

Beginning in 1990, when groups opposed to CWM's incinerator proposal were faced with essentially a choice between an incinerator and yet another expansion of the existing landfill, they had to recognize certain realities. Given their most recent

experience with opposing a CWM landfill expansion (in 1989) as well as the 1990 Siting Board denial of a request to expand the existing nearby CECOS hazardous waste landfill (discussed in the next section), intervenor groups had limited options. In the context of the state's interest in maintaining capacity assurance for hazardous waste disposal, there seemed to be no way that it would deny a request to expand what has become New York's only operating commercial hazardous waste landfill now that the CECOS landfill is closed (Dolen 1996). Besides, there were major concerns that if a negotiated agreement was not reached, the community might end up with both an incinerator and landfill expansion.

4.2.3 The CECOS Proposal

In June 1987, prior to the CWM siting controversies, CECOS International, a hazardous waste landfill operator in nearby Niagara Falls, New York, requested a twenty acre expansion to its existing 385 acre site. 1990 Census data indicates that Niagara Falls has a population of 61,840 with a mostly white population (82.1 percent white; 15.4 percent black; 2.5 percent other). Unlike Lewiston, Niagara Falls has a lower median household income ($20,641) as compared to the state-wide average ($32,965). In March 1990 the Siting Board denied the permit, after an initial approval in August 1989, based on poor hydrogeology and lack of short-term need. Interestingly, the risk assessment score changed from 196.2 in the first decision to 213.0 in the final decision, just under and then over the "scientific" threshold of 200.0. The initial decision had to be reexamined to allow for additional hearings based on changes in DEC's Draft Siting Plan which were also made in August 1989. While the Initial Draft Siting Plan completed in

May 1988 projected the state would require capacity for about 2.2 million tons of landfilled hazardous wastes over the next twenty years (NY DEC August 1989), the Revised Draft Siting Plan projected less than half of that (931,000 tons). Thus, the basic question of whether the CECOS facility was needed at all became an open question (Pearlstein 1990).

Residents of the LaSalle neighborhood (also the home of Love Canal) where the CECOS facility is located bitterly fought the project through a local citizens' group known as *LaSalle and Niagara Demand* (LAND). LAND joined a consolidated party of opposition groups known as the "Citizens Organizations" to act as a formal "intervening" party to the proceedings (Intervenor Concerned Citizens Organization 1988).[11] The City of Niagara Falls became an intervenor group because the portion of the existing facility which was being proposed for expansion was within its city limits. The City consolidated with the County of Niagara and the Niagara County Board of Health as one intervenor group (City of Niagara Falls, et. al. 1989). The Province of Ontario became an official party to the proceedings as an intervening party because of its own concerns about the facility's potential to leach into the Niagara River and ultimately into Lake Ontario (Terris and Hecker 1988). In fact, the existing landfill was already leaking (New York State Facility Siting Board, December 1993; Dickey 1995; Tarnawskyj 1995).

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[11] The "Citizens Organizations" aside from LAND included the Campaign to Save Niagara, the Ecumenical Task Force of the Niagara Frontier, Inc., Evershed Restoration Association, Great Lakes United, and the Society to Oppose Pollution in Towns.

4.3 Facility Siting and The Ontario Waste Management Corporation

Facility siting in Ontario is subject to very similar regulatory provisions as found in New York, though policy implementation has taken a very different form. Procedurally, siting decisions are made on the basis of an initial review by the Ontario Ministry of Environment and Energy (MOEE) and an administrative hearing before the Ontario Environmental Assessment Board (EAB) pursuant to the Ontario Environmental Protection Act (OEPA) and the Environmental Assessment Act, among other provincial statutes. Proposed expansions of the Laidlaw landfill near Sarnia, Ontario's only existing commercial hazardous waste facility (other than transfer stations), have been handled similarly to those in New York. What these cases had in common was that they were all proposed by private industry and reviewed for approval or disapproval by government-appointed review boards. But the Province has also pursued a public-sector approach to siting in one and then another community on the Niagara peninsula. OWMC's first choice was the town of West Cayuga, about ten kilometers west of the Regional Municipality of Niagara. The agency's final selection was West Lincoln Township in the Regional Municipality of Niagara, a largely white (94 percent) jurisdiction of 393,936 people and a median household income of $40,050, as compared to the Ontario average of $44,432, according to the 1991 Canadian Census.

4.3.1 The South Cayuga Proposal

From 1980 until 1995, Ontario hazardous waste policy and politics were focused on the Ontario Waste Management Corporation (OWMC), a provincial crown corporation created to site, build and operate a 63 acre hazardous waste landfill, incinerator and

treatment facility with a capacity of 300,000 tonnes per year. OWMC's first siting proposal was in the Niagara peninsula town of South Cayuga, announced in 1980. The choice was made for the very practical reason that the province already owned the land. This fact and the Ministry of Environment's decision to waive the Ontario Environmental Assessment Act requirement for an environmental assessment were met with immediate scepticism by area residents. They were not swayed by OWMC's Chair, Dr. Donald Chant, who argued that the facility was too urgently needed to wait for the completion of an environmental assessment. Chant had been chosen for the position because of his academic credentials as Professor of Zoology at University of Toronto and his environmental record as the founder and former Chair of Pollution Probe. These initial decisions, however, began eating away at his and OWMC's badly needed credibility.

While no formal environmental assessment was to be conducted for the South Cayuga site pursuant to the Environmental Assessment Act, Chant insisted that public hearings and a series of environmental studies would be carried out pursuant to the Ontario Environmental Protection Act. A full environmental assessment would have required an analysis of alternatives to the project, including other possible locations. But the South Cayuga studies did review the hydrogeology and flood histories of the location. The decision proved to be a critical one in November 1981 when OWMC announced that it would reject the site because of results indicating a high potential for flooding and ground water contamination. Chant also chose this time to initiate a complex siting process to find an environmentally acceptable location. This time, a formal EA and public review process would be carried out pursuant to the Consolidated Hearings Act, in addition to several other statutes.

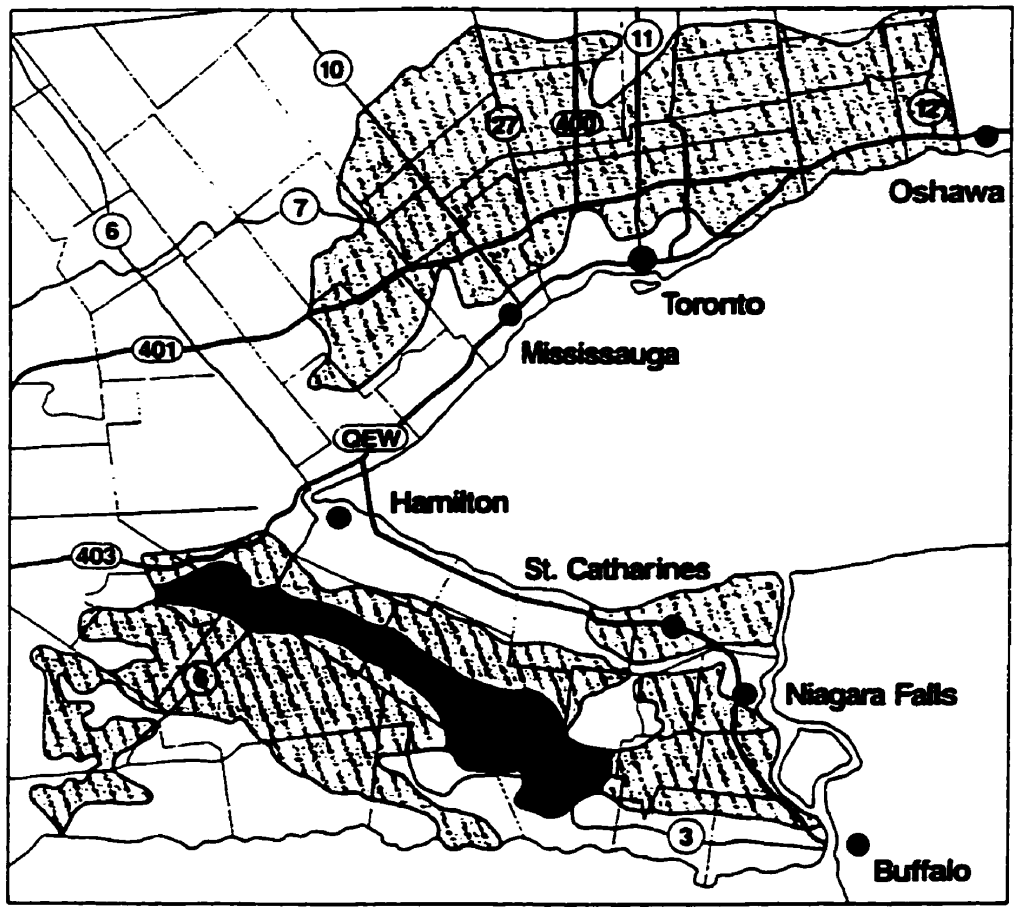
4.3.2 The Search for a "Suitable" Location

The post-Cayuga site selection process ostensibly began with consideration of all areas of the province as potential host communities. But in January 1983, OWMC announced that it had narrowed its search to the Golden Horseshoe region which stretches from the Toronto area, westward around Lake Ontario, and east and south to the Niagara peninsula. One of the justifications for this decision was that 70 percent of the province's hazardous waste is generated in the area, from industries concentrated in Toronto, Hamilton and Niagara Falls. By minimizing the distance from waste generators to TSDFs, the risk of accidents in transport would be minimized. This would also serve to hold down transport costs, an important factor to OWMC since one of its central goals was to "minimize financial cost to OWMC and to the people of Ontario" (EAB 1994).

The other justification was that the Golden Horseshoe area was well suited for a landfill because of its geology with naturally thick clay deposits that would inhibit underground leaching. This commitment to "natural containment" was a part of OWMC's other goals of minimizing "risk to human health" and "impact to the environment" (EAB 1994). OWMC produced a map that depicted the most hydrogeologically suitable locations for the facility (see Figure 17). The most ideal area (Zone 1) is highlighted in black and the second best areas (Zone 2) are shaded in grey, the difference in the two zones having to do with the average depth and permeability of natural deposits of clay in the Golden Horseshoe region. Zone 2 hydrogeology was found to be more variable than Zone 1 on average, but site-specific soil conditions within both areas were thought to be potentially suitable.

Figure 17

OWMC Hydrogeology Mapping



Source: Ontario EAB (1994)

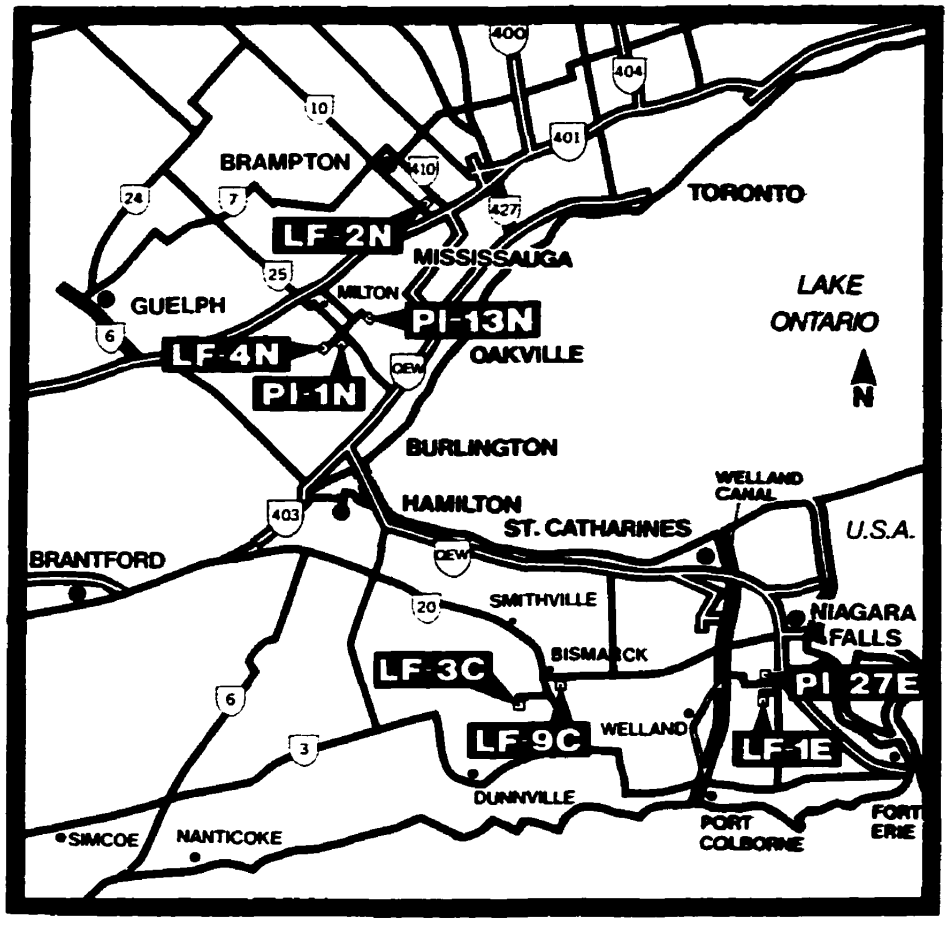
The next phase of the process was to identify several possible specific locations within the Golden Horseshoe area based on the hydrogeological mapping. OWMC began this task in January 1983 and announced twenty candidate areas in May of that year. After nearly a full year of analysis, the list was narrowed to eight sites in March 1984 (see Figure 18). OWMC then spent the next year and a half deciding which of the eight options would be its pick. Only two of the eight sites were situated in Zone 1 and both are in the Township of West Lincoln, so municipal and regional-municipal government officials were not terribly surprised by OWMC's September 1985 announcement that West Lincoln was its preferred location, LF-9C specifically (Boggs 1995; Packham 1995). OWMC spent the next few years developing an environmental assessment and preparing for public hearings before the Ontario Environmental Assessment Board (EAB). Meanwhile, their opponents prepared themselves to fight the facility. Aside from OWMC, there were seventeen parties to the hearing, three of whom were full-time members that participated throughout the rest of the siting process--Ontario's Ministry of Environment and Energy (MOEE), a group of three local opposition groups (the so called Tri-Parties), and Laidlaw Environmental Services.

4.3.3 Local Opposition in West Lincoln

MOEE fully supported the OWMC decision and the environmental assessment with no reservations, but local groups disagreed vehemently. The Tri-parties represented community and environmental interests and opposed the facility for reasons of public health and environmental concerns about the mostly agricultural West Lincoln area. They also objected for reasons of equity that it would be unfair to ask a quiet agricultural

Figure 18

OWMC Candidate Facility Sites



Source: Ontario EAB (1994)

community to bear the burden of such a large facility for the benefit of industries in Toronto, Hamilton, Niagara Falls and other North American jurisdictions (Boggs 1995; Packham 1995). The Tri-parties included the Ontario Toxic Waste Research Coalition, The Township of West Lincoln, and the Regional Municipality of Niagara. Laidlaw Environmental Services, Canada's largest waste management firm and one of the largest in North America, also opposed the facility, not on environmental concerns, but rather on the basis that hazardous waste management should be market driven rather than governmentally controlled (Rombough 1994). This perspective was also reflected in Laidlaw's December 1989 announcement that it would seek approval to build its own rotary kiln incinerator to complement an existing liquid hazardous waste incinerator and landfill near Sarnia, Ontario. This development came just as the OWMC hearing was about to start.

4.3.4 The Environmental Assessment

OWMC released its EA in November 1988 seeking approval to build and operate an integrated TSDF consisting of a hazardous waste incinerator, physical/chemical treatment plant, solidification plant and landfill at its preferred location in West Lincoln Township. The document was 22 volumes and about 7,000 pages in length. The estimated total development cost (including planning and construction) was $500 million, but the province had already spent nearly $100 million and was nowhere near having the necessary approvals to even begin construction, suggesting early on that cost-overruns would be likely. The EA justified the proposal based on the need for off-site disposal capacity and reviewed alternatives (OWMC 1988). In this regard, it also explained and

evaluated OWMC's site selection choice. The EA as well as several government and consultant reports comprised OWMC's evidence to support the project in the ensuing public hearings before EAB. Each of the intervenor groups presented their own evidence and arguments as well. The hearing took over three years to complete, beginning in February 1990 and ending in September 1993. By the time it was over, OWMC had spent over $140 million on its siting efforts (Regional Municipality of Niagara 1994).

The facility would have had a total annual capacity of 300,000 tonnes, with the first phase being about half that size. Several legal requirements were necessary to achieve such a reality, including eleven separate statutory approvals. The first was pursuant to EAA Section 5(1)(a) and Sections 12(2)(c), (d) and (e) which require an EAB approval for the project as defined in an EA and consistent with terms and conditions negotiated with MOEE, Ontario's environmental regulatory agency (EAB 1994). For these requirements, OWMC sought approval for the physical/chemical treatment and solidification plants with an annual capacity of 240,000 tonnes, two incinerators with a total annual capacity of approximately 60,000 tonnes, and a landfill for storage of treatment and incineration residuals. Pursuant to OEPA Section 27, OWMC sought approval to build and operate the first phase of the facility which would have comprised one-half of the overall project--physical/chemical and solidification treatment plants with 120,000 tonnes of annual capacity, and the first incinerator with about 30,000 tonnes of annual capacity. OWMC also sought several other approvals pursuant to various sections of the Ontario Water Resources Act, the Lakes and Rivers Improvement Act, the Conservation Authorities Act, and the Expropriations Act.

4.4 Summary of Cases in the Niagara Region

Of the three facility siting cases in the Niagara region, siting boards denied permits in two of them and in the third gave a partial approval after a negotiated agreement between the proponent and the affected community. The compromise between CWM and local residents was that the existing landfill could be expanded, but only if the company would agree not to seek approval for an incinerator for at least ten years. The other two facilities were rejected based on hydrogeological concerns in the CECOS case and cost-effectiveness considerations with regard to OWMC. The OWMC decision took fifteen years to make, during which the crown corporation abandoned its first locational choice due to poor hydrogeological conditions and chose its second site based on what it considered ideal conditions in this regard.

How is it that so much effort on the part of facility proponents could have gone unrewarded? The following three sections will review the cases and analyze them in terms of key decisions that the various stakeholders made along the way. The definition of facility need, for example, was a fundamental issue that proponents had to prove successfully in order to realize their plans. Likewise, the selection of particular facility characteristics such as location, size and type was critical. Finally, siting boards considered issues of fairness in terms of process and outcome in their final decisions. Each of the stakeholder groups had its own arguments and evidence about these issues and attempted to convince decision-making officials as to the veracity of their claims. Ultimately, siting boards had to consider the opinions and justifications of all parties with

regard to each of the issues in question in order to reach their own conclusions (See Table 7).

Table 7

Summary of Cases in the Niagara Region

Community & Existing Site	Proponent & Proposal	Opposition Groups & Issues	Outcome & Reasons
Niagara Falls, NY (urban): HW Landfill	CECOS: Landfill (6/87-3/90)	City, County, Local Group, Ontario: Spatial & Cum. Equity Hydrology	Denied: Hydrogeology
Lewiston, NY (suburban): HW Landfills	CWM: Landfill & Incinerator (4/89-11/89) (6/90-6/93)	City, County, School Board, Local Group, Ontario: Cum. & Spatial Equity, Hydrogeology	Landfills Approved & Built; Incin. Negotiated
S. Cayuga & W. Lincoln, ON (agricultural): Greenfields	OWMC: Landfill, Incinerator, Treatment Facilities	City, Regional Munic., Local Group, Laidlaw: Spatial Equity & Private Sector Intrusion	Denied: Cost-effectiveness

4.5 Defining Facility Need

Defining facility need was one of the more fundamental issues over which stakeholder groups disagreed regarding each of the proposals. The definition of need differed somewhat between the two halves of the Niagara region. In terms of appearances, there seemed to be a notable difference in governmental strategy between evaluating facility proposals submitted by private sector firms (as in the case of the

Niagara, New York proposals) and evaluating proposals submitted by other public sector agencies (as in the case of the Niagara, Ontario proposals). The Ontario government, through OWMC, certainly had greater discretion over the demonstration of this point as compared to New York officials who were resigned to evaluating the arguments and evidence of private sector facility proponents. Ultimately, however, the stakeholder disputes over this matter revolved around waste generation projections which Ontario and New York government officials and industry groups interpreted as a justification for facility need, whereas local and regional opponents saw a greater need for waste reduction and pollution prevention efforts to reduce waste at the source.

4.5.1 Niagara, Ontario

The Ontario government was intimately involved in defining and characterizing facility need starting with the creation of OWMC. From the beginning, the crown corporation's mission was to site, build and operate a TSDF because the private sector was not providing adequate hazardous waste disposal capacity in Ontario. In 1980, Progressive Conservative Environment Minister Harry Parrot announced that:

> We can and do fully accept the responsibility as a government for the operation of a [TSDF] site (Ontario Ministry of the Environment, quoted in Harrison 1986).

This statement came just before OWMC unveiled its plans for the South Cayuga site. The justification for Parrot's decision was that the province's only existing hazardous waste facility near Sarnia (then owned by Tricil but now part of Laidlaw) was insufficient. In addition, there had been several private sector proposals that were never realized, either because of proponent withdrawal or failure to secure EAB approval.

Ontario's political climate has changed several times during the life of the OWMC dispute; however government support for a public sector approach that would protect the public from the "vagaries of the hazardous waste marketplace" continued until EAB denied the application for approval in November 1994 (Ontario Environmental Assessment Board 1994).

Laidlaw used its own presence in the Ontario hazardous waste management market as justification for opposing the OWMC project. It rejected OWMC's claim that there were deficiencies in the private sector provision of this service. The company, in fact, operates the only commercial toxic waste landfill and incinerator in the province. Tricil as well as Laidlaw representatives insisted that the private sector would respond to any existing or future waste capacity needs if only OWMC would get out of the way. In addition, Laidlaw was seeking approval to build a rotary kiln incinerator, the same technology that OWMC was planning to use for its West Lincoln facility, to complement its liquid injection incinerator and landfill near Sarnia in southwestern Ontario near the Michigan border. The rotary kiln technology was seen as important by both Laidlaw and OWMC because it could handle wastes (such as PCBs and contaminated solids and sludges) that the Sarnia facility could not. But in October 1993, just over a month after the OWMC hearings were completed, Laidlaw announced that it was withdrawing its incinerator proposal because of "insufficient market need and the availability of alternative technologies" (Laidlaw 1993).

The Tri-parties and other opponents of OWMC approached the issue of facility need from a very different point of view. Rather than emphasizing the private sector's ability to respond to market deficiencies, these locally concerned activists disputed

OWMC's projections of facility demand. The Tri-parties argued that the OWMC numbers were exaggerated because of a failure to account for the waste reducing effects of pollution prevention programs and also on-site disposal. They also argued that the facility would create excess capacity which would hold down the cost of disposal and hence discourage efforts at waste reduction and pollution prevention. OWMC argued that its status as a crown corporation would allow it to resist the pressures of market supply and demand that supported the opponents arguments. It maintained that it would work with MOEE to develop a pricing policy that would encourage pollution prevention rather than one that would subsidize waste generation. The Tri-parties also disagreed with MOEE suggestions that future changes in regulations and policies would stimulate higher than anticipated waste generation rates.[12]

In its final decision, EAB generally supported OWMC regarding the role of government and facility need. The Board concluded that

> ... there are compelling policy reasons for a publicly-owned and operated facility that will: i) provide secure capacity; ii) protect Ontarians from the vagaries of the [hazardous] waste marketplace; iii) be able to manage all types of waste; and iv) have the capacity to manage contingency/unforseen wastes (Ontario Environmental Assessment Board 1994).

Clearly, the Board disagreed with Laidlaw's interpretations on the value of crown corporations in the provision of waste management services. With regard to OWMC's

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[12] OWMC and MOEE used the possibility of a future Ontario "land ban" as their main example of such a policy or regulatory change. The restriction has been in place in the U.S. since 1984 and requires limits on toxicity levels before hazardous waste can be placed in a landfill. Instead, current Ontario landfill restrictions impose "physical stability" requirements to inhibit underground leaching. Such a change, OWMC and MOEE predicted, would increase the universe of wastes in need of treatment and incineration, thereby heightening the need for additional facility capacity in Ontario. To date, the province has not enacted a land ban regulation (Radcliffe 1994, 1996).

hazardous waste projections, and thus the issue of need, EAB shared the Tri-parties' concerns that the government numbers may have been too high; however, the Board ultimately found that the need for off-site disposal capacity was sufficiently large to warrant consideration of the facility. The EAB decision on this matter reveals its concern with balancing the concerns and arguments of interested parties on the question of facility need. Nonetheless, even with compelling evidence that OWMC waste generation projections may have been inflated, the Board revealed a fundamental commitment to capacity assurance as a matter of overall policy.

4.5.2 Niagara, New York

Facility need was also a point of contention in Niagara County, New York with respect to the CECOS and CWM facility proposals. While neither of the facilities were to be government owned or operated, as in the case of OWMC, the state had previously attempted to site a hazardous waste incinerator through a public authority (EFC) in Cayuga County in the central portion of the state (Heiman 1990b). Because of EFC's failure to successfully site the facility, proposals for both of Niagara County's off-site waste management facilities, CWM and CECOS, were for private ownership. But while the role of New York's DEC was limited to reviewing the initial proposals and environmental reviews, the state still had a strong interest in maintaining its in-state capacity assurance for hazardous waste treatment and disposal (Olsen 1991, 1995). This is not markedly different from Ontario MOEE's support of the OWMC facility.

New York State's support of the CWM facility is also demonstrated by the Siting Board's determinations regarding risk. While five of the eight Board members agreed on

a total risk score of 182.4, the three remaining members issued a minority opinion that the certificate of approval should be denied based on what they considered a more appropriate score of 200.9, just over the threshold limit of 200. Both estimates were far higher than CWM's conclusion that the risk score should be 149. Interestingly, each of the five Siting Board members who expressed the majority opinion were New York State Commissioners (considered *ex-officio* members), including the Chair who was Commissioner of DEC. The three *ad-hoc* members, who were chosen for their expertise in environmental science and engineering rather than their positions in state government, argued that the population density in the area (nearly 4,000 persons residing or working within a half mile of the site) was too high to permit a TSDF in the vicinity.

The minority opinion made reference to a number of "incompatible" structures that were proximate to the proposed facility (e.g., the Lewiston-Porter School with 2,700 students; U.S. Army and National Guard training stations; several residences; and a restaurant). The minority opinion concluded that CWM should consider alternatives to the proposed facility and implied that it was not needed:

> The Minority disagrees with the ... findings of the Majority in that the applicant did not answer the question of reasonable alternative sites to this location for hazardous waste treatment, storage and final disposal. While the applicant currently operates three hazardous waste landfills that are as large or larger than this proposed site, no evidence was presented to show that either or all of these sites could not handle the waste materials expected to come to the proposed site. The question of whether rail, water or air transportation could be utilized at these other sites was not offered for discussion. Alternatives to landfilling were not adequately presented for study. These items should have been adjudicated (New York State Facility Siting Board, Minority Opinion, December 1993, 3).

The Majority opinion of the Siting Board saw fit to make much more definitive statements regarding need in its majority decision:

> The proposed ... facility constitutes a critical environmental management resource for New York State. Under federal law, each state must demonstrate the continuing capacity to manage all of the hazardous waste generated within its borders. New York State has no other commercial land burial facility for hazardous waste and therefore this project is needed if the State is to be able to meet the requirements of the Superfund Amendments and Reauthorization Act (SARA) for hazardous wastes that cannot be disposed of through other means.
>
> Because this new resource is so valuable, it is crucial that its useful life be extended as long as possible (New York State Facility Siting Board, December 1993, 5-6).

These statements reveal a difference of opinion over facility need, not only among stakeholders, but also among siting board officials. The Minority members clearly wanted to address alternatives to the proposed landfill expansion to a greater extent than did the *ex-officio* or Majority members. Interestingly, however, each of the alternatives specified involved transporting waste to undetermined existing facilities in other locations rather than reducing or preventing waste at the point of production. As with the EAB decision regarding OWMC, the overall Siting Board opinion revealed a fundamental commitment to capacity assurance. Its reference to the Superfund statute indicates an overall concern that the CWM landfill expansion was needed to ensure compliance with SARA.

In the CECOS case, differences in risk estimates did not occur among members of the Siting Board, but rather between the initial approval in August 1989 and the final decision to deny the certificate of approval in March 1990 after a redetermination of facility need. In the initial decision, the Board unanimously agreed on an estimate just below the 200 threshold. But after reopening the hearing to address additional issues related to facility need, the Board reassessed its risk estimate and increased it to over 200

based on potential contamination of ground and surface waters. The Siting Board concluded:

> Even assuming the accuracy of [CECOS'] analyses, the record demonstrates that the leachate from [the proposed facility], in and of itself, would be capable of creating a threefold exceedence in the ambient standard for PCBs in the Niagara River. State water quality standards are set at levels designed to protect receiving waters for their best usage. We therefore conclude that this potential exceedence is a sufficient basis to find that the [proposed facility] presents severe problems with respect to water contamination. This conclusion is further reinforced by the fact that ambient conditions in the Niagara River already exceed the standard for PCBs (New York State Facility Siting Board, March 1990, 3).

The Board also expressed concern about the population density of the area which was 1,200 persons per square mile within a half mile of the facility. Given that the reason for reopening the hearing was to reassess the issue of need, it seems surprising that issues of risk were so prominent in the final decision. Ultimately, while the Board found that short-term need could be met sufficiently by the CWM landfill, but chose not to make a finding with respect to long-term need since the revised risk score was over 200.

> In light of the fact that the Board has concluded that this project does not qualify for a siting certificate on grounds unrelated to the need issue, it would serve no public purpose to render a determination on evidence that presents a snapshot of the need issue at a period in time when the picture is subject to major changes, the effects of which are difficult to project (New York Facility Siting Board, March 1990, 9).

In the case of CECOS, the problem of determining facility need became complicated by competing and shifting assessments of risk. In the end, it is difficult to separate them out so as to isolate the precise reason for the ultimate permit denial. Was it based on the March 1990 reassessment of risk that exceeded the 200.0 threshold (after the August 1989 risk assessment below 200.0) or, alternatively, was it more a function of the November 1989 decision to approve an expansion of the nearby CWM landfill?

Given the political, as well as scientific and technical, nature of risk assessment, as well as the Siting Board's decision not to specify a conclusion regarding need, these questions remain unresolved.

4.6 Selecting Facility Location Size and Type

As with the definition of facility need, decisions about locating facilities of particular sizes and types became very contentious and highly related in the Niagara area cases. In general, large facilities, as compared to smaller ones, are advantageous from the viewpoint of provincial and state agencies as well as industrial interest groups because they provide greater treatment and disposal capacity. Similarly, integrated facilities that provide multiple forms of treatment and disposal (e.g., an incinerator, treatment facility, and landfill) in one location are often considered preferable also. Communities targeted for large facilities, however, see all the more reason to oppose large and integrated facilities based on the volume of waste they will receive, often from distant regions. This was the case in all of the Niagara proposals, each of which involved huge landfills, and two of which involved incinerators as well. In the OWMC case involving a landfill, treatment facility and incinerator, it is difficult to determine which of the facility components, if any, were most objectionable to the Ontario community since they were never given a choice. In the CWM case which also involved a landfill and incinerator, the community made a choice between the two, apparently deciding that a landfill expansion would be preferable to a new incinerator.

4.6.1 Niagara, Ontario

Decisions about facility location, size and type became heated and intertwined in the case of OWMC. Starting with its first TSDF proposal in South Cayuga and continuing throughout its plans for West Lincoln, OWMC expressed a commitment to a centralized, fully-integrated facility with an incinerator, physical/chemical treatment plant, solidification plant and landfill.[13] Moreover, no matter which site was ultimately chosen, there was a clear preference for each of the facility components to be located together rather than separately and that there be a thick clay deposit underneath to provide "natural containment." This meant that one community would host all of the TSDF components (i.e., a very large facility) and that all of its attendant risks and other burdens would be concentrated there. In a 1985 interview about OWMC's West Lincoln and South Cayuga siting decisions, Donald Chant stated:

> We've always said that if we could have it, we wanted a centralized facility. They're safer to operate. It minimizes interfacility transport. Another reason which is less tangible is that to go to an area and give them only the landfill is seen as giving them only the dump. No benefits are attached to that. All of the action, all of the good things in terms of employment and local cash flow, come from the treatment facilities (Quote from Harrison 1986, 143).

In its 1993 Written Argument in Chief to EAB, OWMC reiterated that it had decided on a centralized, fully-integrated facility "early in its planning process," but that it had continued to "re-visit" the issue in its systems analyses and each time concluded

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[13] OWMC defined a "centralized" system as one full-service facility and a "decentralized" system as more than one full-service facility. By "fully-integrated" they meant that each of the facility components would be on a single site as opposed to a "partially-integrated" system which would locate the components onto two or three separate sites.

that the initial decision was correct (EAB 1994). The Tri-parties interpreted OWMC's decision making quite differently. They argued:

> The "systems study" was never anything but window dressing for a system that was selected in 1982 and sited by 1985 ... OWMC never fairly considered systems alternatives because it had already sited its preferred system, the integrated, centralized facility on a clay plain (Quote from Ontario Environmental Assessment Board 1994, 5-3).

A preferable approach according to the Tri-parties was a geographically dispersed system of TSDFs, each designed to meet specific regional waste capacity needs with different kinds of facilities. To design such a system, however, would require data on waste quantities categorized both by "treatability categories" and geographic area. While OWMC had explored alternatives to an integrated centralized facility, it did not match them with treatability categories (e.g., incineration, physical/chemical treatment, solidification, landfilling) or specific geographic areas. Instead, OWMC simply estimated future waste generation for the province and considered different locations, some geographically dispersed, and others integrated at a single site. It did not consider whether particular types of facilities in separate regions of the province, combined with increased pollution prevention efforts, could meet projected capacity needs for each area.

The Tri-parties also criticized OWMC's systems analysis for failing to adequately assess salt mine disposal as an alternative to landfilling. The main advantage of salt mines, they argued, is their ability to contain chloride residues from solidified wastes, a problem that landfills cannot necessarily prevent even with "natural containment" provided by thick clay deposits. Another advantage from a local perspective is that there are no salt mines in the Niagara region, thus undermining the viability of at least OWMC's choice of location if not the need for the project. The Tri-parties submitted that:

> ... it is very likely that a thorough and competent systems study would have shown that the most suitable repository for the waste residues from an OWMC-type facility is an existing salt mine at either Goderich or Windsor (Quote from Ontario Environmental Assessment Board 1994, 5-21).

EAB's final decision on site selection and facility size sided partly with OWMC and partly with the Tri-parties. Nonetheless, their interpretations of these issues proved to be critical in denying the application for approval to build the TSDF. With respect to the evaluation of alternatives to the West Lincoln site, they agreed with both parties to some extent but ultimately ruled in favor of OWMC on this particular point. They stated:

> We accept the proposition that the better approach to analysing alternative waste management systems is to begin by organizing the waste according to geographical origins and treatment categories. However, that, per se, does not cause us to conclude that OWMC's systems analyses were fatally flawed. (Environmental Assessment Board 1994, 5-19).

EAB's findings on OWMC's review of the salt mine alternative had much more serious implications for the proposed facility. The EA had rejected the salt mine option on economic considerations since its capital and annual operating costs would be $27 million and $4 million, respectively, as compared to those of the landfill approach, $5 million and $3 million. EAB pointed out that OWMC had found "the costs factors present[ed] the most significant differences among the alternatives", yet had not included chlorides management in its landfill costs. This was a serious omission given that chlorides management added an estimated $35.7 to $40.9 million in capital costs and $7.9 to $9.4 million in annual operating costs. Worse yet, these estimates were based on the initial plan for only one rotary kiln, so the addition of the second incinerator would increase chlorides management costs to an estimated $370 million over the life of the facility.

In the end, it seems that EAB chose to consider all stakeholder positions in their final determinations regarding facility location, size, and type. With regard to the question of centralized versus dispersed locations for the various facility components, the Board found merit in the Tri-parties' arguments that a more sophisticated analysis of waste projections by geographic areas and treatability categories would have been a useful planning technique. In the absence of such information, however, EAB chose not to deny OWMC a construction permit, at least on this point. Were it not for cost-effectiveness considerations related to chlorides management and the unresolved question of whether to dispose of treatment residues in the proposed landfill or in salt mines, EAB appears to have been willing to approve the facility proposal.

4.6.2 Niagara, New York

One of the main difference between Niagara, New York's and Niagara, Ontario's experiences with TSDF siting is that the former had little control over the location of the facilities whereas in the latter case the provincial government was directly in charge. Instead of directing a state-wide search for "suitable" locations as happened in the case of the West Lincoln OWMC proposal, New York had to rely on its commercial waste management firms to choose potential facility sites. The result was that "natural" containment was less of a siting priority in New York as compared to Ontario which rested its choice of West Lincoln as its proposed site on favorable hydrogeological conditions in the area. Instead, New York, pursuant to federal RCRA requirements, mandates the use of synthetic liners to minimize risk of leaching through "engineered" containment, making "ideal" hydrogeological conditions less of an issue for site selection.

This is not surprising given that Ontarian and Canadian federal regulations do not require synthetic liners for hazardous waste landfills.

Ontario's formal opposition to the CECOS and CWM facility proposals coincided with its own attempts to successfully site the OWMC facility in West Lincoln. In its opposition to the 1989 expansion of the CWM landfill, attorneys for the Province of Ontario recognized this point as well as its concerns regarding hydrogeology:

> Ontario is not opposed, in principle, to the landfilling of hazardous waste. Ontario itself has a hazardous waste landfill and is in the process of considering approval of another. The issue is whether the design of [the CWM landfill expansion proposal] will provide adequate protection of human health and the environment from contamination of groundwater and surface waters by the hazardous wastes stored in the facility.
>
> CWM has not provided sufficient data to demonstrate that its analysis of the hydrogeological conditions at the proposed site ... is adequate (Terris and Hecker, June 1989, 2).

For local groups opposed to CWM landfill expansions, their concerns about the site selection related more to traffic concerns as well as the facility's proximity to what the minority members of the Siting Board for one of the expansion proposals had termed "incompatible" structures. Especially troubling, in this regard, was that CWM is located within a quarter of a mile from the Lewiston-Porter School. In its opposition to CWM, the Acting Superintendent of the school system offered several reasons why the Siting Board should deny the 1989 landfill expansion because of its impact on the community generally and school specifically:

> Foremost, is the adverse affect [sic] the existing facility is having on the quality of life in the Town of Lewiston, Town of Porter, and the Lewiston-Porter School District. CWM has advised the School Board that a minimum of fifty trucks per day will pass the school campus going to and from the site. ... This creates an adverse impact upon the Lewiston-Porter School District. ... The traffic issue cannot be stressed enough. There is

> the potential for accidents and for hazardous waste spills which could seriously affect the children and staff on the campus. In addition, the noise, fumes, and distractions created by the truck traffic intrude on the activities taking place in the school. The safety and welfare of all our students, employees, and visitors is of paramount importance to the Lewiston-Porter School District (Yates, June 1989, 1).

Groups opposed to the CECOS landfill expansion expressed quite similar objections about the location of that facility. Among their concerns were:

> Demographics (population density near the site, population adjacent to transport route, and population growth projections); Climatological conditions at the site; Proximity to incompatible structures; Proximity to utility lines; Seismic risk; and Consistency with local planning and ordinances (Pearlstein, August 1989, 12).

In terms of community reactions to various types of facilities, an illustrative case to consider is CWM's negotiated agreement with local opposition groups allowing a 47 acre landfill expansion as long as the company agrees not to seek approval for an incinerator until at least the year 2003. Local opposition to the landfill was clearly diminished once it was divorced from the incinerator proposal. In this regard, the community seems to have been more concerned by the prospect of an incinerator than a landfill. But as stated previously, intervening parties were concerned that continued opposition to the landfill would be futile since CWM was by then the only operating commercial hazardous waste landfill in the State of New York. In this regard, the community's reaction to landfills versus incinerators was more of a recognition of its own limitations than a tacit approval of one over the other. In addition, not all local residents were in agreement with the settlement (though there is no indication as to how many) as shown in this passage from the hearing report in which the Administrative Law Judge paraphrased a concerned resident's objection:

> One speaker, Lisa Aug of Niagara Falls, said the agreement did not represent the feelings of community residents, although it was signed by the governments of Lewiston, Porter, and Niagara County. She said local elected officials had been "muzzled" by [CWM], and that the DEC had "written off" Niagara County except as a "dump" for hazardous waste (Buhrmaster, October 1993, 3).

This sentiment, though it was not outwardly expressed by citizens who were involved in the negotiated agreement once reached, does reflect the kinds of concerns that led the New York Assembly to write geographic equity provisions into the state hazardous waste statute. The proposals to expand the only two commercial hazardous waste landfills in the state rather than find new locations, as well as the plan to add an incinerator to one of the facilities, flew in the face of everything the geographic equity concept stood for. Issues of fairness are analyzed further in the next section.

4.7 Promoting Fairness in Facility Siting

4.7.1 Niagara, Ontario

Perhaps the most central concern of the Tri-parties in their opposition to OWMC had to do with the basic fairness issue of asking West Lincoln Township to live with the environmental and social burdens of hazardous waste management from industries throughout Ontario and other North American jurisdictions. For this reason, one of the group's proposed conditions, should the project receive EAB approval, was that the OWMC facility not be allowed to accept wastes from outside the province. Their other two conditions of approval had to do with containing leachate by means of landfill engineering requirements and reducing odors through operating restrictions. Clearly, these local participants in the public review process viewed geographic equity as an important

consideration since they were only willing to accept the facility with a spatial limit on the sources of waste and some assurance of reducing burdens on the host community.

EAB addressed procedural equity concerns by providing intervenor funding to defray the legal and administrative costs of OWMC's opponents. Approximately $500,000 was provided to the two full-time intervening parties, the Tri-parties and Laidlaw, as well as other persons and entities involved in particular aspects of the hearing. These funds were no doubt critical in allowing individual community residents to question the reasonableness and viability of the OWMC proposal. But clearly, local participants saw more to procedural equity than the provision of official party status before EAB. The Tri-parties charged that serious procedural problems were present well before the EAB hearing even started, particularly during the earliest portion of site selection. They stated that:

> the original identification of the Golden Horseshoe, as [OWMC's] choice of candidate region ... was arbitrary, lacking in adequate supporting data, neither traceable nor replicable, nor in compliance with the Environmental Assessment Act" (Quote from Ontario Environmental Assessment Board 1994, 7-5).

While EAB supported local interests with regard to issues of cost-effectiveness, it disagreed with the Tri-parties on equity grounds perhaps more than any other. With respect to the question of whether to prohibit the facility from accepting wastes from outside Ontario, the Board simply stated that "it would not be appropriate to impose a Condition that would prohibit the OWMC facility from accepting such wastes" (EAB 1994, xi). With respect to the Tri-parties' other two conditions regarding engineered containment in the landfill and odor controls for the facility generally, EAB referred to OWMC's decision to provide a $35,000 annual budget for a Community Monitoring

Committee of five to nine local residents and a technical consultant to monitor potential problems with leachate and odors. The Board made no findings against OWMC's choice of the Golden Horseshoe area and West Lincoln as site selections or any other procedural factors.

Niagara, Ontario communities would seem to have been extremely lucky that EAB denied the OWMC permit. While opposition groups were surely benefitted in a procedural equity sense by the provision of intervenor funding, the Board did not find much merit in local claims regarding spatial equity. Had it not been for economic considerations related to the cost of chlorides management and OWMC's failure to adequately assess the option of salt mine disposal of chlorides residuals, EAB appears to have been fully willing to approve the facility for location in West Lincoln Township.

> The Board felt that a salt mine system has the potential to be preferred, and it could not find that OWMC's proposal for managing hazardous wastes would provide the greatest benefit to the people of Ontario.
>
> On other matters, the Board found that there is a need for additional off-site hazardous waste treatment and disposal capacity in Ontario. It also found that, in general, OWMC's choice of technology for the treatment of such wastes ... was appropriate. Further, if a centralized, fully-integrated system was the preferred waste management system, West Lincoln would be the preferred site. The Board felt that OWMC had adequately characterized the risks and impacts expected with its facility and proposed to take extensive measures to minimize risks and impacts, consistent with the *Environmental Protection Act*. As a result, the Board did not consider the residual risks and impacts to be of such magnitude that it would have denied approval, had it accepted the environmental assessment (Ontario Office of Consolidated Hearings 1994, 1).

OWMC also had the right to revise its proposal after a thorough analysis of the salt mines alternative, but decided instead simply to abandon the idea in February 1995.

4.7.2 Niagara, New York

As in the case of OWMC, one of the more central concerns of Niagara, New York residents and communities related to the issue of fairness. Despite New York's geographic equity policy, CWM is the only operating hazardous waste landfill in the state and CECOS, though its landfill is now closed, still receives liquid hazardous wastes in its waste water treatment facility. In its 1987 revisions to ECL, the state legislature required that NY DEC make:

> [A] determination of the number, size, type and location by area of the state of new or expanded [hazardous waste] facilities ... consistent with ... an equitable geographic distribution of facilities (Olsen 1991, 484).

New York DEC's Draft Siting Plan identifies counties in three regions in the state which account for the bulk of hazardous waste (93 percent) generated in New York (see Figure 16). In 1993, the Western Region which includes Niagara County generated 54 percent, as compared to 23 percent for the Central Region and 23 percent for the Eastern Region (NY DEC March 1995). While the intent of the legislation and the Draft Siting Plan was to develop off-site hazardous waste capacity in each region, the results to-date are that the Western Region, and Niagara County specifically, still have the only commercial facilities in the state.

With respect to the CECOS and CWM facility siting cases specifically, fairness and equity concerns had little bearing on the proceedings or the Siting Board decisions. In each case, opposition groups argued the proposals ran counter to the geographic equity policy and, therefore, should not be approved. The "toxic legacy" of Love Canal, they submitted, was indicative of Niagara County's existing hazardous waste burden and reason enough to deny the certificates of approval. But to the extent these issues were

even considered, the Siting Boards reduced them to "psychological" or "psychosocial" issues that ultimately had no impact on their decisions to approve or deny the proposals. The Siting Board's conclusion and recommendation regarding equity in the initial approval of the CECOS proposal are illustrative of this point.

> The [CECOS] application and the prospect of the facility being built was shown to have an adverse psychological impact on a significant, though unquantified, proportion of persons in the community. This impact was not demonstrated in terms of the traditional measures of stress, but was shown to be characterized by feelings of ***powerlessness and inequity*** due to the proposed expansion of hazardous waste activities at CECOS ... This psychological effect is not a sufficient basis for denial of the permit or certificate, but it does provide a basis for the imposition of mitigative permit conditions (emphasis added).
>
> CECOS should be required to increase and intensify its community outreach and educational programs. A specific plan with a schedule for implementation of such expanded programs should be prepared by CECOS subject to approval of [DEC] staff, or the Siting Board and Commissioner may prescribe specific elements of such a plan within their discretion (Pearlstein, August 1989, 137-138).

Of course, because the initial approval was later overturned, these issues eventually became moot. Nonetheless, the preceding statements show a lack of regard for community concerns about fairness, even in the context of a geographic equity law specifically written into ECL and a draft policy developed by NY DEC but never implemented. The Siting Board's recommendation that CECOS should "intensify" its outreach and education efforts fails to comply with the original intent of the legislation which was to promote geographic equity of facility sites, not "psychosocial" sensitivity of the same waste management corporations operating new TSDFs in the same places. Ultimately, NY DEC found the geographic equity policy difficult to implement without an OWMC-style governmental site selection process. The State of New York had used

such an approach unsuccessfully in the early 1980s and was unwilling to try this again (Eisman 1995).

NY DEC also attempted to add a dimension of procedural equity to siting by giving technical assistance grants to communities facing the prospect of new hazardous waste facilities so that they could to hire their own technical experts. This approach would have been roughly similar to the Ontario intervenor funding program. The agency recommended such a program so as to facilitate the efforts of local governments in their own decision-making (NY DEC 1988), though this too was never implemented and no funds were ever allocated for it. In the end, Niagara New York communities saw no relief from the existing disproportionate burdens of hazardous waste that they presently face, either through geographic equity or procedural assistance.

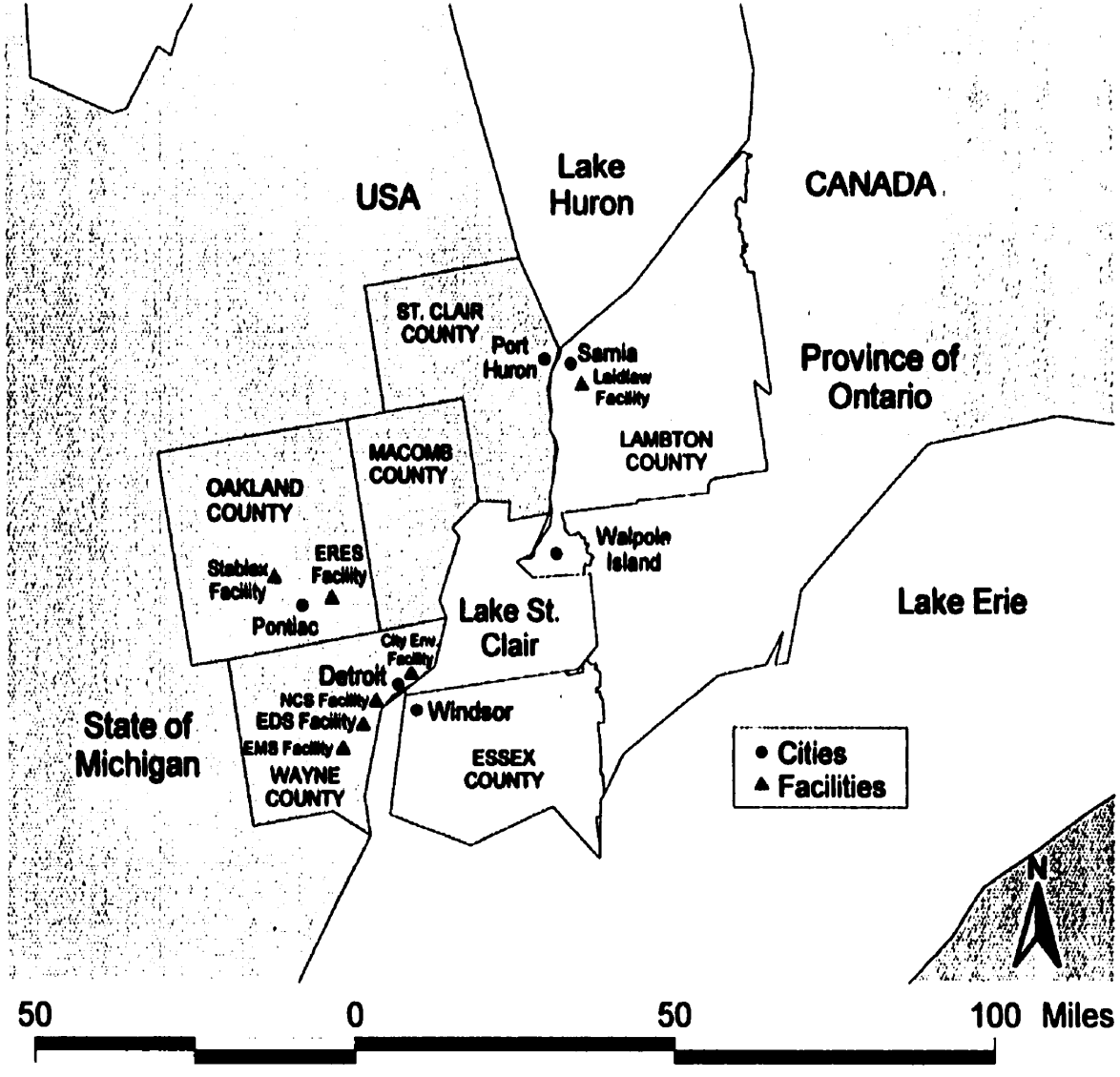
CHAPTER 5: DETROIT AND SARNIA

5.1 Introduction

The Detroit and Sarnia areas lie on the Michigan-Ontario border between the southern end of Lake Huron and the mouth of Lake Erie (See Figure 19). The Detroit metropolitan area includes the City of Detroit and also Wayne, Oakland, and Macomb counties. The area is located in the southeastern portion of the State of Michigan. Sarnia is part of Lambton County and is located in the southwestern part of the Province of Ontario. Both communities are heavily industrialized with metals processing and auto industries in Detroit and petrochemical plants in the Sarnia area. Poor air and water quality have long been critical environmental issues and sources of conflict between industries and residents. Also, the transboundary nature of the problem has made it an international issue and drawn the attention of the International Joint Commission (IJC). Both the Saint Clair and Detroit rivers are on IJC's list of "Areas of Concern" due to the long history of industrial activity in the area, especially in Detroit and Sarnia.

From 1971 to 1978 Dow Chemical Canada faced a law suit for destroying the commercial fishing industry in Lake Saint Clair by discharging mercury into the Saint Clair River at their Sarnia plant over a twenty-year period. The case was finally settled out of court for $350,000 and the pollution has never been removed. In 1985, a highly publicized Dow Chemical Canada spill of dry cleaning fluid created so-called "toxic blobs" in the Saint Clair River. Walpole Island, a Canadian First Nation territory, has long suffered the effects of spills and discharges into the Saint Clair River because of its

Figure 19: The Detroit-Sarnia Region



down-stream location in the river delta (Nin-Da-Waab-Jig 1983, 1984, 1986). The island's Ojibwe residents have been forced to curtail their hunting and fishing practices and adjust their diets to store-bought food and bottled water (Williams 1995).

The City of Detroit's municipal waste incinerator which began operating in 1988 has been another source of controversy on both sides of the border, particularly since it was built with no scrubbers. The Detroit metropolitan area is home to fourteen of Michigan's nineteen commercial hazardous waste treatment, storage, and disposal facilities (TSDFs), six of which are in the City of Detroit (Mohai and Bryant 1992). Ontario's only commercial TSDF is across the border in the Sarnia area.

In 1988, the U.S. Department of State and the Canadian Secretary of State for External Affairs issued requests to IJC that it investigate air pollution problems in the region (IJC 1992). Both made specific references to the Detroit incinerator and also a Detroit area cement plant's proposal to burn hazardous wastes in its kiln. IJC released findings and issued recommendations on air quality in the Detroit-Windsor/Port Huron-Sarnia Region in 1992 and 1993. On the Michigan side of the border, the report identified 1,678 incinerators in the three counties of the Detroit metropolitan area and Saint Clair County, including Port Huron. The majority (94 percent) were small facilities (mostly for apartment buildings) and the remainder were moderate to large facilities (mostly on-site units for industrial plants). In the Ontario counties of Essex (including Windsor) and Lambton (including Sarnia), IJC identified nine incinerators, six of which are small biomedical units and three of which are large industrial facilities. One of three

large facilities is a commercial incinerator owned and operated by Laidlaw and the other two are on-site industrial units.

The Detroit and Sarnia areas have been the settings for several hazardous waste TSDF siting disputes during the 1980s and 1990s. In the following section, Laidlaw-Sarnia's attempts to site a new incinerator at its existing facility complex are discussed in relation to the company's dispute with the Ontario Waste Management Corporation (OWMC). Laidlaw eventually withdrew its proposal so the facility was never built. The chapter continues with reviews of six TSDF siting cases in the metropolitan Detroit area. Two were located in the City of Detroit, two more occurred in the city's Wayne County suburbs, and two more were in the Oakland County suburbs. Together, the Detroit area cases involved two landfills, two treatment facilities, one incinerator and a deep-well injection facility. Only two of the proposals received approvals (both were treatment facilities in the City of Detroit), but neither have been built. The deep-well injection system was built but was never subjected to public hearings (as each of the other cases were) and has not yet been granted permission to begin operations.

5.2 The Laidlaw-Sarnia Case and OWMC

Laidlaw's proposal to build a new hazardous waste facility at their existing location in Moore Township just outside of Sarnia, Ontario was, as shown in Chapter 3, at least indirectly tied to the OWMC siting proposals. In December 1989, when Laidlaw announced its intentions to seek approval to build a rotary kiln incinerator (the same technology as the proposed OWMC incinerator), the OWMC public hearings were about

to begin. As an official party to the OWMC proceedings, Laidlaw's opposition to competing for business with the crown corporation was already in full public view and only became more so when the West Lincoln hearings began in February 1990. As well, during public hearings for its own proposal in August 1993, the company continued to express its opposition to the OWMC facility.

Moore Township is a small rural community with a population of 10,664 and an above average median household income of $52,553 as compared to the Province of Ontario generally ($44,432) according to the 1991 Canadian Census. It lies on the outskirts of the City of Sarnia, Ontario which is a highly industrial jurisdiction similar to Niagara Falls, New York in terms of its concentration of chemical plants. The Laidlaw facility site has been used for industrial waste disposal since 1960 and for hazardous waste incineration since 1968 (Laidlaw 1990). The property has had several ownership changes since this time. The prior owner, Tricil, Ltd., purchased the facility in 1980 and sold it to Laidlaw in 1989.

5.2.1 The Environmental Assessment Board (EAB) Hearing

In August 1993, the first of what was to be a series of public hearings on Laidlaw began, chaired by a representative from Ontario's Environmental Assessment Board (EAB). The company used the opportunity to state its case for the proposal and to introduce its own environmental assessment (EA), emphasizing its compliance with the Ontario Environmental Assessment Act (EAA). A representative from the province's Ministry of Environment and Energy followed with a statement which concluded that Laidlaw had addressed the requirements of EAA in a "reasonable, rational and traceable

planning framework" (EAB August 1993). In addition, ten separate groups and individuals made statements as to their concerns about the new incinerator, seven of whom requested full-time party status and one of whom requested part-time status.

In July 1993, just before the public hearings were to begin, Laidlaw had issued a written argument to Ontario EAB and prospective intervenor groups, including OWMC. The company's long-standing disagreements with the crown corporation came through clearly in its arguments and conclusions regarding the merits of the proposal and why it was needed. The document cautioned that while a rotary kiln incinerator would be most useful for burning some of the wastes that were already going to the Laidlaw facility, OWMC's proposal would only duplicate, rather than add to, treatment capacity. In response, OWMC made a statement reminiscent of Ontario's remarks about the CECOS and CWM proposals in Niagara, New York that it was "not in opposition to the proposal, in principle" (EAB August 1993, 39). Nonetheless, the crown corporation expressed concerns about how Laidlaw's proposed incinerator would affect OWMC and how operational and environmental safeguards would compare with those OWMC planned for its own facility.

5.2.2 Local Opposition to Laidlaw

Local groups and individuals were opposed to the Laidlaw proposal with the exception of the Moore Township government which stated no firm preference but did ask to participate in the proceedings on a full-time basis to ensure that local safety concerns were addressed to its satisfaction. Four local groups opposed the new incinerator and requested full-time party status including the Citizen's Environmental

Action Group (CEAG), a local environmental group, as well as the Lambton Federation of Agriculture, the Saint Joseph's Health Centre, and the Walpole Island First Nation. In addition, two individuals who were nearby residents of the Laidlaw facility expressed their opposition and requested party status in the proceedings. In general, these groups concerns related to ongoing problems they had experienced with the existing facility historically, as well as the potential for increased problems brought on by the proposed new incinerator.

5.2.3 Laidlaw Withdraws

Just two months after what was to have been the first of several public hearings on Laidlaw, the company withdrew its proposal for a new incinerator. The announcement came just after the conclusion of OWMC hearings in September 1993. In an information release, the changed plans were attributed to "insufficient market need and the availability of alternative technologies" (Laidlaw October 1993). This justification seemed surprising given that the company had publicly claimed the facility was needed as little as two months before in the EAB hearing. Laidlaw's reversal on the issue of need seemed to refer as much to OWMC as it did to its own proposal as the company elaborated on its decision:

> The reality is that rotary kilns operating within the North American environmental services sector are running at an average of only 70 per cent of available capacity. The time has come and gone when Ontario's needs require a 20,000-tonne-capacity rotary kiln in the province The service can be provided in other ways (Laidlaw October 1993).

5.3 Hazardous Waste Facility Siting in Michigan

In the State of Michigan, hazardous waste siting is conducted pursuant to the Michigan Hazardous Waste Management Act (Act 64 of 1979). As with the State of New York's facility siting cases in Niagara County, NY, Michigan uses a regulated market strategy that relies on private waste management firms to propose particular projects in specified locations. The Michigan Department of Natural Resources (MI DNR) has the responsibility of reviewing TSDF applications and requiring proposal modifications if it deems them to be necessary or desirable. The agency either denies the application or submits a draft construction permit to the Site Review Board (SRB) which is responsible for overseeing public hearings, reviewing arguments and evidence from parties to the proceedings, and making a recommendation to approve or deny the proposal.

The SRB includes ten members, two of whom represent the local area and eight of whom are "permanent" members pursuant to 1987 amendments to Act 64. Prior to 1987, the board consisted of four local members and five permanent members. According to the 1987 law, one of the local members is appointed by the municipal government of the town or city where the facility is to be located. The other local member is appointed by the county government. The state governor appoints the eight permanent members, one of whom serves as a non-voting chairperson. The others include a geologist, a chemical engineer, a toxicologist, a representative from a manufacturing industry, two representatives from the public, and a municipal government representative (from a community other than the location of the proposed facility). Other groups and individuals may attend the public hearings and are allowed to make statements and submit evidence

to SRB, but they are not given party status as occurs in New York State and the Province of Ontario.

Since 1979 when the original hazardous waste facility siting provisions were put into law under Act 64, SRB has conducted hearings for six separate commercial TSDF proposals. The first was in 1981 regarding an incinerator in the western part of the state on the shore of Lake Michigan. The other five were in the Detroit metropolitan area and are reviewed in the following sections. The cases include a Wayne County landfill (EMS), reviewed from June 1982 to October 1982; an Oakland County incinerator (ERES Corporation), reviewed from September 1982 to December 1982; an Oakland County treatment facility and landfill (Stablex Corporation), reviewed from December 1982 to October 1983; a treatment facility in the City of Detroit (NCS), reviewed from December 1987 to May 1988; and another City of Detroit treatment facility (City Environmental), reviewed from July 1988 to September 1989. In addition, a sixth Detroit area deep well injection facility (EDS) was constructed in Wayne County in October 1993 after three years of planning and approval from local officials. The Site Review Board never heard the case, however, because of a loophole in Act 64 that exempts deep well injection systems from the review process if no other facilities are involved.

5.3.1 Environmental Management Systems (EMS)

In June 1982, SRB began reviewing the Environmental Management Systems (EMS) proposal for a hazardous waste landfill in the Wayne County community of Sumpter Township. Wayne County includes the City of Detroit and stretches to the south. It has a population of 2,111,687 and a lower than average median household

income of $27,997 as compared to Michigan state-wide figures, $31,020, according to the 1990 U.S. Census. The county's racial makeup is 57.4 percent white, 40.2 percent black and 2.4 percent other. Sumpter Township is largely white (85.3 percent) suburban community with a population of 10,891 and a slightly higher than average median household income of $34,929. The proposed facility would have been an 80 acre hazardous waste landfill expansion of an existing 160 acre municipal waste landfill which is currently in operation. The original landfill had been in operation for an unknown period of time but was known to have been accepting wastes for more than twenty years at the time of the public hearings in 1982 (Site Review Board August 1982).

SRB heard testimony from MI DNR and the applicant, EMS, as well as local residents and government representatives from Sumpter Township. MI DNR had already issued a draft construction permit and took the position that the proposed facility and location met all the technical requirements of Act 64. EMS spoke to the suitability of the site in terms of "natural" containment that would be provided by twenty feet of clay deposits and to the technical sophistication of the design with its synthetic liner and leachate collection system. All other testimony came from local government officials and residents who were decidedly negative toward the proposal.

Several representatives of the Sumpter Township government and their technical consultants expressed concerns about the suitability of the site in terms of hydrogeology and also ongoing problems with the existing landfill. The various officials testified that well monitoring data from the existing facility showed evidence of styrene and sulfate contamination. In addition, core samples from the natural clay deposits at the site were

found to be so high in moisture content as to hinder their ability to prevent leaching and ground water contamination. High ground water levels in the area (less than one foot below the surface in places), the presence of numerous private wells, and the potential for flooding were also of great concern to local officials. Finally, Sumpter Township representatives expressed concern about the fairness of the process, in particular the "contractual relationship" that would occur between MI DNR and EMS should the facility be approved. The Township Supervisor suggested that if granted, the permit should be a "three-way" agreement with the community acting as the third party. Numerous local residents made statements throughout the hearings. In general, their complaints reflected ongoing frustrations with the existing facility and the potential for increased problems if the new facility were to be approved. Truck traffic and odor problems were the most commonly mentioned specific problems.

In October 1982 after four months of hearings, SRB met one final time to issue their decision, which was to deny a permit by a vote of six to three. Because the proceedings took place before the 1987 amendments to Act 64, the panel included four local members and five permanent members (rather than two and seven). This was probably critical to the outcome given that all four local members voted to deny the permit and three of the five permanent members voted for approval. The reasons for the decision included unresolved concerns about a "poor record of performance" at the existing landfill and the potential for flooding. The most central conclusion leading to the permit denial related to the high water table which would put the landfill in direct contact with ground water, a violation of Act 64 (R299.6415).

5.3.2 Energy Recovery Systems (ERES) Corporation

In September 1982, SRB initiated hearings regarding an Energy Recovery Systems (ERES) Corporation's proposal for a hazardous waste incinerator in the Oakland County community of Pontiac Township. Oakland County is a suburban jurisdiction within the Detroit metropolitan area and lies to the northwest of the City of Detroit. According to the 1990 U.S. Census, the county has a population of 1,083,592, a higher than average median household income of $43,407 as compared to the state generally ($31,020), and a racial makeup of 89.6 percent white, 7.1 percent black and 3.3 percent other. Pontiac Township is located to the north of the City of Pontiac, within the Pontiac metropolitan area which has a population of 71,166, a lower than average median household income of $21,962, and a racial distribution of 51.5 percent white, 42.2 percent black and 6.3 percent other.

The proposed incinerator site was a 50 acre tract of vacant land adjacent to an existing municipal waste landfill. SRB heard from six State of Michigan legislators and a number of local residents, each of whom was vehemently opposed to the proposed facility. Their comments ranged widely but generally focused on local nuisance issues such as noise and odors as well as risk-related concerns about emissions from the stack, the possibility for ground and surface water contamination, and truck traffic. Local government officials from Pontiac Township, two nearby villages and a school board voiced their opposition to the proposal and submitted resolutions to that effect as evidence for SRB review. A representative of the American Lung Association, Southeast Michigan Chapter expressed opposition due to concerns about the potential toxicity of emissions.

The most positive reaction came from the Oakland County Health Division which supported the proposal as a way of dealing with the problem of "hazardous waste materials which are indiscriminately entering [waste water treatment facilities] via sewers, landfills and illicit dumpings" (SRB October 1982).

In December 1982, SRB issued a seven to one decision to deny the permit. All four of the local members voted against the facility as did three of the four permanent members. The decision was not based on direct evidence that the facility would be unable to comply with Act 64 or otherwise pose an unreasonable risk to the community or the environment, as occurred in the EMS verdict. Rather, SRB found that ERES had failed to submit a satisfactory analysis of risk related to transportation, ground and surface water contamination, fires and explosions, and overall environmental impact. In addition, the board concluded that ERES had "failed to provide adequate information to indicate that it possesses the level of technical and managerial expertise needed to safely operate a facility of the size and complexity being proposed" (SRB December 1982).

5.3.3 Stablex Corporation

The SRB first met to review the Stablex facility siting proposal in December 1982. The applicant was seeking approval to build a landfill and stabilization/treatment facility in the suburban Oakland County community of Groveland Township to the north of Pontiac, Michigan. According to the 1990 U.S. Census, Groveland Township has a mostly white (97.1 percent) population of 4,705 and a higher than average median household income of $48,288 as compared to the State of Michigan generally. Stablex was proposing to convert a 200 acre mining quarry site into a landfill and treatment

facility. The first stage of the project would have involved a 50 acre landfill, but the applicant's long-term plan was for up to a 184 acre landfill.

The proposal was particularly controversial because it would not have included a synthetic liner which Stablex argued would be unnecessary given its patented process of solidification. The "sealosafe" solidification process used calcium alumino silicate (typically flyash from coal plants) and cement mixed with chemically pre-treated hazardous wastes. The British company had developed and applied the process at landfills in England and later at a facility in the Montreal area. The proposal was not new to area residents since the company had originally sought approval for the facility in 1978 when U.S. EPA issued Stablex a regulatory waiver from the usual requirement for synthetic liners in all hazardous waste landfills. Because the case was first proposed before the 1979 passage of Act 64, it was initially handled as a civil preceding and went through a variety of appeals. In May 1981, the Michigan Court of Appeals denied Stablex's request for a construction permit and ordered an SRB review.

During public hearings before SRB from December 1982 to October 1983, local government officials and residents of Groveland Township expressed numerous concerns about the Stablex facility. Town officials took issue with the landfill's incompatibility with site's existing E1 (extraction) zoning, the population density in a three square mile vicinity (4,136 persons per square mile), a lack of hydrogeological assessments, a lack of emergency planning, and the "untested" nature of the "sealosafe" process (at least within the U.S.). A number of area residents spoke to each of these concerns as well as to the problem of odors and the potential for accidents between waste haulers and school buses.

Many of the complaints implied a lack of trust in the company, particularly given its previous attempts to avoid the SRB process and the various competing appeals between the company and the Township that had ensued.

In September 1983, SRB took a preliminary poll of members and denied the construction permit by a six to three vote. Each of the four local members voted for denial as did two of the five permanent members. The decision was based on incompatible hydrogeology (the site was on top of an aquifer with no natural barrier), a conflict with local zoning, a potential harm to local recreation in nearby streams and lakes, insufficient engineering plans, and a lack of proof that the "sealosafe" technology is safe without a synthetic liner. The decision was adopted in October 1983 by a five to two vote (one local member and one permanent member were not present).

5.3.4 National Chemical Services (NCS)

SRB hearings on a National Chemical Services (NCS) proposal for a hazardous waste treatment facility in the City of Detroit began in December 1987. Detroit's population is 1,027,974 and 75.6 percent black, 21.6 percent white and 2.8 other according to the 1990 U.S. Census. Its median household income ($18,742) is much lower than the Michigan state-wide average ($31,020). The facility was proposed for siting in the highly industrial southwestern part of the city in the neighborhood of Delray. The area has a population of 3,941 and is 61 percent white, 29 percent black and 10 percent other, according to the 1990 U.S. Census. The City of Detroit's Master Plan addresses this aspect of Delray's environment in terms of a long-standing dilemma

regarding the "incompatible" needs of residents and industries in the context of urban decay and deindustrialization:

> The City now advocates retention of Delray as a community, including housing, schools, churches, the health center, and commercial and retail services. ... Many changes may be needed. In Delray, the general "goal" of accommodating reindustrialization within existing industrial corridors is not entirely feasible because of the current inter-mixtures of land uses (City of Detroit 1985).

At the time of the public hearings, NCS already operated a spent acid regeneration facility at the 7.2 acre site and was seeking approval to build a series of tanks to chemically treat 72,000 gallons per day of metal-bearing wastes as well as spent acids. Members of the Delray Environmental Concerned Citizens Association (DECCA) as well as many individual neighborhood residents were opposed to the facility. Area residents' concerns about the proposed facility expansion focused heavily on pollution problems from the various industries in the area. Especially troubling was a permit application which a cement company in the Delray neighborhood (Peerless Cement) had submitted so that it could begin burning paint sludges, thinners and solvents in place of coal. In January 1988, after a year of public hearings regarding NCS, MI DNR rejected Peerless' permit application, diffusing at least one of the community's frustrations. With respect to the NCS facility specifically, community opponents expressed the usual concerns regarding truck traffic, air emissions, and the threat of spills, fires and explosions. The existing NCS facility's record of performance was not specifically referenced as a cause for concern.

The City of Detroit was not officially opposed to the NCS proposal but stopped short of supporting it. In a written statement to SRB, the Detroit Health Department

expressed the need for "proper" waste management facilities "to protect the overall public health and the environment" (Detroit Health Department April 1988). The document never defined what a proper facility might be or whether the NCS proposal might be able meet that test, but it did go on to state the following position:

> The safeguards designed into this facility's operation appear, in theory, to reduce the public health risk to the neighborhood to minimal levels under normal operation. However, we are still unable to lend our full support to the siting of this facility in this particular location due to the concerns for the public health and safety in the immediate neighborhood ... (Detroit Health Department April 1988, 1).

In May 1988, SRB voted to approve the NCS proposal with a vote of seven to one. All five permanent members voted to grant the permit as did two of the four local members. Of the two remaining local members, only one voted against the facility and the other was not present. Even the one member who voted for denial explained his decision as an act of solidarity with the community given its opposition, but expressed the belief that the company "would live up to [its] agreement" to operate the facility safely (SRB May 1988, 12). Despite the SRB approval, however, NCS has not expanded its facility due to a lack of market demand and has no current plans to do so (Burda 1997).

5.3.5 City Environmental

SRB hearings on the proposed City Environmental, Incorporated chemical treatment facility began in February 1989. The company was proposing to site the plant on the city's near east side just one block from Detroit's highly controversial municipal waste incinerator. The neighborhood has a population of 5,852 and is 73 percent black,

25 percent white and 2 percent other, according to the 1990 U.S. Census. City Environmental's parent company, City Management Corporation, hauls garbage and incinerator ash on a contractual basis for the municipal incinerator. City Environmental also operates hazardous and municipal waste landfills throughout the State of Michigan. Their proposal was for a treatment facility to process up to 100,000 gallons per day of corrosive and metal-bearing wastewaters.

The City of Detroit made no objections to the City Environmental proposal but area residents voiced a number of concerns during the public hearings. Ongoing problems with the Detroit incinerator were heavily emphasized as evidence that the company, given its relationship to City Management, could not be trusted to operate a safe hazardous waste facility. The municipal incinerator has been in operation since 1988 and has drawn criticism ever since, not only from Detroit area residents, but also environmental groups and the Province of Ontario. With respect to the City Environmental proposal itself, area residents' concerns were very similar to those expressed during the NCS proceedings. The most commonly referenced problems they feared related to truck traffic, air emissions, and the threat of spills, fires and explosions.

In September 1989, SRB voted in favor of granting City Environmental a permit with an eight to one vote. The only vote to deny the permit was made by one of the two local members. This was the first SRB proceeding to operate pursuant to the 1987 amendments to Act 64 that changed the composition of the board from four local and five permanent voting members to two local and seven permanent members. It has been eight years since the SRB granted City Environmental permission to begin construction, but it

has not done so and has no present plans to that effect. As with NCS's decision not to expand its existing treatment facility, as well as Laidlaw's decision to withdraw its proposal for an incinerator, the City Environmental case reflects a lean market for hazardous waste facilities. One reason for this has to do with increased capacity and competition in the industry, partly from expansions of existing commercial TSDFs and additionally from the blending of liquid hazardous wastes with fuel oil to burn in cement kilns and other industrial boilers (Hanke 1993). A second reason is the increased practice of on-site pre-treatment of wastes in the chemicals industry and other sectors. The most common form of this involves the removal of water from liquid wastes so as to reduce volume, though toxicity and other hazardous characteristics generally increase with this method (Bouck 1993). A third aspect of the present hazardous waste market is that current practices in contaminated site remediation emphasize on-site containment of wastes rather than the more costly method of off-site disposal which was more common in the 1980s (Bouck 1993).

5.3.6 Environmental Disposal Systems (EDS)

In August 1990, Environmental Disposal Systems, Incorporated (EDS) initiated plans to build a deep well injection system to dispose of liquid hazardous wastes in the suburban Wayne County community of Romulus. The City of Romulus has a population of 22,898 and a racial composition of 85.3 percent white, 13.7 percent black and 1.0 percent other according to the 1990 U.S. Census. The city's median household income is $31,723, slightly higher than the Michigan state-wide average. From the beginning, City of Romulus Council members worked closely with EDS to develop a proposal that

both the company and the city government could support. In January 1993, the city council passed a resolution in support of the facility after reaching an agreement with the company that the local government would receive five percent royalties.

The EDS proposal was never reviewed by SRB so public input was minimal. The project slipped through a loophole in Act 64 that exempts deep well injection if no other facilities are involved. The system was designed to allow liquid waste haulers to connect directly to the well head without the use of a storage facility that would have triggered the siting process. The facility has the capacity to receive 400,000 gallons per day and up to 96 million gallons per year. MI DNR officials issued a construction permit in October 1991 but cautioned EDS officials that the SRB process would be advisable to protect the company's interests once the facility began operations should community opposition become an issue (Burda 1994). EDS declined the advice and began construction in July 1993. The facility was completely built by August of that same year.

Shortly after the facility's construction was complete but before it was able to begin operations, public opinion against the project started to grow rapidly. In September 1993 a candidate for city council expressed opposition to the city's agreement with EDS. In early October, several hundred residents attended a protest meeting regarding the issue and urged the council to intervene before an operating permit could be issued. One week later, the council issued a unanimous resolution to file an injunction against the company. On October 22, 1993, just two weeks before the council election, the city filed a lawsuit against EDS charging that the company had not complied with local zoning procedures and that the location was unsuitable for a hazardous waste facility. The city has spent

approximately $240,000 in legal fees and has still not reached an agreement with EDS. The facility stands unused but may go through an SRB review once the lawsuit is settled (Burda 1997).

5.4 Summary of Cases in the Detroit and Sarnia Areas

Of the seven facility siting proposals in the Detroit and Sarnia areas, only two treatment facilities were approved, neither of which was built. Aside from the underground injection facility which was built without public hearings and has yet to receive an operating permit, siting boards approved none of the four remaining proposals involving two landfills and two incinerators. One of these was withdrawn by the proponent and the other three were denied permits.

How is it that so much effort on the part of facility proponents could have gone unrewarded? The following three sections, patterned after those in Chapter 4, will review the cases and analyze them in terms of key decisions that the various stakeholders made along the way. The definition of facility need, for example, was a fundamental issue that proponents had to prove successfully in order to realize their plans. Likewise, the selection of particular facility characteristics such as location, size and type was critical. Finally, siting boards considered issues of fairness in terms of process and outcome in their final decisions. Each of the stakeholder groups had its own arguments and evidence about these issues and attempted to convince decision-making officials as to the veracity of their claims. Ultimately, siting boards had to consider the opinions and justifications

of all parties with regard to each of the issues in question in order to reach their own conclusions (See Table 8).

Table 8

Summary of Cases in Sarnia and Detroit

Community & Existing Site	Proponent & Proposal	Opposition Groups & Issues	Outcome & Reasons
Moore, ON (agricultural): HW Landfill & Incinerator	Laidlaw: Incinerator (12/89-10/93)	Local Groups, Walpole Island: Cumulative & Spatial Equity	Withdrawn: Lack of market
Sumpter, MI (suburban): Munic. Landfill	EMS: Landfill (6/82-10/82)	Township, School Board: Hydrogeology	Denied: Hydrogeology
Pontiac, MI (suburban): Munic. Landfill	ERES: Incinerator (9/82-12/82)	Township, School Board: Hydrogeology & Proponent	Denied: Hydrogeology & Proponent
Groveland, MI (suburban): Quarry Site	Stablex: Landfill (12/82-9/83)	Township: Hydrogeology & Design	Denied: Hydrogeology & Design
Detroit, MI (urban): Treatment Facil.	NCS: Treatment Facility (12/87-5/88)	Local Group: Cumulative Equity	Approved: Never Built
Detroit, MI (urban): Munic. Incinerator	City Env: Treatment Facil (2/89-9/89)	Unorganized Residents: Cum. Equity	Approved: Never Built
Romulus, MI (suburban): Greenfield	EDS: Underground Injection	City (after initial support)	Pending: Built Without Public Hearings

5.5 Defining Facility Need

5.5.1 Sarnia, Ontario

Defining facility need was one of the most central issues that faced the Laidlaw-Sarnia case. The company's role as an intervening party to the OWMC proposal in Niagara, Ontario was at least part of what made this the case. In an environmental assessment of its own rotary kiln incinerator proposal, Laidlaw dismissed the OWMC proposal because they considered the construction and operation of a hazardous waste management facility to be an inappropriate activity for government. The company argued that the province's West Lincoln facility would turn out badly for the public interest as well as Laidlaw itself on the basis that OWMC would "maximize rather than minimize public sector costs" and create "major financial uncertainties and limited financial return for Laidlaw Environmental" (Laidlaw 1990). A public sector crown corporation approach, the company argued, would be "highly inflexible" due to its "dependen[ce] upon facilities which have yet to be approved, unknown cost arrangements, and undefined role in the market place". Further, it would mean a "major reorientation for Laidlaw Environmental from [a] major to minor treatment role" (Laidlaw 1990).

In its early statements regarding the need for its own facility expansion, Laidlaw's aversion to the OWMC project came through as well. The company argued that adding a rotary kiln incinerator to its existing facility in Moore Township would allow it to treat organic sludges and solids that are otherwise either landfilled without being treated or shipped out of province. Conversely, Laidlaw suggested that the crown corporation approach would only hinder Ontario's ability to meet industries' disposal needs by

disrupting the private market and corresponding profits. Laidlaw's private sector plan would "redirect" waste, not to another facility in another region as OWMC favored, but within the existing Laidlaw-Sarnia site:

> Laidlaw Environmental [proposes] to enhance the environmental integrity of its existing operations by redirecting selected organic wastes to an environmentally preferred management option. The redirection of such wastes can only be realized to the extent that service delivery by Laidlaw Environmental to its customers and market share are not diminished.
>
> [A]dditional market share may be necessary to maintain the requisite profitability. ... As a private sector proponent offering an important and necessary waste management service to government, industry and the public, it is in the public interest and it is consistent with Laidlaw Environmental's corporate mandate, to increase the type and level of service it can provide economically and at every available opportunity (Laidlaw 1990, 8).

In its early statements, and throughout the public hearing, Laidlaw continued to reiterate its interrelated arguments regarding the role of government and facility need. As a facility proponent it also had to address the question of whether pollution prevention could sufficiently diminish the need for existing and future waste disposal capacity. Laidlaw concluded there was "no further potential for reduction of target waste streams and no evident prospects - given limitations of market, technology and waste characteristics" (Laidlaw 1990). Yet in a final statement explaining its proposal withdrawal, Laidlaw strongly suggested that no new facilities were needed in Ontario since the province could make greater use of pollution prevention to reduce waste in need of treatment and send the remainder to existing rotary kiln incinerators in Canada and the U.S.:

> [U]nder existing and projected market conditions, Laidlaw Environmental could provide effective treatment services more economically by offering

waste generators access to rotary kilns already in operation in the North American market and by continuing to pursue waste minimization opportunities within the province (Laidlaw 1993).

5.5.2 Detroit, Michigan

In Michigan, hazardous waste facility siting has been subject to similar kinds of proceedings as in Ontario and New York, but with different sets of circumstances. With respect to the role of government, the Detroit area proposals were similar to those in Sarnia, Ontario and Niagara, New York in that they were all subject to a regulated market approach with private corporations submitting proposals for government review. The Michigan cases differed in that they were heard by larger and more diverse siting boards as compared to those in the other jurisdictions, but citizens groups were not given official status as intervenor groups. Further, Michigan's SRB became less represented by community interests after 1987 revisions to Act 64 which reduced the number of "local" members from four to two and replaced them with two more "permanent" members appointed by the governor.

The siting board composition and the opinions of permanent and local members were important factors in the outcomes of Michigan facility siting cases. The City Environmental proposal was the first, and thus far the only, proposal reviewed pursuant to the new SRB makeup and one of the only two Detroit area facilities to receive a construction permit. Had the changes to Act 64 been made earlier, other cases may have turned out differently. Three of the four cases prior to City Environmental ended in permit denials because of unanimous opposition from local board members. The fourth

such proposal, NCS, was approved because two of the three local members present at the time of the final vote were willing to grant the permit.

In light of the number of failed attempts to site new hazardous waste facilities, need was a continuing issue that drove MI DNR's support of each. Had the proposals not been seen as necessary in light of capacity assurance objectives with which all U.S. states must comply, the agency would have had far less interest in supporting them. After three unsuccessful facility siting attempts in 1982 and 1983, the need for additional capacity was still unresolved from the state government's point of view. In a 1984 report of hazardous waste options, MI DNR recommended the SRB membership changes that were later written into law precisely because of a perceived need for new facilities. The report attributed the need for new facilities to (a) wastes from contaminated site cleanups, (b) increased compliance from small quantity generators, and (c) ongoing waste generation from large industries (MI DNR 1984). After witnessing three denials and two approvals, MI DNR issued a 1991 Hazardous Waste Management Plan in which it continued to express interest in the siting of new facilities but also recognized the importance of waste reduction:

> Michigan policy should support the general goal of achieving and maintaining sufficient hazardous waste management capacity (at a variety of types of facilities) within the state to meet the needs of Michigan generators, without precluding the interstate transport of imports and exports. When feasible, this capacity should be located at multiple sites to provide stability in site availability.
>
> Michigan policy and studies on future management capacity and needs should continue to incorporate the projected impact of ongoing hazardous waste reduction, including the impact of the state hazardous waste reduction policies ... (MI DNR 1991, 36).

The role of local government took an interesting twist in the EDS case in that the Romulus city council was initially in favor of the project--so much so that members worked closely with the company in developing the proposal--yet ended up opposing the facility and filing suit against the company after the construction was completed. Also, of all the cases reviewed in Chapters 3 and 4, this was the only one where state government officials outwardly expressed reservations about a proposal (at least once they had issued initial permits) and where the official local government position was supportive (even if only initially). MI DNR's concern related specifically to the lack of a formal SRB, and thus community, review. The city council's initial support of EDS only changed when community concerns became obvious.

5.6 Selecting Facility Location, Size and Type

5.6.1 Sarnia, Ontario

The Laidlaw-Sarnia case was interesting in terms of its location because of the issues it would have raised had it been approved. Groups opposed to the CWM and CECOS facilities in Niagara, New York expressed considerable frustration with being the only region of the state with commercial hazardous waste facilities. Niagara, Ontario opponents of the OWMC facility objected to having four separate facilities on one site in their rural community. As it stands, the Laidlaw-Sarnia facility is the only commercial hazardous waste facility in the province and would only have increased in size had the company continued its support for the proposal and received the necessary approvals. The OWMC process was still under way at this point, but its eventual failure to win the

approval of EAB left the Sarnia area with the only commercial landfill and incinerator in the Province of Ontario. It is ironic that the Sarnia area ended up with exactly the situation that Niagara, Ontario residents feared so much with regard to the OWMC facility.

Contrary to the OWMC process that led to a site selection in Niagara, Ontario, each of the Sarnia and Detroit area proposals was submitted by commercial waste management firms. In each, the role of government was limited to reviewing the applications and overseeing the public hearings. As was the case with the Niagara, New York disputes, risk became a dominant issue in the context of site selection and review. The Laidlaw-Sarnia case did not have the chance to reach this point in its EAB proceedings before the company withdrew its proposal, so we will never know how risk concerns would have ultimately played out in this case.

5.6.2 Detroit, Michigan

The Michigan SRB denied the EMS and Stablex landfills and the ERES incinerator based on hydrogeological concerns about the potential for leaching and ground water contamination. These outcomes were much the same as with the OWMC-South Cayuga and CECOS decisions in the Niagara region. In addition, Michigan SRB officials expressed serious concerns about the ability and willingness of the three private sector applicants to operate the facilities safely. In a MI DNR report issued one year after the third SRB permit denial, the agency addressed concerns about the siting dilemma:

> There are people who cite the fact that three proposed commercial facilities have been denied by site review boards and go from that

> experience to draw the conclusion that the process will never result in the siting of a new commercially available facility. Others contend that the fact that the site review board turned down these three applications gives evidence to the fact that the site review board process is working. They cite deficiencies in the applications and the answers provided by the applicant during the site review board meetings as the reasons for denial (MI DNR 1984, 39).

Because hydrogeology was central to each of the three SRB decisions to deny permits, the report explored siting options that would require a preliminary assessment of environmentally suitable locations before applications are even submitted. In its 1984 report, MI DNR addressed this idea with reference to Ontario's OWMC proposal, among other issues:

> There has also been interest expressed in having the state do some prequalification of hazardous waste sites. The State could select several sites which are geologically and otherwise environmentally appropriate for a hazardous waste management facility. The trouble with this suggestion is that it results in great public controversy over possible hazardous waste sites without there ever being an applicant for the site. This problem has occurred in both Ontario and Minnesota.
>
> Also, if the state is involved in selecting potential sites, it can create even greater controversy when an applicant comes to the site review board. It will appear to the citizens the state selected the site and thus are [sic] a co-applicant for the facility (MI DNR 1984, 40).

Facility size and type were also important factors affecting the outcome of facility siting decisions. After having denied permits for two landfills and an incinerator, MI SRB approved the NCS and City Environmental treatment facilities. In comparison to landfills and incinerators, treatment facilities are much smaller and present fewer environmental risks since they neither involve direct contact with the land nor continuous emissions. This is not to say that either of the City of Detroit neighborhoods involved in the treatment facility proposals welcomed their presence. Local SRB members were

divided over the decisions, whereas in the three prior cases, which involved landfills or incinerators, local members had been unified in their opposition to the proposals. MI DNR also expressed fewer concerns about treatment facilities as compared to landfills:

> It must also be recognized that every hazardous waste management facility is not a hazardous waste landfill and the natural geological protection which might be preferred for wastes which are to be permanently stored, such as landfilling, may not be required for processing plants which receive limited quantities and types of wastes and pose little threat to the groundwater (MI DNR 1984, 40).

5.7 Promoting Fairness in Facility Siting

5.7.1 Sarnia, Ontario

The Laidlaw facility was opposed by community groups in two respects that related to fairness. The first problem had to do with the existing facility and its location. The Sarnia-based group CEAG argued that the proposal was deficient in terms of its lack of a "real" site selection process and an "appropriate consideration of a reasonable range of alternatives to the undertaking" (EAB 1993, 30). Unlike the OWMC process for Niagara, Ontario with which residents of the Sarnia area were very familiar, the Laidlaw siting process was simply another of many expansions of an existing land use that was becoming an increasing nuisance in the eyes of local opposition groups.

Walpole Island's Ojibwe residents voiced a second objection to the siting process because Laidlaw had excluded them from previously held consultation sessions with local residents. In addition, the company was refusing to offer them intervenor funding to cover the legal and administrative costs of full party status. Laidlaw offered the renumeration to CEAG and Moore Township only and had excluded Walpole Island from

the public consultations and the funding on the basis that the community was located outside the "community study area" boundary (see Figures 19 and 20). Walpole residents' interest in participating had less to do with their proximity to the facility in a strict sense than it did with the island's downriver location from the Sarnia area where not only Laidlaw, but also several other heavy industries, are located. The community has had a long history of environmental problems because of their geographic position relative to Sarnia area industries.

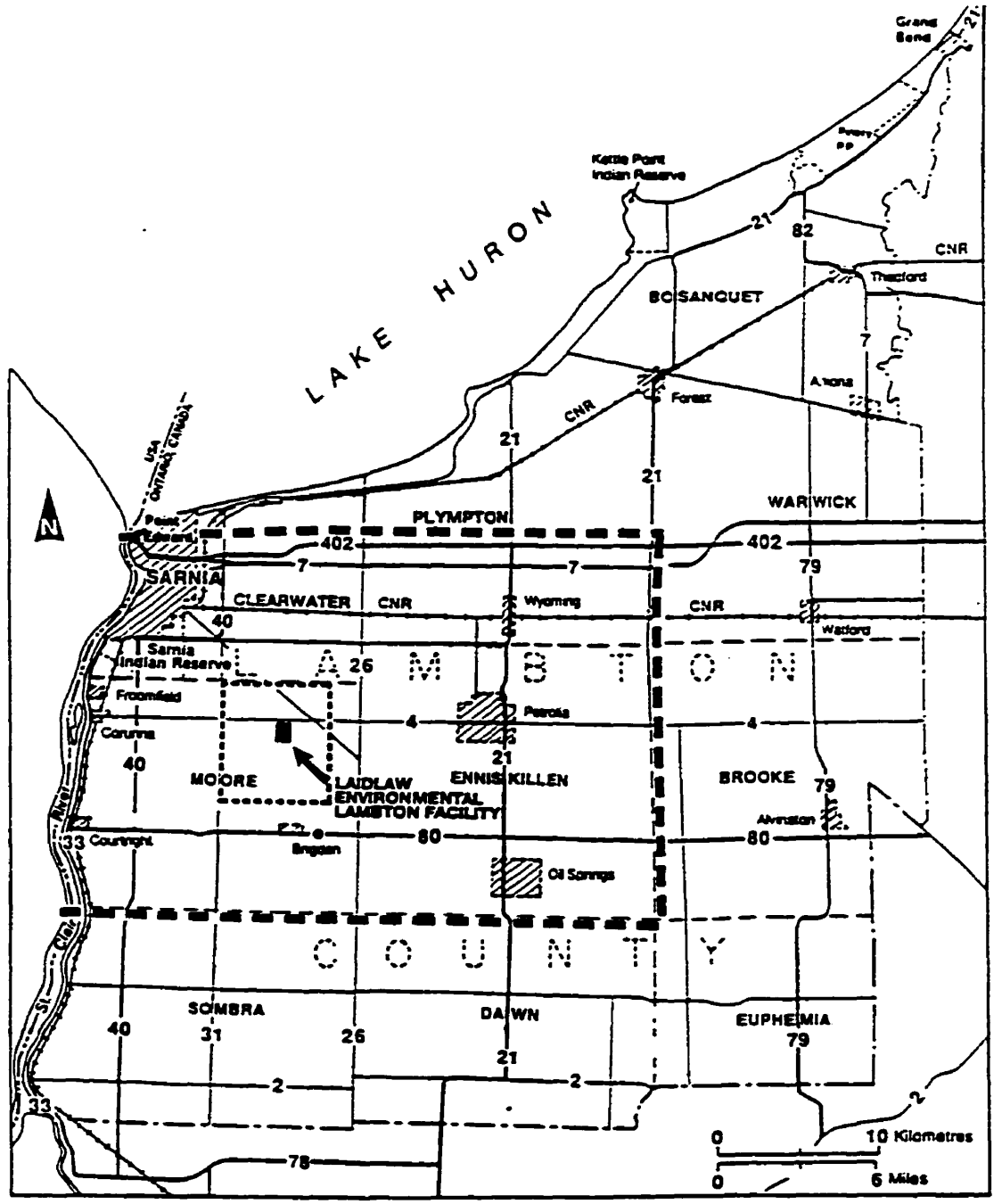
5.7.2 Detroit, Michigan

On the whole, the six Michigan siting disputes had less to do with fairness or equity as compared than in the New York and Ontario cases. One reason may be that commercial hazardous waste facilities are not unique to the Detroit area in that five existing ones are also located in the northern, western and central regions of the state. This is very different from the situation in Ontario where one area (Sarnia) hosts the only commercial TSDF and in New York State where its only two facilities are both located in one county (Niagara County). The first three suburban proposals in Michigan were opposed by local groups, and also rejected by SRB, largely on the basis of risk-related concerns, particularly hydrogeology. In the fourth suburban case, EDS, local residents' concerns were also dominated by questions about risk in terms of the overall safety of deep well injection as a disposal method.

Fairness issues were not altogether missing from local objections to the Detroit area proposals. Critics of EDS' deep well injection facility, for example, have alluded to spatial equity by drawing attention to the company's plans to draw its customer base

Figure 20

Laidlaw Facility and "Community Study Area"



Source: Laidlaw (1990)

partly from Ontario where deep well injection has been phased out of use. Local opponents of the two City of Detroit treatment facility proposals emphasized cumulative risk as a central area of concern. Their specific objections had less to do with the potential for leaching and air emissions from the particular facilities up for review than they did with ongoing problems related to area industries. To repeat a point from the previous section, treatment facilities are less noxious than landfills or incinerators since they do not involve dumping or burning, though the related issue of truck traffic was still a sore point with the community.

To distinguish itself from other industries in the Delray community, NCS negotiated an agreement with ten separate local groups just one day before the SRB took its vote on the proposed facility expansion. The company agreed to hire 60 percent of its employees from Delray and committed itself to $12,000 in annual donations to area schools and for a neighborhood rehabilitation program, among other concessions. In the last public hearing, the president of the local group DECCA, which had opposed the proposal initially, ended up defending NCS while calling attention to the cumulative environmental problems presented by other industries:

> This might not be much to the liking of my community, but I would like to say that since I have lived here for 36 years, I have the same concerns that you do and I have to live, breathe and live in that same area that you do. I think that it is a shame that with the organizations that we have in our community, that our people are not more knowledgeable about the differences between this company and an incineration company. This is a recycling industry. They do not burn, they recycle. And when you recycle a product, it is not profitable to lose anything that they are processing.
>
> They are the first ones ... that have offered to work with the community. ... Nobody else has done that. ... [I]f they are given their permits, which

> they probably will, at least we have a chance, avenues to work--to combat the rest of the pollution that we have there (MI SRB May 1988, 43).

Critics of the City Environmental treatment facility proposal were also largely concerned about cumulative risks from nearby industries as well as increased truck traffic. Many of the complaints related more to the Detroit municipal incinerator across the street from the site than to the proposal itself. Curiously, the question of environmental racism did not surface even though the neighborhood is majority black. Instead, local residents opposed the facility simply on the grounds that it was yet another noxious industry which they would prefer not to have in their vicinity. Unlike NCS, City Environmental did not negotiate a community agreement so changed opinions were not forthcoming. MI SRB approved the facility's construction permit in spite of local opposition. But just like NCS, City Environmental has not built its facility and has no current plans to do so (Burda 1997).

PART III: INTERPRETATIONS

ENVIRONMENTAL JUSTICE AND HAZARDOUS WASTE

Introduction

The facility siting disputes reviewed in Part II reveal a fundamental contradiction in hazardous waste policy between capacity assurance objectives and pollution prevention initiatives. The environmental justice implications of hazardous waste play out in the locational conflicts in ways that relate to community concerns about equity, and also to broader policy questions about whether to regulate disposal methods only, or to additionally regulate production by requiring specific reductions in waste generation. Off-site disposal fulfils an industry need and thus benefits the same corporations that generate waste while communities that serve as hosts for proposed new sites are asked to receive the burdens, often against their will. Also, American states and Canadian provinces absorb the costs of facility siting processes, which in one of the border region cases lasted fifteen years. Most of the disputes involved repeated shorter proceedings with different waste management firms in separate locations and including various facility sizes and types. This public sector subsidy of locating new TSDF sites is, again, for the direct benefit of industries that generate hazardous waste.

Disjoints between the economic benefits of industrial production and the environmental and social burdens pollution creates are not the only problems with hazardous waste policy generally, or capacity assurance objectives specifically. By not requiring industries to prevent, or at least reduce, the wastes they generate as a function of doing business, the state misses the opportunity to break the cycle of unchecked growth and its result, externalized noxious residuals. American and Canadian cradle-to-grave hazardous waste management systems are impressive in their sophistication at tracking

and regulating the various kinds of hazardous wastes industries generate and/or manage in treatment, storage and disposal facilities (TSDFs). But even this is not enough to deal with the need for off-site waste management in a way that avoids endless attempts to build new facilities and expand existing ones. Pollution prevention is clearly the only way to address these systemic aspects of the hazardous waste problem.

Chapter 6 interprets the findings about hazardous waste sites from Part II based on the conceptual, theoretical and empirical discussions from Part I. I argue that the TSDF siting problem is a function of linear production systems that fail to adopt technologically feasible recycling and recovery strategies and also a lack of research and development to advance pollution prevention possibilities even further. Questions of environmental equity and justice are shown to predominate in many hazardous waste siting disputes and are quite difficult to resolve to the point of satisfying both community and industry interests in most cases. An environmentally just hazardous waste policy requires fairness in facility siting in order to meet with the approval of local residents that feel systematically targeted for waste facilities. The lack of success in approving new or expanded facilities suggests that communities have begun to demand no less. But social or spatial equity in waste location will not solve the problem on its own. A sustainable industrial ecosystemic approach which makes pollution prevention central to the production process is also necessary to reduce the need for TSDFs.

CHAPTER 6: TOWARDS ENVIRONMENTAL JUSTICE AND HAZARDOUS WASTE

6.1 Introduction

I have attempted to demonstrate in this thesis that hazardous waste presents many difficulties to society, particularly in communities with actual or planned hazardous waste facilities, and that differing conceptions of fairness are central to the disputes that often arise. The environmental justice implications of facility siting heighten the controversies by adding debates about equity and justice to the complexities of how and where best to deal with industrial wastes. Distributive and procedural justice concerns about treatment, storage and disposal facilities (TSDFs) came through to some degree in all of the facility siting cases reviewed in Part II. The particular details of each related most especially to in-state or in-province waste generation and disposal practices, resulting in variations as to the specific equity and justice issues that would become most salient.

In Ontario, the role of the Ontario Waste Management Corporation (OWMC) predominated in all discussions of hazardous waste management and policy. Even though the province's only commercial TSDF, then and now, is located in the Sarnia area, OWMC's proposals for a large integrated facility, at one and then another greenfield site in Niagara, were at issue in other waste management decisions. This included Laidlaw's proposal to build its own rotary kiln incinerator at its existing Sarnia location in which the company took issue with the very notion of allowing a government agency to compete with private firms in the waste management market.

The Ontario context was very different from that in Michigan and New York where regulated market strategies were used to determine what kinds of TSDFs should go where, relying on the private sector to submit proposals. New York had previously tried a public sector strategy similar to OWMC's using a public utility to site a facility in central New York, but later abandoned this plan in the face of intense public opposition. Michigan explored a similar idea in planning documents after siting boards rejected three Detroit area private sector proposals in a row, but dismissed it as a potentially more troublesome strategy from the state government's point of view, making specific reference to Ontario's long ordeal over OWMC as supporting evidence.

6.2 Spatial and Social Equity

6.2.1 Ontario

In Ontario, spatial equity was especially at issue with regard to the OMWC proposals in Niagara. West Lincoln residents, as well as local and regional governments, opposed the project on the basis that since they are a rural-agricultural, rather than urban-industrial, community and since the wastes bound for the proposed facility are mostly generated as production residuals in Toronto, Hamilton, and Niagara Falls (70 percent), then one or more of those cities should bear the responsibility for treatment and disposal. Also, since OWMC's siting approach was to locate all four facility components at one location, the community and regional response was particularly negative (See Table 9).

The Tri-parties, a local intervenor group, argued in favor of a geographically dispersed facility strategy with each component in a separate location based on a waste

Table 9

Spatial and Social Equity in Ontario

Ontario Proposals	Location/Pre-Existing Site	Community Arguments	Siting Board Findings
OWMC Landfill, Incinerator & Treatment	Rural Niagara (W. Lincoln) (S. Cayuga) Greenfields	Waste should stay in industrial areas	Good idea, but not a sufficient basis to deny
Laidlaw Incinerator	Rural Sarnia (Moore Twnshp) Landfill & Incinerator	Walpole wanted official status over Laidlaw objections	No action before proposal was withdrawn

analysis that would determine which communities generate the most of particular kinds of wastes. The group's version of spatial equity was clearly that communities which generate waste should have to deal with it themselves rather than send it somewhere else, and that the government's environmental policy response should uphold this view. Admittedly, their plan would likely have serious problems of its own. After all, geographic equity is but one element of distributive equity, which is itself only part of the question with respect to environmental equity. Also, a perfectly equal distribution of hazardous waste across space would hardly constitute justice. Nonetheless, the data analysis they proposed would have certainly added to the government's knowledge and understanding of the province's waste management needs in particular regions. Such an approach, combined with increased attention to and information on pollution prevention and on-site treatment and disposal, which the group also supported, could prove to be very beneficial in the determination of particular types of waste capacity shortfalls. Also,

any charge of spatial inequity would be muted with this kind of strategy since it would place the disposal facilities more proximate to waste generators.

The Tri-parties' three conditions for approval, were the siting board to have allowed the project to go forward, were clearly designed to make for the fairest, in a spatial sense, of what they saw as an unjust situation. Two of the points, engineered containment and odor control, had been addressed to the extent possible through negotiations with OWMC. The crown corporation agreed to certain operating conditions based on community concerns to allay local residents' fears in case the project was approved. The third community request, a restriction on out-of-province wastes, met with no serious response by OWMC or the siting board. Given the size and expense of the proposed facility, it is understandable why neither body was willing to entertain this point more fully. Such a restriction would have limited potential customers and associated revenues to the point that the facility might never escape operating cost overruns. But the need to subsidize Ontario waste management with shipments from other jurisdictions as a necessary precondition for a cost-effective facility would seem as easily to call the entire project into question. Given that the original justification for the idea was to deal with Ontario's hazardous waste problem, why should the facility be used to rectify other jurisdictions' capacity shortfalls as much as it deals with in-province pollution? Ontario will instead continue to rely on other provinces and states for some of its hazardous waste management needs, as do many other North American jurisdictions.

Ontario also relies on its only existing commercial hazardous waste landfill and incinerator near Sarnia. Local opposition to expanding that facility to add a rotary kiln

incinerator, the same technology as one of the OWMC components, was very present, though to a somewhat lesser degree than in West Lincoln. Part of the difference may have to do with the duration of the siting proceedings. The OWMC process lasted for fifteen years, nearly ten of which were focused on West Lincoln Township specifically. By comparison, the Laidlaw process lasted less than four years since the company withdrew its proposal just after the OWMC public hearings ended. Had the company continued to pursue the process, local opposition may well have increased as it did in West Lincoln and other cases. Another difference is that the facility has been in use as an industrial waste disposal site since 1960, so to some degree the community may be used to it.

Local government opposition was not an issue in the community where it is located since Moore Township stated no position on it and participated only to ensure the safety of the community, whatever the decision on this specific siting question. Opposition to the Laidlaw facility was greater in Walpole Island, a Native community located approximately 50 kilometers down river from the facility. When the company withdrew its proposal, it was involved in a bitter dispute with area residents over the question of whether the Walpole Heritage Centre could act as an intervenor party to the proceedings. Laidlaw argued the community is too far from its plant to have a legitimate grievance in the case, whereas Walpole representatives claimed the Saint Clair River would transport hazards from the facility downstream and directly affect their local environment. This dispute over the likely spatial distribution of burdens presented a

variation on spatial equity concerns which are typically most pronounced in the communities where the facilities are located.

6.2.2 New York and Ontario Compared

Spatial equity was at least as central an issue in the New York siting cases as in Ontario or Michigan, given the state's concentration of active and inactive hazardous waste facilities in Niagara County and other areas of western New York, as well as the intended remedy of the problem, the "geographic equity" provisions of the state's hazardous waste law (ECL). After abandoning a public sector plan for a commercial TSDF in central New York, the state's only other proposals for additional disposal capacity were for expansions of the two existing facilities in Niagara, New York (CECOS and CWM). The result was intense local opposition to both plans based largely on spatial inequity in much the same way that West Lincoln responded to the OWMC facility proposal in Niagara, Ontario (See Table 10).

The basis for the spatial injustice allegations differed somewhat between Niagara residents of New York and Ontario. Local opponents of OWMC argued it would be spatially inequitable to ask a non-industrial community to host one of what would have been the province's two commercial TSDFs. They argued that salt mines near Windsor (and Sarnia) would provide a more suitable location for land disposal of chlorides residuals than a landfill in West Lincoln. Other facility components should go to one or more of the communities that generate most of the waste (Hamilton, Niagara Falls and Toronto), according to the Tri-parties. This perhaps classic NIMBY response would, of course, place the facility nearly anywhere but in their own area, though one of the

Table 10

Spatial and Social Equity in New York State

New York Proposals	Location/Pre-Existing Site	Community Arguments	Siting Board Findings
CECOS Landfill	Niagara Falls HW Landfill	New TSDFs should go to other areas according to law	Not the Board's decision even if true--Denied on other basis
CWM Landfills & Incinerator	Suburban Niagara Falls HW Landfill & Incinerator	New TSDFs should go to other areas according to law	Not the Board's decision even if true--Approved

suggested communities (Niagara Falls, Ontario) was within the borders of the Regional Municipality of Niagara. Their salt mine suggestion would have placed still more of a spatial burden on the southwestern region of the province, the only area of Ontario that presently receives hazardous wastes on a commercial basis.

By contrast, the vision of spatial equity in Niagara, New York was that the state should remedy the existing concentration of hazardous waste in their area by siting new facilities in other regions. This too might be regarded as a typical NIMBY, though somewhat different, reaction when nearly anywhere else will do as a viable alternative waste site location. Also, the local responses in New York as compared to Ontario seem to contradict one another to some extent. While residents of Niagara, New York may feel inordinately burdened by their historic and existing concentration of hazardous waste sites, their local industries are major contributors to the generation of toxic production residuals.

Residents of Niagara, Ontario argued in favor of locating the various proposed OWMC facility components in the communities from which the wastes come rather than in a non-industrial area; in other words, in communities such as Hamilton, Niagara Falls, and Toronto. Also, their proposal to restrict out-of-province wastes would have applied to places like Niagara Falls, New York. It should also be noted, however, that New York State's geographic equity legal provisions were not intended to target rural areas similar to West Lincoln for new waste sites. Rather, the policy would have attempted to reduce demand on existing Niagara area facilities (and the need to expand them) by building any new hazardous waste capacity in industrial communities from the eastern and central regions of the state, which together generate nearly half of New York's hazardous waste (Eismann 1995; Olsen 1991, 1995).

6.2.3 Michigan Compared

In the state of Michigan, spatial equity was not nearly as central to the facility siting disputes as compared to New York and Ontario. The only case that involved such a controversy was the EDS deep-well injection proposal in Romulus. The most central community concern had to do with the company's attempts, in concert with initial local government support, to avoid the Site Review Board process and public hearings. But local residents were also angered by news that EDS planned to receive perhaps as much as half of its waste shipments from a Canadian transport company that presently ships its waste to a cement kiln in Alpena, Michigan in the northern part of the state (See Table 11). The Alpena plant has an operating permit to burn liquid hazardous wastes mixed with fuel oil.

Table 11

Spatial and Social Equity in Michigan

Michigan Proposals	Location/Pre-Existing Site	Community Arguments	Siting Board Findings
EDS, Deep-Well Injection	Suburban Detroit Greenfield	Waste shipments from Canada unfair	Decision pending

Part of the explanation for the lack of concern about spatial equity in Michigan, relative to that in New York and Ontario, may be spatial distribution of existing commercial hazardous waste facilities. Five are located in areas of Michigan other than the southeastern region, so the prospect of having new ones in the Detroit area may have been less of a political obstacle for facility proponents to overcome than in the CECOS, CWM and OWMC cases. Another explanation is that the Detroit area hosts a large proportion of the state's hazardous waste generators. Still, the Detroit area has a the largest share of the state's commercial hazardous waste facilities (fourteen of nineteen), six of which are located within the City of Detroit, more than any other city or metropolitan area in Michigan. This fact and the obvious social equity implications related to Detroit's largely racial minority (76 percent) and low-income population make it all the more surprising that equity and justice concerns were not more salient in at least some of the six Michigan disputes.

Four of the six Detroit area TSDF siting proposals were located in white communities in the suburbs rather than the central city where the two remaining facilities would have been sited. These two, City Environmental and NCS, are the ones in which

one would expect to find evidence of social inequity based on race and class presented as at least part of local groups' objections to facility location plans. The absence of such evidence and arguments can be partly explained by the type of proposals, both of which were for treatment facilities, rather than landfills or incinerators. Another factor may have been the prior occurrence of the three suburban Detroit siting processes, suggesting that white middle-class communities in Michigan are as likely to face the prospect of a TSDF as are the state's racial minority or low-income communities. Also, unlike New York and Ontario, each of which have only one area where a commercial hazardous waste site can be found, these kinds of facilities are located in four separate regions of Michigan.

Notwithstanding these explanations, given the percentage of the state's commercial TSDFs located in Detroit (32 percent) and its metropolitan area (74 percent), as well as the fact that siting boards rejected each of the three suburban proposals but approved the two central city proposals, it still seems surprising that social equity was not made an issue in the proceedings. The timing of the two Detroit cases (late-1980s) may also partially account for the lack of attention to racial and other social issues, given their occurrence prior to three important developments in the struggle for environmental justice: (1) the Michigan Coalition conference (1990), which was an important impetus for (2) the U.S. EPA environmental equity report (1992), and (3) the establishment of a local environmental justice group in the Detroit area (Bullard 1994). A final factor was that MI DNR reduced the number of local Siting Board members from four to two prior to the NCS and City Environmental proposals in order to increase the chance of permit

approvals. This could have reduced the extent to which area residents' concerns might otherwise have been raised and articulated during Siting Board meetings.

6.3 Cumulative and Intergenerational Equity

6.3.1 Michigan

While social and spatial justice may not have been prominent issues in the Detroit area disputes, community concerns about cumulative and intergenerational justice were quite visible in each (See Table 12). Local opponents of the NCS and City Environmental proposals in the City of Detroit focused almost exclusively on cumulative risk as the basis of their arguments and positions. The type of facility involved in both cases (treatment and storage rather than disposal) was at least part of the reason for this since it poses less risk to communities than incinerators or landfills. Aside from the usual concerns about truck traffic and the potential for accidents at the treatment facilities, most of the complaints from City of Detroit residents had more to do with the burden of existing industrial activity in the neighborhoods most affected. In other words, it was not the potential risk from the proposed facilities themselves that bothered these central city Detroiters most about the projects, but the addition of any further industrial burden in either neighborhood, however remote the possibility of serious problems should the siting board approve them. NCS managed to turn at least some of its local opposition into reluctant support by reaching a community agreement that addressed some of the residents' concerns.

Table 12

Cumulative and Intergenerational Equity in Michigan

Michigan Proposals	Location/Pre-Existing Site	Community Arguments	Siting Board Findings
EMS Landfill	Suburban Detroit Munic. Landfill	Incompatible hydrogeology	Incompatible hydrogeology--Denied
ERES Incinerator	Suburban Detroit Munic. Landfill	Incompatible hydrogeology	Incompatible hydrogeology--Denied
Stablex Landfill	Suburban Detroit Quarry	Incompatible hydrogeology	Incompatible hydrogeology--Denied
NCS Treatment Facility	Central Detroit Treatment Facility	Too many existing toxic hazards	Minimal risk--Approved
City Env. Treatment Facility	Central Detroit Munic. Incinerator	Too many existing toxic hazards	Minimal risk--Approved
EDS, Deep-well Injection	Suburban Detroit Greenfield	Uncertain hydrogeology	Decision pending

In the case of larger and more complicated TSDFs such as incinerators, landfills and underground injection facilities, community opposition is harder to overcome than in the case of treatment and storage units. Michigan's siting board rejected the first three proposals (two landfills and an incinerator) because of hydrogeological problems with the locations. In these cases, intergenerational equity was at least an implicit justification for these decisions, as well as the community opposition to each of the facilities. What makes this criterion of equity and justice most different from all of the others is the depth

of concern siting board officials seem to have regarding the potential for creating new "Love Canals" sometime in the future. Michigan decision makers were most concerned about the potential for ground water contamination, perhaps hundreds of years from now, in their denial of permits for the first three suburban facilities. It remains to be seen how the pending EDS proposal for a deep well injection system in Romulus will conclude, given the complex and often contradictory relationship between the company and the local government.

6.3.2 New York

Cumulative equity was central to local objections to the CECOS and CWM facilities, particularly as it related to spatial equity (See Table 13). Western New York's disproportionate share of hazardous waste includes corresponding cumulative risks and other burdens whether one considers presently active TSDFs only, or all facilities, including those which are closed and no longer accepting wastes. Additionally, the concentration of petrochemical plants in Niagara County makes this a heavily industrialized community with many pollution-related risks. Of course, the very existence of industries in the chemicals sector necessitates a certain amount of hazardous waste disposal capacity, so the relationship between production and disposal seems clear in Niagara, New York. The accumulation of these already spatially disproportionate risks serves only to worsen the effect on this community, but as in the Michigan cases, New York's siting board decisions had little to do with cumulative risk despite local concerns to this effect, but instead focused on the hydrogeological suitability of the locations.

Table 13

Cumulative and Intergenerational Equity in New York State

New York Proposals	Location/Pre-Existing Site	Community Arguments	Siting Board Findings
CECOS Landfill	Central Niagara Falls HW Landfill	Too many existing toxic hazards	Not the Board's decision even if true--Denied on other basis
CWM Landfills & Incinerator	Suburban Niagara Falls, HW Landfill & Incinerator	Too many existing toxic hazards	Not the Board's decision--Negotiated

By contrast, intergenerational risk was a determining factor in the CECOS case, at least after the second siting board decision, based on hydrogeological concerns about the location. It seems encouraging that siting boards in New York, Michigan and Ontario are so reluctant to approve hazardous waste landfills in places that have potential flooding or ground water problems. But the CECOS case also shows that risk assessment is more of a political process than a scientific one. In the first siting board decision, before the decision to expand the nearby CWM landfill in lieu of an incinerator, the need to expand CECOS seemed more pressing (e.g., capacity assurance). The result was a risk ranking just under the magic limit of 200. But the second CECOS decision came after the siting board approved the CWM landfill expansion, so the board slightly increased the risk score to just over 200. As long as capacity assurance is the prime justification for defining facility need, it is very convenient to allow it to trump other factors such as cumulative risk or equity.

6.3.3 Ontario

In the Province of Ontario, cumulative risk issues were somewhat different in the OWMC case as compared to Laidlaw. For local opponents of the OWMC facility, cumulative risk overlapped with spatial inequity, much the same as was the case across the Niagara River in New York State. In a sense, what the Tri-parties wanted as a means of achieving spatial equity--siting the facility in industrial locations--could well have generated cumulative equity concerns in those other communities similar to what happened in Niagara, New York. But siting boards in Ontario, as in Michigan and New York, gave little notice to cumulative risk in its decision making. In its final decision to reject the OWMC proposal due to cost-effectiveness considerations, Ontario's EAB also rejected area residents' concerns about disproportionate spatial and cumulative burdens as a justification for denying the permit (See Table 14).

Table 14

Cumulative and Intergenerational Equity in Ontario

Ontario Proposals	Location/Pre-Existing Site	Community Arguments	Siting Board Findings
OWMC Landfill, Incinerator & Treatment	Rural Niagara (W. Lincoln) (S. Cayuga) Greenfields	Centralized TSDF will bring too much waste	Not the Board's decision even if true--Denied on other basis
Laidlaw Landfill & Incinerator	Rural Sarnia area HW Landfill & Incinerator	Too many existing toxic hazards	Proposal withdrawn

Laidlaw's Sarnia area opponents were very concerned about cumulative risk but, unlike OWMC's critics, they did not link the issue to that of spatial equity. Because this case was ended prematurely when the proponent withdrew its application, it is hard to compare it with others. But given that the existing commercial landfill and incinerator near Sarnia are the only ones in the province, as well as the prospect for still further expansions, it would seem just as reasonable for this community to make the link between spatial and cumulative equity as it is for Niagara residents on both sides of the border.

Even Walpole Island residents' spatial equity concerns were tied more to procedural equity questions related to whether they would receive intervenor party status than they were to cumulative equity. For them, the cumulative risk of any facility that generates or manages toxic waste located upriver from them was as problematic as the next. Like the opponents of NCS and City Environmental in central Detroit, local concerns about Laidlaw's plans had to do with existing industrial hazards in the area more than the risks posed by a new rotary kiln incinerator.

Intergenerational equity was to some degree implicit in Ontario EAB's rejection of the OWMC facility. Though the official reason for their decision had to do with cost considerations, the existence of cost-effectiveness as a determining factor only arose because of OWMC's efforts to minimize risk to future generations. If it were not for the corporation's chlorides management plan, which was to pre-treat this waste stream, projected operating costs would have been much lower. A less costly chlorides plan may well have led to a different outcome. It is interesting to note in this regard that the nearby CWM facility in Niagara, New York takes a much simpler approach to chloride

wastes by releasing them into the Niagara River (Spira 1995). OWMC did explore the option of disposal in an underground injection facility, though Ontario MOEE was unwilling to support the plan (Ontario EAB 1994).

6.4 Procedural Equity and Beyond

Procedural equity has been the prime justification for implementing administrative and public reviews of facility siting proposals. Involving the public, particularly members of the community where the TSDF is to be located, is a necessary prerequisite to fairness in hazardous waste management and policy. But beyond the use of siting boards to review the proposals and make decisions, there are many different possibilities for facility siting procedures. Ontario differed from Michigan and New York, not only with respect to the question of public or private ownership, but also with respect to support of opposition groups. Local critics of both the Laidlaw and OWMC proposals were able to apply for provincial intervenor funding to support their efforts. By contrast, neither Michigan nor New York offers such funds, making the job of opposing TSDF proposals all the more difficult for community groups and local governments.

Another factor is the question of siting board composition. Michigan uses a complex system that ensures representation of local and permanent members as well as distinct roles for particular kinds of experts (e.g., a chemist, a geologist, a manufacturing representative, etc.). In earlier Michigan cases, local members who represented community interests were more likely to vote against a facility than were permanent members. But the decision to change the siting board makeup to include fewer local

members and replace them with permanent members makes it much harder for community interests to control the final decision. By contrast, New York and Ontario use smaller and less complicated siting board structures, but opposition groups are given a more formal role in the proceedings as intervening parties. Ontario intervenor groups were certainly benefitted by provincial funding to support their efforts as compared to their New York and Michigan counterparts who relied on local funding, at least in cases where the official local government position was in opposition to the proposal.

Only one of the cases examined in this thesis could be regarded as a "voluntary" process from the point of view of local government involvement. However, even that one (EDS) did not remain so for very long. According to Rabe (1994), voluntary site selection processes involve local communities, including the general public as well as their local representatives, as early as possible in the siting process. This can even involve a competition where two or more communities bid on hosting the facility as occurred in Alberta, Manitoba and Minnesota. In Ontario, even though the provincial government provided local opposition groups with intervenor funding, both the Laidlaw and OWMC processes were very much lacking in terms of fair process. OWMC's Niagara region critics clearly saw more to procedural equity than the provision of modest funding to fight a project that was chosen for them rather than with them, and long after the original conception and subsequent ongoing development of the facility proposal.

Community agreements between facility operators and local governments were reached in the OWMC case, and also in Michigan (NCS) and New York (CWM), to negotiate terms agreeable to both sides. This procedural device is obviously important

and potentially beneficial to communities facing at least the prospect of hosting a TSDF. But it is also limited in its capacity to fully represent local interests, particularly if negotiated toward the end of a siting process when the community is faced with an imminent siting board decision. This was the situation in each of the three cases involving community agreements. In these examples, local governments were officially opposed to the projects, negotiating with waste industry or government officials only as a last resort and in the event of a worst-case scenario (a siting board approval). This reluctance to participate in a negotiation that presumes the community will ultimately host a new or expanded TSDF is a good indication of the lack of local "voluntarism" so often present in hazardous waste siting, even in cases where community agreements are negotiated.

Even voluntary siting has its pitfalls when facility operators ignore conditions of approval after beginning their operations. A Quebec industry has angered residents near its Stablex facility in Blainville because of reports that the landfill is leaking and that it is accepting mixed wastes with traces of organics, an environmentally unsound practice that the company promised it would not use (Rabe 1994). Alberta's facility in Swan Hills was originally approved with the understanding of hazardous waste import restrictions. But the day before the EAB announced its decision for Ontario, Alberta announced that it would remove the import restrictions, allowing its cash-strapped incinerator to take in more revenues (Westell 1994). Alberta officials recently shut down their facility, Canada's only commercial rotary kiln incinerator, after a series of leaks and explosions (Marsden and MacDonell 1997). With no other means to destroy PCB wastes in this

country, interpretations of capacity assurance and facility need could lead to additional incinerator proposals. If so, voluntary siting would be a definite improvement over the cases reviewed in this thesis from both sides of the border.

If siting is to work in a manner that promotes equity and justice, facility operators must uphold the agreements they reach with communities, and regulatory officials must not allow breaches of faith to go unchecked. Moreover, the benefits of voluntary siting are easily overstated. If industries and governments site TSDFs only in communities willing to accept the burdens as well as the benefits of such land uses, and even if facility operators diligently uphold their end of agreements with local residents, the numerous problems associated with hazardous waste siting and other management decisions will not go away. To deal with the problem head-on requires policies that regulate production as well as disposal in order to reduce and avoid waste generation at-the-source rather than after-the-fact.

Distributive and procedural equity in facility siting and other hazardous waste management decisions are clearly important, especially to communities faced with inordinate environmental problems. But no matter how fairly we may try to distribute pollution, success in this regard will remain elusive unless and until public policies and laws directly address the industrial practices that generate it. If we are to use metaphors like *cradle to grave* in reference to our hazardous waste management systems, we should take them more seriously by extending environmental protection in both directions of the waste *life-cycle* to deal more effectively with the origins and destinations of toxic residuals. In order to achieve such a reality, we will have to promote pollution prevention

to reduce the need for new or expanded hazardous waste facilities at with at least as much regulatory muscle as we do with capacity assurance policies.

CHAPTER 7: CONCLUSION

7.1 Introduction

The environmental justice implications of hazardous waste involve a number of distributive and procedural factors that are complex and interrelated. Since the discovery of toxic contamination at Love Canal in Niagara Falls, New York, the North American public have become increasingly sensitized to the risks associated with toxic substances and wastes. Twenty years after the event, the anti-toxics movement has combined forces with an environmental justice movement to respond to inequities in exposure to pollution, especially those related to race and class.

Environmental policies have developed and changed dramatically during this period. In the United States and Canada, hazardous waste laws and regulations impose a number of requirements on industries that generate or handle hazardous wastes to provide *cradle to grave* management. These restrictions have provided greater protection of local environments from toxic contamination relative to the policies of two decades ago. Newer treatment, storage and disposal facilities (TSDFs) are far better able to contain chemical and metal-laden wastes than older ones such as Love Canal and over 4,000 other inactive sites in the Great Lakes basin. But the numerous problems caused by these industrial relics have made communities highly suspicious of plans to make them hosts for new facilities, in spite of the newer "state of the art" designs.

Disjoints between the benefits of production and the burdens of toxic residuals of production tend to make communities react in a particularly negative way to proposals

for new TSDFs. These distributive disparities have social, spatial, cumulative and intergenerational aspects. Procedural inequities add to the difficulty of achieving environmental justice, particularly when facility siting proceedings are less concerned with local community and environmental interests than they are with industrial-environmental objectives that are larger than local.

The structural limitations of hazardous waste laws and regulations in both Canada and the U.S. make the goal of environmental justice even more elusive and indeterminant. The "end of pipe" emphasis on waste treatment and disposal over waste reduction and pollution prevention mutes the efforts of government regulators to reduce demand on existing TSDFs and the need for new ones. Capacity assurance policies require that states and provinces permit enough commercial facilities to handle projected hazardous waste streams, but there are no restrictions on the volume or toxicity of waste that industries are allowed to generate. If we are to achieve environmental justice, hazardous waste policies will have to adopt an "industrial ecology" approach that regulates production as well as treatment and disposal.

7.2 U.S. and Canadian Hazardous Waste Policies

Hazardous waste policies in Canada and the United States have become increasingly formalized during the last twenty years. Manifests track hazardous wastes from place to place, beginning with the point at which they are generated and through to their ultimate treatment or disposal. Regulations define the various dimensions of hazardousness to distinguish between various kinds of wastes. TSDF standards impose

restrictions on landfills, incinerators, deep-well injection facilities, and treatment plants. Corrective action regulations set requirements for the clean-up of facilities that are found to be leaching or otherwise threatening the environment. Capacity assurance measures have been put in place to ensure that industrial waste generators have a facility to receive the toxic residuals of their manufacturing processes.

U.S. and Canadian hazardous waste policies are far more similar than they are different. The basic requirements of each of the aforementioned policy elements are much the same from state to state and from province to province in both countries. What is different between the two countries has more to do with the style of policy making. The American approach is legally formalistic in the sense that most of the specific requirements are statutorily driven. RCRA has required EPA to write volumes of regulations to deal with nearly every conceivable circumstance of hazardous waste management. States are required to implement federal laws and to develop their own laws with provisions at least as strict as those out of Washington. The Canadian approach, by contrast, is to impose general requirements at the federal level and to leave the specifics to the provinces. Even provincial laws and regulations are relatively general as compared to those in the U.S., with operating permits for particular facilities being the only place to find the details of specific requirements in many cases.

Facility siting works differently in the two countries very often, though not necessarily. Most U.S. states rely on the private sector to develop proposals for new TSDFs, whereas Canadian provinces are more likely to establish crown corporations to provide this function such as in the case of OWMC in Ontario. This is not always the

case even in Ontario where the only operating commercial or off-site facility is owned and operated by Laidlaw, a private sector firm. In the early 1980s, New York State attempted to build an off-site public sector TSDF in the central region of the state but backed away from the plan in the face of intense community opposition. The State of Michigan explored the public sector facility approach but decided against it on the basis that it had proved to be problematic for Ontario and other jurisdictions that had tried it. In the end, all three jurisdictions had a great degree of difficulty in obtaining all the necessary approvals to build new facilities. Only one of the ten facilities reviewed in Part II was approved and built.

Community opposition was present in each of the ten facility siting cases. Local actors in the TSDF siting proceedings based their opposition on arguments that were responsive to problems that could or would affect nearby residents. Hydrogeological problems with the proposed sites could have led to local contamination problems at some future date. Cumulative and spatial equity, discussed further in the next section, were also uniquely local concerns in the disputes. Local residents also pointed to the possibility that pollution prevention could obviate the need for new facilities, a notion that industries and provincial/state governments found to be unrealistic, however important the need to reduce waste generation where possible. In seven of the ten cases, local governments officially opposed the proposals and presented evidence regarding these issues to support their arguments and positions. These findings are consistent with Blomley's interpretive continuum (see Figure 1) whereby local, and locally-concerned,

officials develop arguments based on instrumental forms of validity to respond to specific community needs and concerns.

The community concerns stand in contrast to those of provincial and state government officials which were based on ideological forms of validity. Their arguments and evidence emphasized the need to build new TSDFs as a way to provide industrial waste generators with capacity assurance so as not to hinder production and capital accumulation. This formalist approach is not statutorily driven in the Canadian context as it is in the U.S., yet capacity assurance is a primary provincial, state and federal justification for facility siting in both countries. Another indication of formalist provincial and state arguments has to do with the determination of site suitability and its relationship to facility standards in the case of landfills. RCRA requires that TSDFs in the U.S. use synthetic liners to minimize the risk of future ground water contamination, a form of "engineered" containment. Federal and provincial policies in Canada do not require synthetic liners but they attempt to make up for this by insisting on the selection of sites with natural deposits of thick clay to reduce contamination risks through "natural" containment. The opinions of facility proponents and regulatory agencies were more consistent with these site selection policies than they were with local concerns or needs.

7.3 Distributive and Procedural Environmental Justice

Environmental justice has a number of components which were described conceptually in Chapter 2 and explored empirically in Chapter 3. Distributive environmental justice refers to the social, spatial, cumulative and intergenerational

arraying of benefits and burdens associated with hazardous waste and other forms of pollution. The benefits have to do with production and the economic stimulus that comes with it in the form of revenue generation and job creation. These tend to be distributed more broadly than the risks and other burdens of hazardous waste which are most concentrated near TSDFs. Procedural environmental justice refers to the distribution of power and influence among stakeholders in facility siting processes.

Social environmental justice is a concern when racial minority or low-income communities are disproportionately burdened with the location of hazardous waste facilities relative to white or affluent areas. The empirical studies presented in Chapter 3 indicate that race is more predictive of TSDF location than class in the U.S., though the results differ depending on the geographic unit of analysis and the definition of comparison groups. These factors account for the variation in results between the UCCCRJ and UMass studies. Mohai and Bryant found race to be a stronger predictive factor than class in the Detroit metropolitan area.

Wayne County, including the City of Detroit, has the highest density of active and inactive hazardous waste facilities (over 0.20 per square mile) in the State of Michigan and the entire Great Lakes Basin (See Figure 10). Wayne County, and especially Detroit, are both mostly non-white and low-income in population. Fourteen of nineteen active commercial TSDFs in Michigan are located in the Detroit metropolitan area, six of which are located in the city center. The results for the other study regions in Chapters 4 and 5 found no relationship between either race or class and hazardous waste facility location. No claims of social environmental injustice were made in any of the ten cases.

Spatial environmental justice refers to the geographic distribution of benefits and burdens associated with hazardous waste. Spatial inequities were cited by local opposition groups in five of the ten cases, though the exact basis of the claims differed from place to place. In Niagara, New York this became an issue because the state hazardous waste law includes "geographic equity" provisions to promote the location of new commercial TSDFs in other regions of the state. Niagara County is the only jurisdiction in New York where these facilities are located, despite the fact that nearly one-half of the hazardous waste generated in the state comes from other areas.

In Niagara, Ontario the OWMC case generated a different kind of spatial equity dispute. Local residents complained that they should not have to host a TSDF, particularly such a large one, given the lack of industries that generate hazardous waste in their community. Spatial equity took yet another twist in the other Ontario case involving the Laidlaw facility. The Walpole Island First Nation located 40 kilometers down river from the site opposed the plan for a new incinerator and sought the right to become an official intervenor group. Laidlaw opposed the request on the basis that they were not located close enough to the facility to have a direct stake. The dispute involved a difference of opinion over the spatial limit of risk, a controversy which had yet to resolve itself when the company withdrew its proposal. Still another variation on spatial equity arose in the EDS case in suburban Detroit. Local opponents of the deep-well injection facility became concerned that much of the projected business was to come from Canadian sources of hazardous waste.

Cumulative and intergenerational equity introduce a temporal dimension to claims of environmental injustice. Cumulative equity became an issue in five of the ten cases. In each of them, the local concerns had to do with the distribution of existing sources of risk from industrial facilities, including TSDFs. These hazards were argued to accumulate over time, leading to still further disparities in risk that would be exacerbated by the addition of new facilities. Intergenerational equity claims came about with regard to concerns about hydrogeology in five of the ten cases. In each, the concerns had to do with the potential for future contamination problems that might result given the risk of flooding or ground water contamination.

Procedural equity concerns became an issue in all three jurisdictions, generally speaking. In Ontario, the province reduces the salience of this issue to some degree by providing intervenor funding for opposition groups. Neither Michigan nor New York make use of this method of supporting local groups. However, only one of the ten proposals was developed with the consent of local governments, and even in that case (EDS) the local support eventually turned into opposition. Negotiated agreements between facility proponents and local communities are another way to promote procedural equity, but even in the three cases where this did occur (CWM, NCS, and OWMC) the process did not even begin until very late in the game. None of the proposals could be regarded as truly voluntary.

7.4 Environmental Justice and "Industrial Ecology"

The concept of "industrial ecology" is a useful way to illustrate the structural limitations of hazardous waste regulation in Canada and the United States. The legislative history of RCRA described in Chapter 1 shows that the debate over whether and how to regulate production as well as disposal is nothing new and that Congress' decision only to establish legal authority for disposal standards has had a lasting effect. The Canadian and provincial governments made the same fundamental choice in strategy early on as well, debating instead over the allocation of power within federalism. The *life-cycle* and *cradle to reincarnation* approaches to industrial design described in Chapter 3 differ from the standard *cradle to grave* management in much the same way as the difference between the regulation of production and disposal.

Federal, provincial and state governments in both Canada and the U.S. operate voluntary pollution prevention programs to encourage and prioritize the reduction of waste over "end of pipe" pollution control measures. Industry groups as well as environmental activists encourage these practices also. Yet in spite of this agreement over the merits of pollution prevention, regulatory agencies have no authority to limit the volume or toxicity of industrial waste in any sector of the economy. While capacity assurance policies are used to require the development of new TSDFs as a national environmental policy priority, no similar driving force exists to insist on waste reduction. Without such a mechanism, industries have no direct incentives to prevent pollution unless it benefits them economically.

Local opponents of TSDFs often point to the need for waste reduction as an alternative to facility siting. This was particularly true for intervenor groups involved in the OWMC proceedings (the Tri-parties). They developed a proposal to evaluate facility need by integrating the potential for pollution prevention. These measures, the Tri-parties argued, could reduce the need for particular kinds of TSDF capacity for the various forms of hazardous waste from particular industrial sectors and locations. The Ontario siting board (EAB) agreed with the soundness of the proposal but stopped short of requiring that OWMC re-evaluate its proposal in this context. None of the siting boards saw fit to integrate pollution prevention into their determinations about facility need in any of the ten TSDF siting cases.

7.5 The Importance of Love Canal

The Love Canal story is important in its own right because of the severity of the problems it represented, the anti-toxics movement it generated, and the effects it had on environmental policy making, especially in the U.S. The location of Love Canal on the Ontario-New York State border heightened the concerns of Canadians as well as Americans. Public responses to hazardous waste problems in both countries have revealed an increasing distrust of TSDFs, especially when people are confronted with proposals for new ones in their local communities. There is an explicitly spatial component to the response in that acceptance of new facilities increases with distance from the location in question. The politics of not in my backyard (NIMBY) have their roots in the events at Love Canal and other stories like it.

Hazardous waste policies prior to Love Canal were extremely informal for the most part. The U.S. had added hazardous waste provisions to its federal waste statute just two years prior to the event, but the U.S. Environmental Protection Agency (EPA) was nowhere near completing the regulations to implement any of the new requirements. The U.S. Congress had failed to inquire into the agency's lack of progress so the new law may as well have never been written, at least as far as legal enforcement was concerned. Love Canal was one of the principal driving forces behind renewed Congressional interest in the new Resource Conservation and Recovery Act (RCRA), so the first attempts to implement the statute followed quickly. Canadian and Ontarian laws and regulations emerged shortly thereafter due to concerns of becoming a pollution haven for American waste. The Ontario Environmental Protection Act was passed into law in 1972. The Canadian Environmental Contaminants Act was enacted in 1975 and in 1988 the Canadian Environmental Protection Act went into effect.

7.6 Towards Environmental Justice and Hazardous Waste

In this thesis, I have attempted to contribute to knowledge and theory of the environmental justice implications of hazardous waste. Human geographers and other social scientists have generated a considerable amount of work on this issue in a relatively short time. The rapid growth of activist and academic interest in the various connections between environment and social justice is a good indication of the importance of this area of inquiry. While many questions remain contested and unresolved (e.g., race and class; "chicken and egg") about the precise social, spatial, cumulative and intergenerational

distributions of economic benefits and environmental burdens, it is clear that fairness and equity are central to disputes over hazardous waste facilities. These issues spill over into procedural questions as to the structure of siting boards, the allocation of power and authority among interest groups, and the relative importance of capacity assurance as compared to pollution prevention.

The ten facility siting cases reviewed in Part II reveal the connections between environmental justice and hazardous waste in a number of respects. First, distributions of existing waste sites and other industrial facilities (whether actively operating or not) are fundamentally important to communities facing the prospect of new TSDFs in their local areas. Social, spatial and cumulative equity considerations are all relevant indicators as to the fairness of particular proposals. Second, communities slated to host new TSDFs fear the prospect of becoming new "Love Canals" at some time in the future if facility containments begin to fail. They also tend to prefer any alternative that would either obviate the need for the facility or place it somewhere, perhaps anywhere, else. This is partly a concern about intergenerational equity, benefitting present society by risking the environmental health of people in the future. It also reflects a sense of personal loyalty and commitment to one's own community as imagined in terms of both history and destiny. Third, these local issues have been rather poorly addressed historically. National environmental and industrial needs have tended to override community desires, though NIMBY-style protests have proven to be very effective at tipping the balance of power. Still, the effectiveness of grassroots activism is highly contingent from one situation to the next.

The Great Lakes basin is an important place to explore the connections between environmental justice and hazardous waste. The area is highly industrialized and heavily polluted in places. This binational region is also interesting because of the differing policy styles one observes from one side of the border to the other. These variations refer not only to the explicit laws, regulations and policies that federal, provincial and state governments have imposed on hazardous waste management. They also have become relevant to the role of government in the promotion of fairness in environmental management. The composition of facility siting boards, the level of assistance provided to intervenor groups, and the question of public or private ownership of TSDFs all were relevant. The cases varied from place to place, depending at least partly on whether the controlling legal authorities were American or Canadian.

If we are to deal with hazardous waste in ways that are both practical and fair, the lessons learned through activist and academic inquiries into environmental inequity and injustice are highly relevant. Distributive and procedural dimensions of the problem are especially of concern to local communities who find themselves slated to become hosts for new hazardous waste facilities. Moreover, the structural limitations of hazardous waste policies make it difficult to foster the development of more environmentally benign forms of production. The internalization of noxious externalities should not be the responsibility of communities through the development of new TSDFs. Nor should governments have to subsidize the siting process for the benefit of waste generators. Instead, governments should make industries accountable for the adoption of waste reduction techniques, rather than simply encourage them to do so. We must counter the

prominence of capacity assurance objectives that lead to the siting of new facilities with an expanded role for pollution prevention to reduce demand on existing TSDFs and the need for new ones. Without such an expanded conception of procedural equity, we will never be able to reverse existing environmental inequities and injustices related to hazardous waste and other forms of industrial pollution.

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