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Toward a general theory of social regulation: Determinants of state behavior in the implementation of Title III of the Resource Conservation and Recovery Act (RCRA)

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The Ohio State University, 1993
TOWARD A GENERAL THEORY OF SOCIAL REGULATION:
DETERMINANTS OF STATE BEHAVIOR IN THE IMPLEMENTATION OF
TITLE III OF THE RESOURCE CONSERVATION AND RECOVERY ACT
(RCRA)

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Stephen V. Quinlan

* * * * *

The Ohio State University

1993

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ACKNOWLEDGEMENTS

I want to thank the members of my committee, Dr. Randall B. Ripley (chair), Dr. Larry A. Baum, Dr. Aage R. Clausen, and Dr. Robert L. Vertrees, for their patient assistance. I also want to thank Dr. Frank Mott and the staff of the Center for Human Resource Research for their encouragement. I owe a special debt to Julie, Andrew, and Michael, without whose support and understanding this project would not have been possible.
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CHAPTER I
THE EMERGENCE OF SOCIAL REGULATION IN THE UNITED STATES

Introduction: Economic Regulation and The "New Social Regulation"

Between 1900 and 1980 the United States experienced three periods of profound political activity directed at effecting change in the relationship between business interests and the government. These three periods, the Progressive Era (1902-1914), the New Deal (1933-1938), and what for lack of a convenient label is sometimes referred to as the "new wave" of regulation or the era of "New Social Regulation" (1964-1977), witnessed the formulation and implementation of a number of regulatory policies intended to control the activities of industry.¹ ²

Vogel (1981) suggested in an essay outlining the history of regulation in the United States during the Twentieth Century that the forces which influenced the formulation of regulatory policies during the first two periods differed significantly from those which shaped the policies of the third:

First, the degree of political conflict and debate over social regulatory policies in general and environmental and consumer protection regulations in particular was
significantly greater during the recent period of business-government conflict. Secondly, there was a quantitative and qualitative increase in the scope and intrusiveness of federal controls over corporate social performance. Finally, and most critically, in sharp contrast to both the Progressive Era and the New Deal, government social regulatory policy became far more politicized.³

Vogel also proposed that the regulatory policies established during the first two eras could be distinguished from their more recent counterparts on the basis of their regulatory "focus" (i.e., the types of activities regulations are intended to control). He argued that the older forms of economic regulation which characterized the first two periods were intended to control prices, outputs, terms of competition, and market entry and exit, while the social regulation of the 1960s and 1970s dealt primarily with the social impacts of corporate behavior.⁴

As McCraw (1981) noted, analyses such as Vogel's are the product of a renewed interest in the study of regulation, an interest sparked in part by the rapid growth in the scope and magnitude of regulation in the United States. Because of the efforts of historians such as McCraw and political scientists such as Vogel (1981) we now have a much profound understanding of the development of social regulation as an historical phenomenon. An examination of the regulation literature suggests that we have failed to make similar progress in our understanding of social regulation as an economic and political phenomenon.⁵
There is agreement among students of regulation regarding the dynamics of the "traditional" economic regulatory policies which originated during the Progressive Era and the New Deal. The efforts of Huntington (1952), Bernstein (1955), Stigler (1971, 1975), Wilson (1980) and others have resulted in a general consensus that when regulation results in the generation of concentrated benefits and dispersed costs, those parties whose activities are subject to regulation will eventually come to dominate the regulatory process. There is no corresponding consensus regarding the dynamics of social regulation (a process which bestows diffuse benefits on a large group as a result of the imposition of costs on a relatively small group). The failure to achieve such a consensus may be seen as evidence that the debate over how our political system responds to demands for relief from the impacts of corporate behavior is confounded by a number of theoretical and practical issues.

A survey of the regulation literature uncovers a number of theories which purport to describe the political and economic mechanisms that form the foundation of social regulation. This survey also reveals an intense debate over the determinants of social regulation - a debate that "sheds more heat than light." The failure to resolve this debate can be attributed to three factors. First, instead of developing hypotheses and constructing relevant variables on the basis of analytic frameworks derived from these
theories, many scholars have chosen to base their analyses on assertions of personal beliefs regarding the dynamics of social regulation. Although the results of these analyses are often quite interesting, they cannot be evaluated in terms of any theoretic framework.

Second, while some sophisticated theories of social regulation have been advanced, the application of these theories has for the most part been limited to case studies of laws and programs at the federal level or to the study of the enforcement of regulations in a single state. This narrow focus has made it difficult to engage in any meaningful comparative assessment of these theories in terms of their relative ability to explain or describe the phenomenon of social regulation.

Third, and perhaps most importantly, many extant theories of social regulation fall short in addressing the relationship between the formulation, administration, and evaluation of regulations and the complex, multi-stage process of public policy-making. The policy making process is exceedingly complex, yet existing theories typically fail to address many aspects of that process. Wilson (1974, 1980), Mitnick (1980) and others have argued that a full theory of social regulation must have the capacity to account for all of the stages of that process, from policy formation through implementation to evaluation and feedback, and must be able to accommodate the full range of
participants in the policy process and the characteristics of the environments in which they exist.\textsuperscript{10} Theories which focus exclusively on a single class of explanatory factors (e.g., regulated parties, or legislators, or public interest groups, or the failure of the market to efficiently distribute scarce resources) may generate interesting predictions regarding regulatory behavior. However, as Mitnick (1980) noted, while the ability to produce adequate predictions is "valuable, . . . understanding through explanation may be more so."\textsuperscript{11} We cannot say that a theory of regulation is capable of producing adequate understanding unless it is able to account for and provide explanations of the range of behaviors and relationships that occur throughout the regulatory process.\textsuperscript{12}

\textbf{A Brief History of the Origins of the Debate Over Social Regulation}

During the 1950s and early 1960s a body of scholarship emerged that was to serve as the intellectual foundation of the "New Wave" of social regulation. Observers interested in the politics of regulation had observed that over time the interests of regulatory agencies began to resemble those of the industries they were charged with regulating. The theories which originated within the body of literature describing this phenomenon came to be known as regulatory "capture" theories of regulation.\textsuperscript{13}
These theories typically identified three factors which contributed to the development of regulatory capture: the presence of well-organized industry groups; the absence of groups representing the interests of the public; and the bureaucratic ossification of regulatory agencies. The solution to the problems, in theory, was the creation of powerful regulatory agencies that could maintain their independence from the industries they regulated. Evidence of the influence wielded by proponents of capture theorists may be found in a number of features of the enabling legislation of agencies such as the Environmental Protection Agency and the Occupational Safety and Health Administration.\textsuperscript{14} First, the legislation often contained strict performance standards for the agency being created. Second, procedures for the promulgation of formal rules and regulations that eliminated agency discretion to bend rules in favor of industry interests were established. Third, in order to enable agencies to resist pressures exerted by interests that were adversely affect by the enforcement of regulations, agencies were to be protected in the appropriations process. Fourth, the agencies were to be staffed not by political appointees or those who might be overly sympathetic to the interests of the regulated, but by trained professionals. Wilson (1980) noted that many of these professionals were cognizant of capture theories and their implications.
The debate over social regulation intensified in the 1970s and 1980s as a group of neoconservative scholars reacted to the results of attempts to reform the regulatory process. Just as the capture theorists provided the intellectual underpinning of the expansion of social regulation in the 1960s and 1970s, this new group of critics established the foundation for many of the regulatory reforms of the 1980s. They argued that independent regulatory agencies had become too powerful, that the explosion in the volume of rules and regulations with which businesses were forced to comply resulted in increased operating costs without any concurrent improvement in the quality of life, and that as a result of their capture by public interest groups, regulatory agencies had adopted a decidedly "anti-business" perspective.

The Terms of the Debate Over Social Regulation

The terms of the debate regarding the dynamics of social regulation are defined by conflicting assertions regarding three fundamental relationships that form the basis of the politics of social regulation. The first of these relationships is that which exists between the phenomenon of market failure and social regulation. Economists have long recognized that under certain circumstances the private market will fail to efficiently allocate scarce resources. Proponents of market failure theories of
regulation (which are a single class of a family of public interest theories of regulation) contend that the origins of social regulatory policies, as well as the level of effort expended in implementing those policies, may best be understood in terms of the magnitude and distribution of the social costs of market failure. Social regulation is described as a systemic response to those costs. Critics of market failure theories have responded by noting that analyses of older, more "traditional" forms of economic regulation do not support this model. Instead these analyses indicate that regulated industries "procure" regulation from government in order to advance their own interests. Critics have suggested that the origins of many examples of social regulation may also be the results of efforts on the part of industries to advance their own interests.

The second point of contention in these debates deals with the relationship between social regulation and the activities of agents acting in the name of "the public interest". Vogel proposed that one cannot adequately describe the origins of social regulation without accounting for the efforts of those who act to protect the interests of "third parties." Findings by Ingram (1978) and others seem to support this proposal. On the other hand, critics of public interest groups theories contend that because these groups obey the "logic of collective action", their ability to consistently affect the policy process is quite
limited.¹⁹

The third relationship playing a prominent role in these debates is that which exists between social regulation and the parties whose activities are subject to regulation. Perhaps the most widely-cited example of industry dominance theories is that presented by Stigler (1975), which is characterized by an emphatic rejection of the paternalistic image of government that forms the basis of public interest theories and the notion that regulations are designed for the protection and benefit of the public at large.²⁰ The central feature of Stigler's theory was the premise that "regulation is acquired by industry and designed and operated primarily for its benefit."²¹ The image of regulation which emerges from Stigler's theory is that of a commodity which regulators are willing and able to supply in return for political support.

Other industry dominance theories of regulation offer a slightly different image. Authors such as Bernstein (1955), Meier and Plumlee (1978), and Pertschuk (1982) describe a regulatory environment in which the origins of regulation may be found in a desire to protect the public interest. However, because of a number of factors industrial interests are able to "capture" the regulatory mechanism over the course of time. Peltzman (1976) summarized this vision of industry dominance when he wrote:

A common, though not universal, conclusion has become that, as between the two main
contending interests in regulatory processes, the producer interest tends to prevail over the consumer interest.\footnote{22}

The Setting

Regulation of the management and disposal of hazardous wastes presents us with many of the classic problems of social regulation. How should the costs of negative externalities arising from the production and management of hazardous wastes be distributed across society? Who should bear the costs of enforcing regulations intended to reduce or eliminate those negative externalities be distributed? What are the most effective methods of insuring that the impacts of hazardous wastes on human health and the environment are minimized? Finally, to what degree of protection is the public entitled?\footnote{23}

The Resource Conservation and Recovery Act of 1976 (RCRA) and the 1980 and 1984 amendments to that Act offer individual states the opportunity to take responsibility (or not to take responsibility) for regulating the management and disposal of hazardous wastes within their borders via the primacy mechanism described below. We therefore have the opportunity to observe the dynamics of social regulation in fifty different economic and political environments. Because of the reporting requirements incorporated in RCRA and its amendments and intensity of public reaction to the
hazardous waste issue there is a wealth of data available for use in such an evaluation.

"Primacy" - An Important Element of the "New Wave" of Regulation

A significant element of the "new wave" of social regulation was a dramatic change in the nature of the American federal system. Program relationships between the national and state governments that in 1960 had been "comparatively few, narrow, and in many aspects not too deep" had, by 1980, become "bigger, broader, and deeper -- bigger within the federal system...broader in its program and policy concerns...and deeper in its regulatory thrusts and preemptive proclivities."24 One indication of the nature of these changes is the number of mandates that were imposed by the federal government on the states.25 At least ninety-five major federal laws, executive orders and court decisions have placed restrictions upon state activities since 1965.26

Environmental protection is one of a number of policy areas in which this expanded federal role is particularly evident. Prior to 1961 the role of the federal government in the formulation and implementation of environmental protection policies was rather limited. While it maintained a significant presence in the conservation and management of natural resources through the implementation of programs
housed in the U.S. Army Corps of Engineers and the Departments of Agriculture and the Interior, there was little federal involvement in the implementation of regulations designed to protect human health and the environment from the impacts of population growth, urbanization, and an ever-expanding universe of industrial waste streams. Instead, responsibility for these protective policies rested with state and local governments.

This situation had been radically altered by 1980. Increased public concerns about environmental hazards, coupled with a growing awareness that the impacts of environmental problems are not limited by political boundaries, resulted in the emergence of the national government as the dominant force in environmental regulation. Between 1961 and 1980 Congress passed a total of twenty-five major legislative measures addressing the issues of air and water pollution, solid and hazardous waste management, noise, land use, and the overall impact of government activity on the environment. Eighteen of these laws included some form of mandate, or preemption of state authority; they asserted the authority of the federal government over regulatory functions that had previously been performed by the states. Not all of these were total preemptions of state authority. For example, four of the most important pieces of environmental legislation to be passed during this period, the Clean Air Act of 1970, the Federal Water Pollution Control
Act of 1972 (now commonly referred to as the Clean Water Act), the Safe Drinking Water Act of 1976, and the Resource Conservation and Recovery Act of 1976 contained provisions for so-called "partial preemptions" of state authority, a technique which allows the relevant federal agency (in this case the United States Environmental Protection Agency, or USEPA) to return program responsibility to the states while at the same time retaining the ultimate authority to determine if the states' regulatory activities are acceptable. 29, 30

States that have been granted primacy are allowed a certain amount of flexibility in designing and implementing their own laws; however, these laws must meet minimum standards set by the federal agency charged with administering the program. States applying for primacy may elect to "start out small" and accept responsibility for implementing a single regulatory function, or they may choose to apply for the responsibility to implement all eligible functions. Federal agencies such as the USEPA are responsible for developing and enforcing regulations which serve as the minimum standards for evaluating state efforts as well as enforcing those regulations within the boundaries of states that elect not to apply for primacy. Federal personnel are also given the task of monitoring the performance of state enforcement efforts; they may revoke the primacy of any state which fails to meet the minimum standards set by
federal regulations.

Preemptions create asymmetrical relationships between the federal government and the states, relationships in which the federal government is clearly the superior entity. Many state officials have expressed resentment at being forced to assume a subservient role; they have also expressed their displeasure over the additional work loads and expenses created by these asymmetrical relationships. A study by the General Accounting Office (GAO) which focused on preemptive relationships in environmental protection programs reported that state officials tend to perceive their counterparts at the national level as being "less than federalist" in their behavior. These officials complained of excessive oversight by federal administrators; they also complained that the minimum regulatory standards left them little flexibility to tailor programs to meet local conditions. Finally, state personnel interviewed for this study noted that while federal dollars accounted for only a portion of program funding, federal administrators were able to achieve almost total control through "regulations, guidelines, grant documents, duplicative reviews, and paperwork requirements."

The U.S. Supreme Court has upheld the federal government's right to preempt state authority provided that two conditions apply: (1) the issue in question is of national import; and (2) Congress can justify its intent to override
state autonomy. The Court did not address the issue of whether or not Congress could compel state authorities to implement national regulations.

It is interesting to compare the reactions of state officials to the perceptions and beliefs of their federal counterparts. Federal program requirements that, from a state regulator's perspective seem to be "heavy-handed" might be seen by federal administrators as a means of countereacting a tendency on the part of many state regulators to be less-than-willing participants in the regulatory process. For example, a federal official involved in the development of regulations governing surface mining is quoted by Shover, Cleland and Lynxwiler (1983) as saying that regulations are:

...built on the fervor of the time, of the winners. And the winners were the environmental movement people, who had persisted...and, by god, they had slain the giant. And the wicked giant was lying there...and the sinners are gonna' be brought to justice...there are gonna' be rigid regulations, by god. We're not gonna' leave anything out, because you can't trust them.

State officials do not totally reject the possibility that federal participation may be beneficial. The authors of the GAO report found that in some instances state environmental officials actually welcomed preemption, because they felt that it strengthened their hands.

While preemptive arrangements have been described as being asymmetrical, it should not be assumed that state
officials are powerless to influence the course of decision making. Factors such as ambiguity in relevant statutes and the complex nature of the problems being addressed shape the context in which decisions are made. State officials may also enjoy other advantages, such as: detailed information regarding local conditions that is not available to federal officials; the support of a Congressional delegation in specific conflicts with those federal officials; and staff and other resources that exceed those available to federal agencies.39

Finally, the prospect of nonparticipation may also be seen by the states as a potentially valuable resource. Federal administrators realize that the prospect of successful implementation of conjoint programs is a function of the state commitment. This dependency upon the states serves as a powerful incentive to federal officials to bargain with their state counterparts.40 Studies of programs in which state participation has been terminated or suspended reveal that it is nearly impossible for federal agencies to effectively pick up the resulting regulatory slack.41

Three interesting points emerge from an examination of the history of regulatory policies which include the primacy option. First, there is abundant evidence that social regulatory policies which incorporate preemptions of state authority have resulted in the imposition of significant costs on state governments and their citizens.42 Second,
there is a growing body of evidence that the impacts of regulatory policies which incorporate preemptions vary significantly across the states. Third, despite the fact that many of the social regulatory policies initiated by the federal government during the 1960s and 1970s offered the states an opportunity to play pivotal roles in the implementation process, there are few examples of systematic examinations of the variation in the degree to which states have chosen to commit resources to the implementation of these policies. The literature dealing with state implementation of federal regulatory policies consists primarily of qualitative studies of specific programs and analyses of the legal issues underlying the phenomenon of "regulatory federalism."

The Research Question

This dissertation is not an attempt to develop a full theory of social regulation. Rather, it is a comparison of competing theoretic perspectives regarding the origin and implementation phases of the "social regulation qua policy-making" process and is intended to help resolve the debate regarding the determinants of state participation and enforcement vigor in the implementation of social regulation. The comparison of competing theoretic perspectives (as they relate to the origin and implementation of a specific regulatory policy) serves two purposes. First, it allows for
the evaluation of the individual theoretic positions in terms of their relevance to RCRA. Second, this type of comparison will also establish an empirical basis for the rejection of "single theme" theories of regulation in favor of theories which define the context of regulatory policymaking in much broader terms.

The first question under consideration addresses the origins of state participation in the regulation of hazardous wastes. Forty-one of the fifty states had been granted the responsibility for implementing hazardous waste regulatory programs under RCRA by January of 1988. Is it possible to identify a set of characteristics that can be used to differentiate between those states that have been granted primacy and those which have not?

The second question deals with the process of policy implementation. Specifically, what factors are associated with the level of effort state regulators chose to expend in implementing social regulatory policies? There is significant variation among the states in terms of the vigor with which they enforce hazardous waste regulations. What factors distinguish those states which vigorously enforce hazardous waste regulations from those which expend less effort?
The Structure of This Analysis

Chapter II serves two purposes. First, it establishes a "real world" context for this research by means of a discussion of the effects of improper management and disposal of hazardous wastes on the environment and public health and the magnitude of the hazardous waste problem. Second, it describes the evolution of hazardous waste regulation in the United States starting with the enactment of the Solid Waste Disposal Act of 1965 and ending with the passage of the 1984 Amendments to the Resource Conservation and Recovery Act. Included in this description is an explanation of the regulatory requirements which govern state participation in the implementation of hazardous waste regulation under RCRA.

Chapter III presents a review of the relevant literature. The review begins with a discussion of competing theories of regulation. In order to provide a context for the development of testable hypotheses this discussion focuses specifically on the set of theories which attempt to explain regulatory origin and implementation effort in terms of: the impacts of market failure; the influence exerted by groups acting in the name of the public interest; or the influence exerted by parties that are subject to regulation. The review then shifts to a consideration of the comparative state politics literature in order to establish a basis for the construction of variables that will be used in the evaluation of those hypotheses.
Chapter IV is devoted to a discussion of the hypotheses developed on the basis of the literature review presented in the Chapter III. Also included in Chapter IV is a description of operationalization of relevant variables and the sources of data used in the construction of those variables. The results of the analysis are described in Chapter V, while a summary and a discussion of the implications of this research with regard to future research are presented in Chapter VI.
NOTES

1. The definitions of these three periods are drawn from a number of sources, including Link (1954), Schlesinger (1958) and Weidenbaum (1977). The term "new wave" was used by Weidenbaum (1975).

2. Mitnick (1980: 5-9) stated that the term "regulation" is used to describe both a practice ("the intentional restriction of a subject's choice of activity, by an entity not directly party to or involved in that activity") and a process in which the restrictions placed upon private actions evolve over time.


10. There is no general agreement in the public policy literature regarding the number of distinct stages in the policy-making process. Models of that process range from simple three-stage affairs (which describe the policy process in terms of formulation, implementation, and evaluation) to highly detailed (which include agenda setting, formulation, legitimation, implementation, and evaluation as separate steps in the process). See Cobb and Elder (1972), Jones (1977), and Sabatier (1977) for discussions of various models of the policy-making process.


12. The recognition that an adequate understanding of the dynamics of social regulation (as well as those of economic regulation) is well-nigh impossible unless the regulatory process is described in terms of a generalized model of the public policymaking process casts the consensus regarding traditional economic regulation in a new light. To what extent is this general agreement a byproduct of inaccurate perceptions regarding the significance of the process of policymaking?
13. The two most widely-cited examples of capture theories were produced by Bernstein (1955) and Huntington (1952).


15. Examples include Jones (1975), Bardach and Kagan (1982), and Stigler (1975).

16. The private market is said to fail when it does not allocate scarce resources as efficiently as possible. Stigler (1975) identified three general conditions which qualify as instances of market failure: the generation of significant externalities; the production of public goods; and the inability of consumers to obtain accurate information about product quality. McCormick (1989) expanded this roster to include natural monopolies, economies of scale, and other unspecified problems is property rights assignments. Externalities, also called "external economies", "external diseconomies", "neighborhood effects", "third party effects", or "spillovers", are unintended impacts that result from the production or consumption of goods and services. Holtermann (1972: 27) defined externalities as being present "whenever an output of one economic agent appears as an input in the consumption or production vector of another" without accompanying compensation.

Externalities may be characterized on the basis of a number of dimensions, including: (a) positive vs. negative effects; (b) collective or public goods vs. private or particular goods character; and (c) directness of effect. Positive externalities create unintended benefits for affected third parties, while negative externalities result in unintended costs. Public goods may be distinguished from private goods on the basis of their nonexcludability (the act of "supplying" an externality to one bystander means that it cannot be withheld from any other) and their nondepletability ("supplying" an externality to any individual bystander does not affect its availability to others). Indirect effects (also known as pecuniary externalities) are transmitted through the price mechanism, while direct externalities (also referred to as technological externalities) are manifested as effects on valued rewards or activities. This research deals specifically with the regulation of technological externalities.

17. See, for example, Stigler (1975).

18. As described in theories of agency, agents are individuals or groups who "act for" or represent the interests of others. The relationship between theories of agency and the study of regulation is addressed in Chapter III.

19. For a discussion of the "logic of collective action" see Olson (1971).
23. It is important to recognize that while a complete elimination of the threat posed by hazardous wastes is not a realistic policy option, there are a number of strategies available to industrial managers and regulators that can result in significant reductions in the types and volumes of wastes generated. One system of categorizing these strategies is based upon the following model of the flow of hazardous materials: sources; transport and fate; exposure; and health effects. Source minimization control strategies include: chemical substitution; product reformulation; process modification; and equipment changes. Transport and fate management options include: recycling; waste exchanges; volume reduction; treatment (including biological, chemical, physical and thermal); dilution; and containment and storage. Exposure control strategies include: product-use protocols (regulations covering the use of materials that are themselves hazardous or which are transformed into hazardous materials after use); product substitution; personal protective measures; and removal of susceptible populations. Medical intervention strategies designed to counter health effects include blocking toxins from reaching target tissues and therapy for damaged tissue. Detailed descriptions of these control strategies may be found in Kneese and Bower (1979) and U.S. General Accounting Office (1983). A discussion of the forces which contribute to the "inevitability" of continued production of hazardous wastes may be found in Ayres, McMichael and Rod (1987). See Kneese and Schultze (1975: 18-22) for a discussion of the relationship between discharge reductions strategies, increases in marginal treatment costs, and associated impacts on environmental policy options.

25. Mandates are regulations or constraints placed by one unit of government on another.
29. Ibid.
30. Thomas (1976: 130) reported that the first use of primacy within the field of environmental protection was in association with the Clean Air Act. The inclusion of the primacy option was one element of a strategy designed to minimize the prospects of state challenges to the Act.


33. Ibid.

34. Ibid.


42. See, for example, Weidenbaum and DeFina (1978) and Advisory Commission on Intergovernmental Relations (1984).

43. See, for example, Shover, Clelland and Lynxwiler (1986) and Advisory Commission on Intergovernmental Relations (1984).

44. Aron (1979) and Menzel (1981) are two examples of qualitative studies of state implementation of federal regulatory programs. See Crotty (1988) and Welborn (1988) for examples of analyses of the issue of regulatory federalism.

45. See, for example, Bowman (1984).

46. The policy process obviously comprises more than the origin and implementation phases. Models of the policy process typically include an evaluation component encompassing such features as impacts and effects, evaluation and feedback, and modification (including termination). The choice to exclude the evaluation phase from this research is a reflection of the author's belief that the significant differences between social regulation and more "traditional" forms of economic regulation are to be found in the first two phases of the policy process.
CHAPTER II

A HISTORY OF HAZARDOUS WASTE MANAGEMENT IN THE UNITED STATES: 1976 TO 1984

Introduction

It is indeed ironic that many of the problems associated with the improper management and disposal of hazardous wastes are the results of efforts to control point sources of air and water pollution.\(^1\) Much was written during this period about the need to incorporate a "materials balance" perspective into the formulation of environmental policy.\(^2\) However, the issue of solid waste disposal received relatively little attention, either in the popular press or in the technical literature. Solid waste management was perceived as a local or regional problem dealing primarily with the issues of trash removal and littering, and was viewed as secondary to more pressing public health and amenity issues associated with air and water pollution. Indeed, prior to the flurry of legislative activity that resulted in the passage of the Resource Conservation and Recovery Act of 1976 the issue of solid waste management was treated as an "unwanted orphan."\(^3\)

The Clean Air Act and the Federal Water Pollution Control Act (now commonly referred to as the Clean Water
Act) placed strict limits on the disposal of hazardous materials into the nation's air and waterways. Industrial facilities and municipalities were required to capture these materials before they escaped from smokestacks or outfalls. These captured materials were designated as wastes; however, there were no federal guidelines regarding the management or disposal of these wastes. For example, while the use of a number of pesticides (e.g., DDT) had been declared illegal except under restricted conditions by the mid-1970s, there were no federal regulations covering the disposal of unused pesticides and pesticide containers. (Thirty-one states also failed to regulate the disposal of these materials during this time period.)

It has been suggested that the single event most responsible for focusing national attention on hazardous wastes occurred in August of 1978, when New York state officials ordered the emergency evacuation of 240 families living within a two-block radius of an abandoned canal, the Love Canal, located near Niagara Falls. Dangerous concentrations of carcinogenic and highly toxic chemicals had been discovered leaching out of the canal after the Niagara River had overflowed its banks and flooded the old canal site.

The Love Canal

Construction of the Love Canal was begun in the 1880s by the entrepreneur William T. Love as part of his plan to
create an industrial complex between the two branches of the Niagara River. The site's primary benefit, and one of the selling points used by Love to persuade the State of New York to grant him "authority to condemn properties and to divert as much water from the Upper Niagara River as he saw fit", was the electricity that could be generated in conjunction with operation of the canal.5

Love's plans called for the construction of factories along the shores of the canal, where they could take full advantage of the inexpensive hydroelectric power that would be made available. Prior to the development of alternating current (AC) generation and transmission technology, electricity was available only as direct current (DC). Because long-distance transmission of direct current was not technically possible industrial facilities using electricity had little choice but to locate as close as possible to generating stations. Once this constraint was removed the canal site's major selling point was eliminated. As a result Love's plans were abandoned less than two decades after construction on the canal had begun.

The Hooker Electrochemical Corporation, later known as the Hooker Chemical and Plastics Corporation, was a member of the Niagara Falls business community from the time it commenced operations in 1905. Hooker began using the abandoned canal as a dump for its chemical wastes in 1942 after entering into an agreement with the canal's owner, the
Niagara Power and Development Corporation. Hooker purchased the canal from the Development Corporation in 1946. It has been estimated that over the next six years (1947-1952), Hooker dumped over 43 million pounds of chemical wastes into the canal. These wastes included: more than 13 million pounds of the pesticide lindane (also known as benzene hexachloride, a carcinogenic chlorinated hydrocarbon); over four million pounds of chlorobenzenes (derivatives of benzene, an industrial solvent known to induce aplastic anemia and leukemia); and approximately 500,000 pounds of trichlorophenol (TCP), a chemical used in the manufacture of herbicides such as 2,4,5-trichlorophenoxyacetic acid ("2,4,5-T"). The TCP was later found to be contaminated with trichlorodibenzo-dioxin (TCDD), also known as dioxin, which is generated when TCP is overheated during the manufacturing process. Dioxin is one of the most potent known carcinogens; exposures to concentrations as low as 10 parts per trillion (ppt) have been shown to produce carcinogenic effects.6

Hooker ceased operations at the canal dump site in 1953, at which time the site was covered with topsoil. Later that year Hooker sold the property to the Niagara Falls Board of Education. The school district, in turn, sold portions of the property to local developers. By 1976, several hundred homes and an elementary school had been built in the area around the canal.

Although evidence that wastes were migrating from the
dump site had begun to accumulate, neither Hooker nor the Board of Education took any steps to inform the public of the potential harmful effects of coming into contact with the muddy, black liquid that oozed from the area of the canal. The need for corrective action finally became apparent after a number of children received chemical burns while playing in the school playground. A subsequent investigation revealed that over 200 dangerous chemical compounds, including 11 known carcinogenic substances, had been flushed from the canal into the soil of the residential area.

President Jimmy Carter declared Love Canal an emergency disaster area. Residents of 1,004 households in the area were evacuated (on a "temporary permanent" basis), and the Department of Housing and Urban Development was charged with the task of creating a "buffer zone" around the canal through the purchase of residential properties; it ultimately purchased approximately 550 houses within a thirty-square block area surrounding the canal at a cost of approximately $30 million.

There is ample evidence that the hazardous waste issue caught the public's attention. For example, more than 60 percent of the respondents in polls conducted by the Roper Organization in 1987 and 1988 indicated that they viewed the hazardous waste problem as "very serious." The language used by public figures indicated that they shared these concerns. For example, Albert Gore, Jr. (then a
Representative from Tennessee) remarked that "America has been pockmarked with thousands of cancer cesspools."\textsuperscript{10}

The descriptions offered by a former United States Assistant Attorney General testifying before Congress revealed that public officials knew they were confronted with an issue about which they knew very little:

\begin{quote}
We do not know where the millions of tons of stuff is going. We feel that the things that have turned up in like the Love Canal and Kin-Buc situation are simply the tip of the iceberg. We do not have the capacity at this time to find out what is actually happening. In my view is simply a wide-open situation, like the Wild West in the 1870s, for toxic waste disposal. The public is basically unprotected. There just are not any lawmen out there, State or Federal, policing this subject.\textsuperscript{11}
\end{quote}

What Are the Risks?

Past and present practices for hazardous waste disposal have created substantial risks for public health and the environment. These risks can be acute, as when 60,000 drums of hazardous wastes caught fire at the Chemical Control site in Elizabeth, New Jersey, or insidious, as was the case at Love Canal. In such a case, the full extent of victims' injuries resulting from exposure to hazardous wastes, if any, may not be known for 10 to 20 years, because chronic diseases such as cancer, heart disease, neurological disorders, and reproductive problems, often have long latency periods. According to a study conducted by the United
States Environmental Protection Agency (USEPA) emissions of volatile organic compounds from hazardous waste facilities may result in from 1 to 250 cases of cancer annually in the United States.\textsuperscript{12} Similarly, it has been estimated that leachates and air emissions resulting from the improper disposal of used oil may result in up to 80 cases of cancer each year nationwide.\textsuperscript{13}

The Love Canal incident focused national attention on the potential threat of land and water contamination from improperly managed land disposal sites, pesticide applications, and chemical and gasoline storage tanks. A survey of 1,246 hazardous waste disposal facilities found some indications of groundwater contamination at 559 of the sites.\textsuperscript{14} There is reason to believe that this represents the "tip of the iceberg." For example, the USEPA believes that more than 90 percent of the estimated 180,000 surface impoundments (ponds constructed for the purpose of short or long-term storage of liquids) in this country are designed and located in a manner that could result in groundwater contamination.\textsuperscript{15} In addition, while only a small fraction of the nation's 12 million to 14 million private drinking-water wells have been tested for contamination by toxic materials, individual wells in at least 40 states have been closed because of contamination.\textsuperscript{16}

Some of the hazardous waste types most frequently found at dump sites, and the types of potential health risks
associated with these substances, are listed in Table 1. Because of the wide variety of waste types, disposal sites, exposure modes and other factors it is difficult to describe the health risks associated with a "typical" site. However, it is possible to describe health problems that may be encountered as a result of exposure to specific types of hazardous wastes. Table 2 provides a summary of findings from a 1984 study conducted by the USEPA of chronic effects associated with exposure to a range of hazardous wastes. The results of a 1980 USEPA survey of impacts on human health and environmental quality that were detected at 350 known hazardous waste disposal sites are presented in Table 3.

What Is the Magnitude of the Problem?

A. Generation

Surveys of hazardous waste production conducted during the late 1970s and early 1980s yielded many interesting results, perhaps the most significant of which was a confirmation of how little was actually known about the scope of the hazardous waste problem. A study released in 1985 by the Congressional Budget Office (CBO) presented a compilation of several competing estimates of the total volume of hazardous wastes generated in the U.S. in the year 1983.17 Table 4 is a summary of the CBO's findings. Estimates of the quantities of hazardous wastes generated within major
Table 1. Examples of Chemicals Found in Hazardous Waste Sites and Associated Health Risks.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Number of Sites</th>
<th>Potential Health Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trichloroethylene</td>
<td>179</td>
<td>Possible carcinogen</td>
</tr>
<tr>
<td>Lead</td>
<td>162</td>
<td>Acute toxicity in young children, associated with brain damage</td>
</tr>
<tr>
<td>Toluene</td>
<td>153</td>
<td>Carcinogen, possible neurotoxin</td>
</tr>
<tr>
<td>Benzene</td>
<td>143</td>
<td>Carcinogen</td>
</tr>
<tr>
<td>Polychlorinated biphenols</td>
<td>121</td>
<td>Possible carcinogen, nervous/digestive disorders</td>
</tr>
<tr>
<td>Chloroform</td>
<td>111</td>
<td>Carcinogen, reproductive toxin</td>
</tr>
</tbody>
</table>

Table 2. Chronic Effects of Selected Hazardous Wastes.

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Carcinogenic Effects</th>
<th>Mutagenic Effects</th>
<th>Teratogenic Effects</th>
<th>Damage to Reproductive System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halogenated organic pesticides</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>+</td>
</tr>
<tr>
<td>Halogenated organic phenoxy herbicides</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Organophosphorus pesticides</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Polychlorinated biphenyls</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc, copper, selenium, chromium, nickel</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Cadmium</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogenated organics</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonhalogenated volatile organics</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


+ Statistically verifiable effects on human beings.
* Statistically verifiable effects on laboratory animals.
Table 3. Environmental and Public Health Impacts at 350 Hazardous Waste Disposal Sites

<table>
<thead>
<tr>
<th>State</th>
<th>Water Supply/ Groundwater Contamination</th>
<th>Well Closures&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Human Health Damage</th>
<th>Soil Contamination</th>
<th>Other Damage&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Alaska</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arizona</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>California</td>
<td>7</td>
<td>34</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Colorado</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Connecticut</td>
<td>7</td>
<td>21</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Delaware</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida</td>
<td>2</td>
<td>6</td>
<td></td>
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<td>Georgia</td>
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</tr>
<tr>
<td>Idaho</td>
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<td>1</td>
</tr>
<tr>
<td>Illinois</td>
<td>17</td>
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<td>1</td>
<td>1</td>
<td>10</td>
</tr>
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<td>Indiana</td>
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<td>2</td>
<td></td>
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<td>3</td>
</tr>
<tr>
<td>Iowa</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Kansas</td>
<td></td>
<td></td>
<td></td>
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<td>4</td>
</tr>
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<td>Kentucky</td>
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<tr>
<td>Louisiana</td>
<td>2</td>
<td>1</td>
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<td></td>
<td>1</td>
</tr>
<tr>
<td>Maine</td>
<td>3</td>
<td>16</td>
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<tr>
<td>Maryland</td>
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<td>Massachusetts</td>
<td>4</td>
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<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Michigan</td>
<td>7</td>
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<td>1</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Montana</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Missouri</td>
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<td></td>
<td></td>
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<tr>
<td>New Hampshire</td>
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<td>17</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>New Jersey</td>
<td>9</td>
<td>252</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td>1</td>
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<td></td>
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<tr>
<td>New York</td>
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<td>3</td>
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<td>11</td>
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<td>Rhode Island</td>
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<td>15</td>
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<td>Utah</td>
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<td>Vermont</td>
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<td>Virginia</td>
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<tr>
<td>Washington</td>
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<tr>
<td>West Virginia</td>
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<tr>
<td>Wisconsin</td>
<td>4</td>
<td>111</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Wyoming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>168</strong></td>
<td><strong>468</strong></td>
<td><strong>27</strong></td>
<td></td>
<td><strong>121</strong></td>
</tr>
</tbody>
</table>


Notes:  
- States not appearing in this list were not found to have any of the listed impacts during the 1980 survey.
- The number of wells (drinking water) closed in the state.
- Includes: habitat destruction, fish kills, livestock loss, and damage to publicly-owned treatment works or sewer damage.
industry groups are reported in Table 5.

A study released by the USEPA in 1980 concluded that approximately 10 percent (by weight) of all industrial wastes would qualify as hazardous waste under the standards contained in the Resource Conservation and Recovery Act of 1976 (RCRA), and that there were an estimated 650,000 generators of hazardous. From a regulatory perspective it is important to note that over 95 percent of these wastes were produced by roughly 2 percent of these industrial generators. Most of the remaining 98 percent of hazardous waste generators produced less than 1,000 kilograms per month. Approximately 95 percent of hazardous wastes produced in this country in 1980 were stored onsite, or on the property at which they were generated. The remaining 5 percent were shipped elsewhere for treatment and/or disposal.

The report also included a forecast that the volume of hazardous waste generated in the United States would increase at an annual rate of 3.6 percent between the years 1980 and 1985.

One interesting aspect of the hazardous waste problem is the extent to which hazardous wastes are generated during the production of common consumer products. Table 6 identifies several examples of hazardous wastes that are generated during the production of common consumer products.
### Table 4. Estimates of Industrial Hazardous Wastes Generated in 1983 (in thousands of metric tons).

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Estimated Range</th>
<th>Percent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Nonmetallic inorganic liquids</td>
<td>68,102</td>
<td>96,420</td>
</tr>
<tr>
<td>Nonmetallic inorganic sludge</td>
<td>23,285</td>
<td>32,837</td>
</tr>
<tr>
<td>Nonmetallic inorganic dusts</td>
<td>19,455</td>
<td>22,784</td>
</tr>
<tr>
<td>Metal-containing liquids</td>
<td>14,125</td>
<td>25,394</td>
</tr>
<tr>
<td>Miscellaneous wastes</td>
<td>14,438</td>
<td>16,393</td>
</tr>
<tr>
<td>Metal-containing sludge</td>
<td>13,246</td>
<td>15,748</td>
</tr>
<tr>
<td>Waste oils</td>
<td>9,835</td>
<td>18,664</td>
</tr>
<tr>
<td>Nonhalogenated solvents</td>
<td>11,325</td>
<td>12,935</td>
</tr>
<tr>
<td>Halogenated organic solids</td>
<td>9,321</td>
<td>10,246</td>
</tr>
<tr>
<td>Metallic dusts and shavings</td>
<td>6,729</td>
<td>8,738</td>
</tr>
<tr>
<td>Cyanide and metal liquids</td>
<td>4,247</td>
<td>10,520</td>
</tr>
<tr>
<td>Contaminated clay, soil and sand</td>
<td>5,092</td>
<td>5,839</td>
</tr>
<tr>
<td>Nonhalogenated organic solids</td>
<td>4,078</td>
<td>5,078</td>
</tr>
<tr>
<td>Dye and paint sludge</td>
<td>4,035</td>
<td>4,438</td>
</tr>
<tr>
<td>Resins, latex and monomers</td>
<td>3,451</td>
<td>4,585</td>
</tr>
<tr>
<td>Oily sludge</td>
<td>2,965</td>
<td>4,502</td>
</tr>
<tr>
<td>Halogenated solvents</td>
<td>2,774</td>
<td>4,185</td>
</tr>
<tr>
<td>Other organic liquids</td>
<td>2,866</td>
<td>4,003</td>
</tr>
<tr>
<td>Nonhalogenated organic sludge</td>
<td>2,179</td>
<td>2,305</td>
</tr>
<tr>
<td>Explosives</td>
<td>508</td>
<td>933</td>
</tr>
<tr>
<td>Halogenated organic sludge</td>
<td>583</td>
<td>848</td>
</tr>
<tr>
<td>Cyanide and metal sludge</td>
<td>537</td>
<td>577</td>
</tr>
<tr>
<td>Pesticides, herbicides</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Polychlorinated biphenols</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total** 223,196 308,006 265,595

*Source: Congressional Budget Office (1985).*

*Note: * Less than 1 percent.

<table>
<thead>
<tr>
<th>Major Industry</th>
<th>Estimated quantity</th>
<th>Percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals and allied products</td>
<td>127,245</td>
<td>47.9</td>
</tr>
<tr>
<td>Primary metals</td>
<td>47,704</td>
<td>18.0</td>
</tr>
<tr>
<td>Petroleum and coal products</td>
<td>31,358</td>
<td>11.8</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>25,364</td>
<td>9.6</td>
</tr>
<tr>
<td>Rubber and plastic products</td>
<td>14,600</td>
<td>5.5</td>
</tr>
<tr>
<td>Miscellaneous manufacturing</td>
<td>5,614</td>
<td>2.1</td>
</tr>
<tr>
<td>Nonelectrical machinery</td>
<td>4,859</td>
<td>1.8</td>
</tr>
<tr>
<td>Transportation equipment</td>
<td>2,977</td>
<td>1.1</td>
</tr>
<tr>
<td>Motor freight transportation</td>
<td>2,160</td>
<td>0.8</td>
</tr>
<tr>
<td>Electrical and electronic machinery</td>
<td>1,929</td>
<td>0.7</td>
</tr>
<tr>
<td>Wood preserving</td>
<td>1,739</td>
<td>0.7</td>
</tr>
<tr>
<td>Drum reconditioners</td>
<td>45</td>
<td>---</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>265,594</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Congressional Budget Office (1985).
B. Disposal

Three characteristics distinguish hazardous wastes from more "conventional" pollutants. First, it is relatively easy to hide poor hazardous waste disposal practices from regulators and the public. Landfills are located in out-of-the-way places, and many are located on private property. So-called "midnight dumpers" (individuals or firms who are hired to illegally dispose of hazardous materials) don't even bother to use landfills - they simply drop their cargo in isolated rural locations and drive off.

Second, hazardous wastes can affect all three environmental media: air, land, and water. Wastes stored in metal drums may escape from their containers and begin to percolate through the soil into underground aquifers or be carried through surface runoff into streams or rivers. Emissions from wastes stored above ground may mix with the surrounding air to create a health risk to those near or downwind from the site. The linkages between the disposal of wastes and their ultimate effects on health and the environment can be much more numerous and complex than the linkages involved with conventional pollutants. Exposure routes are often indirect and may simultaneously involve several different avenues.

Third, a hazardous waste site may continue to pollute long after it has ceased to accept new wastes. It is possible to stop a factory from polluting the air by requiring
Table 6. Potential Hazardous Wastes Generated During The Manufacturing of Common Products.

<table>
<thead>
<tr>
<th>Products</th>
<th>Potential Hazardous Waste Byproducts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics</td>
<td>Organic chlorine compounds, organic sludges</td>
</tr>
<tr>
<td>Pesticides</td>
<td>Organic chlorine compounds, organic phosphate compounds, organic sludges</td>
</tr>
<tr>
<td>Medicines</td>
<td>Organic solvents and residues, heavy metals (e.g., mercury, zinc)</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>Cyanides, heavy metal sludges, caustics, solvents, acids</td>
</tr>
<tr>
<td>Paints</td>
<td>Heavy metals, pigments, solvents, organic residues</td>
</tr>
<tr>
<td>Oil, gasoline, and other petroleum products</td>
<td>Oil, phenols and other organic compounds, heavy metals, ammonia salts, acids, alkalis</td>
</tr>
<tr>
<td>Metals</td>
<td>Heavy metals, fluorides, cyanides, acid and alkaline cleaners, solvents, pigments, abrasives, plating salts, oils, phenols</td>
</tr>
<tr>
<td>Leather</td>
<td>Heavy metals, organic solvents</td>
</tr>
<tr>
<td>Textiles</td>
<td>Heavy metals, dyes, organic chlorine compounds, solvents</td>
</tr>
</tbody>
</table>

Source: Goldman, Hulme and Johnson (1986).
the installation and operation of abatement technology such as electrostatic precipitators. Likewise, the discharge of pollutants into waterways and sewers may be controlled through the use of appropriate collection and treatment technologies. Ultimately, the negative impacts associated with a factory's production of "conventional" pollutants cease to be a problem when once the facility itself ceases operations. However, environmental and health risks generated by an improperly designed or managed disposal facility may linger for decades after the facility has closed.

Estimates regarding the prevalence of methods used to dispose of hazardous wastes vary widely. Three such estimates, prepared by the Congressional Budget Office, the USEPA, and the Chemical Manufacturers' Association (CMA), are summarized in Table 7. According to the CBO the most commonly used method by volume of waste is deep-well injection, a process which involves pumping the wastes into thin, deep shafts. Deep-well injection, according to the CBO's estimates, accounts for approximately 25 percent of all off-site disposal; another 23 percent goes into sanitary and hazardous waste landfills, and 5 percent is burned in incinerators. The remainder are treated or disposed of via a variety of other techniques. The USEPA and the CMA estimates present somewhat different pictures. According to CMA estimates more than 90 percent of the total volume of

<table>
<thead>
<tr>
<th>Method</th>
<th>USEPA</th>
<th>CBO</th>
<th>CMA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface impoundment</td>
<td>55</td>
<td>19</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Injection into wells</td>
<td>13</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Direct or indirect discharge to water</td>
<td>b</td>
<td>22</td>
<td>91</td>
</tr>
<tr>
<td>Landfill</td>
<td>1</td>
<td>23</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Treatment</td>
<td>20</td>
<td>6</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Incineration</td>
<td>&lt;1</td>
<td>5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Storage</td>
<td>9</td>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>Other</td>
<td>&lt;1</td>
<td>b</td>
<td>b</td>
</tr>
</tbody>
</table>

Notes: USEPA = United States Environmental Protection Agency; CBO = Congressional Budget Office; CMA = Chemical Manufacturers' Association.

* Chemical industry only.
* Method not included in specific estimate.
* Includes hazardous waste disposed in sanitary landfills.
* Includes industrial boilers.
hazardous wastes are disposed of via discharge into surface waters.

There are approximately 500 licensed commercial treatment, storage, and disposal facilities (TSDFs), 2,500 generator-owned TSDFs, and 75,000 individual landfills currently operating in the United States. It is estimated that 10 generator-owned facilities account for the management of more than 60 percent of all hazardous wastes.

Competing estimates of the number of abandoned hazardous waste disposal sites vary dramatically. The USEPA currently lists 27,000 abandoned waste sites on an inventory of sites that may require some sort of cleanup. Of these, the USEPA estimates that cleanup of at least 2,000 sites will require some federal action. The General Accounting Office, on the other hand, has estimated that the number of sites may actually be anywhere from 130,000 to 425,000, depending on the definition of a hazardous waste site. The Office of Technology Assessment (OTA) took a much broader and more pessimistic view, estimating that there are more than 600,000 active or former solid waste disposal facilities in the United States that could pose threats to human health or the environment. According to the OTA as many as 10,000 of these will require federal attention. If nothing else the differences among these estimates reflect the degree of uncertainty associated with past waste management practices. For example, none of the estimates account for the number of
abandoned deep-well injection facilities because of the difficulties associated with locating and evaluating such facilities. Nor do these estimates include the number of potential hazardous waste sites owned by the federal government.

**Evolution of the Current Regulatory Framework**

Two major themes emerge from a review of the legislative history of hazardous waste regulation. The first is that the federal government's role in managing hazardous wastes has changed significantly since the passage of the first major piece of legislation (i.e., the Solid Waste Disposal Act of 1965). Prior to 1965 federal involvement was limited to a rather modest program of research and of technical and financial assistance. However, as a result of the 1965 Act and subsequent legislation, the federal government assumed a role of leader (particularly with regard to agenda setting and policy initiation), a role which has often led to conflict with the states. Second, such an examination reveals that the Executive Branch, whether controlled by the Democrats or Republicans, has consistently assigned a low priority to hazardous waste programs and has often sought to reduce or eliminate the federal government's role in establishing and implementing hazardous waste management policies.

The Solid Waste Disposal Act directed the Department of
Health, Education, and Welfare (HEW) to survey the nation's solid waste stream and to create a "national research and development program for new and improved methods of proper and economic solid waste disposal."25 It also directed the Secretary of HEW to provide technical and financial assistance to state and local governments, which retained responsibility for maintaining and operating disposal sites. The Act set no national standards for solid waste disposal facilities. States were encouraged to set their own standards, but the act provided neither any incentives for them to do so nor any sanctions against states which chose not to do so. A key White House adviser was quoted as saying that the succeeding Nixon administration "did its best to restrict the federal government's role in solid waste management."26

The Resource Recovery Act of 1970, which called for a more active national governmental role in the recovery of materials and energy, was opposed by the White House and almost vetoed. President Nixon's opposition to the bill can be traced to two factors. First, it increased federal funding of solid waste programs to approximately $239 million by fiscal year (FY) 1973, an amount approximately 14 times greater than was spent in 1969. Second, the bill was seen as a "first step toward an all-out program that would shift responsibility for solid waste disposal construction from the local to the federal government, just as sewage
construction funding had gradually been shifted from a state and local responsibility to a federal one. ²⁷

From a hazardous waste management perspective the importance of the 1970 Act lies in its call for the USEPA to conduct a thorough study of hazardous waste storage and disposal practices. Results of this study were to be submitted to Congress in a "timely fashion." ²⁸ The report did not appear until 1974, due in part to growing hostility between the Nixon administration and the environmental community and a lack of commitment on the part of the newly-created USEPA. ²⁹ Authority over air and water pollution, as well as solid waste, had been transferred from other agencies to the USEPA earlier in the year. Agency administrators did not relish the prospect of tackling the solid waste issue. "This program was subjected to benign as well as malignant neglect. The host agency gave the Solid Waste Management Program all the tender loving care of an unwanted orphan in an institution which at the time seemed to regard only air and water pollution as legitimate offspring." ³⁰

The report stated that the hazardous waste management practices across the nation were generally inadequate, and that these practices represented a growing threat to public health and to environmental quality. The report also stated that federal, state, and local laws had been found to be nonexistent or, at best, spotty. The USEPA concluded that there was a need for a new regulatory program, to be run by
the national and state governments in cooperation with the private sector, that would result in the creation of a network of "regional processing facilities" dedicated to hazardous waste disposal.31

By the time Representative Paul Rogers (the Chairman of the Health Subcommittee of the House Commerce Committee) opened hearings at the end of March of 1974, Congress was in the mood to focus on the problem of solid waste disposal and to confront the Nixon administration over its perceived lack of commitment to finding workable solutions to that problem. Rogers in particular had several reasons to be angry. The Nixon White House had refused to implement programs intended to provide federal assistance to municipalities' solid waste disposal efforts. The federal budget for solid waste programs was being cut by 82 percent. The USEPA was supporting an extension of permits which allowed the states of New York and New Jersey to dispose of their garbage by dumping it off the Atlantic coast, even though this dumping had created a "dead sea". Finally, Rogers was incensed because the annual report of the Council on Environmental Quality (CEQ), the President's environmental advisors, had devoted only eleven pages (out of a total of 1,200) to a discussion of solid waste-related issues. Rogers commented that the "Environmental Protection Agency, perhaps because of the action of the Office of Management and Budget, seems to be expending more effort in dismantling this program than in
administering it."32

Indeed, the administration made little effort to disguise the fact that it was attempting to keep municipal trash disposal a state and local problem. Nixon did not want to create a major federal role in solid waste management. Instead, the administration suggested that the federal role be limited to dealing with the disposal of toxic wastes and submitted a proposal for creating a hazardous waste management program that would be a substitute for a federal program in the general area of solid waste management. Rogers was opposed to the administration's plan. He favored a comprehensive solid waste bill, one that would require the states to develop overall plans for the safe disposal of all their solid wastes. Rogers' plan would have created a strong federal role in the review and approval of these plans as well as extensive federal assistance in implementing them.

Meanwhile, the Nixon administration was busy trying to limit the terms of the hazardous waste debate. In Congressional hearings USEPA witnesses advanced the administration's position that only a few exceptionally hazardous types of materials produced by selected industries required federal attention. The effect of the White House stance was to make hazardous waste regulation appear to be a non-controversial item. Since both the administration and Congressional leaders agreed that the federal government
should play a central role in regulating hazardous waste, little attention was focused on how this regulation should be accomplished. Only two witnesses called by Rogers even mentioned the bill's hazardous waste section, and members of the committee failed to ask any questions devoted to the subject. The bulk of the hearings were devoted to an examination of items that were at the time seen as the core features of the solid waste problem - bans on throwaway bottles, the problem of siting municipal dumps, the burning of garbage to generate electricity, and the impact of federal tax policies on the development of recycling.

Similar hearings were held by the Senate in 1974 by Senator Gary Hart of Colorado. These hearings, like those held by Rogers, were more expressive of the ongoing struggle between leaders in Congress and the Nixon administration over proposed cuts in federal environmental programs than they were of a commitment to pass a bill. Because the two sides could not agree on what to do about "nonhazardous" solid waste, no action on regulating hazardous waste was taken, and Congress recessed without passing any solid waste legislation.

The political climate had changed dramatically by the time Congress convened in January of 1975. Richard Nixon was no longer president. Democrats enjoyed lopsided margins in both houses of Congress, prompting some party leaders to boast of a "veto-proof Congress." It appeared that
advocates of a major federal role in the management of solid waste would soon realize their dream. However, solid waste legislation was quickly pushed from the limelight by a number of factors, not the least of which was a renewed interest in environmental damages caused by toxic materials. Prior to 1975 attempts to pass a Toxic Substances Control Act (TSCA) had been thwarted as a result of pressure from industry, particularly from the chemical industry, which was led by the Chemical Manufacturers Association (CMA). In early 1975 representatives of Dow Chemical announced that the company would continue to oppose the passage of any toxic substances legislation. However, the remainder of the chemical industry, including the CMA, believed that Congress would eventually pass such legislation in one form or another, and decided to focus their energies on seeing to it that the 1975 TSCA, if passed, would interfere as little as possible with their operations. Industrial representatives felt they had little reason to oppose the inclusion of language dealing specifically with hazardous waste in the proposed solid waste bill known as the Resource Conservation and Recovery Act (RCRA). In fact, they welcomed the inclusion of these sections, partly because they did not want to be seen as being totally opposed to the safe disposal of hazardous wastes and because they felt that the proposed hazardous waste sections of TSCA would be much more stringent. 34
Environmental groups, led by the Sierra Club, had likewise decided that the "toxics" issue was more pressing than the solid waste issue and focused most of their energy on the drafting of TSCA. The one exception to this was the group Environmental Action, which assigned its lobbyist the task of working closely with the Senate Public Works Committee and the House Commerce Committee as they drafted the hazardous waste sections of RCRA. Fearing that too much publicity would attract attention from otherwise preoccupied industrial interests the lobbyist and key staff members decided to avoid generating public attention to RCRA. From an historic perspective the decision to pursue a low-profile approach was a wise one. Most of the debate over RCRA focused on such issues as a proposed ban on throwaway containers that had been introduced by Senator Hatfield of Oregon and the proper role of the federal government in encouraging or financing the operation of "resource recovery" facilities.

President Ford had little opportunity to exert any significant influence over the terms of the hazardous waste debate. His efforts to fight inflation and curb expansion of the federal budget (which resulted in White House opposition to the creation of any new federal programs), coupled with his refusal to resubmit hazardous waste legislation that had been proposed by the Nixon administration, alienated many in Congress. Representative Fred Rooney, Chairman
of the House Subcommittee on Transportation and Commerce, characterized Ford's stance as:

... chintzy in an area that means so much to the health and welfare of this nation. Here we are trying to solve a problem and you say that just because we are trying to battle inflation we can't spend another nickel.38

Efforts by waste disposal firms and waste haulers (the only groups to oppose the inclusion of hazardous waste language in RCRA) to influence deliberations on RCRA were ineffective, largely because they did not have the backing of the far more powerful waste generating industries. In addition, the haulers and disposers were unable to overcome the effect of a document prepared by committee staff that listed fifty-nine incidents in twenty-two states in which the industry's disposal practices had resulted in threats to the environment and public health.

An additional factor which served to stifle debate over the hazardous waste sections of RCRA was the difficulty that industry experienced in arguing against the safe disposal of such wastes. (They had similarly failed in debates on both the Clean Air and Clean Water Acts to find a basis for arguing against controls on toxic or hazardous pollutants.) The sponsors of RCRA knew from this experience that even the most stringently worded language prohibiting the release of toxic or hazardous materials would draw little fire from industry. In fact, the hazardous waste section was
strengthened in two important ways during the course of the debate. First, the bill was amended to include provision for the establishment of a "cradle-to-grave" manifest system that would enable USEPA to track hazardous wastes from the point of generation to ultimate disposal. Second, the definition of "hazardous" wastes was expanded to include a wider range of substances. The only significant concession to industry was the inclusion of a provision permitting hazardous waste disposal facilities to receive "interim permission" to dispose wastes while the USEPA developed hazardous waste regulations.

It was obvious during the final stages of the debate over RCRA that few of the participants had any notion of what would be required to carry out the mandate of safe disposal of hazardous wastes. Given the tone of the debate it is clear that Congress viewed the problem of hazardous waste management as a minor issue resulting from the successful enforcement of earlier pollution laws, and that RCRA would be a rather modest "mopping up" operation.

The Resource Conservation and Recovery Act was passed in the last days of the 94th Congress. The Senate Committee report on the bill was critical of administration attempts to "restrict federal activities to control hazardous wastes through administrative reorganizations, reduced budget requests, and delays in submitting reports to Congress." RCRA was signed by President Ford on October 22, 1976.
Table 8 presents a brief chronology of federal efforts at regulating hazardous substances.

**The Resource Conservation and Recovery Act**

The Resource Conservation and Recovery Act includes eight separate titles. This research focuses specifically on the regulatory framework erected in response to Title III, which deals specifically with hazardous wastes and is divided into eight major sections. The following discussion highlights the most important aspects of Title III. Capsule summaries of all eight titles of RCRA are presented in Table 9.

**Section 3001: What Is a "Hazardous Waste?"**

Section 3001 of RCRA directed the USEPA to develop criteria for identifying and listing hazardous wastes. Pursuant to this mandate, the agency developed a two-tiered approach to developing a hazardous waste identification system. First, based on the definition of what constitutes a "hazardous waste" as stated in RCRA, the agency produced a list of industrial waste streams determined to be hazardous on *prima facie* grounds. Included in this list of more than 500 substances are a number of sludges, spent solvents, still bottoms, wastewaters, spent catalysts, residues, and other materials; these materials are identified either specifically (i.e., commercial and generic names...

<table>
<thead>
<tr>
<th>Year</th>
<th>Law</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>Solid Waste Disposal Act (called for a survey of solid waste management and disposal practices and estimates of the volumes being managed).</td>
</tr>
<tr>
<td>1970</td>
<td>Clean Air Act and Amendments (regulates six major pollutants based on health-effect levels, plus hazardous air pollutants more generally).</td>
</tr>
<tr>
<td>1972</td>
<td>Federal Water Pollution Control Act (later known as the Clean Water Act) and Amendments (regulates the disposal of toxic pollutants into the nation's waterways). Solid Waste Act (called for a study of hazardous waste management practices in the United States). Federal Railroad Safety Act (provide for tightened controls on shipment by rail of hazardous substances).</td>
</tr>
<tr>
<td>1975</td>
<td>Hazardous Materials Transportation Act (provides general guidelines and regulations to control the transport of toxic substances).</td>
</tr>
<tr>
<td>1977</td>
<td>Federal Mine Safety and Health Act (addresses human exposure to toxic substances and harmful physical agents in mines).</td>
</tr>
<tr>
<td>1978</td>
<td>Hazardous Materials Transportation Act (regulates the transportation of toxic and other hazardous materials).</td>
</tr>
<tr>
<td>1980</td>
<td>Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] and Amendments (provides liability requirements and funds [<em>Superfund</em>] for the cleanup of contaminated sites).</td>
</tr>
<tr>
<td>1984</td>
<td>Hazardous and Solid Waste Amendments (modifies the Resource Conservation and Recovery Act to require corrective action at hazardous waste management facilities, and bans land disposal of selected wastes).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 3001</th>
<th>Directs the administrator of the USEPA to publish criteria for the identification of hazardous waste materials.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 3002</td>
<td>Requires the USEPA to develop regulations establishing minimum record keeping, labeling, packaging, and transportation requirements for firms generating hazardous wastes.</td>
</tr>
<tr>
<td>Section 3003</td>
<td>Directs the USEPA to establish regulations covering the activities of hazardous waste transporters.</td>
</tr>
<tr>
<td>Section 3004</td>
<td>Directs the USEPA to establish minimum design and performance standards for hazardous waste disposal facilities.</td>
</tr>
<tr>
<td>Section 3005</td>
<td>Requires all hazardous waste disposal facility operators to receive a permit from the USEPA. These permits specify the types and quantities of wastes each facility is allowed to process as well as the site and methods to be used in the disposal process.</td>
</tr>
<tr>
<td>Section 3006</td>
<td>Allows the USEPA to delegate authority (&quot;primacy&quot;) over hazardous waste management to states that establish programs that are at least as stringent as the federal program.</td>
</tr>
<tr>
<td>Section 3007</td>
<td>Requires that inspectors have access to inspect any sites engaged in the generation, handling, transportation, or disposal of hazardous wastes. Also requires that public records must be maintained at all such sites.</td>
</tr>
<tr>
<td>Section 3008</td>
<td>Allows for both criminal and civil penalties for violations of the hazardous waste sections of RCRA.</td>
</tr>
</tbody>
</table>
are listed) or on a "generic" basis (i.e., identified primarily by source).  

Second, the agency also established four criteria to be used for the purpose of classifying individual components of the nation's solid waste stream as "hazardous" or "nonhazardous." These characteristics, (ignitability, corrosivity, reactivity, and toxicity), are described in Table 10. A number of analytic tests have been developed for all four criteria. The management and disposal of any waste material which (a) qualifies as a "solid waste" and (b) proves "positive" on any one of these criteria is subject to regulation under RCRA.

In order to be classified as a "hazardous waste" under the second classification tier a waste material must first meet the definition of "solid waste" set forth in 40 C.F.R. 261.2. Failure to meet this definition exempts it from regulation under RCRA. Such a failure does not, however, eliminate the possibility that the material's ultimate fate may be decided under some other set of environmental regulations, such as the Clean Water Act.

Solid wastes are defined as "any garbage, refuse, or sludge from a water supply or wastewater treatment plant or air pollution control facility . . . including solid, liquid, semi-solid or contained gaseous material." In order to be covered by this definition, such material must result from industrial, commercial, agricultural or mining
Table 10. Characteristics of Hazardous Wastes.

**Ignitability**
- Liquids with a flash point (the temperature at which the vapor easily ignites in air) lower than 140°F. (Except for aqueous solutions containing 24 percent by volume or less of alcohol.)
- Materials that are not liquids and are capable, under standard temperature and pressure, of causing a fire by means of friction, absorption of the moisture of spontaneous chemical changes.
- Materials that burn so vigorously and persistently when ignited that they create a hazard.
- Ignitable compressed gases.
- Oxidizers.

**Corrosivity**
- Aqueous wastes with a pH less than or equal to 2, or greater than or equal to 12.5.
- Liquid wastes that corrode steel at a rate equal to or greater than 0.25 inches per year at a test temperature of 130°F.

**Reactivity**
- Materials that are normally unstable and readily undergo violent change without detonating.
- Materials that react violently with water.
- Materials that form potentially explosive mixtures with water.
- Materials that, when mixed with water, will generate toxic gases, vapors, or fumes in quantities sufficient to endanger human health or the environment.
- Cyanide- or sulfide-bearing materials that, when exposed to pH between 2 and 12.5, can generate sufficient quantities of toxic gases, vapors, or fumes to present a danger.
- Materials capable of detonation or explosive reaction if subject to a strong initiating source or if heated under confinement.
- Materials that are readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
- Class A (e.g., primers, dynamite) and Class B (e.g., propellants) explosives.

**Toxicity**
The steps in this determination procedure are based on the USEPA Extraction Procedure, which identifies hazardous concentrations of a constituent in groundwater, and the National Interim Primary Drinking Water Standards (NIPDWS).
- Constituents are extracted from the wastes in a manner designed to simulate the leaching action that occurs in landfills.
- The extract is analyzed to determine whether it contains any toxic contaminants identified in NIPDWS.
- If the extract contains any contaminants in concentrations 100 times greater than that specified in NIPDWS, the waste is considered hazardous.
- If the original solid waste stream contains less than 0.5 percent solid matter, technicians analyze the original solid waste stream rather than the leachate.

operations, or from community activities, and it must meet one or more of a set of specific tests as to whether the material is to be "discarded."

The term "solid waste" does not refer to a material's physical state; it is strictly a regulatory term. For example, industrial wastewater streams not regulated by the Clean Water Act and its amendments are classified as a "solid" waste under the definitions developed under RCRA. The definition of "solid waste" also applies to any material that is a "manufacturing or mining byproduct" and is "sometimes" discarded. This is the language which extends regulatory coverage to those materials that are reused or recycled in lieu of being discarded. It is USEPA's position that this language covers not only those cases where an individual plant sometimes uses and discards a particular material after its initial use, but also those cases where the material is reused by some plants conducting similar operations. The end result is that a material escapes the definition of "solid waste" only if it is the universal practice within a given industry to reuse and not discard that material after initial use.

Materials that (1) qualify as "manufacturing or mining byproducts" and (2) are not universally reused also fall under the heading of "solid waste." Manufacturing and mining byproducts are defined as including any secondary and incidental product of a particular operation that would not
be solely and separately manufactured or mined; they do not include intermediate manufacturing or mining products that are typically processed through the next step of the process or that are used as inputs in other production operations.\textsuperscript{46}

It should be noted that RCRA and associated regulations exclude several major categories of material from the category of "solid waste." These materials are identified in the first column of Table 11. Table 11 also lists several wastes which have been specifically excluded from the "hazardous waste" classification.

USEPA administrators realized that they may well have classified some materials as hazardous wastes that do not, in fact, represent a significant hazard to human health or the environment. The agency therefore designed a procedure by which any person or organization handling a listed waste may petition to have that material removed from the list (i.e., to have it "delisted").\textsuperscript{47} An attempt to have a material listed may be based on one of two grounds: (a) that USEPA reached an erroneous conclusion in its evaluation of available data; or (b) that the wastes being managed by a particular petitioner differ significantly from those materials evaluated by USEPA in classifying an entire class of wastes as hazardous. Delisted materials are still considered to be solid wastes unless they are granted a variance under 40 C.F.R. 260.30 or 260.31.
Table 11. Materials Specifically Excluded From Definitions of "Solid Waste" and "Hazardous Waste".

<table>
<thead>
<tr>
<th>Excluded from &quot;Solid Waste&quot;</th>
<th>Excluded from &quot;Hazardous Waste&quot;</th>
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<tr>
<td>Domestic sewage</td>
<td>Household wastes</td>
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<tr>
<td>Mixtures of domestic sewage and wastes going to publicly owned</td>
<td>Agricultural wastes used as fertilizers</td>
</tr>
<tr>
<td>treatment works (POTWs)</td>
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<tr>
<td>Industrial point-source discharges under Section 402 of the Clean</td>
<td>Mining overburden returned to the site</td>
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<td>Water Act</td>
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<tr>
<td>Irrigation return flows</td>
<td>Discarded wood treated with arsenic</td>
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<tr>
<td>Source, special nuclear, or byproduct material regulated under the</td>
<td>Chromium wastes</td>
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<tr>
<td>Atomic Energy Act</td>
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<tr>
<td>In-situ mining waste</td>
<td>Petroleum-contaminated media from tank cleanup</td>
</tr>
<tr>
<td>Reclaimed pulping liquors</td>
<td>Specific ore processing wastes*</td>
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<tr>
<td>Regenerated sulfuric acid</td>
<td>Specific utility wastes*</td>
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<tr>
<td>Secondary materials returned to the original process under certain</td>
<td>Oil and gas exploration, development and production wastes*</td>
</tr>
<tr>
<td>conditions</td>
<td>Cement kiln dust*</td>
</tr>
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</table>

Source: Quarles (1982).

Note: *Special study wastes.
The USEPA created a special exemption for small waste generators as a concession to the practical considerations that would have made it virtually impossible to extend the full requirements of RCRA to the hundreds of thousands of industrial, commercial, agricultural, and mining sites across the nation. In describing this exemption, the USEPA stated that RCRA would still cover 99 percent of the hazardous wastes generated across the country while regulating only 10 percent of the generators.48 "Small" generators were initially defined as any operation which produced less than 1,000 kilograms (i.e., one metric ton, or 2,205 pounds) of hazardous wastes in a calendar month, or any operation which had accumulated less than 1,000 kilograms at any given time.49 This exemption is applied on a site-by-site, month-by-month basis. Companies conducting multi-site operations could therefore be faced with the task of "balancing" exempt and non-exempt sites. Likewise, operations at any one site could shift back and forth between exempt and non-exempt status over the course of a year.

Sections 3002-3004: The "Cradle-to-Grave Manifest" System

Regulations developed in response to Sections 3002 through 3004 call for the tracking of hazardous wastes from "cradle to grave", a phrase which refers not only to waste generation, but also to transportation, storage, and ultimate disposal as well. Congress anticipated that this
tracking function would include, at a minimum, the use of a system of manifests for following the movement of hazardous wastes from generation to disposal. The system developed by the USEPA requires all generators, transporters, and disposers of hazardous wastes to be part of a system that would identify the origin, quantity, and destination of hazardous wastes being transported as well as the identity of the transporter. This information was to be contained on a manifest form that would accompany the waste though its travels. The USEPA did not initially propose a uniform national system; instead, states were allowed to develop their own manifests. In response to complaints (primarily from industry) concerning manifest requirements that varied from state to state, the USEPA developed a national manifest.\textsuperscript{50} In addition to allowing the USEPA to "track" wastes, the manifest system also provides a mechanism through which ultimate accountability for environmentally sound disposal can be imposed upon the parties responsible for the generation of the wastes.

Under the terms of the manifest system a transporter may not accept a shipment of hazardous waste from a generator unless it is accompanied by a manifest; designated hazardous waste facilities are likewise prohibited from accepting a shipment of hazardous waste if no manifest is presented. The USEPA also requires that designated facilities note, and report, any discrepancy between the manifest
and a waste shipment received.

The clear intention of the manifest and record keeping requirements was to inhibit the practice of "midnight dumping", or illegal disposal, and to fix responsibility for the ultimate disposition of wastes. However, given the fact that most hazardous wastes never leaves the point of generation, only a small portion of the overall volume of wastes falls under the purview of the system. Further, we know very little about how effective the manifest system is at inhibiting illegal waste disposal. The incentives for "midnight dumping" still exist under the manifest system, at least for those who find illegal disposal cheaper than contracting with a responsible transporter and disposal site.

Section 3006: Primacy

The legislative history of RCRA indicates that Congress did not intend to preempt the role of the states in the implementation process. Indeed, the House report accompanying RCRA stated that the states were to be given "primary enforcement authority" and the "primary option of implementing federal minimum standards." In order to allow for this "primary option", Section 3006 of RCRA directs the USEPA to establish a mechanism which would allow states to apply for authorization to develop and operate their own hazardous waste programs as alternatives to USEPA
management. RCRA provides for a two-stage process in granting primacy to individual states. The first stage, interim authorization, establishes a two-year period during which a state may implement its own hazardous waste regulation program provided that it demonstrates a commitment to developing a regulatory structure that is "substantially equivalent" to the federal regulations. In order to secure final or full authorization the states are required to demonstrate that their hazardous waste programs are at least "substantially equivalent" to the federal program established in response to RCRA. The authorization mechanism developed by the USEPA requires states applying for certification to submit the following items to the appropriate USEPA Regional Administrator:

(1) a letter from the state’s governor requesting program approval;
(2) copies of all applicable state statutes and regulations, including those governing state administrative procedures;
(3) a detailed description of the program, including descriptions of:
   (a) the program’s scope, structure, coverage, and processes;
   (b) the state agency or agencies that would be responsible for implementing the program;
   (c) the state-level staff who would implement the program;
   (d) the state’s compliance tracking and enforcement program;
   (e) the manifest system that would be used to monitor the transportation of hazardous wastes;
   (f) estimates of the annual cost of running the program; and
   (g) an itemization of the sources and amounts of funding available to support the program’s operation;
(4) a statement by the state’s attorney demonstrating
that the state has adequate legal authority to carry out all aspects of its program, including references to statutes, regulations, and judicial decisions upon which the state will rely in order to administer the program; and

(5) a Memorandum of Agreement (MOA) between the Director of the state agency or agencies that will implement the program and the appropriate USEPA Regional Administrator that specifies:
   (a) the frequency and contents of compliance reports to be submitted by the state to the USEPA Regional Administrator;
   (b) the plan for coordinating the compliance monitoring activities conducted by the state and the USEPA;
   (c) procedures for joint processing of permits for facilities that require permits from both the state and USEPA under different programs; and
   (d) the types of permit applications that will be sent to the USEPA Regional Administrator for review and comment.63

State programs are subject to continuous review. The USEPA is authorized to withdraw a state's primacy privilege if a review indicates that the state program no longer complies with the requirements of RCRA. Examples of circumstances that can lead to withdrawal of primacy include: failure to issue permits that conform to regulatory requirements; failure to inspect and monitor activities subject to regulation; failure to comply with the terms of the MOA; and failure to take appropriate enforcement action. States may voluntarily transfer implementation authority back to the USEPA. Hazardous waste programs in these states are then administered by the relevant USEPA Regional Office.

Under RCRA the USEPA is authorized to enforce state regulations that are more stringent than the federal minimum if they are part of a state program for which the primacy
agreement has been revoked by the USEPA. When the agency assumes responsibility for implementing RCRA in a state that had been enforcing regulations stricter than the federal minimum, it does not suspend those regulations in favor of its own, less stringent, regulations. On the other hand, the USEPA may not enforce state regulations that are broader in scope than the federal regulations. This issue of stringency versus breadth is addressed in Section 3008(a)(2) of RCRA, which provides for EPA enforcement of any provision of any authorized state's approved program, and 40 CFR 271.1(i), which states that state provisions that are broader in scope than the federal minimum regulations are not part of federally approved RCRA program and are not, therefore, enforceable by the USEPA.

As intended by Congress, most of the states have assumed responsibility for implementing at least a part of the hazardous waste management program. As of January 1, 1988, 41 states (and the District of Columbia) had received full final authorization to implement the RCRA program (see Table 12).

The 1980 Reauthorization

Not long after the passage of RCRA the Congress began to perceive the enormity and complexity of the hazardous waste problem. Congress had originally directed the USEPA to develop and implement all regulations necessary to comply
with Sections 3001 through 3005 by the end of March, 1978. However, the combination of two factors prevented the USEPA from meeting this deadline. First, because the Carter administration continued the pattern established by the Nixon and Ford administrations of assigning a low priority to hazardous waste management, the USEPA was able to secure only a fraction of the human and financial resources that were required to complete this task. The second factor which contributed to the delay was Carter’s decision to consolidate hazardous waste permit rules with rules governing the issuance of permits under the Clean Water Act, the Clean Air Act, and the Safe Drinking Water Act.\(^54\), \(^55\)

Congress had originally scheduled reauthorization of RCRA for 1979. However, as a result of the USEPA’s inability to meet the timetable included in RCRA and increased public pressure resulting from the unfolding events at Love Canal, Congress was unable to meet its own deadline. After a lengthy debate the House and Senate reached agreement on a reauthorization of RCRA in October of 1980. The most important features of the 1980 RCRA Amendments were the strengthening of the USEPA’s enforcement powers and the inclusion of a provision which allowed the USEPA to distinguish between new and existing facilities in setting regulatory requirements.

<table>
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1 Federal Register Page Number.
The 1982 Reauthorization

Despite heightened public concern over the hazardous waste problem the implementation of RCRA actually slowed during the early years of the Reagan administration. In 1980 David Stockman referred to RCRA as a "monument to mindless excess." The Administration’s subsequent actions reflected this philosophy. For example, referrals of hazardous waste actions by USEPA regional offices to headquarters dropped from 86 in 1980 to 9 in 1981. Reagan, who was sympathetic with Carter’s idea of phasing out federal solid waste activities, proposed that the elimination of federal funds for nonhazardous waste activities by moved up from FY 1984 to FY 1982. The Reagan strategy for reducing federal involvement in hazardous waste management incorporated a number of controversial elements, including: postponing the enforcement of insurance requirements for operators of hazardous waste sites; deferring the issuance of landfill regulations; and proposals for a 10 percent reduction in all hazardous waste planning grants and a partial lifting of the ban on landfill disposal of containerized liquid wastes. The White House and the USEPA were forced to pull back from these initiatives, however, as a result of protests by a coalition of environmentalists and companies engaged in the destruction and detoxification of hazardous materials.

As they considered the scheduled 1982 reauthorization
of RCRA members of the Senate criticized the Reagan proposals and responded with a bill that would have funded a study by the National Academy of Sciences of the health risks associated with hazardous wastes as well as increased funding for the implementation of RCRA. At the same time the House began work on a bill that would have: (1) reduced the volume of hazardous wastes used to differentiate between large and small generators from 1,000 kilograms per month to 100 kilograms per month; (2) imposed specific deadlines for the approval or closure of land disposal facilities; and (3) expanded the definition of hazardous wastes subject to regulation under RCRA. However, no bill was produced and the 1982 reauthorization of RCRA died with the 97th Congress.

The 1984 Hazardous and Solid Waste Amendments

Advocates of a stronger USEPA presence in the regulation of hazardous wastes were heartened by the nomination of William Ruckelshaus as Administrator. However, the agency continued to be the target of stinging criticism. A study released by the Office of Technology Assessment in 1983 found that the USEPA's regulatory approach contained a number of flaws, including: (1) relying on inadequate data regarding the scope and complexity of hazardous waste problems; (2) significant exemptions of small volume generators; and (3) a philosophy that provided stronger incentives for
land disposal than for treatment or resource recovery.\textsuperscript{57}

The Senate version of the reauthorization of RCRA (S 757) was reported by the Environment Committee in July of 1983, but floor passage took nearly a year. The Reagan administration objected to the bill, calling it "inflexible and unnecessary regulatory mandates." Finally, after considerable debate over proposed exemptions for specific wastes, the Senate passed the bill on July 25, 1984 by a vote of 93-0. Disagreements with the House version were settled in conference committee, and a compromise bill was produced and signed by President Reagan on November 9, 1984.

The 1984 amendments represented a significant move away from the delegation of powers to the Environmental Protection Agency. More so than in any previous piece of environmental legislation, Congress assigned itself the role of regulator and set out specific instructions, rather than general guidelines, regarding the form the hazardous waste program should take. Congress was not content to simply list regulatory requirements as it developed the amendments. It also wanted to force action on the USEPA's part. Dissatisfied with the slow pace of earlier activity under RCRA, Congress laid out a specific timetable for the agency to accomplish the tasks delegated to it under the 1984 and earlier amendments. For example, USEPA was required to identify acceptable disposal techniques for one-third of all high-volume, highly hazardous wastes by August of 1988; to
do the same for the other two-thirds of those wastes by May of 1990; and to address disposal of all other wastes by April of 1991.

Congress identified four major goals as it began the process of constructing the 1984 amendments. First, it wanted to revoke the most far-reaching of the regulatory exemptions granted under the 1976 program revoked and to expand the universe of control to included more sources and wastes. Second, it wanted the program to get under way with no delays. Third, it wanted to address the problems that might arise after waste disposal facilities discontinued operation. Finally, Congress wanted to create a hazardous waste program that was biased against land disposal, the method most often associated with environmental risk. In its policy statement Congress stated:

> The Congress hereby declares it to be the national policy of the United States that, wherever possible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored or disposed of so as to minimize the present and future threat to human health and the environment.\(^5\!\!9\)

This shift in policy focus was a result of a growing awareness that the volume and variety of hazardous wastes generated by industry was increasing at a rate unimagined in 1976. By 1984 it had become apparent that while treatment was technologically feasible there was far too little treatment capacity available. It had also become apparent that
resistance to any expansion of that capacity (from both the market and the public) would effectively eliminate any short-term chances of expanding that capacity. Congressional leaders, faced with the prospect of a projected 5.6 percent increase in hazardous waste loads between 1984 and 1990, began the process of seeking out alternatives to disposal-based management strategies.

Proponents of waste reduction estimated that the generated volume of hazardous wastes could be reduced by nearly 14 percent between 1984 and 1990 if industry could be persuaded to adopt basic waste reduction principles and to take advantage of existing waste reduction technology. These proponents conceded such a strategy could result in significant (as much as 46 percent) increases in hazardous waste management costs. They pointed out, however, that the projected 5.6 percent increase in hazardous waste loads coupled with a continued reliance upon a disposal-based approach to hazardous waste management could result in a 94 percent increase in management costs.

Congress decided not to include a waste reduction mandate in the 1984 amendments despite the compelling economic and environmental logic. Economic incentives, combined with the articulation of waste reduction as an overarching policy goal, were deemed sufficient to induce industry to reduce rates of hazardous waste generation.

Passage of the 1984 amendments resulted in four
significant changes in RCRA. First, the amendments closed what had come to be viewed as a loophole in RCRA by bringing under regulation an estimated 13,000 relatively small sources that generate between 100 and 1,000 kilograms of hazardous waste per month - sources that had been exempted earlier by USEPA in the interest of manageability. Congress recognized that regulation of these small sources would require a different approach than that used in dealing with large-scale waste producers. The 1984 amendments therefore allowed for the creation of a separate body of regulations applicable to small-scale generators that are "sufficient to protect human health and the environment." Small-scale generators were not exempted from the USEPA's uniform manifest system requirements, nor were they excused from the requirement that all of their wastes be disposed of in a facility that is permitted to receive municipal or industrial solid waste.

The second major change introduced by the 1984 amendments concerned the disposal of certain hazardous wastes on land. In the eyes of some, the biggest shortcoming in the evolving hazardous waste program was a bias toward land disposal of wastes. (Three distinct technologies fall under the heading of "land disposal": deep-well injection, which is usually used to dispose of dilute wastes; surface impoundments, which include pits, ponds and lagoons; and landfills.) With public concern mounting over the perceived
risks of land disposal (such as the increasing number of abandoned disposal sites) and the release of a report by the Office of Technological Assessment which argued that alternative management and disposal techniques were available, Congress decided to force the USEPA to pursue the development of alternatives to the disposal of hazardous materials in landfills. Specifically, RCRA was amended to prohibit land disposal of hazardous waste unless the USEPA administrator determines that "the prohibition of one or more methods of land disposal of such wastes is not required in order to protect human health and the environment for as long as the waste remains hazardous." 

The third major change introduced by the 1984 amendments was an expansion of the universe of generators and facilities that are subject to regulation under RCRA. Perhaps the most significant of these facilities (both in terms of the number of sites and the volume of wastes involved) are underground storage tanks used to hold petroleum, solvents, pesticides, and gasoline. A study released in 1983 indicated that as many as 100,000 such tanks, containing a wide range of potentially hazardous materials, may have been leaking their contents into the surrounding environment. Motivated by the fear that many of these tanks had the potential to become serious environmental hazards, Congressional leaders decided to bring all underground storage tanks into the RCRA system. As a result USEPA was
required to: establish standards for detecting leaks; investigate the causes of such leaks and develop programs that will remove or reduce those causes; determine financial responsibility for tanks that may have been taken out of service; and issue rules regarding the design and construction of new underground tanks. It has been estimated that about 1.4 million tanks will be subject to these rules.68

Finally, the 1984 amendments reclassified violations of RCRA from civil to criminal offenses, with penalties of up to $50,000 per day and two years in jail. The USEPA was authorized to conduct criminal investigations of suspected violators, and private citizens were granted the power to file "imminent hazard" lawsuits against generators and storage facilities.

A summary of regulatory requirements imposed upon hazardous waste generators, transporters, and operators of treatment, storage, and disposal (TSD) facilities is presented in Table 13.

**Cost to Private Industry**

There is some evidence that large, better-financed firms have begun the process of modifying some production processes and substituting inputs in response to RCRA.69 This is clearly what Congress had in mind. On the other hand, it is also clear that the implementation of RCRA is not going to result in the balancing of benefits and costs
that Congress had envisioned. Flexibility is not a hallmark of the RCRA program; rather, RCRA is based on detailed specification and regulation of virtually every aspect of disposal facilities and siting options.

The Chemical Manufacturers Association estimated in 1980 that compliance could ultimately cost American firms as much as $100 billion. (Estimates of disposal costs per unit of waste are presented in Table 14.) The Congressional Budget Office estimated that the 1984 Amendments alone would increase industrial compliance costs from $4.2 billion in 1983 to between $8.4 billion and $11.2 billion in 1990. The CBO projected that certain industries, such as wood preserving and primary metals, would be particularly burdened by the new requirements; hazardous waste expenditures could rise as high as 111 percent of expected profits for wood preservers, and as high as 64 percent for primary metal producers, if no waste reduction measures were employed. Estimates of the costs of various hazardous waste treatment options that comply with the 1984 amendments are presented in Table 14.

The economic impacts of implementing the 1984 amendments extend to the USEPA as well. Expenditures required to implement RCRA increased from $184 million in 1985 to $265 million in 1989. While these expenditure levels are below those associated with the implementation of the Clean Air and Clean Water acts, they are increasing at a much faster
Table 13. Summary of RCRA Requirements for Hazardous Waste Generators, Transporters, and Treatment, Storage and Disposal (TSD) Facilities.

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<th>Required Action</th>
<th>Generators</th>
<th>Transporters</th>
<th>TSD Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine if wastes are hazardous.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Notify the USEPA if a hazardous waste handler, and obtain an ID number.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Train personnel in proper waste management and emergency response procedures.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Develop preparedness and prevention programs and notify authorities of releases.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prepare contingency plans and emergency procedures.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Periodically inspect facility operations.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Track wastes via a manifest system.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Carry out recordkeeping and reporting.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Use proper packaging, labeling, and transport vehicle placards.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Follow proper security procedures.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Use and manage waste containers, landfills, and other operating areas properly.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Design and operate adequate waste handling areas.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Monitor groundwater.</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Provide closure and postclosure care.</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ensure financial responsibility for closure and postclosure care.</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Source: Gentry (1989).
### Table 14. Estimated Costs of Hazardous Waste Treatment Technologies.

<table>
<thead>
<tr>
<th>Treatment Technology</th>
<th>Estimated Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill</td>
<td></td>
</tr>
<tr>
<td>Bulk solids with assigned USEPA number</td>
<td>$230/ton, $200/drum</td>
</tr>
<tr>
<td>Drums, local facility</td>
<td>$25-250/drum</td>
</tr>
<tr>
<td>Bulk, local facility</td>
<td>$30-100/ton</td>
</tr>
<tr>
<td>High hazard, local facility</td>
<td>$100-300/ton</td>
</tr>
<tr>
<td>Low hazard, out-of-state</td>
<td>$100-300/ton</td>
</tr>
<tr>
<td>Liquids requiring extensive pretreatment to meet land disposal restrictions</td>
<td>$2.75/gallon, $220/drum</td>
</tr>
<tr>
<td>Liquids requiring stabilization prior to land disposal</td>
<td>$1.95/gallon, $160/drum</td>
</tr>
<tr>
<td>Incineration</td>
<td></td>
</tr>
<tr>
<td>Offsite, low BTU content</td>
<td>$250-750/ton</td>
</tr>
<tr>
<td>Onsite, low BTU content</td>
<td>$300-425/ton</td>
</tr>
<tr>
<td>Offsite, high BTU content</td>
<td>$50-250/ton</td>
</tr>
<tr>
<td>Onsite, high BTU content</td>
<td>$100-175/ton</td>
</tr>
<tr>
<td>PCBs, less than 500 ppm</td>
<td>$350-450/ton</td>
</tr>
<tr>
<td>PCBs, more than 500 ppm</td>
<td>$850-1,350/ton</td>
</tr>
<tr>
<td>Specific Wastes and Treatment Types</td>
<td></td>
</tr>
<tr>
<td>Cyanide, by chemical oxidation</td>
<td>$2.30-2.80/gallon, $210/drum</td>
</tr>
<tr>
<td>Metal sludges, by hydrometallurgical recycling</td>
<td>$195/ton</td>
</tr>
<tr>
<td>Industrial waste acids, by electrodialysis</td>
<td>$0.57/gallon</td>
</tr>
<tr>
<td>Halogenated and nonhalogenated organic solvents, by distillation</td>
<td>$0.20-1.42/gallon</td>
</tr>
<tr>
<td>Waste oils, by re-refining</td>
<td>$0.10-0.40/gallon for a 10 million gallon plant</td>
</tr>
</tbody>
</table>

Title III of RCRA focuses on the management of hazardous waste at facilities that are currently operating or which will come "online" at some point in the future. It was designed, in part, to plug a regulatory gap left by the Clean Air Act and the Clean Water Act. Those statutes require industries to remove hazardous substances from their emissions to air and water; however, they could not assure that the ultimate disposal of these materials would be environmentally sound. RCRA was intended to provide such assurance. The Act does not, however, deal directly with abandoned sites or closed facilities where hazardous wastes were handled or disposed of in the past. These situations are covered by the Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund") of 1980. This research does not include the implementation of the Superfund.

Conclusion

The problem of how to deal with hazardous wastes is as old as human technology. The ancient Greeks recognized that asbestos fibers released during the process of weaving cloth created a health hazard for slaves engaged in the manufacture of garments. Eighteenth and nineteenth-century
advances in the fields of chemistry and metallurgy resulted in an explosion in the number and volume of waste materials that could adversely affect human health and the environment. Advances in the field of organic chemistry, particularly those advances associated with the development of petroleum-based products, resulted in a much larger explosion during the twentieth century. The hazardous waste problem currently confronting the United States is the product of these developments. It is also the result of a number of other factors, including the rapid pace of urbanization and the evolution of a framework of environmental regulation that redirected health and environmental risks from the air and water to the land.

Starting in 1976 the federal government has attempted to address the hazardous waste problem through the implementation of the regulatory mechanism created with the passage of the Resource Conservation and Recovery Act. This Act, with its "cradle-to-grave" philosophy of tracking the movement, storage and disposal of hazardous wastes, is one of the most significant examples of social regulation that emerged during the era of "New Social Regulation."

The literature review presented in Chapter III begins with an examination of relevant works drawn from the regulation literature. Information drawn from this examination is used to guide the development of testable hypotheses; details of these hypotheses are described in Chapter IV. The
operationalization of variables used in the testing of these hypotheses is based upon the results of the second portion of the literature review, which focuses on the comparative state policy literature.
1. In 1976 the EPA estimated that changes in air and water pollution regulations accounted for approximately two-thirds of the rate at which industrial waste generation had increased between the years 1970 and 1975. See, for example, Report on H.R. 14496, House Report No. 76-7260, page 52 or Dower (1990), page 151. For an account of how government programs affect the distribution of health and environmental risks see Whipple (1985).

Examples of point source pollution include factory smokestacks, automobile tailpipes, and municipal and industrial sewer outfalls. Examples of nonpoint source pollution include asbestos from brake linings, automobile oil and worn tire fragments that are deposited on city streets and are subsequently washed into sanitary and storm sewers, and pesticides and fertilizers that drain from farms into streams or vaporize into the atmosphere.

2. "Materials balance" is a term used to identify an accounting procedure based on the fundamental physical principle that mass cannot be created or destroyed within the realm of chemical and biological reactions; however, it may change forms.


6. A thorough discussion of the wastes known to have been dumped at Love Canal may be found in Health Effects of Toxic Pollution, a Report to the U.S. Senate Committee on Environmental and Public Works (Ser.96-15). August, 1980.


8. It should be noted that the problems at Love Canal did not arise solely from faulty disposal technology. The landfill design principles employed by Hooker Chemical in the construction and operation of its landfill are not significantly different from those used in many landfills that are currently in operation. Rather, the problems were a result of "misinformation" on the part of Hooker Chemical and inadequate enforcement of post-closure safeguards on the part of the Niagara Falls Board of Education. When Hooker sold the land to the Board in April of 1953, it failed to disclose that the site
had been used as an industrial dump. Representatives of the company have claimed that they warned the Board not to engage in any construction activities of any kind at the site. Language to this effect was not included in the language of the deed to the property.

In early 1954 a construction crew doing site preparation work prior to the laying of the foundation for the new elementary school pierced the top of the clay "cap" used to cover the landfill when it was closed in 1952. Shortly thereafter they uncovered a "pit" filled with chemicals. The School Board failed to take any steps to identify these chemicals. Rather, they simply ordered the construction company to move the foundation approximately 100 feet. Unfortunately, they did nothing to restore the integrity of the clay "cap". As a result, rain water percolating through the soil began to mix with the wastes, accelerating the rate at which the wastes were transported out of the abandoned landfill.


15. U.S. Environmental Protection Agency (1980).


27. Ibid.


29. Ibid.


36. Of the twenty-six pages in the Congressional Record devoted to the actual debate on RCRA and amendments to it, fifteen are devoted to the debate on the Hatfield amendment and related bottle-bill issues. The debate over the hazardous waste portions of RCRA occupies approximately one page. See Congressional Record 122: S11061-11105, June 30, 1976.

37. It is interesting to note that these facilities, designed to separate recyclable materials such as glass, ferrous metals, paper, aluminum, and plastic from municipal wastes, and generate electricity via the combustion of other solid and liquid waste components, have not yet lived up to the promises made by their proponents. Markets for recovered materials have, overall, been weak. Furthermore, the technology for burning municipal waste has proven to be unreliable.


40. 40 CFR § 261.30
41. The definition of "hazardous waste" put forth in RCRA is as follows: "...a solid waste, or 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 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 mismanaged." [Resource Conservation and Recovery Act, § 1004(5), 42 U.S.C. 6903(5).]

42. This is an example of a "risk-based" definitional or decision making process.


44. 40 C.F.R., § 261.2(e).

45. 40 C.F.R. § 261.2(e).

46. 40 C.F.R. § 261.2(e).

47. 40 C.F.R. § 260.22.


49. 40 C.F.R. § 261.5. This definition was subsequently changed in 1984 with the passage of the RCRA Amendments. The Amendments reduced the minimum volume threshold from 1,000 kilograms to 100 kilograms. While the regulations covering sites generating from 100 to 1,000 kilograms differ from those governing operations at larger sites, they still must be sufficient to "protect human health and the environment."


53. See U.S. Environmental Protection Agency (1980).


55. Carter also proposed the elimination of solid waste planning grants by fiscal year (FY) 1984. This proposal was quietly dropped, however, when public demands for action on hazardous waste problems increased as a result of the events at Love Canal.
58. See Florio (1986).
61. Ibid.
62. Ibid.

63. Congress again addressed the issue of volume reduction when it passed the Pollution Prevention Act of 1990. Implementation of this legislation is not included in this analysis.

64. 42 U.S.C 6921.

65. There are two classes of alternatives to land disposal: waste elimination and reduction strategies; and alternative disposal technologies. Waste elimination and reduction strategies are based on the premise that the easiest, and least expensive, means of complying with hazardous waste regulations is to reduce, if not eliminate, the volume of wastes that must be disposed of. Options under such a strategy include: source segregation and separation, process modification, raw material substitution, recovery and recycling; treatment for volume reduction; and treatment for hazard reduction or elimination. If the application of these options is not feasible, there is the option of using alternative disposal technologies. The most important of these technologies are incineration and placement in secured vaults above or below ground level.


70. Ibid.

73. Ibid.
CHAPTER III
REVIEW OF RELEVANT LITERATURE

Introduction

The evaluation of opposing positions regarding the dynamics of social regulation requires the development of a set of testable hypotheses. That process begins in this chapter with a survey of the regulation literature. The survey describes competing perspectives regarding the roles played by the economic phenomenon of market failure, groups acting in the name of the public interest, and private interests in the formulation and implementation of regulatory policies.

As noted in Chapter I, extant analyses of the politics of regulation which might provide direction as to the types of variables that ought to be included in this research (as well as to how those variables might be constructed) tend to be case studies of regulation in specific policy settings. While these studies are useful in that they provide clues as to productive strategies for the study of regulatory origin and implementation, their value with regard to the selection of appropriate variables is rather limited. The second section of this literature review therefore focuses on the
comparative state politics literature.

The Regulation Literature

Much has been written about the role of regulation in American society. McCraw (1975) noted that regulation "in America has been a multifunctional pursuit" serving a number of diverse and sometimes contradictory, economic, political, and cultural ends. This "multifunctional" image is reflected in the terms that have been used to classify theories of regulation. A reading of the history of theories of regulation reveals that a host of labels have been used to describe the creation of regulatory structures and the formulation and implementation of regulatory policies. Examples include such terms as "economic", "functional", "consumer protection", "producer protection", "utility-maximizing", and "bureaucratic behavior." Upon reflection, however, it becomes evident that the theories associated with these various labels all share a common characteristic in that they are all in fact theories of "interest". A central feature of these theories is the assumption that regulation is the governmental instrument through which interest satisfaction or attainment may best be achieved. It is therefore appropriate to organize this examination on the basis of a distinction between "public interest" and "private interest" theories of regulation."
"Public Interest" Regulation: Regulation as a Response to Market Failure

Bonbright et al. (1988) described public interest theories of regulation as being founded upon the assumption that regulatory policies are formulated and implemented in order to achieve one or more "public-interest-related objectives." This hardly constitutes an exhaustive definition. As McCraw (1975) and others have noted, the concept of "the public interest" has assumed a number of different forms over time. Mitnick (1980) described five variations on the concept, including: (1) a balancing process, in which the public interest is the output of a process in which selected aspects of several different interests are simultaneously satisfied; (2) compromise, in which competing parties are forced to surrender a part of their respective interests so that the overall outcome is in "the public interest"; (3) a series of trade-offs, in which interests subject to regulation are compelled to provide some costly service or other benefit judged to be in the public interest, in exchange for which they are granted specific private benefits; (4) an overriding national or social goal which is held to be in the public interest and to supersede private interests; and (5) the preferences of a specific entity, whether that entity be a person, a group, an organization, or a system.

As noted in Chapter I, economists have long recognized
that under certain circumstances the private market will fail to efficiently allocate scarce resources. Depending upon their distribution and magnitude the amelioration of costs arising from cases of market failure may come to assume the form of an "overriding national or social goal", thus providing a theoretical basis for government intervention in the operation of the private market.

During the nineteenth century the specter of market failure provided the motivation for political activity that resulted in the establishment of regulatory controls over the activities of the banking, transportation, and other "public utility" industries. Regulation of the banks was needed, proponents argued, because those institutions combined enormous economic power with a proclivity toward corruption; regulation of banking practices would protect the interests of potential victims. In the case of industries which were characterized as having a tendency toward natural monopoly (e.g., the railroads), regulation was seen as a replacement for the disciplining effect of competition. Later, during the twentieth century, the need to impose discipline upon the market in order to prevent the destabilizing effects of chaotic competition was offered as justification for the regulation of the airlines and radio and television broadcasting industries.

Many of the forerunners of modern public interest theories of regulation, particularly those which emerged
during the 1930s and 1940s, pursued what might be called a "structural" or legalistic approach to describing government intervention in the marketplace, an approach in which the connection between regulatory actions taken to correct instances of market failure and the public interest was implicit. These early efforts often described the regulatory process as a deliberate, carefully organized attempt to correct instances of market failure in which decision making proceeded in an incremental fashion.

Cushman's (1941) study of the origins of federal regulatory agencies, The Independent Regulatory Commissions, is often described as the standard work of this era. Cushman described these agencies as having been created by Congress for the purpose of solving major economic problems arising either from repeated abuses by industrial interests or from the failure of the private sector to achieve goals that were perceived to be in the nation's interest. This perspective is reflected in Cushman's description of the origins of the Interstate Commerce Commission (ICC):

... it is clearly recognized that the important problem of federal railroad regulation would have to be solved by trial and error. A major purpose in creating a commission was to provide machinery to secure the accurate and expert information necessary to the solution of that problem. Congress felt it wise to move slowly.\textsuperscript{11}

Later, while comparing the goals and operations of the
ICC with those of another regulatory body, the Federal Reserve Board, Cushman repeated this theme of "regulation as problem solving" when he wrote that:

. . . the two bodies bore only a very superficial resemblance to each other, but one thing they had in common. . . . Each was created in order that government control of a great economic problem could be made effective.12

The model of regulatory origin offered by Blachly and Oatman (1940) resembled Cushman's in that it too highlighted the notion that regulation is a deliberate response to economic problems:

. . . the administrative structure is not a haphazard assemblage of miscellaneous parts. It is a system, and an organic system, in which specialized organs perform different functions. Further evolution, however, can improve the system.13

An interesting feature of the conception of "the public interest" advanced by Blachly and Oatman is the emphasis placed on the need to balance the promotion of administrative efficiency with the protection of the rights of those who were subject to regulatory control:

Because the regulatory process might interfere with personal or property rights by commanding or compelling something to be done or by refusing to permit something to be done, special forms of action were developed which (1) enable the government to function in its sublegislative and subjudicial capacity, and (2) at the same time
guarantee that as it does so, individual rights shall be protected.\textsuperscript{14}

More recent examples of market failure theories of regulation do not evince this level of concern for the rights of regulated parties. However, these examples typically pursue an approach which specifically acknowledges the connection between the concept of "the public interest" and the origin of regulatory policies. Williams and Matheny's (1983) description of the origins of social regulation is typical of this approach:

For our purpose, we use the term to refer to the effects of private market operations on the general population over and above the effects that are priced by market transactions. Thus, we are assuming that the functioning of the market creates two sets of costs and benefits, and therefore interests are created. One set of costs and benefits that is priced by the market is imposed upon those that participate in private transactions and thus constitute private interests. A second set of costs and benefits (some of which may, in principle, be accurately priced, others not) falls on some portion of the wider population not participating in private transactions, and these people constitute the public interest. Regulation is usually undertaken to insure that this second set of costs and benefits is taken into account.\textsuperscript{15}

While recent market failure theories may no longer emphasize the structural approach which characterized their predecessors, they still present an image of regulation as a "deliberate, carefully organized attempt to correct
instances of market failure" and assume, either implicitly or explicitly, that the regulatory process is (or can be) guided by formal analysis of the distribution and severity of market failure.\textsuperscript{16}

\textbf{Variations on the Theme of Market Failure as a Stimulus for Regulation}

There are two "subclasses" of market failure theories that deserve special mention. Proponents of the first of these "subclasses", the so-called "symbolic politics" theories, have argued that while the costs associated with instances of market failure do in fact serve as stimuli for the initiation of social regulation, government is inherently incapable of providing significant regulatory relief from those costs. They contend that regulators are hampered by a combination of factors which render their responses to externalities ineffective. According to this perspective the level or intensity of regulatory effort is determined not by the problem(s) being addressed but by the limited financial resources available to government and private industry.

Despite these limiting factors regulatory policies are formulated because legislators feel compelled to create the appearance that they are "doing something" about whatever problem is currently on the agenda. Edelman (1964) found that because of this need to "do something", regulation
often yields symbolic (rather than substantive) relief from market failure. He also found that the private interests whose activities were apparently being restricted by regulation were in fact benefitting from its implementation. Ophuls (1977) argued that regulators often lack the administrative authority and the organizational and financial resources needed to design and implement effective regulatory systems. He also suggested that one of the most significant impediments to the provision of timely regulatory responses to instances of market failure is the very structure of our government, or what he referred to as "the procedural checks and balances built into our basically adversary system of policy making."17

Advocates of the "symbolic politics" perspective also note that government officials have periodically acknowledged that they lack the ability to regulate effectively. For example, when addressing the issue of whether or not state and local governments are capable of effectively managing water quality, the President's Council on Environmental Quality stated:

... their focus is often too narrow to cope with the broad environmental problems that cut across many jurisdictions. Agencies dealing with water pollution, for example, typically do not have jurisdiction over the geographical problem - the watersheds. Control is split, instead, among sewage districts, municipalities, and a multitude of other institutions.16
The second "subclass" of market failure theories, which proceed from what is sometimes referred to as a "political realist" perspective, is based upon the belief that while the incidence of market failure may be associated with the origin of social regulatory policies, the implementation of those policies is shaped by a combination of pressures generated by demonstrable need (i.e., demand for relief) and pressures generated by the political machinations of various classes of actors seeking to advance the causes of policies that will enhance their own interests. "Political realist" theories of regulation are based on the recognition that legislators and bureaucrats have an interest in the outcome of the policy process, and that factors such as political culture, interparty competition and bureaucratic considerations such as hierarchical integration within and among implementing institutions have a direct impact on the availability of political resources that might be used to protect those interests.\textsuperscript{19}

Proponents of "political realist" theories of regulation have repeatedly argued that many social regulatory policies are ill-designed and that the implementation of these policies produces far more damage that the activities they are designed to curb.\textsuperscript{20, 21}
Critical Reactions to Market Failure Theories of Regulation

Critics acknowledge the possibility that public interest theories of regulation are intended to be prescriptive rather than descriptive. This does not, however, exempt them from criticism. In fact, these commentators continue, such criticism is quite appropriate when one considers that justifications for legislative and judicial decisions in the regulatory area are well-nigh invariably couched in public interest rhetoric.\textsuperscript{22}

Public interest theories of regulation have been subjected to a wide range of criticisms, perhaps the most significant of which center on the phrase "the public interest" itself. Critics have argued that because a number of vague (and often conflicting) definitions have been assigned to this phrase, public interest theories of regulation are on the whole incapable of providing satisfactory explanations of the origins or subsequent characteristics of regulatory policies. In fact, these critics contend, the phrase "in the public interest" has come to mean little more than "anything the government does."

Friendly (1962) suggested that the language used to describe the goals and objectives of regulatory policies is both a reflection and a cause of the uncertainty as to what constitutes "the public interest." While phrases such as "just and reasonable rates", "reasonable and nondiscriminatory prices", and "public convenience and necessity" sound
noble, they are in fact vague to the point of being well-nigh free of content.\textsuperscript{23} It is not surprising, critics have noted, to find that the phrase "the public interest" has been used to justify a wide variety of regulatory actions, including actions motivated solely by a desire to advance specific private interests.\textsuperscript{24}

Reviewers have not limited their efforts to describing the problems arising from the rather elusive nature of the concept upon public interest theories are based. Analysts have described a number of public interest theories of regulation as being little more than "black box" models because of the absence of a plausible mechanism or process by which good intentions and demands for regulatory relief might be transformed into specific regulatory policies.\textsuperscript{25} It has been suggested that because the state cannot act for itself in seeking regulation, the absence of such a mechanism is significant.\textsuperscript{26} It signals an implicit acceptance of what Stigler described as the sole alternative to his industry influence model - that is, a model based upon the assumption that the "political process defies rational explanation: politics is an imponderable, a constantly and unpredictably shifting mixture of forces of the most diverse nature."\textsuperscript{27} In light of these criticisms, McChesney argued, the theory "that government regulates in some disinterested, 'public interest' fashion to repair market failure has crumbled."\textsuperscript{28}

Advocates of public interest theories have responded to
this criticism by noting that to claim that all public interest theories fail to incorporate a transformation mechanism is to ignore the role of agents such as entrepreneurial politicians and public interest groups - a role that has received a great deal of attention in the literature. 29

There are a number of "agency" theories which describe mechanisms by which good intentions are translated into policy. 30 This theory assumes that a wide range of social relationships in which agents "act for" or represent the interests of principals share a number of structural and procedural features, including preferences, norms, reward systems, information gathering and dissemination mechanisms, and oversight (e.g., the relationship between legislators and their constituents). 31

Principal-agent relations may be formed for a number of reasons. For example, principals may acquire the services of agents when they (principals) lack the expertise needed to perform some task, or when the costs of performing that task make it impractical for the principal to perform it directly. Principals may also establish a relationship with agents when they are confronted with a problem which requires some form of collective action. 32 Regardless of which of these conditions applies, the formation of principal-agent relationships as described by the theory of agency provides a theoretic basis for understanding the role played
by public interest groups in the politics of social regulation.

The Role of Agents in Theories of Regulation: Public Interest Groups

The historical roots of the strategy of describing policy formulation and output in terms of the activities of public interest groups can be traced to the group-oriented model proposed by Bentley (1908), which described government as a process shaped by interested groups and their interactions. In Bentley's conception of politics the group is determinant:

When the groups are adequately stated, everything is stated. When I say everything I mean everything. . . . We shall have to get hold of political institutions, legislatures, courts, executive officers, and get them stated as groups, and in terms of other groups.33

Authors such as Fainsod (1940) and Fainsod and Gordon (1941) modified this image by incorporating a role for the state in the formulation of solutions to market failures. Fainsod (1940) wrote that regulation is a process that can be understood in terms of (1) the conditioning factors which make up the institutional context of regulation, (2) the parties of interest who are concerned with the character of regulation, and (3) the actual political instruments which provide the pattern of operative controls.34

The "conditioning factors" Fainsod referred to include
institutional, economic, and technological factors which establish the context in which interested parties (including regulators) operate. Fainsod wrote that these factors could properly be called "institutional because they contribute elements of continuity, stability, and even rigidity to the regulatory process." Fainsod and Gordon (1941) echoed the theme of "regulation as solution to problems created by business" when they noted that such regulation is:

a series of empirical adjustments to felt abuses . . . initiated by particular groups to deal with specific evils as they arose, rather than inspired by any general philosophy of governmental control.

Truman (1971) argued that the emergence of interest groups could be understood as a result of increasing societal specialization and complexity, and as a response to needs arising from economic "disturbances" and "dislocations." This image meshes nicely with conditions described by the theory of agency as leading to the creation of principal-agent relationships. Truman's work may be seen as a precursor of a theory of agency. His description of the origin of interest groups indicates he recognized that their potential for impacting the policy process resides in the resources (e.g., knowledge) at their command. He did not, however, provide clear explanations of the processes by which groups are formed or how groups are able to maintain themselves over time.

The literature reflects three distinct perspectives
regarding the role of public interest groups in the regulat-
tory process. The first of these, "public interest group
dominance", suggests that once groups operating in the name
of large latent groups are organized around an issue they
will exert significant influence over the regulation pro-
cess.\footnote{37} Ingram (1978) argued that because the negative
externalities arising from industrial activity are highly
visible at the state and local levels, the mobilization of
environmental groups is much easier at these levels than is
the case at the national level. As a result these groups
have become extremely effective at the state level.

Proponents of the second perspective, "limited public
interest group influence", argue that while public interest
groups may occasionally be able to force the passage of
regulatory legislation, a combination of two factors often
ensures that this legislation has little impact. First, the
passage of regulatory legislation does not guarantee the
provision of adequate funding.\footnote{38} Second, once regulatory
legislation is passed, public interest groups often find it
difficult to marshall the resources needed to maintain a
presence in the regulatory process that is sufficient to
ensure successful implementation. Regulated industries, on
the other hand, are quite capable of gathering and coordi-
nating the use of those resources.\footnote{39}

The third position regarding the influence of public
interest groups relative to that of industry, the so-called
"countervailing power" perspective, suggests that when public interest groups confront the interests of industry the results are usually a draw. This perspective, described by Bernstein (1969), is based on the assumption that the involvement of public interest groups in a particular policy area is triggered by the appearance of negative externalities, and that these public interest groups provide an effective counter to the influence of industry. The result is a regulatory environment in which gains made by public interest groups are, on average, balanced by similar gains (i.e., losses that are avoided) on the part of industry.

Critical Reactions to Public Interest Group Theories

Public interest group theorists have often provided useful information regarding the types and characteristics of public interest groups, as well as the range of positions taken by such groups. They have also delineated a variety of mechanisms by which groups may be integrated into the policy process. However public interest group theories have failed to answer a number of important questions. For example, these theories provide unsatisfactory explanations of the dynamics of regulatory controversy. Critics contend that interest group theories are based on the assumption that groups are all-pervasive and that groups will (eventually) emerge to represent well-nigh any interest. These
assumptions lead to two difficulties. First, if groups are in fact so pervasive, why is it that some issues never appear on the policy agenda, or languish in obscurity on that agenda for years without any action being taken? Second, what characteristics distinguish groups that are successful at getting their particular cause placed on the policy agenda from groups that fail to do so?

Critics have also turned their sights on assumptions regarding the motivation for actions taken in the name of the public interest. Theories which explain the origin and implementation of regulation as a product of the activities of agents for the public interest have been described as unrealistic and "analytically embarrassing" in light of the predisposition of most people to pursue their self-interest at the expense of "other" interests.

The most frequently-cited criticism of interest group theories of regulation (from a theoretic perspective) is derived from the work of Olson (1965). Olson argued that interest group theories are flawed because they fail to account for the confounding effects of what he referred to as the "logic of collective action." This failure, Olson suggested, arises from the fact that interest group theories assume that individuals decide to join groups in order to pursue "collective goods" (goods which benefit members and nonmembers alike). Why, Olson asked, would a rational, self-interested individual invest his or her time and energy
in group activities if they knew they would enjoy the benefits resulting from that group's success regardless of whether or not they had contributed to that success? Instead of joining these rational individuals would simply opt to be "free-riders":

(Interest group theories) generally assume that such groups will act to defend or advance their group interests, and take it for granted that the individuals in these groups must also be concerned about their individual economic interests. But if the individuals in any large group are interested in their own welfare, they will not voluntarily make any sacrifices to help their group attain its political (public or collective) objectives.

Private Interest Theories of Regulation: The Influence of Industry

It is fair to say that the influence of industrial interests on the formulation and implementation of regulatory policies has received more attention in the literature than any other factor. The regulation literature presents three distinct perspectives on the ability of industrial interests to influence the formulation and implementation of regulatory policies ("industry dominance", "limited industry influence" and "countervailing power"); descriptions of the first two if these positions follow.

The first of these, the so-called "industry dominance" perspective, is based upon the assumption that industries subject to regulation are likely to be well-organized and to
have at their disposal an array of resources that may be used to dominate the regulatory process.44

George Stigler is arguably the most influential of the "industry dominance" theorists.45 His empirical studies of the regulation of motor carriers and of occupational licensing resulted in the conclusion that economic regulation is in fact "purchased" from the government by the regulated industries for their own benefit, not that of the public.46

The central theme of Stigler's work, which represented a dramatic departure from the traditional "public interest" view of regulation which had characterized economics, is that:

...political systems are rationally devised and rationally employed, which is to say that they are appropriate instruments for the fulfillment of desires of members of the society. This is not to say that the state will serve any person's concept of the public interest; indeed the problem of regulation is the problem of discovering when and why an industry (or other group of like-minded people) is able to use the state for its purposes, or is singled out by the state to be used for alien purposes.47

Operating from this assumption that political systems are "rationally employed" and the observation that regulations often fail to correct market failure, Stigler deduced that the goals of regulation may be quite different from those prescribed by public interest theories. In order to
determine the nature of those goals he examined the benefits and costs that confront industry, regulators, and the public as they seek to influence the course of regulation. Stigler assumed that these three groups weigh anticipated benefits and costs in a rational manner, and that their analysis of benefits and costs takes place within the context of a political framework in which success is determined by the ability to secure and maintain a voting majority.

Stigler recognized that while the outcome of the struggle over any particular regulatory policy depends upon the relative interests and forces in question, over time these struggles will be dominated by groups have relatively large per capita stakes in the outcome. This led to the conclusion that "producer interest tends to prevail over the consumer interest." Stigler’s capture theory assumes that it will be so costly for a large group (with a small per capita stake) to determine where its interest lies and make its political influence felt that the payoff will not be worth its while. If, on the other hand, it is relatively inexpensive for the members of a large group to gauge the impacts of regulation on its well-being, and if the threat of the ballot box (either directly or indirectly) easily attracts the attentions of regulators, then the largest group may dominate the regulatory process.

Posner’s (1974) analysis of Stigler’s capture theory of regulation began with the observation that Stigler had
incorrectly characterized many regulatory policies as "failures." Instead, Posner argued, what Stigler and other economists viewed as inefficiencies should be recognized as policy outputs supplied by regulators in response to the demands of interest groups.49

Posner then attempted to improve upon Stigler's theory by through the application of a modified version of the economic theory of cartels. Cartels offer benefits to their members through the imposition of shared rules of behavior. In return for agreeing to abide by those rules, cartel members enjoy many benefits that are similar to those available through regulation (e.g., protection from potential competitors). Posner suggested that the choice between forming a cartel and securing protective regulation is a determined by group size. The organizational costs of organizing small groups into cartels are relatively low; however, small groups are often unable to command the political resources (votes) needed to secure regulation. On the other hand, the efforts of large groups (which do have sufficient political resources at their disposal) to form cartels are often hindered by substantial organizational costs, not the least of which are costs associated with free rider problems.50

Posner also extended this modified cartel theory to include the customers of industry groups. Industries and their clients would, according to Posner, combine their
efforts in order to secure mutually beneficial regulation. Under such circumstances regulation may be seen as:

... the product of coalitions between the regulated industry and customer groups, the former obtaining some monopoly profits from regulation, the latter obtaining lower prices (or better service) than they would in an unorganized market - all at the expense of unorganized, mostly consumer, groups.\textsuperscript{51}

Jordan (1972) also argued that regulation tends to favor industry interests over the public interest. He insisted that once market structures are taken into account, producer protection hypotheses appear to do a better job of describing historical experience than do consumer protection ("a forced and tortuous way to accommodate existing evidence") or "no-effect" hypotheses.\textsuperscript{52}

Lindblom (1977, 1982) argued that in addition to any advantages they may enjoy as a result of superior organization and other resources, industries are able to dominate the politics of regulation because market-oriented societies are inherently resistant to change and to government interference in the operation of the private sector. He contended that politicians are reluctant, or in some cases unable, to seriously affect market outcomes because they believe that attempts to modify or regulate the behavior of the private market result in sluggish economic performance and higher unemployment, and that their performance is judged to a great extent on the basis of the economy's performance.

A second, less subtle, set of industry dominance
theories have been advanced by authors who have focused upon the ability of business interests to influence government officials. These authors suggest that as a result of business leaders' access to decision makers (and the pro-business ideology of many of those decision makers) the costs to business interests arising from regulatory policy decisions are minimized. The ability of business to influence regulatory policy should be especially pronounced at the state level, according to industry dominance theorists, because of the strong bargaining position that results from the relatively low costs of relocation. The mobility of capital is seen as an inducement to state governments to devote effort to providing a favorable business climate. While investigators such as Kieschnick (1981) and Wheat (1986) have consistently found that the influence of such variables as the costs of government and other political factors have been less significant in firms' location decisions than factors such as characteristics of the labor force and the availability of markets, it is also true that costs arising from the implementation of state and local policies may affect the marginal cost of production for firms at a given location. Once a firm has made the decision to locate in a given region on the basis of economic considerations (such as market access and labor, energy and transportation costs), the costs of complying with regulations may become an important factor in the choice
among alternate jurisdictions within that region.\textsuperscript{56} States may therefore choose to manipulate the marginal costs of regulation in order to make themselves more attractive than competing jurisdictions which have comparable economic costs of production.\textsuperscript{57}

The capture model has dominated economic studies of regulation since the early 1940s.\textsuperscript{58} From the perspective of political scientists, however, the notion of capture was hardly innovative. Herring (1936), Huntington (1952), Bernstein (1955) and Kolko (1965) had documented instances of regulatory capture prior to the publication of Stigler's capture theory.

The second perspective, referred to as "limited industry influence", is based upon the belief that industries that are subject to regulation lack the ability to consistently prevent the formulation and implementation of social regulatory policies.\textsuperscript{59} At the same time political entrepreneurs (such as Ralph Nader) are able to periodically mobilize latent groups and generate support for the creation of such regulation. Advocates of limited industry influence theories of regulation argue that the difficulties inherent in organizing these latent groups are overcome through the use of dramatic claims about the dangers posed by the impacts of market failure. These claims generate demands for regulatory relief, which in turn are translated into stringent regulations.
Critical Reactions to Private Interest Theories

Stigler's industry capture theory suffers from a number of flaws, not the least of which may be found in its treatment of the class of actors referred to as "regulators." Stigler does not differentiate between legislators who participate in the regulatory process and regulatory bureaucrats. Instead, the term "regulators" appears to refer to some hybridized combination of legislator and bureaucrat who both set policy (in exchange for votes) and enforce the resulting regulations.

It is difficult to describe Stigler's theory in terms of a model of the policy process because he ignores many stages of that process. He glosses over details of the agenda-building process, pays little attention to the decision making stage of the policy process, and ignores the implementation process. It has been suggested that in this regard Stigler seems to have followed the lead of earlier public interest theories of regulation and assumed that implementation "takes care of itself." \(^6\)

Posner observed that Stigler's capture theory failed to explain why industries are able to capture some agencies while being unable to capture others. While he attempted to present a case for private interest theories, Posner recognized that there was still much work to be done:

The economic theory is still so spongy that virtually any observations can be reconciled with it. . . . At best it is a list of criteria relevant to predicting
whether an industry will obtain favorable legislation. It is not a coherent theory yielding unambiguous and therefore testable hypotheses.61

Studies which have incorporated Stigler's theory have failed to uncover evidence that it provides an accurate model of the dynamics of the regulatory process. For example, Ippolito (1979), who studied regulation of the automobile industry in an effort to operationalize Stigler's theory of regulation of the automobile insurance industry, wrote that his results failed to support Stigler's model.

The accuracy of Stigler's model has also been called into question on the basis of studies which have examined the distribution of benefits realized as a result of regulatory decisions. For example, Sabatier (1975) found that industries did not benefit as a result of the implementation of air quality regulations in Chicago. Kelman (1980) noted that the creation of the Occupational Safety and Health Administration was accomplished despite the opposition of manufacturers. Smith's (1982) analysis of liquor regulation revealed that consumer interests were far more significant than was predicted on the basis of the Stigler model. Carron (1983) found that contrary to what would have been anticipated on the basis of Stigler's prediction that organized producer interests would prevail over the interests of relatively unorganized consumers, the deregulation of the financial industry was in fact quite beneficial to
consumers. Alexis's (1983) study of the deregulation of the surface transportation industry and Kahn's (1983) examination of the deregulation of air transportation revealed that consumers, whose interests were rarely represented before the appropriate agencies, realized benefits far in excess of those that would have been anticipated in Stigler's model. Appleton (1985) found that producer interests played no significant role (positively or negatively) in the origin of consumer protection regulation.

Theories of Regulation: A Synopsis

The debate over the dynamics of social regulation is defined in terms of conflicting positions regarding the relative importance of three theoretical sets of determinants of regulatory policy. Market failure theories state that regulatory origin and implementation effort can be explained in terms of the occurrence of market failure and the magnitude and distribution of resulting externalities or third party costs. The creation and implementation of regulatory programs is described as an attempt by the state to ameliorate those costs. Interest group theories describe regulatory origin and implementation in terms of the actions taken by agents acting in the name of the protecting the public interest. Finally, private interest theories of regulation describe a system in which industrial interests are able to capture the regulatory process in order to
secure benefits for themselves.

The Comparative State Policy Literature

The regulation literature provides a set of concepts upon which to base the development of testable hypotheses that will enable us to compare and contrast these three theoretic perspectives in terms of their relative ability to describe and predict state decisions regarding the management of hazardous wastes under RCRA (i.e., decisions regarding primacy and implementation effort). It does not, however, provide a suitable basis for the selection of appropriate variables. The balance of this literature review therefore focuses on the comparative state policy literature.

State Political and Socioeconomic Characteristics and the Implementation of Regulatory Policies

The comparative study of state policy outputs grew out of attempts to relate those outputs to characteristics of state political systems (e.g., interparty competition, voter turnout, and the apportionment of state legislatures) considered important from a pluralist perspective. The hypothesis underlying this work was that states more closely conforming to the pluralist ideal of democratic structure would be more attentive to the health, welfare, and educational needs of the economically less powerful. For example, states with high interparty competition, high voter
turnout, and legislatures apportioned according to population were expected to provide higher levels of health care, educational services, and welfare payments to lower income groups. This expectation was based on the assumption that these political characteristics should allow the economically disadvantaged to have an impact on the policy making process.63

Critics of this pluralist approach have argued that state economic characteristics have a greater impact on state policy outputs than do political characteristics. Cnudde and McCrone (1969) noted in their response to these critics that advocates of economic explanations of policy outputs were guilty of attempting to apply the pluralist perspective as articulated by Key (1956) and the explanatory variables derived from it to policy areas to which it was not intended to apply. Their admonition against the use of an explanatory framework intended to examine variation in redistributive policies in the study of other policy areas without significant alteration was supported by a study published by Sharkansky and Hofferbert (1969). They found that political variables were effective in explaining variations in state welfare and education (i.e., redistributive) policies, while economic variables were better in explaining variation in state natural resources and highway (i.e., distributive) policies.64

Lester (1980) lent support to the pluralist perspective
when he argued that the dominance of socioeconomic variables in multivariate analyses (at the expense of political indicators) of policy at the state level is more of a measurement artifact than a reflection of the actual dynamics of the policy process. He based this conclusion on findings which indicated that socioeconomic factors appear to be more important in decisions regarding the level of state spending than they are in determining the types of policies formulated and implemented.

**Political Characteristics: Political Culture and "The Public Interest"**

The debate over the dynamics of social regulation focuses on fundamental questions regarding the relationship between industry and the government and the role of "the public interest" in the origin and implementation of public policy. The concept of political culture, which encompasses fundamental beliefs regarding the appropriate role of government, provides us with a means of capturing the policy values which shape state regulatory decisions.

Political culture "sets the stage" for social regulation in that it defines the range of acceptable actions a government might take in imposing controls on corporate behavior in the name of the public interest. This "stage setting" function is reflected in the work of Verba (1965), Elazar (1984), and Miller (1991). Verba defined political
culture as "the system of empirical beliefs, expressive symbols, and values which defines the situation in which political action takes place." Elazar (1984) emphasized the connection between political culture and the states' historical experiences and traditions about what constitutes the proper realm of governmental action. Finally, Miller (1991) envisioned political culture as "an embodiment of the conflict between visions of civil society [and its political system] as marketplace versus that of a commonwealth."

Elazar (1984) identified three dominant subcultures, individualistic, moralistic, and traditionalistic, that are tied to certain regions of the country as a result of the historical migration and settlement patterns of ethnic and religious groups. As described by Elazar, the individualistic subculture emphasizes the notion of the political system as a marketplace; political competition in this marketplace tends to highly partisan and oriented toward capturing the spoils of office. Because "the public interest" is defined in terms of the preferences of those who are able to control the political marketplace, there is little inclination to place controls upon business activities that might impinge upon third parties.

The moralistic subculture emphasizes the role of an active government in the quest for "the public interest." In this subculture citizens bear a responsibility for participating in politics, and political competition tends
to be issue-oriented. Parties and interest groups actively advance their conception of "the public interest." Regulatory policies (both social and economic) are seen as legitimate applications of the coercive power of government. Sharkansky and Hofferbert (1969) and Johnson (1976) demonstrated that states in which the moralistic political subculture predominates are more likely to engage in policy innovation and implement more progressive policies, including regulatory policies.

The traditionalistic subculture reflects an older, precommercial attitude toward politics "that accepts a substantially hierarchical society as part of the ordered nature of things, authorizing and expecting those at the top of the social structure to take a special and dominant role in government." Political competition tends to be limited in scope and centers on personal factions rather than parties or interest groups. Government is seen as preserver of the "old social order", with political power residing in the hands of established elites. Government’s role in communal affairs is dominated by members of those elites; the job of government is to create favorable business climate in which the costs of doing business, including the costs of complying with regulations, are kept low. Regulation is therefore kept to a minimum.

Elazar’s conception of political culture has typically been operationalized using Sharkansky’s (1969) additive
scale, which ranges from 1 (pure moralistic) to 9 (pure traditionalistic). Johnson (1976) argued that despite its widespread use the Sharkansky typology is not without its faults, perhaps the most significant of which is its unidimensional nature. Johnson noted that a multidimensional concept such as political culture cannot be accurately described on a unidimensional scale. The consequences of "force fitting" this scale onto the concept are particularly telling in cases involving the individualistic subculture, which occupies the midpoint of Sharkansky's scale. Johnson's alternative to the Sharkansky typology was a scale based on state religious affiliation data. Johnson cautioned that use of these data should not be taken as a suggestion of causal connections between specific religious beliefs and political values. Rather, religious affiliation was to be viewed simply as a "flag" or indicator for the various political subcultures. Johnson found significant correlations in the expected directions for several variables, including interparty competition, and state policy innovation.

Political culture, as previously noted, "sets the stage" for policy making in general, and regulation in particular, by defining the range of acceptable actions a government may take in imposing limits upon the activities of industry. Political culture may therefore be seen as a measure of potential support for a given policy. It tells
us little, however, about how that potential support is translated into policy. Mazmanian and Sabatier (1983) and Miles (1978) offer valuable insights into that translation process. Mazmanian and Sabatier's analysis of the relationship between systemic support (or "receptivity") for statutory objectives and policy outcomes is applicable to an investigation of regulatory origin and implementation effort. The likelihood that a state will opt to (a) participate in and (b) make meaningful commitments of scarce resources to the implementation of a new policy is a function of the extent to which the goals of that policy coincide with the goals of existing policies. Miles' Law ("where one stands on an issue depends on where one sits") provides a concise description of the process by which new policies come to be viewed as "proper" components of the political universe. Miles (1978) and others recognized that over time bureaucrats often assume the role of advocate for the programs they administer, and can be expected to dedicate their efforts to securing that program's future.

Lester and Bowman (1989) used two measures of systemic support for environmental protection. The first of these, an indicator of partisan control of state legislatures, was based on the assumption that environmental protection policies typically enjoy greater support from Democrats than from Republicans. (The issue of partisanship is discussed in the next section of this chapter.) The second measure
indicated whether or not state leaders mentioned specific environmental problems during a given period of time. The utility of such a measure could be criticized on the grounds that it measures little more than the willingness of state leaders to press environmental "hot buttons" in order to meet their own needs.

Duerksen's (1983) index of state environmental protection activity provides a more satisfactory measure of support for environmental regulation. Because it reflects the history of state activity in a wide range of environmental policy areas Duerksen's index gives us a more comprehensive image of sovereign support than does Lester and Bowman's variable.

Political Characteristics: The Role of Political Parties and Bureaucracy

As noted earlier, "political realist" theories of regulation highlight the importance of political considerations in the policy process. These theories suggest that an accurate model of the process of social regulation and the origin of social regulatory programs, and the effort with which they are implemented, should be positively correlated with measures of the extent to which those elites favor the creation and implementation of social regulation.

Although its importance is generally not emphasized in the environmental policy literature, the role of interparty
competition has often been acknowledged in comparative state research. A number of authors have suggested that competition between the two parties for control of the legislature, not domination by one party or the other, is what generates policy activity.\textsuperscript{70} The level of policy outputs should be lower in states with legislatures dominated by a single party than in states where competition between the two parties for control of the legislature is higher.

Associated with the issue of interparty competition for control versus party dominance is the question of whether or not there are significant differences between Democrats and Republicans regarding environmental policy preferences. Lester (1980) identified two distinct perspectives regarding the influence of party on responses to issues related to the environment. The first of these perspectives, which describes environmental policies as "consensus issues" that transcend the partisan differences commonly associated with most political issues, represented an attempt to explain differences in environmental policy preferences in terms of socioeconomic factors such as rural versus urban conflicts and patterns of income distribution.\textsuperscript{71} Lester dismissed this perspective on the basis of a series of studies which support the competing perspective, namely that there are important reasons to expect significant partisan differences on environmental issues.\textsuperscript{72}

The organizational context within which regulators
operate is a significant feature of the regulatory environment. The degree of hierarchical coordination within and among agencies is described as a limiting factor in the implementation of conjoint regulatory policies such as RCRA. Bureaucratic consolidation, the assembly of all bureaucratic functions associated with a particular policy area within one umbrella agency, is a management strategy designed to maximize that coordination. Game (1979) referred to these consolidated agencies as "superagencies." He argued that consolidation prevents the implementation of policies from being sidetracked because of the deleterious effects of fragmentation of authority, and has the added benefit of placing all the available expertise in a policy area within one organization. Consolidation should therefore have a positive effect on the skill and commitment of the personnel charged with implementing a given policy. Game's contention is supported by the results of Kramer's (1983) case study of hazardous waste management in Texas, a state in which responsibility is divided among four agencies.

Political Characteristics: The Role of Public and Private Interest Groups

The policymaking process portrayed in interest group theories of regulation is one characterized by persistent struggles between opposing groups. Explaining variations in
regulatory policies among the states therefore involves describing the relative strength of the competing groups.

The ability of industry and private interest groups to influence the policy making process should be a function of the magnitude of the political resources they are able to control. Although a number of indicators of industry resources have been used, the indicators that are of interest in this research setting follow the example set by Stigler (1971). Stigler argued that size is a key industrial resource. Large industries are able to draw upon important political resources (e.g., potential votes and campaign contributions) not available to smaller firms. Because larger firms are more likely to be important to a given state's economy than smaller firms, state leaders may view them not as potential objects of regulation but as valuable economic resources. Stigler used two indicators of industry size - measures which captured employment levels and sales or revenues raised. He also relied on measures of industry structure to capture the potential for dominance of a given industry by larger firms. Stigler's influence is reflected in subsequent studies such as those by Meier (1987), who used the number of individual firms within each state and employment and average sales figures in a study of state consumer protection laws, and Lester (1980) and Lester and Bowman, who measured industry influence at the state level in terms of the proportion of each state's total payroll
that could be attributed to employment in the industrial sector.

Measuring public interest group influence at the state level is more difficult than measuring industry influence. Groups that are active in some states may not have organized chapters present in other states. These groups often lead an ephemeral existence, coming into existence because of a single issue and then disappearing. In addition to measuring public interest group influence in terms of membership figures, Meier (1987) also constructed a surrogate measure of influence which took into account the backgrounds of activists working to promote the public interest. The construction of this surrogate measure reflected the influence of Truman (1951) and Stigler (1971). Truman argued that since activists may be found in all fifty states, mobilization of these groups is probably a product of contact between individuals sharing similar views. Stigler sought to refine this image, noting that the likelihood of contact is maximized in an urban setting.

Morehouse (1981) developed a classification scheme, based on her reading of the state politics literature, which describes the states in terms of the relative strength of their respective interest group systems. Although Morehouse cautioned that her strength rankings were estimates "based on judicious consideration of the available evidence", there is evidence that her categorization is of some value. For
example, Zeigler (1983) demonstrated that Morehouse's estimates of interest group strength scores were strongly associated with measures of economic and social complexity.77

Policy Outputs

The issue of how state policy outputs ought to be measured has been a source of no small amount of controversy in the literature.78 Early studies focused primarily on fiscal measures of state policy activity, usually in the form of state spending per capita. While measures of fiscal output offer certain advantages, their use has been criticized on theoretical grounds as providing an overly narrow operationalization of policy activity.79 For example, Sharkansky (1970) demonstrated that the actual level of services rendered by states for a specific amount of money is related to administrative characteristics of the states' service delivery mechanisms. It has also been argued that measures of economic output tend to bias comparative analyses in favor of measures of economic input.80

Inspired by Walker's (1969) landmark study, a subfield of comparative state policy analysis focusing on the diffusion of innovations among the states emerged. This diffusion literature departed totally from the practice of using fiscal indicators as measures of state policy activity. Instead, a number of measures, such as the length of time a policy has been in effect or the number of years separating
the time of adoption in the initiating state from adoption in other states, were employed.81

Two dependent variables, measuring the presence or absence of primacy and the level of implementation effort respectively, will be used in this analysis. The strategy used in the construction of these multiple indicators of policy activity is based on that which was employed by Thompson and Scicchitano (1985) in their study of the implementation of the Occupational Safety and Health Act of 1970. In this analysis Thompson and Scicchitano tested four theories (wealth, partisanship, group, and organizational search) in an attempt to identify factors contributing to observed state-to-state variations in participation and in what they called "implementation effort". One element of their work that is of particular relevance to this research is the argument that it is unrealistic to describe the concept of "effort" with a unidimensional variable. Their preferred alternative was to describe the concept of "effort" in terms of two distinct dimensions, each of which captured a decision by state governments. The first dimension, participation, was an indicator of individual states' decisions to participate (or not participate) in the implementation of the federal program. The second dimension, enforcement vigor, was designed to be a measure of the level of states' commitment to implementation. Information used in the construction of this dimension included: the number
of state personnel assigned to the program; the number of inspections conducted by state personnel; and the number of citations and penalties assessed. The authors found evidence of a weak relationship between Republican party control of the governor's office and a state's decision to participate, and of a slightly stronger relationship between implementation effort and indicators of state wealth and interest group strength.82

Lester and Bowman: A Synthesis

Although the authors did not describe it as an examination of the dynamics of social regulation, Lester and Bowman's (1989) study of factors affecting the formulation of state environmental policies represents an important synthesis of alternative perspectives regarding the determinants of social regulation. The value of this study arises from the use of four competing models of the implementation process, models which could easily have been drawn from the regulation literature.

The first of these models, the "technological pressures" model, is roughly analogous to the market failure theory of regulation described above in that it is based upon the assumption that the demand for hazardous waste regulations is a function of the environmental problems which accompany extensive industrialization. Environmental problems associated with the petrochemical and metallurgical
industries and increasing rates of consumption of goods and services are a dominant feature of this model, which is based on work by Jones (1976), Wenner (1976), and Sabatier (1977).

The "systems resources" model is based upon the assumption that there is a direct relationship between the resource base of a political system and the level of policy outputs generated by that system. The degree to which a government can provide its constituents with public goods and services is constrained by its economic wealth. Dye's (1966) finding that the level of a state's economic development accounts for a significant portion of the variance in policy outputs across a range of government functions, including education, welfare, and natural resource management work was particularly significant in the development of this model.

The roots of the "political demands" model are found in what may be the most common generalization in the environmental policy literature - that differences between Democrats and Republicans can be used to explain environmental policy making. The hypothesis linking support for environmental policy making with Democratic partisanship has been generally affirmed by examination of voting behavior in Congress and public opinion data.

A different pattern emerges, however, when the focus shifts from the national to the state level. For example,
Lester (1980) found that Democratic party strength is negatively related to environmental policy outputs. He suggested that this finding may well have been an artifact of the anomalous nature of the southern states, where legislatures have traditionally been dominated by Democrats who have little in common with their non-southern counterparts.

The "administrative/organizational" model focuses on administrative and legislative reforms as potential sources of variation in public policy outputs. For example, the movement for administrative reform advocated consolidation of administrative agencies into a small number of departments, organized by functions, whose heads are appointed and controlled by the governor. Such reorganization would, it was argued, help to eliminate jurisdictional overlap, jealousies, and conflicts between multiple agencies in a specific functional area. Such consolidation of the bureaucracy would also tend to increase the governor's span of control in that the chief executive would be better able to mobilize bureaucratic resources in order to meet policy objectives.

A Preview of Hypothesized Relationships

We have seen that market failure theories of regulation begin with the assumption that regulation is a policy response to the costs imposed upon society by instances of market failure. These theories suggest that the origin (or absence) of remedial regulatory policies can be predicted on
the basis of the severity of the problems generated by instances of market failure. Market failure theories also suggest that the level of regulatory response engendered by such policies will be positively related to the severity or magnitude of the problem(s) being managed. Within the context of this research we would therefore expect to find that the degree of problem severity will be a strong positive indicator for both state participation and state implementation effort.

Interest group theories of regulation begin with the same core assumption as in market failure theories - that market failure is a stimulus for the origin and implementation of social regulation. The presence of market failure, though, is seen as insufficient to explain the origins of regulation. If these theories apply we would expect to find that public interest group strength will be a strong positive determinant of both state participation and state implementation effort. The two special subclasses of market failure theories, the so-called "symbolic politics" and "political realist" theories, predict slightly different relationships. Symbolists, like market failure theorists, anticipate a strong positive association between market failure and regulatory origin. However, because of the confounding effects of resource limitations, there should only be a weak positive relation between the degree or severity of instances of market failure and implementation
effort. Political realists also acknowledge a positive association between market failure and regulation. Because of the confounding effects of intervening political factors, however, that association may or may not be as strong as in the case of market failure theories.

Two groups of theories representing alternative perspectives regarding the ability of public interest groups to affect the social regulation process have been described. The first of these groups, "public interest group dominance" theories of regulation, predict strong positive relationships between measures of interest group strength and regulatory origin and implementation effort. On the other hand, "limited public interest group influence" theories suggest that there should be no significant observable pattern of relationships between measures of group strength and regulatory origin or effort.

As in the case of public interest theories, private interest theories also fall into one of two categories. The first, "industry dominance" theories, suggest that industry influence at the state level should be a strong negative determinant of state participation in the implementation of social regulation. They also suggest that industry influence will have a strong negative impact on state implementation effort. On the other hand, "limited industry influence" theories of regulation suggest that industry influence will be a negative, albeit weak, determinant of both state
participation and implementation effort.
NOTES

1. See, for example, Meier (1988).


4. For the purposes of this research theories of regulation are classified as "public" or "private" in accordance with a typology proposed by Posner (1974). Theories are categorized on the basis of whether the creation and implementation of a given regulatory program is intended to result in the realization of the interests or goals of the public at large or in those of private or particularistic referents. This design does not address the issue of the effects of regulation upon those interests. See Stigler (1971), Posner (1974), and Abrams and Settle (1978) for a discussion of the distinctions between public interest and private interest theories of regulation.


6. The concept of "the public interest", and its forerunners, has long been associated with the regulation of business practices. See Glaeser (1957), Held (1970), and Phillips (1988) for discussions of the history of this association.


8. See Endnote 13, Chapter I.


10. These early theories are described as "structural" because of their characteristic emphasis on the legal and constitutional foundations of regulatory action, and on the formal structural and organizational issues associated with the creation and operation of regulatory agencies.

11. Cushman (1941): 64.


20. See, for example, Weidenbaum (1977) and MacAvoy (1978).

21. In order to simplify the task of differentiating among these three sets of theories the term "classic" will be used to signify those theories which describe regulation as a direct response to the appearance of externalities.


29. See, for example, Curry and Wade (1968), Ross (1973), Mitnick (1975 and 1982).

30. See Ross (1973) and Mitnick (1982).


32. Mitnick (1982) suggested that in the case of social regulation elected officials established regulatory agencies to serve as their agents in order to create the appearance of "doing something" after being confronted by demands for relief from publicized environmental and public health crises.
34. Fainsod (1940): 299.
35. Ibid.
37. See Jones (1975) and Wilson (1980).
38. See Williams and Matheny (1983).
40. See Cobb and Elder (1972) for a discussion of the concept of the "policy agenda".
42. See, for example, Bernstein (1955), Stigler (1971), Quirk (1981) and Meier (1983).
43. The countervailing power has already been described as part of the discussion of public interest group theories.
44. A similar argument may be found in the public policy literature. Ripley and Franklin (1982), for example, suggested that because they face increased costs resulting protective regulatory policies business interests will have an incentive to organize themselves in order to enhance their ability to resist the implementation of those policies. As a result, regulatory agencies cannot expect to enjoy the support and encouragement from target groups that often accompany the implementation of other policy types.
46. See Stigler (1975).
52. Jordan (1972): 175.
53. See, for example: Domhoff (1967), Dye (1979b), and Herman (1981).

54. See Bluestone and Harrison (1982).

55. See Schmener (1982).


58. One of the major economic studies to reject the then-current "public interest" model in favor of the "capture" mode was Gray (1940).


62. For comprehensive reviews of this literature see Dye (1979a), Morgan (1982), and Hansen (1983).

63. See, for example, Key (1956), Lockard (1963), and Fenton (1966).


65. Patterson (1968): 188.


69. See, for example, Weber and Shaffer (1972), Peters and Welch (1980), and Fitzpatrick and Hero (1988).

70. See, for example: Dye (1966); Hofferbert (1966); Fry and Winters (1970); and Tucker (1982).

71. See, for example, Edmunds and Leete (1973) and Ogden (1971).

72. See, for example, Dunlap and Gale (1974) and Ritt and Ostheimer (1974).

73. Downs (1986).
74. See, for example, Sabatier (1977), Sabatier and Mazmanian (1980), Lester (1980), and Kramer (1983).

75. Game (1979): 730.


77. These three measures (industrialization, economic integration, and income distribution) have been used as indicators of social and economic conditions that contribute to interest groups' ability to dominate the policy process. For a discussion of the relationship between these factors and interest group strength see Zeigler (1980).

78. Lester et al. (1983).


81. See, for example, Grey (1973), Menzel and Feller (1977), Eyestone (1977), Foster (1978), Savage (1978), and Welch and Thompson (1980).


83. See Dye (1966) and Anderson et al. (1978).

84. See, for example, Dunlap and Gale (1974).

85. For discussions regarding the link between partisanship and voting behavior with regard to environmental protection see Ritt and Ostheimer (1974); Dunlap and Gale (1974), and Kenski and Kenski (1981). See Dunlap and Van Liere (1980) for a discussion regarding the evidence found in public opinion data.
CHAPTER IV
HYPOTHESES TO BE TESTED AND VARIABLE OPERATIONALIZATION

The discussion in the preceding chapter identified three theoretic perspectives regarding the determinants of social regulation. Using that discussion as a foundation, Chapter IV is dedicated to the development of testable hypotheses regarding those determinants and the construction of appropriate variables to be used in testing those hypotheses.

Hypotheses Regarding the Determinants of Primacy and Implementation Vigor: Market Failure

"Classic" market failure theories describe regulation as a response to externalities. These theories suggest that hazardous waste management regulations will emerge as a result of the appearance of adverse impacts on human health and the environment associated with extensive industrialization, and that states which must contend with more severe environmental problems resulting from the improper management of hazardous wastes would therefore be more inclined to participate in the implementation of RCRA than would states facing less severe problems. A similar relationship between
the magnitude or intensity of problem associated with hazardous wastes and the level of effort expended in implementing hazardous waste regulations is also predicted. The two hypotheses presented below offer an opportunity to test these predictions.

H1. The severity of hazardous waste problems will be a strong positive predictor of state participation in the implementation of hazardous waste regulations under RCRA.

H2. The severity of hazardous waste problems will be a strong positive predictor of implementation effort in primacy states.

The "symbolic politics" theories described in Chapter III suggest that while origin of regulatory policies may be positively associated with the incidence of market failure, implementation effort is determined not by the magnitude or severity of market failure but by the limited resources available for the implementation of regulatory programs. Symbolic politics theories of regulation suggest that the following hypotheses ought to be included in this analysis.

H3. The magnitude of the financial resources upon which a state may draw will be a strong positive predictor of the level of implementation effort in states that have primacy.

H4. The severity of hazardous waste problems will be a positive predictor of the effort expended by states participating in the implementation of hazardous waste regulations under RCRA; however, the strength of the relationship between problem severity and effort will be lower than that between the level of resources available and implementation effort.

As noted in Chapter III, the "political realists"
subclass of market failure theories describe regulation as a product of the conjunction of a number of political factors. This research examines the potential significance of four such factors - political culture, the level of pre-existing support for policy objectives, partisanship, and bureaucratic consolidation.2

The concept of political culture is particularly relevant to an analysis of regulatory origin and implementation because it provides an efficient means of summarizing differences in attitudes regarding the role of government in society. Distinguishing among competing perspectives regarding the range of demands for policy outputs and the universe of actions government may take in order to meet those demands "sets the stage" for regulatory policies such as RCRA. Application of Elazar's conception to a "realist" theory of regulation results in the expectation that we should find the greatest level of potential support for hazardous waste regulations in states dominated by the moralistic subculture.

H5. The extent to which a state's political culture is dominated by the moralistic subculture will be a strong positive predictor of state participation in the implementation of hazardous waste regulations under RCRA.

H6. The extent to which a state's political culture is dominated by the moralistic subculture will be a strong positive predictor of the level of implementation effort in primacy states.

The role of partisanship in "political realist"
theories echoes that described by Dunlap and Gale (1974),
namely that Democrats (in general) have a greater commitment
to environmental protection in general and the implemen-
tation of RCRA hazardous waste regulations in particular.³

H7. Control of state politics by the Democratic party
will be a strong positive predictor of state
participation in the implementation of hazardous
waste regulations under RCRA.

H8. Control of state politics by the Democratic party
will be a strong positive predictor of the level of
implementation efforts in primacy states.

Studying the relationship between partisanship and
policy outputs is complicated by the anomalous character of
the southern states. Legislatures in these states have
traditionally been dominated by Democrats who ideologically
have little in common with their nonsouthern counterparts.
Southern states have also been outliers at the low end of a
number of policy output measures. In order to determine if
this is the case in the hazardous waste policy realm the
issue of implementation effort will be analyzed twice; the
first analysis will include all states which had primacy as
of January of 1988, while the second will focus specifically
on the nonsouthern primacy states.⁴

The final set of political factors to be considered are
associated with the role of the bureaucracy in the formula-
tion and implementation of regulatory policies. The first
of these, bureaucratic consolidation, is a measure of the
extent to which the authority and resources required to
enforce hazardous waste regulations under RCRA are under the control of a single agency. There is evidence in the literature to support the notion that consolidation will have a modest impact on state primacy decisions. At the same time we would expect to find, on the basis of "realist" theories, that there is a strong relationship between the consolidation and implementation effort.

H9. The level of consolidation within the bureaucracy charged with the implementation of environmental protection policies will be a weak positive predictor of state participation in the implementation of hazardous waste regulations under RCRA.

H10. The level of consolidation within the bureaucracy charged with the implementation of environmental protection policies will be a strong positive predictor of the level of implementation effort in primacy states.

Hypotheses H5 and H6 highlighted the "stage setting" aspect of the concept of political culture. Measures of political culture may be thought of as descriptors of potential popular support for a particular policy. In addition to popular support, "political realists" also point to the importance of support within the bureaucracy as a possible limiting factor in the implementation of a given policy. The concept of bureaucratic support is similar to Sabatier and Mazmanian's (1980) concept of "receptivity." Their model of the implementation process provided for the inclusion of a measure of receptivity, or the extent to which officials and agencies charged with implementing a
particular policy are committed to that policy's underlying objectives. As the authors noted, implementors must be committed to the attainment of those objectives in order to insure that effective regulations are developed and enforced in the face of resistance from affected interests.\textsuperscript{7}

The variable used as an indicator of bureaucratic values is based on Miles' Law ("where one stands on an issue depends on where one sits"). Downs (1967), Miles (1978) and Appleton (1985) recognized that bureaucrats often become advocates for the programs they administer. Support from the bureaucracy for the implementation of hazardous waste regulations should therefore be greater in states that already have a greater level of involvement in the protection of the environment.

\textbf{H11.} Indicators of state commitment to the protection and enhancement of environmental quality will be strong positive predictors of state participation in the implementation of hazardous waste regulations under RCRA.

\textbf{H12.} Indicators of state commitment to the protection and enhancement of environmental quality will be strong positive predictors of the level of implementation effort in primacy states.

\textbf{Hypotheses Regarding the Determinants of Primacy and Implementation Vigor: Public Interest Groups.}

The social regulation literature describes three possible positions regarding the influence of public interest groups: dominance, limited influence, and countervailing
power. As noted in the preceding chapter, public interest group dominance theories of regulation hold that once these groups have become active in a policy area they will be able to exert a significant influence on the regulatory process.

H13. Public interest group activity will be a strong positive predictor of state participation in the regulation of hazardous wastes under RCRA.

H14. Public interest group activity will be a strong positive predictor of the level of implementation effort in primacy states.

Limited public interest group influence theories describe a regulatory environment that is for the most part controlled by private (industry) interests, which are typically better organized and which control resources that far outstrip those commanded by public interest groups.

H15. There is no significant relationship between public interest group activity and state participation in the regulation of hazardous wastes under RCRA.

H16. There is no significant relationship between public interest group activity and the level of implementation effort in primacy states.

Countervailing power theories suggest that public interest group initiatives aimed at expanding the regulatory sphere are effectively balanced by private interest efforts aimed at minimizing regulatory impacts. This "middle ground" position suggests that public interest group will enjoy moderate levels of success in the regulatory process.

H17. Public interest group activity will be a moderate positive predictor of state participation in the regulation of hazardous wastes under RCRA.
H18. Public interest group activity will be a moderate positive predictor of the level of implementation effort in primacy states.

Hypotheses Regarding the Determinants of Primacy and Implementation Vigor: The Regulated Industries.

The social regulation literature describes three possible positions regarding the influence of regulated industries: industry dominance, limited influence, and counter-vailing power. Industry dominance theories predict that because industry interests are able to resist regulation because they command superior organizational and financial resources.

H19. Indicators of the economic strength of industries subject to regulation under RCRA will be strong negative predictors of state participation in the implementation process.

H20. Indicators of the economic strength of industries subject to regulation under RCRA will be strong negative predictors of the level of implementation effort in primacy states.

The limited influence position holds that due to the actions of entrepreneurial politicians and public interest groups (who make overly dramatic claims regarding the severity of instances of market failure) industry has little opportunity to successfully influence the regulatory process.

H21. Indicators of the economic strength of industries subject to regulation under RCRA should be weak negative predictors of state participation in the implementation process.
H22. Indicators of the economic strength of industries subject to regulation under RCRA should be weak negative predictors of the level of implementation effort in primacy states.

The balance of this chapter is devoted to the construction of independent variables used in this analysis.

**Measures of State Implementation of Social Regulation: The Dependent Variables**

Thompson and Scicchitano (1985) argued that state implementation of regulatory policies cannot be adequately described in terms of a single dimension. They noted that while analyses which have relied exclusively on a single indicator of state effort (such as expenditure data or formal policy mandates) have established a "valuable foundation", the results of these efforts have failed to generate a "well-rounded" theory of regulation. This research examines two separate dimensions of state implementation effort. In addition to a consideration of possible determinants of the presence or absence of state participation, this research also addresses the issue of factors that are related to what Thompson and Scicchitano described as "enforcement at the street level", or state-level decisions regarding how vigorously relevant regulations are to be enforced.  

This research is conducted in two phases. The goal of the first phase is to determine if it is possible to distinguish between states which have been awarded primacy and
those which have not on the basis of characteristics suggested by the theories of regulation described in Chapter III. The dependent variable (PRIMACY) was designed to capture the presence or absence of state participation in RCRA hazardous waste management programs as of January 1, 1988. This is a dichotomous variable; any state which had been awarded primacy by the cutoff date was given a score of "1", while states which did not have primacy by that date were given a score of "0". State PRIMACY scores are reported in Table 15.

The second phase focuses on the issue of implementation effort or vigor. Within the context of this analysis the term "vigor" refers to the level or magnitude of efforts undertaken by those states that had been granted the authority to regulate the activities of parties involved in various phases of hazardous waste management. The dependent variable (VIGOR) was designed to provide a measure of the level of enforcement effort in each state that had been granted primacy as of January 1, 1988. VIGOR scores reflect an average level of implementation and enforcement activities undertaken by a state between the time it was granted primacy and December of 1988.

The construction of these VIGOR scores involved five steps, the first of which was a determination of the number of facilities subject to inspection under RCRA in each of these states. In order to allow for meaningful comparisons
Table 15. State Participation and Implementation Effort.

<table>
<thead>
<tr>
<th>State</th>
<th>PRIMACY</th>
<th>VIGOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>1</td>
<td>278.5</td>
</tr>
<tr>
<td>Alaska</td>
<td>0</td>
<td>------</td>
</tr>
<tr>
<td>Arizona</td>
<td>1</td>
<td>326.3</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1</td>
<td>275.0</td>
</tr>
<tr>
<td>California</td>
<td>0</td>
<td>------</td>
</tr>
<tr>
<td>Colorado</td>
<td>1</td>
<td>124.3</td>
</tr>
<tr>
<td>Connecticut</td>
<td>0</td>
<td>------</td>
</tr>
<tr>
<td>Delaware</td>
<td>1</td>
<td>526.7</td>
</tr>
<tr>
<td>Florida</td>
<td>1</td>
<td>387.4</td>
</tr>
<tr>
<td>Georgia</td>
<td>1</td>
<td>843.0</td>
</tr>
<tr>
<td>Hawaii</td>
<td>0</td>
<td>------</td>
</tr>
<tr>
<td>Idaho</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Illinois</td>
<td>1</td>
<td>456.9</td>
</tr>
<tr>
<td>Indiana</td>
<td>1</td>
<td>274.4</td>
</tr>
<tr>
<td>Iowa</td>
<td>0</td>
<td>------</td>
</tr>
<tr>
<td>Kansas</td>
<td>1</td>
<td>393.8</td>
</tr>
<tr>
<td>Kentucky</td>
<td>1</td>
<td>673.9</td>
</tr>
<tr>
<td>Louisiana</td>
<td>1</td>
<td>215.6</td>
</tr>
<tr>
<td>Maine</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Maryland</td>
<td>1</td>
<td>1742.0</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>1</td>
<td>149.6</td>
</tr>
<tr>
<td>Michigan</td>
<td>1</td>
<td>262.1</td>
</tr>
<tr>
<td>Minnesota</td>
<td>1</td>
<td>319.1</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1</td>
<td>489.9</td>
</tr>
<tr>
<td>Missouri</td>
<td>1</td>
<td>270.9</td>
</tr>
<tr>
<td>Montana</td>
<td>1</td>
<td>642.9</td>
</tr>
<tr>
<td>Nebraska</td>
<td>1</td>
<td>412.0</td>
</tr>
<tr>
<td>Nevada</td>
<td>1</td>
<td>500.0</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>1</td>
<td>177.3</td>
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<td>New Jersey</td>
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<td>985.9</td>
</tr>
<tr>
<td>New Mexico</td>
<td>1</td>
<td>243.7</td>
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<tr>
<td>New York</td>
<td>1</td>
<td>182.2</td>
</tr>
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<td>North Carolina</td>
<td>1</td>
<td>394.2</td>
</tr>
<tr>
<td>North Dakota</td>
<td>1</td>
<td>236.4</td>
</tr>
<tr>
<td>Ohio</td>
<td>0</td>
<td>------</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>1</td>
<td>231.4</td>
</tr>
<tr>
<td>Oregon</td>
<td>1</td>
<td>217.5</td>
</tr>
<tr>
<td>Pennsylvania</td>
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<td>772.9</td>
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<tr>
<td>Rhode Island</td>
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<td>136.4</td>
</tr>
<tr>
<td>South Carolina</td>
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</tr>
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<td>South Dakota</td>
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<td>80.0</td>
</tr>
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<td>Tennessee</td>
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<td>502.4</td>
</tr>
<tr>
<td>Texas</td>
<td>1</td>
<td>270.0</td>
</tr>
<tr>
<td>Utah</td>
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<td>290.9</td>
</tr>
<tr>
<td>Vermont</td>
<td>1</td>
<td>220.0</td>
</tr>
<tr>
<td>Virginia</td>
<td>1</td>
<td>408.9</td>
</tr>
<tr>
<td>Washington</td>
<td>1</td>
<td>343.1</td>
</tr>
<tr>
<td>West Virginia</td>
<td>1</td>
<td>695.8</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>1</td>
<td>253.6</td>
</tr>
<tr>
<td>Wyoming</td>
<td>0</td>
<td>------</td>
</tr>
</tbody>
</table>

* PRIMACY scores based on status as of January 1988.

b VIGOR scores are for primacy states.
this enumeration included only those entities that are categorized as "major facilities" under RCRA. A facility involved in the generation, treatment, storage, transportation or disposal of hazardous wastes is designated as a "major facility" if it meets one or more of the following criteria:

- all facilities subject to groundwater monitoring and/or protection requirements
- all incinerators
- the top three percent of generators and transporters (as defined by volumes of wastes handled).\(^\text{10}\)

The second step was to determine: (a) the average number of times per year these major facilities were inspected during each (full) year the state in question had primacy; and (b) the average number of times per year all records those major facilities are required to maintain (e.g., manifests) were reviewed. The third step was to determine the average number of so-called "Class I" violations that had occurred per year in each state and the average number of enforcement actions that had been initiated by state officials as a result of these violations.\(^\text{11}\)

The fourth step involved the calculation of three ratios: (a) the average number of inspections per major facility; (b) the average number of record reviews per major facility; and (c) the average number of enforcement actions per Class I violation. The fifth and final step, the calculation of VIGOR, involved the summation of (a) and (b), and (c). Information used in the calculation of these scores was
derived from the Quarterly Report series published by the United States Environmental Protection Agency. State VIGOR scores are presented in Table 15.

**Possible Determinants of State Participation in Social Regulation: The Independent Variables**

Tucker (1982) demonstrated that the use of a dependent variable measured at a single point in time (e.g., a state’s primacy status in 1985) can create difficulties when used in association with independent variables that are measured over a period of several years. Tucker suggested that many of the results reported in the state politics literature that at first glance appear to be contradictory may in fact be artifacts of normal fluctuations in state characteristics; many state socioeconomic measures that are taken on a yearly basis vary over time to a degree sufficient to affect the analysis of their relationship to policy outcome variables. Tucker’s proposed solution is to use periodic dependent variables with periodic independent variables whenever possible or, alternatively, to check several single-point measures of an independent variable in order to see if their relationship with the periodic dependent variable changes over time. The two dependent variables used in this analysis, PRIMACY and VIGOR, are periodic variables; therefore, following Tucker’s advice, the independent variables will (subject to limitations on data availability) be
constructed so as to reflect average conditions within the states between 1976 and 1988.

**Indicators of Market Failure**

Bowman (1984) described two strategies for the operationalization of market failure or the level of "need" for hazardous waste regulation. The first is based on the assumption that the magnitude of the potential threat to human health and the environment posed by hazardous wastes is a function of the total volume of wastes generated within a given state (i.e., greater waste volumes create greater loads upon existing management mechanisms, thus increasing the chance that some of those wastes may "slip through the cracks"). The second approach is based on an alternative assumption, namely that while volume is an important consideration, the level of need for regulatory relief is a function of the number of facilities involved in the generation, transport, storage or disposal of hazardous wastes (i.e., an increase in the number of facilities handling hazardous wastes results in an increase in the number of potential points at which wastes may be introduced into the environment).

Bowman noted that the selection of market failure indicators could possibly affect one's results. She did not, however, indicate what the nature of that impact might be. Inspired by a mixture of caution and of curiosity as to
what Bowman might have been referring to this research uses three separate indicators are used to capture the severity of the hazardous waste problems confronting individual states. These are: the estimated quantity of hazardous waste per capita generated annually within each state (HWA); the estimated number of hazardous waste impoundments found within each state (IMP); and the total number of Superfund sites within each state (SUF). Data used in the computation of HWA are drawn from Environmental Protection Agency estimates, while IMP and SUF are based on data taken from The Book of the States.

Indicators of Political Factors That May Affect Regulatory Decisions

The hypotheses used to test "political realist" theories of regulation describe regulatory origin and implementation effort in terms of four political factors: political culture, systemic commitment to regulatory objectives, partisanship, and bureaucratic consolidation.

Three options were considered prior to the construction of this variable. The first was to simply use Sharkansky's (1969) operationalization of Elazar's construct. This was rejected on the basis of the unidimensionality problem described in the preceding chapter. The second option was to use Johnson's (1976) alternative operationalization of Elazar's construct. This alternative also has its
limitations. Johnson based his work on religious census data covering the period from 1906 to 1936. While the theory of political culture describes a slowly evolving phenomenon, it seems reasonable to expect that migration has produced an interstate distribution of religious affiliations that is significantly different from that observed by Johnson. This leaves the third and final option, which is to use the updated version of Johnson’s work produced by Morgan and Watson (1991).  

As part of an analysis of state controls over the siting of industrial facilities Duerksen (1983) constructed an index of state commitment to environmental protection. This index was a composite of 23 individual "ranking indicators" covering a wide range of environmental protection and natural resource management functions. However, because Duerksen included subscores which (a) recorded the presence or absence of a consolidated ("umbrella") environmental agency and (b) rated state performance in the management of hazardous materials the index could not be used as originally scored. The "support" index used in this analysis (ENV) employs Duerksen's data minus these two subscores.

Partisanship (RAN) is measured with an updated version of the Ranney (1976) Index of Interparty Competition. Four components were used in these computations: the average percentage of the popular vote captured by Democratic gubernatorial candidates; the average percentage of the seats in
the state senate held by Democrats; the average percentage of seats in the state house of representatives held by Democrats; and the percentage of all terms for governor, senate and house controlled by Democrats. The final index score for each state reflects the average of these four components.\textsuperscript{18}

Sabatier (1977) suggested that the consolidation of pollution control authority into a single agency may encourage a stricter regulatory approach than would be possible in cases where authority is split among two or more agencies. State consolidation scores (AGN) are based on the identity of the organization assigned the responsibility of acting as the lead agency in the implementation of hazardous waste regulations. Those states which have created so-called "superagencies", which combine the functions of a health department and environmental protection agency, were given a score of 3 on AGN. States in which a state environmental protection agency has been designated as the lead agency in hazardous waste management efforts were awarded a score of 2. Those states which rely upon a state health department to serve as lead agency were awarded an AGN score of 1, while those states which have failed to designate a lead agency were awarded a score of 0. Information used in the construction of this variable was drawn from \textit{The Book of the States}. 
Indicators of State Fiscal Capacity

The notion that regulatory policies are shaped not by the severity of the target problem(s) but by the limited resources available to develop and implement those policies is central to "symbolic politics" theories of social regulation. Two sets of indicators of state wealth are used in this analysis - average per capita income and average general revenue per capita. Dollar figures used in the computation of average per capita income and average general revenue per capita scores for the 1976-1988 period (INC and REV) were adjusted to 1988 dollars. Data used in the computation of these variables were taken from The Book of the States.

Indicators of Public Interest Group Influence

Two measures of the potential influence of public interest groups are employed. The first of these, urbanism (URB), reflects Truman's (1951) contention that the mobilization of consumer interests is probably a function of contact among function of contact among like-minded individuals. The probability of such contact is greatest in urban settings. The variable URB is based on U.S. Census Bureau estimates of metropolitan area (SMSA) populations in each state as of 1985. URB scores are based on figures taken from the Statistical Abstract of the United States 1987.

The second measure of potential consumer group activity, the number of Sierra Club members per 100,000 population
(SIC), serves as a measure of intrastate concentrations of potential "contact initiators" who may be sympathetic toward the goals of RCRA. SIC scores based on information provided by the Sierra Club.

**Indicators of Private Interest Influence**

Industry dominance theories suggest that the ability of industrial interests to affect regulatory decisions is a function of the magnitude of the resources at their command. The variables used to capture the magnitude of these resources at the state level, the percent of the non-agricultural labor force employed in manufacturing and per capita value-added generated by manufacturing, were selected on the basis of the example set by Stigler (1971), Oster (1980) and Appleton (1985).

One strategy for measuring the potential influence of industries subject to regulation under RCRA is to construct a variable that will measure the value-added by industries which have the potential to produce hazardous wastes. In this context the term "value-added" refers to the economic value added to the value of raw materials (e.g., wheat) by manufacturing processes (e.g., making bread). The average per capita value-added by manufacturing for a given state is simply the sum of the value added to raw materials by manufacturing for all goods produced within that state, within a given time period, divided by the state's
population. As was the case in the computation of REV and INC, dollar figures used in the computation of average per capita value added scores for the 1976-1988 period (VAL) were adjusted to 1988 dollars.

MFG, the average percent of a state’s non-agricultural labor force engaged in manufacturing during the period 1976-1988, is used as an indicator of the potential electoral strength of workers who might be affected by regulatory decisions. Data used in the computation of these variables were taken from The Book of the States and the Statistical Abstract of the United States. Descriptive statistics for all independent variables are presented in Table 16.

**Summary**

A total of 22 hypotheses describing relationships between participation in and the level of effort expended in the implementation of hazardous waste regulations promulgated as a result of the passage of the Resource Conservation and Recovery Act of 1976 and its amendments have been generated on the basis of theories of regulation described in Chapter III. These relationships are summarized in Tables 17 and 18.\textsuperscript{20}
Table 16. Independent Variables to be Used in the Analysis of State Participation (PRIMACY) and Implementation Effort (Vigor).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWA</td>
<td>404.6</td>
<td>28.6</td>
<td>5121.6</td>
<td>715.1</td>
</tr>
<tr>
<td>IMP</td>
<td>2654.2</td>
<td>30.0</td>
<td>16176.0</td>
<td>3763.5</td>
</tr>
<tr>
<td>SUF</td>
<td>19.1</td>
<td>0</td>
<td>101</td>
<td>22.2</td>
</tr>
<tr>
<td>MOR</td>
<td>19.2</td>
<td>1.0</td>
<td>92.0</td>
<td>16.2</td>
</tr>
<tr>
<td>ENV</td>
<td>25.5</td>
<td>8</td>
<td>45</td>
<td>8.1</td>
</tr>
<tr>
<td>RAN</td>
<td>59.1</td>
<td>33.9</td>
<td>83.5</td>
<td>13.5</td>
</tr>
<tr>
<td>AGN</td>
<td>2.0</td>
<td>0</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td>INC</td>
<td>9941.24</td>
<td>7173.36</td>
<td>14294.45</td>
<td>1392.76</td>
</tr>
<tr>
<td>REV</td>
<td>1370.83</td>
<td>853.51</td>
<td>7785.67</td>
<td>967.37</td>
</tr>
<tr>
<td>URB</td>
<td>63.6</td>
<td>19.1</td>
<td>100.0</td>
<td>22.2</td>
</tr>
<tr>
<td>SIC</td>
<td>223.2</td>
<td>54.9</td>
<td>817.5</td>
<td>141.2</td>
</tr>
<tr>
<td>MFG</td>
<td>20.8</td>
<td>4.5</td>
<td>64.2</td>
<td>10.0</td>
</tr>
<tr>
<td>VAL</td>
<td>3106.21</td>
<td>643.50</td>
<td>5222.87</td>
<td>1223.45</td>
</tr>
</tbody>
</table>

Note: IMP = the number of hazardous waste impoundments; SUF = the number of Superfund sites; HWA = the average number of pounds of hazardous waste generated per capita annually; SIC = the average number of Sierra Club members per 100,000 population; URB = the estimated percent of the state's population living in SMSAs as of 1985; INC = the average per capita income from 1976 to 1988; REV = average general revenue per capita from 1976 to 1988; RAN = average Ranney Index of Interparty Competition scores for the period 1976 to 1988; AGN = environmental agency consolidation scores; MOR = percent of state population with religious affiliations associated with moralistic subculture; ENV = score on "commitment to environmental protection"; VAL = average per capita value added by manufacturing between 1976 and 1988; and MFG = average percent of non-agricultural labor force employed in manufacturing between 1976 and 1988;
Table 17. Summary of Hypothesized Relationships Between Independent Variables and State Participation.

<table>
<thead>
<tr>
<th>Theories and Positions</th>
<th>Predicted Relationship with PRIMACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Market Failure</td>
<td></td>
</tr>
<tr>
<td>a. &quot;Classic&quot; Market Failure Theories: Participation is a response to market failure.</td>
<td>HWA strong + SUF strong + IMP strong +</td>
</tr>
<tr>
<td>b. Political Realist Theories:</td>
<td>HWA n.r. a SUF n.r. a IMP n.r. a RAN strong + MOR strong + AGN strong + ENV strong +</td>
</tr>
<tr>
<td>2. Influence of Public Interest Groups</td>
<td></td>
</tr>
<tr>
<td>a. Dominance Theories: The dynamics of entrepreneurial politics leads to dominance of the regulatory process.</td>
<td>SIC strong + URB strong +</td>
</tr>
<tr>
<td>b. Limited Influence Theories: Industry dominance renders interest group PIG impact symbolic at best.</td>
<td>SIC n.r. + a URB n.r. + a</td>
</tr>
<tr>
<td>c. Countervailing Power Theories: Interest group influence is balanced by industry influence.</td>
<td>SIC moderate + URB moderate + MFG moderate - VAL moderate -</td>
</tr>
<tr>
<td>3. Influence of Regulated Industries</td>
<td></td>
</tr>
<tr>
<td>a. Limited Industry Dominance Theories: Industry is unable to affect state primacy decisions.</td>
<td>MFG n.r.- b VAL n.r.- b</td>
</tr>
<tr>
<td>b. Industry Dominance Theories: Industry is able to affect state primacy decisions.</td>
<td>MFG strong - VAL strong -</td>
</tr>
</tbody>
</table>

Notes: 1) *n.r.+ = a positive, but statistically insignificant relationship.
       b n.r.- = a negative, but statistically insignificant relationship.
   2) See Table 16 for key to abbreviations.
Table 18. Summary of Hypothesized Relationships Between Independent Variables and State Implementation Effort.

<table>
<thead>
<tr>
<th>Theories and Positions</th>
<th>Predicted Relationship with VIGOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Market Failure</strong></td>
<td></td>
</tr>
<tr>
<td>a. &quot;Classic&quot; Market Failure Theories:</td>
<td></td>
</tr>
<tr>
<td>Regulatory effort is determined by the</td>
<td>HWA strong +</td>
</tr>
<tr>
<td>severity of instances of market failure.</td>
<td>SUF strong +</td>
</tr>
<tr>
<td>b. Symbolic Politics Theories:</td>
<td>IMP strong +</td>
</tr>
<tr>
<td>Regulatory effort is determined by the</td>
<td>HWA, SUF, and IMP +,</td>
</tr>
<tr>
<td>ability of the state to bear costs, not</td>
<td>but not as strong as INC or REV</td>
</tr>
<tr>
<td>by the severity of instances of market</td>
<td>INC strong +</td>
</tr>
<tr>
<td>failure.</td>
<td>REV strong +</td>
</tr>
<tr>
<td>c. Political Realist Theories:</td>
<td></td>
</tr>
<tr>
<td>Regulatory effort is determined by</td>
<td>HWA n.r. a</td>
</tr>
<tr>
<td>political factors, not by the severity</td>
<td>SUF n.r. a</td>
</tr>
<tr>
<td>of instances of market failure.</td>
<td>IMP n.r. a</td>
</tr>
<tr>
<td></td>
<td>RAN strong +</td>
</tr>
<tr>
<td></td>
<td>MOR strong +</td>
</tr>
<tr>
<td></td>
<td>AGN strong +</td>
</tr>
<tr>
<td></td>
<td>ENV strong +</td>
</tr>
<tr>
<td><strong>2. Influence of Public Interest Groups</strong></td>
<td></td>
</tr>
<tr>
<td>a. Dominance Theories:</td>
<td></td>
</tr>
<tr>
<td>The dynamics of interest group politics</td>
<td>SIC strong +</td>
</tr>
<tr>
<td>leads to dominance of the regulatory</td>
<td>URB strong +</td>
</tr>
<tr>
<td>process.</td>
<td></td>
</tr>
<tr>
<td>b. Limited Influence Theories:</td>
<td></td>
</tr>
<tr>
<td>Industry dominance renders the impact</td>
<td>SIC n.r.+ a</td>
</tr>
<tr>
<td>of public interest groups symbolic at</td>
<td>URB n.r.+ a</td>
</tr>
<tr>
<td>best.</td>
<td></td>
</tr>
<tr>
<td>c. Countervailing Power Theories:</td>
<td></td>
</tr>
<tr>
<td>Public interest group influence is</td>
<td>SIC moderate +</td>
</tr>
<tr>
<td>balanced by industry influence.</td>
<td>URB moderate +</td>
</tr>
<tr>
<td></td>
<td>MFG moderate -</td>
</tr>
<tr>
<td></td>
<td>VAL moderate -</td>
</tr>
<tr>
<td><strong>3. Influence of Regulated Industries</strong></td>
<td></td>
</tr>
<tr>
<td>a. Limited Influence Theories:</td>
<td></td>
</tr>
<tr>
<td>Industry is unable to avoid regulation.</td>
<td>MFG n.r.- b</td>
</tr>
<tr>
<td>b. Industry Dominance Theories:</td>
<td></td>
</tr>
<tr>
<td>Industry influence of the regulatory</td>
<td>MFG strong -</td>
</tr>
<tr>
<td>process results in low levels of</td>
<td>VAL strong -</td>
</tr>
<tr>
<td>implementation effort.</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) *n.r.+ = a positive, but statistically insignificant relationship.

   *n.r.- = a negative, but statistically insignificant relationship.

   2) See Table 16 for key to abbreviations.
NOTES

1. Note that this is consistent with Lester (1980).

2. The "political realist" literature utilizes a myriad of variables to capture the many aspects of the phenomenon of "politics" as it applies to regulation. The reader will no doubt observe that this analysis does not address the possible role of legislative professionalism in the hazardous waste regulation process. The decision to omit this particular aspect of state politics from the analysis was based on the fact that comparative state policy research has generally failed to demonstrate that professionalism has much of an impact on policy. (See, for example, Karnig and Sigelman (1975), LeLoup (1978) and Roeder (1979)).

3. Note that this does not address potential impacts arising from the North versus South split among Democrats, which has often complicated the process of distinguishing between Democrats and Republicans.

4. States designated as "southern" include Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Designation is based on Lester (1980). In light of the fact that all of these states had primacy as of the January 1988 cutoff date it was decided that a separate examination regarding regional differences and the primacy/nonprimacy issue was not warranted.

5. See, for example, Lester and Bowman (1989).


9. At that time 41 out of the 50 states had been awarded primacy.


11. Class I violations are defined as incidents that result in the release or serious threat of release of hazardous wastes to the environment, or which involve the failure to assure that: groundwater will be protected; proper closure and postclosure activities will be undertaken; or that hazardous wastes will be transported and delivered to permitted or interim-status facilities.
12. The term "periodic variable" as used here refers to a variable measuring a characteristic over a period of time (e.g., an average of several years' worth of data). These are contrasted with single-point variables, which are measured at a single point in time.


15. An interesting aspect of the differences among these three indicators is the role of experience regulators may have had in dealing with the problems caused by hazardous wastes. HWA and IMP address the connection between current conditions and the future. They serve as surrogate measures of the potential harm hazardous wastes might produce. SUF, on the other hand, may be interpreted as a reminder of the past, evidence that an "out of sight, out of mind" approach to the management of hazardous wastes is not a particularly intelligent alternative.


17. Duerksen noted that his selection of specific indicators was guided by the need to generate an index that would capture as many aspects of the multidimensional nature of "commitment to environmental quality" as possible. The indicators range from comparative rankings of state spending on natural resource and air and water quality management programs to dummy variables that reflect the presence or absence of tax checkoff for wildlife funds.

18. Ranney (1976) suggested the following definitions be used in interpreting index scores: one-party Democratic (0.850 and higher); modified one-party Democratic (0.650 to 0.849); two-party (0.350 to 0.649); modified one-party Republican (0.150 to 0.349); and one-party Republican (0.000 to 0.149).


20. Relationships between the independent variables and PRIMACY and VIGOR are described in Tables 17 and 18 as being "strong", "moderate", or "not significant." Determinations as to whether or not an observed relationship qualifies as "strong", "moderate" or "not significant" will be based on the magnitude and significance of standardized discriminant (PRIMACY) and regression (VIGOR) coefficients.
CHAPTER V
ANALYSIS

Introduction

This research is intended to answer two questions regarding the dynamics of social regulation. First, what political and economic factors are associated with the origin of state participation (primacy) in social regulation? Second, what factors are associated with the level of effort state regulators expend in implementing social regulatory policies? A set of hypotheses describing possible determinants of state participation and implementation effort was presented in the preceding chapter. The process of testing those hypotheses is described in this chapter.

Determinants of Primacy: Methodology

PRIMACY, the dependent variable used in the first part of this analysis, is a dichotomous nominal variable. A state which had been granted primacy as of January 1, 1988 has a PRIMACY score of 1, while states that had not been granted primacy as of that date have a score of 0. The nature of the dependent variable limits the range of appropriate analytic techniques. Discriminant analysis will
be used to evaluate hypothesized relationships between political and economic factors and state participation in the implementation of the Resource Conservation and Recovery Act.²

Discriminant analysis is "a statistical technique which allows the researcher to study the differences between two or more groups of objects with respect to several variables simultaneously".³ The technique provides two types of information. First, it measures the relative strength of relationships between the dependent variable and a set of independent (or discriminating) variables. Second, it assesses the overall ability of a model comprising a linear combination of the discriminating variables (i.e., a discriminant function) to explain the grouping of cases in the dependent variable.⁴ Discriminant analysis will be used to sort the independent variables in terms of the relative contribution each makes to the overall discriminant function. This sorting will make it possible to perform a comparative evaluation of the hypotheses developed in the preceding chapter.⁵

By default the classification phase of discriminant analyses involving dichotomous dependent variables is based on a 50 percent prior probability of group membership. We know, however, that in this instance 41 of the 50 states have a PRIMACY score of 1. Running a discriminant analysis based on the assumption of equal prior probabilities would
result in an overestimation of the probability of a case being in the nonprimacy group and an underestimation of the probability of being in the primacy group. The discriminant analysis procedure was therefore modified to properly reflect adjusted prior probabilities.⁶

Discriminant analysis is based on the assumption that the discriminating (independent) variables are normally distributed. Violating this assumption affects tests of significance and the assessment of probabilities of group membership. We should note, however, that Klecka (1980) has argued that discriminant analysis is sufficiently robust to tolerate moderate violations of this assumption.⁷

Another assumption underlying discriminant analysis is that none of the discriminating variables is a linear combination of any other discriminating variables.⁸ It is therefore necessary to assess the data for indications of multicollinearity prior to running the analysis. Examination of the bivariate correlations among the discriminating variables is commonly used to detect multicollinearity; coefficients of approximately .8 or greater are seen as indications of the presence of multicollinearity. Correlations among all independent variables used in both phases of this analysis are reported in Table 19. As the figures reported in Table 19 indicate, only one pair of variables, the number of Superfund sites (SUF) and average per capita value added from manufacturing (VAL), demonstrate a correlation
coefficient approaching this threshold value.

While the examination of bivariate correlations is useful in situations where multicollinearity among pairs of variables is a concern, its ability to detect situations in which one discriminating variable is a linear combination of three or more different discriminating variables is quite limited. The preferred method for determining the magnitude of multicollinearity problems, therefore, is to regress each discriminating variable against all the other discriminating variables. Results of this step are reported in the "Series One" column of Table 20.

As indicated in Table 20 the $R^2$ value for one variable (VAL) exceeds the .8 threshold. It was removed from the variable set and a second series of regressions was run. The results of this second series of regressions (reported in the "Series Two" column of Table 20) indicate that none of the $R^2$ values for the remaining variables are close enough to the .8 threshold to warrant further examination.

A discriminant analysis was run using the ten variables which remained after the multicollinearity test. Results from this analysis are reported in Table 21 and are discussed below.
Table 19. Intercorrelations Among the Variables Used in This Analysis.

<table>
<thead>
<tr>
<th></th>
<th>VAL</th>
<th>IMP</th>
<th>SUF</th>
<th>HWA</th>
<th>SIC</th>
<th>URB</th>
<th>INC</th>
<th>REV</th>
<th>RAN</th>
<th>AGN</th>
<th>MOR</th>
<th>ENV</th>
<th>MFG</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMP</td>
<td></td>
<td>.32b</td>
<td></td>
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<td>SUF</td>
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</tr>
<tr>
<td>HWA</td>
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<td>-.07</td>
<td>-.01</td>
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<td></td>
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<tr>
<td>SIC</td>
<td>.25b</td>
<td>.08</td>
<td>.19</td>
<td>.11</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>URB</td>
<td>.55a</td>
<td>.06</td>
<td>.57a</td>
<td>.23</td>
<td>.38a</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>INC</td>
<td>.27b</td>
<td>-.06</td>
<td>.33a</td>
<td>-.11</td>
<td>.54a</td>
<td>.51a</td>
<td></td>
<td></td>
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<td>REV</td>
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<td>.08</td>
<td>.18</td>
<td>.29b</td>
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<td>-.13</td>
<td>.66a</td>
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<td>RAN</td>
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<td>-.04</td>
<td>-.09</td>
<td>-.08</td>
<td>.23</td>
<td>.12</td>
<td>-.29b</td>
<td>.17</td>
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<td>AGN</td>
<td>-.01</td>
<td>-.13</td>
<td>.17</td>
<td>-.09</td>
<td>-.11</td>
<td>.05</td>
<td>.09</td>
<td>.15</td>
<td>.03</td>
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<td>MOR</td>
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<td>-.08</td>
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<td>.10</td>
<td>.56a</td>
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<td>ENV</td>
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<td>.01</td>
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<td>.28b</td>
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<td>.13</td>
<td>.30b</td>
<td>.37a</td>
<td>.22</td>
<td>-.09</td>
<td>.19</td>
<td>-.09</td>
<td>.04</td>
</tr>
<tr>
<td>VIG</td>
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<td>-.04</td>
<td>.17</td>
<td>.38b</td>
<td>.12</td>
<td>.17</td>
<td>.25</td>
<td>.49a</td>
<td>.42b</td>
<td>-.10</td>
<td>-.08</td>
<td>.19</td>
<td>.27b</td>
</tr>
</tbody>
</table>

Notes: 1) a = significant at .01 level; b = significant at .05 level; c = significant at .1 level.

2) IMP = the number of hazardous waste impoundments; SUF = the number of Superfund sites; HWA = the average number of pounds of hazardous waste generated per capita annually; SIC = the average number of Sierra Club members per 100,000 population; URB = the estimated percent of the state's population living in SMSAs as of 1985; INC = the average per capita income from 1976 to 1988; REV = average general revenue per capita from 1976 to 1988; RAN = average Ranney Index of Interparty Competition scores from 1976 to 1988; AGN = environmental agency consolidation scores; MOR = percent of state population with religious affiliations associated with moralistic subculture; ENV = score on "commitment to environmental protection"; VAL = average per capita value added by manufacturing between 1976 and 1988; MFG = average percent of non-agricultural labor force employed in manufacturing between 1976 and 1988; PRI = presence or absence of primacy as of January 1988; and VIG = implementation vigor.
Table 20. Results of Tests for Multicollinearity in the Analysis of Determinants of State Participation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>( R^2: ) Series One</th>
<th>( R^2: ) Series Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMP</td>
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<td>.28</td>
</tr>
<tr>
<td>SUF</td>
<td>.61</td>
<td>.61</td>
</tr>
<tr>
<td>HWA</td>
<td>.23</td>
<td>.22</td>
</tr>
<tr>
<td>AGN</td>
<td>.27</td>
<td>.19</td>
</tr>
<tr>
<td>MOR</td>
<td>.46</td>
<td>.53</td>
</tr>
<tr>
<td>RAN</td>
<td>.45</td>
<td>.05</td>
</tr>
<tr>
<td>ENV</td>
<td>.39</td>
<td>.46</td>
</tr>
<tr>
<td>SIC</td>
<td>.50</td>
<td>.46</td>
</tr>
<tr>
<td>URB</td>
<td>.75</td>
<td>.45</td>
</tr>
<tr>
<td>MFG</td>
<td>.71</td>
<td>.53</td>
</tr>
<tr>
<td>VAL</td>
<td>.81</td>
<td>---</td>
</tr>
</tbody>
</table>

Note: See Table 19 for explanation of the variable identification codes.
Table 21. Determinants of PRIMACY: Results of Discriminant Analysis.

<table>
<thead>
<tr>
<th>Discriminating Variable</th>
<th>Discriminant Function Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIC</td>
<td>.93&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>HWA</td>
<td>.59&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>MFG</td>
<td>.43&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>SUF</td>
<td>.40&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>URB</td>
<td>.36&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>IMP</td>
<td>.23</td>
</tr>
<tr>
<td>RAN</td>
<td>-.14</td>
</tr>
<tr>
<td>ENV</td>
<td>.14</td>
</tr>
<tr>
<td>MOR</td>
<td>.13</td>
</tr>
<tr>
<td>AGN</td>
<td>-.01</td>
</tr>
</tbody>
</table>

Notes: 1) See Table 19 for explanation of the variable identification codes.
2) <sup>a</sup> = significant at .05 level; <sup>b</sup> = significant at .10 level; <sup>c</sup> = significant at .15 level.

Canonical Correlation = .79
Wilks’ lambda = .62

Group centroids:
Group 1 (Primacy) = 1.64
Group 2 (Nonprimacy) = -.36

CLASSIFICATION RESULTS

<table>
<thead>
<tr>
<th>Predicted Group</th>
<th>Nonprimacy</th>
<th>Primacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonprimacy</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>(55.6%)</td>
<td></td>
<td>(44.4%)</td>
</tr>
<tr>
<td>Primacy</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td>(0%)</td>
<td></td>
<td>(100.0%)</td>
</tr>
</tbody>
</table>

Percent of cases correctly classified = 92% (tau = .73)
Results of the Discriminant Analysis

Before examining the relative impact of each of the ten discriminating variables we shall first consider the question of how well the discriminant function performs in terms of distinguishing between primacy and nonprimacy states. (Relevant statistics are reported in Table 21.)

Klecka (1980) recommended that the canonical correlation coefficient be used to evaluate discriminant functions in instances such as this when the number of cases is small. He also noted that the percentage of cases correctly classified by the discriminant function provides an important indication of the extent to which violation of the normality assumption may have produced distortions in the discriminant function and subsequent classification procedures. If the percentage of correctly classified cases is high distortions resulting from the violation of normality will have minimal consequences as far as assessing the discriminant function coefficients is concerned. The discriminant function correctly classified 92 percent (46 out of 50) of the states; 100 percent (41 out of 41) of the primacy states were correctly classified, while 55.5 percent (5 out of 9) of the nonprimacy states were correctly classified.

Sigelman (1984) argued that when dealing with an assemblage of cases with skewed marginals one should not be concerned with the number of correctly classified cases.
Instead, Sigelman recommended placing greater emphasis on the canonical correlation coefficient and tau (a standardized measure of improvement over random assignment in the classification of cases) when assessing the performance of a discriminant function. The reported canonical correlation coefficient (.67) indicates a fairly high level of association between the groups and the discriminant function, while the computed value of tau (.73) indicates that the function provides a 73 percent reduction in error over random classification. Collectively, these measures of the model's overall fit demonstrate that the discriminant function contributes to the evaluation of competing perspectives regarding the dynamics of social regulation.

The variable making the greatest relative contribution to the discriminant function is SIC, the number of Sierra Club members per 100,000 state population (standardized discriminant coefficient = .93). There is a strong, positive relationship between this indicator of public interest group strength and primacy. States which exhibit a higher "Sierra Club members to general public" ratio are more likely to have primacy than are states with a lower ratio. This finding supports the public interest group dominance position.

HWA, or the average weight of hazardous waste generated per capita annually, is the second most powerful discriminating variable. The sign and magnitude of the standardized
discriminant coefficient (.59) support the hypothesis (derived from the market failure position) that the severity of market failure is a strong, positive determinant of primacy. The performance of the variable HWA in this discriminant function contradicts the political realist position, which describes a regulatory environment in which there is no significant connection between severity of market failure and the appearance of primacy.

The third most influential source of discriminating power is MFG, or the average percent of the non-agricultural labor force engaged in manufacturing (.43). The discriminant coefficient describes a strong, positive relationship between this variable and PRIMACY; states in which a greater percentage of the workforce is employed in manufacturing are more likely to have primacy than are those states in which manufacturing employs a smaller fraction of the workforce. This finding runs counter to the predictions of the industry dominance position.

The number of Superfund sites within each state (SUF) is the fourth most influential variable in the discriminant function (.40). The performance of this variable supports the market failure position that the states most likely to have primacy are those in which evidence of market failure is greatest. The fact that SUF is a statistically significant component of the discriminant function analysis belies the political realist position, which emphasizes the role of
political factors in the origin of primacy.

The fifth most important variable in the discriminant function is URB, or the percent of a state's population living in urban areas (.36). States with a higher degree of urbanization are more likely to have primacy than states in which a greater percentage of the population is located outside of SMSAs. This finding corresponds with the public interest group dominance position, which predicts that increased urbanization enhances the ability of public interest groups to affect policy decisions. The fact that this is a statistically significant (positive) relationship belies the limited public interest group influence position, which describes a regulatory environment in which such groups are unable to counter the efforts of private interests.

The number of hazardous waste impoundments (IMP) is the sixth most powerful discriminating variable (.23). The direction of the relationship between IMP and participation conforms to the prediction of the political realist position. However, because the increase in discrimination power associated with the inclusion of this variable in the discriminant function is not statistically significant the positive association between IMP and primacy cannot be interpreted as support for the market failure position.

The updated Ranney Index of Interparty Competition (RAN) and the modified Duerksen index of commitment to
environmental protection (ENV) tied in terms of discriminating power. The political realist position predicted a strong, positive relationship between primacy and a state's Ranney Index and Duerksen index scores. The standardized discriminant coefficient for ENV (.14) indicates that states with higher commitment scores are more likely to have primacy than those with lower scores (as predicted by the political realist position); however, the increase in discriminating power resulting from the inclusion of ENV is not statistically significant.

RAN presents us with a slightly different situation. Democratic dominance of state politics is inversely related, rather than positively associated, with primacy (-.14). The coefficient's sign indicates an inverse relationship between dominance by the Democrats and primacy. As in the case of ENV, the inclusion of RAN in the discriminant function fails to produce a statistically significant increase in the ability to discriminate among the states.

MOR, the percent of a state's population with religious affiliations associated with the moralistic subculture, is next to last in terms of discriminating power (.04). The coefficient's sign conforms to the political realist position; however, the variable fails to provide a statistically significant improvement in the discriminant function's ability to classify the states.

State scores on environmental agency consolidation
(AGN) is the least important variable (-.01) in the discriminant function. The performance of AGN fails to conform to the predictions of the political realist position, which describes a strong, positive relationship between primacy and the degree of consolidation within state bureaucracy.

Comparisons between hypothesized and observed relationships between primacy and the discriminating variables are presented in Table 22.

Primacy and Market Failure

The results of the discriminant analysis conform more closely to the hypotheses reflecting the "classic" market failure position than to those of the political realist perspective. Whereas two of the three indicators of market failure (HWA and SUF) are strong, positive predictors of participation, not one of the variables used to test the political realist position performed as anticipated. None of the four variables used to measure the intensity of political factors that form the foundation of the political realist position proved to be a significant discriminating variable. Compounding this failure is the fact that two of the four measures turned out to be inversely related to participation. Collectively, these results suggest that state participation in the regulation of hazardous wastes under RCRA is a product of the magnitude of problems resulting from the generation, management and disposal of hazardous
Table 22. Comparison of Hypothesized and Observed Relationships: Primacy.

<table>
<thead>
<tr>
<th>Theoretic Position</th>
<th>Variable</th>
<th>Hypothesized Relationship</th>
<th>Standardized Discriminant Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Failure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Classic&quot;</td>
<td>IMP</td>
<td>Strong, Positive</td>
<td>.23</td>
</tr>
<tr>
<td></td>
<td>SUF</td>
<td>Strong, Positive</td>
<td>.40(^a)</td>
</tr>
<tr>
<td></td>
<td>HWA</td>
<td>Strong, Positive</td>
<td>.59(^a)</td>
</tr>
<tr>
<td><strong>Political Realist</strong></td>
<td>IMP</td>
<td>Positive (but not significant)</td>
<td>.23</td>
</tr>
<tr>
<td></td>
<td>SUF</td>
<td>Positive (but not significant)</td>
<td>.40(^b)</td>
</tr>
<tr>
<td></td>
<td>HWA</td>
<td>Positive (but not significant)</td>
<td>.59(^a)</td>
</tr>
<tr>
<td></td>
<td>AGN</td>
<td>Strong, Positive</td>
<td>-.01</td>
</tr>
<tr>
<td></td>
<td>MOR</td>
<td>Strong, Positive</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>RAN</td>
<td>Strong, Positive</td>
<td>-.14</td>
</tr>
<tr>
<td></td>
<td>ENV</td>
<td>Strong, Positive</td>
<td>.14</td>
</tr>
<tr>
<td><strong>Public Interest Groups</strong></td>
<td>SIC</td>
<td>Strong, Positive</td>
<td>.93(^a)</td>
</tr>
<tr>
<td>Dominance</td>
<td>URB</td>
<td>Strong, Positive</td>
<td>.36(^c)</td>
</tr>
<tr>
<td><strong>Limited Influence</strong></td>
<td>SIC</td>
<td>Positive (but not significant)</td>
<td>.93(^a)</td>
</tr>
<tr>
<td></td>
<td>URB</td>
<td>Positive (but not significant)</td>
<td>.36(^c)</td>
</tr>
<tr>
<td><strong>Countervailing Power</strong></td>
<td>SIC</td>
<td>Moderate, Positive</td>
<td>.93(^a)</td>
</tr>
<tr>
<td></td>
<td>URB</td>
<td>Moderate, Positive</td>
<td>.36(^c)</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td>MFG</td>
<td>Strong, Negative</td>
<td>.43(^b)</td>
</tr>
<tr>
<td><strong>Limited Influence</strong></td>
<td>MFG</td>
<td>Negative (but not significant)</td>
<td>.43(^b)</td>
</tr>
</tbody>
</table>

Notes: 1) See Table 19 for explanation of the variable identification codes.  
2) \(a = \) significant at the .05 level; \(b = \) significant at the .10 level; \(c = \) significant at the .15 level.
wastes, and that this decision is not affected by partisanship, cultural predisposition toward government intervention in the operation of the market, or by pre-existing policies and bureaucratic structure.

The average per capita weight of hazardous wastes generated within a state is a strong, positive determinant of primacy; HWA is second only to SIC in discriminating power. This is in itself an interesting finding, because the variable HWA is not a measure of the severity of extant instances of market failure. Instead, it is an approximate indicator of the potential for market failure. I use the term "approximate" because HWA neither identifies the type(s) of wastes involved nor distinguishes between wastes that are responsibly managed and those which are released into the environment. Rather, HWA may be thought of as a measure of the potential for market failure - an indicator of the magnitude of environmental and human health problems that might result from the improper management of hazardous waste materials.

Unlike the relationship between primacy and HWA, the association between participation and SUF (the number of Superfund sites) is clearly one in which regulation emerges as a response to pre-existing instances of market failure. Superfund sites represent extraordinary threats to the environment and human health, and are dramatic manifestations of the phenomenon of market failure as it
pertains to hazardous waste management. The conjunction of HWA and SUF as powerful discriminating variables suggests that state participation in RCRA may be an act of prevention in addition to being a response to existing conditions.14

The positive relationship between IMP (the number of hazardous waste impoundments) and primacy is in accord with the market failure position; however, the incremental improvement in discriminating power resulting from the inclusion of IMP is not statistically significant. Because the variable IMP is a measure of the potential for, rather than the actual occurrence of, market failure (much like HWA) this "failure" is not interpreted as providing a sufficient basis for declaring that the market failure position has been found wanting. These results are similar to findings reported by Game (1979) and Clarke (1979).

The reader may recall from the preceding chapter that Bowman (1984) identified two distinct strategies for the operationalization of market failure: a volume-based strategy which measures need for regulatory relief in terms of the quantity of material that requires management, and a "weak link" approach which assumes that threats to human health and the environment are a function of the number of facilities involved in the generation, transport, storage or disposal of hazardous wastes. The results of this analysis indicate that the "weak link" approach appears to be an inadequate measure of need as it relates to state decisions.
regarding primacy. Whether or not such an approach is appropriate when considering the issue of implementation effort will be addressed shortly.

**Primacy and Public Interest Groups**

The relationship between Sierra Club membership levels, urbanization (SIC and URB), and participation are consistent with the interest group dominance position that public interest group strength has a significant, positive impact on state decisions regarding the assumption of responsibility for implementing hazardous waste regulations under RCRA. The finding that interest group strength is a powerful predictor of participation comports with Ingram's (1978) observation that because the impacts of industrial activities are quite visible at the state level, environmental groups such as the Sierra Club have become quite an effective political force.\(^{15}\) As noted in the preceding chapter, membership levels for public interest groups such as the Sierra Club have been used in previous research as indicators of interest group strength.\(^{16}\) The Sierra Club has been an active participant in the hazardous waste and toxic substances policy realm for a number of years.\(^{17}\)

Public interest group theories describe measures of the degree of urbanization within a given state (URB) as measures of contact. Truman (1951) characterized contact as a necessary complement to measures of attitudes and membership
levels in the evaluation of interest group resources. Two additional discriminant analyses were run in order to test Truman's characterization of the synergic relationship between urbanization and interest group membership levels; URB was deleted from the first analysis, SIC from the second. In both cases the deletion resulted in significant reductions in the discriminant function's performance. While the original discriminant function correctly categorized 46 states, the modified function was only capable of placing 41 of the 50 states into the correct category. Removing SIC from the analysis resulted in a significant decrease in the canonical correlation coefficient (a measure of the strength of the relationship between the discriminant function and the groups), which dropped from a value of .79 to .43. Finally, deleting SIC all but eliminated URB's power as a discriminating variable. The standardized discriminant coefficient for URB was reduced from .36 to .05, and the F-to-enter test revealed that URB's contribution to the discriminant function was no longer statistically significant.

Similar impacts were observed following the removal of URB from the discriminating function. In this second test of the association between contact and group membership levels the discriminant function was only able to correctly classify 84 percent of the cases, while the canonical correlation coefficient fell from .79 to .52. In addition,
the standardized discriminant coefficient for SIC dropped from .93 to .80. While hardly conclusive, these results suggest that the potential for contact between members of public interest groups and (1) like-minded individuals in other organizations and (2) members of the general public is a significant source of interest group influence.

That measures of interest group strength were found to be strong discriminating variables belies the limited interest group influence and countervailing power positions regarding the origins of state participation.

**Primacy and Industry Interests**

This analysis suggests that neither the industry dominance nor the limited industry influence position provide accurate descriptions of the process of social regulation as it applies to state participation in the implementation of RCRA. The fact that we have observed a positive (rather than negative) relationship between MFG and PRIMACY suggests that the linkage between the influence of industry and the origins of social regulation is more complex than described in extant private interest theories of regulation.

These findings parallel the results reported by Thompson and Scicchitano (1983), who found that the strength of groups targeted for regulation fails as a predictor of state participation under the Occupational Safety and Health Act of 1970.
Primacy: Interpreting the Results

The results of the discriminant analysis indicate that market failure and the public interest group dominance theories provide meaningful insights into the phenomenon of state participation in the regulation of hazardous wastes. That it should be this particular combination of positions is interesting for a number of reasons, not the least of which harkens to Chapter III and the discussion of critical reactions to market failure theories of regulation.

Market failure theories have been described by critics as being "black box" models of the policy process because they often fail to incorporate a plausible mechanism by which the demands for regulatory relief generated by occurrences of market failure might be translated into specific policies. Responses from advocates of the market failure position suggest that because they have failed to account for the role played by agents of the public interest these critics have overstated their case. (Theories of agency, which describe a range of social relationships in which agents represent the interests of others, provide a basis for understanding the role played by public interest groups and policy entrepreneurs in translating demands for regulatory relief into policy.) The fact that indicators of market failure and public interest group strength are strong, positive predictors of participation in this policy setting may be seen as an indication that interest groups in
fact perform such a function.\textsuperscript{20}

That the results from the discriminant analysis provide support for both the "classic" market failure and interest group dominance perspectives suggests that Mitnick was correct when he described theories of regulation which focus exclusively on a single class of explanatory variables as "simplistic." Regulation, like any other example of public policymaking, is a complex process shaped by numerous economic and political factors. Theories which explain regulation solely in terms of market failure, or the power of private interests, are incapable of capturing that complexity.\textsuperscript{21}

We now shift our focus to consider the implementation of hazardous waste regulations and the issue of how vigorously those regulations are enforced.

**Analysis of Implementation Vigor**

The term "implementation vigor" is used to denote the degree to which states which have primacy and are participating in the implementation of social regulatory policies monitor the entities targeted for regulation and apply sanctions for noncompliance. The available data indicate that states participating in the regulation of hazardous wastes under RCRA vary substantially in terms of implementation effort. (State scores for the dependent variable used in this portion of the analysis are reported in Table
15, Chapter IV.) This portion of Chapter V is devoted to a comparison of competing theoretic perspectives regarding the sources of that variation.

As noted in Chapter IV, southern states have in the past displayed outlier characteristics in terms of policy outputs. Comparative researchers have, as a result, become sensitive to the implications of the region's distinctive qualities. In order to determine if these unique patterns of behavior extend into the realm of hazardous waste regulation this analysis of implementation vigor, which draws upon the experiences of all eligible states, will be supplemented by an analysis which focuses specifically on a subset of states that have been designated as "nonsouthern."22

There are two significant differences between the analysis of vigor and the discriminant analysis described in the preceding section. First, because we are no longer dealing with a dichotomous dependent variable the constraints on the use of analytic techniques such as ordinary least squares multiple regression analysis no longer apply. Second, two additional independent variables have been included in order to examine the relative merits of the "symbolic politics" position regarding the determinants of implementation vigor. The variables INC (the average per capita income from 1976 to 1987) and REV (average general revenue per capita for that same time period) are introduced in order to account for the possibility that limitations on
the financial resources which would used for funding the implementation of a regulatory program such as RCRA may in fact be a limiting factor.

The addition of INC and REV necessitated a reexamination of the data in order to determine if multicollinearity would be a problem. Following the procedure outlined earlier each independent variable was regressed against all the other independent variables. As a result of this process it was determined that it would be necessary to exclude two variables (INC and VAL) from the analysis. (See Table 23 for details.)

Two regression equations were estimated; the first equation was used to investigate implementation vigor in the 41 states that had primacy as of January 1988, while the second was applied to the thirty "nonsouthern" states which had primacy as of the January 1988 cutoff date. The general form of the equations is:

\[
\text{VIGOR} = a_0 + b_1\text{IMP} + b_2\text{SUF} + b_3\text{HWA} + b_4\text{AGN} + b_5\text{RAN} + b_6\text{ENV} + b_7\text{MOR} + b_8\text{SIC} + b_9\text{URB} + b_{10}\text{MFG} + b_{11}\text{REV} + e_t.
\]

Results of regression analyses are reported in Table 24.
Table 23. Results of Tests for Multicollinearity in the Analysis of Determinants of Implementation Effort.

<table>
<thead>
<tr>
<th>Variable</th>
<th>R²: Series One</th>
<th>R²: Series Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMP</td>
<td>.28</td>
<td>.23</td>
</tr>
<tr>
<td>SUF</td>
<td>.61</td>
<td>.60</td>
</tr>
<tr>
<td>HWA</td>
<td>.24</td>
<td>.21</td>
</tr>
<tr>
<td>INC</td>
<td>.80</td>
<td>---</td>
</tr>
<tr>
<td>REV</td>
<td>.61</td>
<td>.25</td>
</tr>
<tr>
<td>AGN</td>
<td>.27</td>
<td>.24</td>
</tr>
<tr>
<td>MOR</td>
<td>.61</td>
<td>.53</td>
</tr>
<tr>
<td>RAN</td>
<td>.65</td>
<td>.51</td>
</tr>
<tr>
<td>ENV</td>
<td>.59</td>
<td>.46</td>
</tr>
<tr>
<td>SIC</td>
<td>.50</td>
<td>.49</td>
</tr>
<tr>
<td>URB</td>
<td>.75</td>
<td>.53</td>
</tr>
<tr>
<td>MFG</td>
<td>.75</td>
<td>.31</td>
</tr>
<tr>
<td>VAL</td>
<td>.81</td>
<td>---</td>
</tr>
</tbody>
</table>

Note: See Table 19 for an explanation of the variable identification codes.
Table 24. Regression Analysis of Determinants of VIGOR.

<table>
<thead>
<tr>
<th>Variables</th>
<th>All Primacy States</th>
<th>Nonsouthern Primacy States</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMP</td>
<td>.003</td>
<td>.008</td>
</tr>
<tr>
<td>SUF</td>
<td>2.854</td>
<td>1.282</td>
</tr>
<tr>
<td>HWA</td>
<td>.484</td>
<td>.732</td>
</tr>
<tr>
<td>REV</td>
<td>.292</td>
<td>.515</td>
</tr>
<tr>
<td>AGN</td>
<td>-31.276</td>
<td>-64.733</td>
</tr>
<tr>
<td>MOR</td>
<td>3.409</td>
<td>.620</td>
</tr>
<tr>
<td>RAN</td>
<td>998.480</td>
<td>951.392</td>
</tr>
<tr>
<td>ENV</td>
<td>7.207</td>
<td>12.812</td>
</tr>
<tr>
<td>SIC</td>
<td>.359</td>
<td>.053</td>
</tr>
<tr>
<td>URB</td>
<td>1.392</td>
<td>.982</td>
</tr>
<tr>
<td>MFG</td>
<td>-10.615</td>
<td>-16.409</td>
</tr>
</tbody>
</table>

R² = .281
Adjusted R² = .136

R² = .524
Adjusted R² = .242

Notes: 1) See Table 19 for explanation of the variable identification codes.
2) *p<.05;  †p<.10.
Results of the Regression Analysis

An examination of the adjusted $R^2$ for each equation reveals that the independent variables explain a modest amount of the observed variance in implementation vigor. However, we are more interested in identifying patterns of relationships among the independent variables than in the overall variance explained. It is these patterns that will enable us to evaluate the relative empirical strength of competing assumptions regarding the determinants of state vigor in the implementation of social regulation.

Implementation Vigor and Market Failure

As in the analysis of participation we find a strong, positive association between the average per capita weight of hazardous wastes generated within a state (HWA) and state behavior. Results from both the 41-state and "nonsouthern" analyses of implementation vigor indicate that states faced with the task of managing a greater per capita quantity of hazardous wastes will pursue that task more vigorously than states facing a lower per capita hazardous waste load. The zero-order correlation between HWA and VIGOR is a significant .38. The relationship is not diminished after controlling for the other independent variables; we find that partial correlation for HWA is .378 in the case of all 41 primacy states, and .520 for the nonsouthern primacy states. We also find that, as in the case of primacy, the
volume-based strategy for operationalizing the need for regulatory relief described by Bowman yields results unmatched by the "weak-link" approach. Neither the number of Superfund sites (SUF) nor the number of hazardous waste impoundments (IMP) exhibit a significant association with implementation vigor in either equation.

Symbolic politics theories of social regulation suggest that budgetary constraints are the ultimate determinants of state regulatory effort. The results of this analysis lend support to that suggestion. The zero-order correlation between average general revenue per capita (REV) and VIGOR (.49) indicates that wealthier states exert more effort in implementing RCRA than do states with more meager financial resources. The partial correlation between REV and VIGOR, controlling for the need for regulation is significant in both the 41-state and nonsouthern equations (.347 and .355 respectively). We see that states which have both a greater need for regulatory relief and more financial resources per capita implement hazardous waste regulations more vigorously than do states with equal need and fewer resources.

The political realist position stresses the relevance of political factors (e.g., partisanship and bureaucratic consolidation) in the determination of state implementation effort. It is at this stage of the analysis that the role of the southern states and their "outlier" characteristics becomes particularly interesting. When we examine the
results from the 41-state equation we see a strong association between Democratic partisanship (RAN) and the level of implementation effort (beta = .470, significant at the .05 level). If we were to stop at this point we might conclude that Dunlap and Gale (1976) and Kenski and Kenski (1981) were correct in asserting that a positive link exists between Democratic partisanship and state environmental policies. However, when we consider the results from the second equation (i.e., the equation from which southern states have been excluded) the nature of this link is called into question, because RAN is no longer significant (even at the .10 level). The finding that Democratic control of elected offices at the state level is not associated with implementation vigor is similar to results reported by Thompson and Scicchitano (1983), who found no link between partisanship and the level of state vigor in the enforcement of the Occupational Safety and Health Act.

The reader will recall that the inclusion of a second regression equation (which omits the southern states) was motivated by findings such as Lester’s (1980) that when one considers all 50 states Democratic party strength is negatively related to environmental policy outputs. Lester concluded that this was an artifact of the anomalous nature of the southern states, in which legislatures have traditionally been dominated by Democrats who have little in common (in terms of policy preferences) with their
nonsouthern counterparts. Based upon these results (and other studies which have described southern states as outliers on numerous measures of policy outputs) we would expect to find that southern states score higher on the modified Ranney Index, and lower on VIGOR, than nonsouthern primacy states. Surprisingly enough, such is not the case.

The southern states perform as anticipated with regard to the modified Ranney Index - they had an average Index score of .75 (a score described by Ranney as an indication of "modified one-party Democratic" control), while the average score for nonsouthern states was .55 (or "two-party"). However, it also turns out that the VIGOR scores for the southern states are slightly (albeit insignificantly) higher than those for the nonsouthern primacy states (422.9 versus 404.7). The obvious question at this point is "Why should this occur?" We shall return to this question after considering the evidence (or lack of evidence) for the remaining theoretic perspectives.

**Implementation Vigor and Public Interest Groups**

The results of this analysis indicate that neither the public interest group dominance position nor the limited interest group influence position provide satisfactory explanations for the observed levels of state implementation vigor.

Public interest group dominance theories predict that
we should find strong, positive associations between VIGOR and indicators of public interest group influence. Neither equation yields results which could be construed as support for this prediction.

Limited public interest group influence theories describe a regulatory environment in which these groups are unable to effectively counter the influence of private (industry) interests. Sierra Club membership levels and urbanization (SIC and URB) both perform as predicted; the 41-state and nonsouthern equations reveal no significant relationship between either of these variables and VIGOR. Before concluding that the limited public interest group position is an accurate description of the dynamics of implementation effort it is necessary to demonstrate not only that no connection exists between public interest group strength and implementation effort, but also that an inverse relationship exists between the level of implementation effort observed and variables which gauge the strength of the parties whose activities are subject to regulation (i.e., the regression coefficient for MFG must be negative and statistically significant). Both the 41-state and the nonsouthern equations fail to uncover any evidence that industry influence plays a significant role in shaping the implementation process. The negative beta values (-.267 and -.403 respectively) show that states in which manufacturing accounts for a greater percentage of the non-agricultural
labor force implement hazardous waste regulations less vigorously than do states in which manufacturing is not as important a source of employment opportunities; MFG does not, however, achieve statistical significance in either equation.

Implementation Vigor and Private Interests: The Role of Regulated Industries

On the basis of the results described in the preceding section we conclude that the industry dominance position fails to provide an adequate explanation of state behavior in the implementation of RCRA. On the other hand, the fact that MFG is negatively associated with VIGOR and fails to achieve statistical significance in both equations may be seen as evidence in favor of the limited industry influence position, which suggests that industry is unable to avoid regulation.

Vigor: Interpreting the Results

We have seen that problem severity and state wealth are determinants of vigor as it applies to state implementation of hazardous waste regulations under RCRA. States' efforts at implementing RCRA are not determined by the efforts of public interest groups to minimize the impacts of hazardous waste-related externalities, nor are they determined by industrial efforts to avoid the costs of hazardous waste
management. We have also seen that any attempt to explain hazardous waste regulation in terms of partisan consider­ations must take into account the impact of Democratic control of state elected offices in the South; once controls for the anomalous nature of the South have been introduced the strength of the association between partisanship on implementation vigor is considerably diminished.

There is, however, one question which remains to be answered - why is it that the vigor scores for the southern states are higher, instead of lower, than those of non­southern primacy states? An examination of the data reveals that the answer may lie (at least in part) in the fact that between 1976 and 1988 the scale of the hazardous waste management problem confronting the South was much greater than that facing the rest of the nation. During that period of thirteen years the nonsouthern primacy states generated a combined annual average of 272.6 pounds of hazardous waste per capita, while at the same time the eleven southern states generated a combined annual average of 424.5 lbs per capita. The hazardous waste surveys which served as the basis for the calculation of HWA do not present the detailed information needed to determine the "mix" of substances that comprised these wasteloads in all primacy states; however, the magnitude of the difference in wasteloads between the two regions suggests that the southern states' behavior ran counter to expectations simply because they were confronted
Conclusions

Perhaps the most important conclusion to be drawn from these results is that simplistic theories which either focus on a single "theme" or set of related explanatory variables (e.g., industry influence) or fail to differentiate between the various phases of the regulatory process cannot adequately capture the dynamics of social regulation. We have observed that primacy *qua* state participation is determined by a combination of problem severity (whether potential or extant) and the influence of public interest groups. We have also observed that the determinants of state behavior change when we focus on the implementation phase of the regulatory process and the issue of how vigorously hazardous waste regulations are enforced; budgetary constraints move to the forefront, while the importance of public interest group influence is greatly diminished.

We cannot address the question of whether or not neo-conservative regulatory reformers such as Wilson or Jones are correct when they assert that social regulation "goes too far" and imposes unreasonable costs upon industry. We have, however, observed that industrial interests appear to have little influence on the vigor or intensity with which hazardous waste regulatory programs are implemented. This leads us to consider the issue of impact as it relates to
the regulation of hazardous wastes. What relationship, if any, exists between the level of energy expended in implementing RCRA and the level of protection afforded from unintended exposure to hazardous wastes? It seems more than a bit naive to assume that increased vigor automatically results in greater reductions in the magnitude of hazardous waste-related externalities. Might it not be the case that what appears on the surface to be a robust implementation effort is in fact a "paper program" representing little more than a symbolic response to the hazardous waste problem?

Although we have found little evidence to support the notion that private interests are able to "capture" the social regulatory process, we must remember that we are dealing with a regulatory policy that is still relatively "young." As Pertschuck (1982) suggested, we may eventually discover that early victories by policy entrepreneurs in policy realms such as consumer protection are ephemeral, and that the influence of industrial interests increases as regulatory policies mature. Private interests are typically better organized and command more resources than their public interest counterparts, and are therefore in a much better position to influence the policy process over time. Thus, while we have failed to find empirical support for the industry dominance position (and have in fact criticized theories such as Stigler's as overly-simplistic) we must also acknowledge that a full theory of regulation must have
the capacity to account for the long-term ability of industry to protect and advance its own interests.

Finally, while we have seen no evidence to suggest that either participation or implementation vigor are determined by such factors as political culture or agency consolidation, we must acknowledge the possibility that these factors may play a role in shaping social regulatory policies as they mature.
NOTES

1. The terms "primacy" and "participation" are used interchangeably in this chapter.

2. The decision to use discriminant analysis, instead of possible alternative techniques such as logit or probit, was based on the fact that we are considering a problem of classification (i.e., we are attempting to identify the combination of independent variables that maximizes our ability to correctly classify states as being "primacy" or "nonprimacy." Discriminant analysis was designed specifically for such a task.

   One way of conceptualizing how discriminant analysis works is to think in terms of an n-dimensional space (in which "n" represents the number of independent variables). Discriminant analysis is an attempt to divide that space into m mutually exclusive regions (in which "m" is the number of classes or categories the dependent variable may assume). The boundaries between these regions are defined by discriminant functions (the maximum number of functions that may be derived is equal to the number of categories minus one or, in cases in which there are fewer discriminating variables than cases, the number of discriminating variables). The fact that the number of regions within this n-dimensional space is defined by the number of catefories illustrates the principal advantage of discriminant analysis, relative to OLS, in the analysis of dichotomous dependent variables - it is impossible to generate predicted values greater than 1 on the dependent variable. OLS imposes no such constraint on the magnitude of predicted values.


5. Comparison of the relative importance of each discriminating variable is made possible through the examination of standardized discriminant coefficients. Determinations regarding the contribution each discriminating variable makes to the discriminant function are based on the F-to-enter statistic.

6. For a discussion of the importance of properly established prior probabilities see Klecka (1980): 46-47 and Aldrich and Cnudde (1984): 287-290. Prior probabilities assigned in the analysis of all 50 states were .82/.18 (primacy/nonprimacy), and .77/.23 (primacy/nonprimacy) for the 39 nonsouthern states.

8. A "linear combination" is the sum of two or more variables (which may or may not have been weighted by constant terms).


10. The canonical correlation coefficient (r') is a measure of association which describes the relation between the discriminant function and the groups. Possible values for this coefficient range from 0.0 (indicating no relationship) to 1.0. See pages 36-38 of Klecka (1980) for more details.


12. The formula used in the computation of tau is:

\[ \tau = \frac{n_c - \sum_{i=1}^{g} p_i n_i}{n - \sum_{i=1}^{g} p_i n_i} \]

where \( n_c \) is the number of cases correctly classified, \( n \) is the total number of cases, \( g \) is the number of groups, and \( p_i \) is the prior probability of group membership.

13. Evaluations of the strength of the relationships between individual discriminating variables and the dependent variable are based on the combination of two factors - the magnitude of the standardized discriminant coefficient and statistical significance. The determination of statistical significance is based on the F-to-enter statistic (recorded in the Discriminant Coefficient column of Table 26.) The F statistic is used to test whether the additional discrimination resulting from the inclusion of a given variable is statistically significant.

14. The element of prevention touches upon an issue typically not addressed in market failure theories of regulation, which describe regulation as an act taken in reaction to, rather than in anticipation of, market failure.

15. Ingram suggested that much of this success may be a product of the fact that environmental problems are more salient at the state and local levels.

16. While it may not be the case the Sierra Club is the most active environmental group in this policy realm in every state, I have assumed that membership in this particular organization will covary with membership levels in other organizations that might be more active in the politics of hazardous wastes.
17. For example, the Sierra Club's lobbyist assigned to hazardous waste-related issues played an important role in the development of the Toxic Substances Control Act of 1976. See, for example, Epstein, Brown and Pope (1982): 190.

18. It is particularly interesting to note that while the original function correctly classified all of the primacy states, the removal of SIC resulted in the misclassification of 2 of the 41 primacy states.

19. In order to gauge the performance of the competing theoretic perspectives a second series of discriminant analyses was run; in each analysis the pool of discriminating variables was limited to those suggested by one of the theories of regulation (i.e., unique discriminant functions were constructed in order to test the market failure, symbolic politics, political realist, public interest group, and industry interest positions.) None of the discriminant functions was able to match the results just reported. Canonical correlations ranged from .04 for the industry dominance position to a value of .42 for the political realist model. In addition, none of the models was able to correctly classify more than 2 of the nonprimacy states. The performance of the industry dominance function was particularly poor; it misclassified all 9 nonprimacy states.

20. A series of difference of means tests was performed as a check on the outcome of the discriminant analysis. These tests revealed significant differences between the primacy and nonprimacy states with regard to HWA, SIC, and MFG - the three most powerful discriminating variables.

21. Acknowledging that the process of regulating hazardous wastes is a multi-stage process enables us to expand upon the interpretation of the "failure" of the industry dominance position. Industries within a given state are subject to regulation under RCRA regardless of that state's primacy status; we should therefore consider the possibility that the industry dominance position fails to provide a satisfactory explanation of state behavior because it applies to the implementation phase, rather than the origin phase, of the policy process.

22. States designated as "southern" include Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Designation is based on Lester (1980).

23. The two regression equations which form the basis of this portion of Chapter V were run with all independent variables entered simultaneously.
24. A difference of means test indicates that the disparity between the two regions is significant at the .05 level. There were no statistically significant differences between the two regions either in terms of the number Superfund sites (14.6 for southern states, 21.9 for nonsouthern) or hazardous waste impoundments (2815.1 versus 2568.5).
Summary and Concluding Remarks

Introduction

This inquiry began with the observation that between the years 1900 and 1980 the United States experienced three periods of dramatic expansion in the number of public policies intended to modify the behavior of business. It was noted that the regulatory policies introduced during the first two of these periods (i.e., the Progressive Era and the New Deal) addressed "traditional" concerns such as the control of prices, outputs, terms of competition, and market entry and exit, while the policies which emerged during the most recent of these periods were aimed at reducing the social impacts of corporate behavior. We also observed that several of the social regulatory policies initiated during this third era provided for state participation through the mechanism known as primacy, an implementation tool which allows the federal government to transfer responsibility for the enforcement of regulations to the states.

While there is general agreement among scholars regarding the dynamics of "traditional" economic regulatory policies such as those initiated during the Progressive Era and
the New Deal, there is no corresponding understanding regarding the dynamics of the "new" social regulation. What one finds instead is a lively debate over how our political system responds to demands for relief from externalities and whether or not the costs imposed as a part of the creation of social regulatory policies have resulted in economic dislocation. The failure to settle this debate was described in terms of three factors. First, instead of engaging in the development and testing of hypotheses regarding the relative importance of those potential determinants of social regulation many scholars have directed their efforts to the presentation of assertions of personal beliefs. We therefore find a body of literature populated with numerous discussions of whether or not social regulation represents unreasonable government interference in the operation of the market, and precious few examples of theory-driven examinations of the political and economic forces which motivate that interference.

Second, while there are extant examples of theory-driven analysis of social regulation, their value is often limited because they are confined to the examination of social regulation within a single jurisdiction (e.g., a single state), a situation which makes it quite difficult to conduct comparative assessments of theories of social regulation.

Third, the failure to arrive at a common understanding
regarding the dynamics of social regulation is a result of the failure to place the phenomenon of social regulation within the larger context of public policymaking. For example, Stigler produced a theory of regulation which attempted to explain regulatory behavior exclusively in terms of industry influence. Compounding this was the fact that he chose to treat regulation qua policymaking as if it were a featureless, monolithic process. Little attempt was made to describe the origins of regulatory policies, or discuss the factors that shape their implementation. Under different circumstances such a parsimonious approach to theory building might be seen as a virtue - not so in this case. In order to develop a useful and relevant theory of regulation we must account for the entire range of actors who have a stake in the outcome of the regulatory process, as well as the political, economic and environmental characteristics which shape the setting in which regulation takes place. Theories which lack the capacity to capture the constantly evolving interactions between these characteristics are of little value.

This dissertation, which tests competing positions regarding the determinants of social regulation, serves two purposes. First, it is intended to shed light on the dynamics of social regulation and help settle the debate as to the relative merits of the competing theoretic positions. Instead of attempting to persuade the reader that "Theory X"
is clearly superior to its competitors, we have focused our efforts on an empirical comparison of the three major positions regarding the economic and political factors that shape social regulation. Second, and more importantly, this analysis, which demonstrates that none of the three major theoretic perspectives described herein is capable of generating an adequate explanation of the regulatory process, is intended to serve as the basis for future work directed at the development of a full theory of social regulation.

The implementation of Title III of RCRA, the Resource Conservation and Recovery Act of 1976 and its amendments, provides an opportune setting for this sort of investigation. The management of hazardous wastes poses many of the problems social regulation is supposed to address. To what level of protection from exposure to hazardous wastes is the public entitled? How should the costs of providing that protection be distributed across society? What are the most effective methods for minimizing hazardous waste-related impacts on human health and the environment? How efficient are those methods? Because the states have been given the opportunity to bear as much, or as little, of the regulatory burden as they desire we can observe the unfolding of a policy in a number of different environments.
Summary of Findings

The debate over the dynamics of social regulation was characterized in terms of competing position regarding the importance of three factors: market failure; the influence of public interest groups; and the economic and political strength of parties whose activities are subject to regulation. Based on a survey of the regulation literature a set of hypotheses reflecting the assumptions underlying these three positions was developed and tested.

The significance of the results of this analysis, which focuses on a single, relatively "young" policy, can only be determined after similar investigations of a number of social regulatory policies have been completed. While it is therefore necessary to treat conclusions based on these results as tentative, we are nevertheless presented with interesting glimpses into the mechanics of social regulation.

Based on the discriminant analysis described in Chapter V we have concluded that state participation in the implementation of RCRA is associated with two factors - market failure and the strength of public interest groups.

We have seen that two of the three indicators of problem severity, the average weight of hazardous waste generated per capita (HWA) and the number of Superfund sites (SUF), were powerful discriminating variables. The combination of these two measures suggests that within the context of RCRA,
State participation in the implementation of social regulation is both a response to the "sins of the past" as well as an attempt to stem the transgressions of the present and future; SUF allows us to capture the extent to which past hazardous waste management practices have resulted in extraordinary threats to human health and the environment, while HWA serves as an indicator of the potential for future exposure.

We have also observed that the influence of public interest groups is not merely a matter of the number of active members within a particular state. As Truman (1951) suggested, contact (measured here in terms of urbanization) is a necessary complement to the attitudes and membership levels of public interest groups.

The fact that we failed to observe the predicted inverse relationship between primacy and the percentage of the non-agricultural workforce employed in manufacturing (MFG) in a given state may be seen as evidence that the relationship between private interests and the origins of social regulatory policies is more complex than described in the industry dominance position. We shall briefly consider three alternative explanations for this behavior.

First, it may be the case that industry dominance theorists have based their work on erroneous assumptions regarding the relationship between the interests of hazardous waste generating industries and the of the men and women
employed by those industries. It is conceivable, for example, that instead of merely parroting their employers' objections to regulation, workers may want to balance the maintenance of a favorable economic climate for their employers with attempts to minimize the environmental consequences of their employers' waste management practices. Under such circumstances the prospect of state participation in the implementation of RCRA may not represent a significant threat to their employers' ability to continue to do business and provide employment opportunities.

Second, it may be the case that the significance of MFG as a discriminating variable is not a function of the potential economic and electoral strength of industrial labor but of a connection (in the minds of state officials) between the magnitude of industry (as measured by employment) and the potential for hazardous waste generation.

Finally, there is some evidence which suggests that industry officials may in fact welcome the prospect of state participation as a substitute for federal involvement in the implementation of environmental policies. State regulators are typically more familiar with local conditions, and may be willing to work with industry rather than develop an adversarial relationship. These same state officials are also typically more accessible than federal personnel; they are not forced to divide their attention among a number of programs in several states.
Having identified relationships between this set of discriminating variables and state participation, we turn our attention to a consideration of factors that are not determinants of state participation in RCRA. Counter to the predictions of the political realist position, state participation is not associated with such factors as partisanship, a cultural predisposition toward government regulation of business practices, bureaucratic consolidation, or preexisting support for environmental protection policies.

Market failure also plays a role in determining the level of vigor with which states that have primacy implement hazardous waste regulatory programs. It is interesting to note that while primacy seemed to be both a response to and an anticipation of market failure, implementation vigor appears to be determined solely by the potential for harm. The number of Superfund sites, which had been a powerful predictor of state participation, fails to materialize as a determinant of state implementation effort.

Budgetary constraints move into the foreground, while the influence of public interests groups recedes as state involvement in RCRA progresses into the implementation stage of the policy process. Proponents of symbolic politics explanations of social regulation (such as Ophuls) have suggested that while regulators may be motivated by the best of intentions, their actions are often ineffectual because they lack the resources to mount significant attacks on offending
behavior. While this analysis cannot address the issue of regulatory impact and the effectiveness of state actions, we do find that states with larger budgets are in better position to "do something" about hazardous wastes.

We have found, as in the case of primacy, that industries that are subject to regulation under RCRA appear to have little impact on state behavior. A note of caution is in order - this should not be interpreted as evidence that hazardous waste generators will never be able to affect state behavior. It may be that the issue of hazardous waste management was too visible during the study period, and that industry dominance would not have a chance to appear until the policy realm had "matured."

The comparison of the various positions in terms of their ability to correctly predict state participation and vigor is an interesting exercise; it is not, however, the only raison d'être for this analysis. Because this dissertation is also intended to serve as a starting point in the development of a full or synthetic theory of social regulation we are also interested in demonstrating that no theory which is grounded on a single "class" of independent variables (e.g., market failure) is capable of generating a satisfactory model of the policymaking process. Based on the observations that: (1) both the market failure and public interest group dominance positions provided accurate predictions regarding state participation; and (2) that the
market failure and symbolic politics positions both fared well in terms of identifying determinants of implementation vigor we have concluded that such theories are in fact incapable of providing adequate explanations of the dynamics of that process.

What Next? Steps Toward a General Theory of Social Regulation

As stated earlier, the goal of this dissertation was not to develop a general theory of regulation. Rather, my intention was simply to take the necessary first step in the process of developing such a theory, and demonstrate that none of the competing theoretic perspectives is capable of generating an adequate explanation of social regulatory policymaking by itself. Having done that, the obvious question is: "what next?"

There are a number of issues that still need to be resolved. The most obvious of these involves the need to look beyond RCRA and the regulation of hazardous wastes in order to gain a comparable understanding of the dynamics of other social regulatory programs both in and outside of the environmental policy realm. Do the determinants of air and water pollution control policies differ significantly from those of hazardous waste management policies? Is market failure a determinant of policy origin in the consumer protection realm? To what extent is the enforcement of regula-
tions intended to promote safety in the workplace subject to budgetary constraints? Are partisan considerations significant in other policy realms?

A second issue that should be explored concerns the dependent variable used to analyze participation. In this instance we treated participation as a dichotomous phenomenon - either a state had primacy or it didn’t. What differences might we have observed if we had treated the origin of social regulation at the state level as an example of the process of policy innovation, and focused on such topics as the rate at which states obtained primacy or the spatial distribution of participation and its impacts on implementation vigor?

In order to conduct such an analysis we would have to account for the potential impacts of federal as well as state level conditions. For example, the regional offices of the USEPA played a central role in primacy decisions. Regional administrators were responsible for evaluating state applications and making "go/no go" recommendations to agency officials in Washington. Based on personal experience in dealing with USEPA regional offices I suspect that differences across the regions played a central role in the rate at which primacy was granted for the implementation of RCRA as well as in decisions regarding state participation in the implementation of the Clean Water Act and Clean Air Act. ¹ Other factors, such as the near self-destruction of
the USEPA in 1983, the clarity (or lack thereof) of the RCRA message to state officials, and the effects of judicial challenges to RCRA might also have affected the speed with which states assumed primacy.

The significance of spatial distribution goes to the issue of whether state decisions are affected by conditions in neighboring states. Do neighboring states tend to emulate one another and move toward a "lowest common denominator" in terms of implementation vigor so as to avoid placing themselves at a competitive disadvantage? Tracking the behavior of neighboring states could provide an interesting image of the regional aspects of policy evolution.

One of the more interesting aspects of social regulation is the potential connection between issue salience and the locus of decision making, and the impact such a connection might have on implementation effort. For example, Ingram et al. (1979) found evidence of an interaction between the nature or severity of the problem being addressed by a regulatory policy and other elements of the policymaking process. After studying water resource policies in the Four Corners states they concluded that under "normal" circumstances (i.e., when water resource problems are less visible) policy activities are focused in executive agencies, the courts, and regulatory commissions: "legislatures will act structurally, reassigning decision-making responsibility elsewhere."² Conversely, they argued, when water resource
problems reach crisis levels and become politically "ripe" the focus shifts back to the state legislatures. What impacts (if any) on the "mix" of determinants of state action might we observe if we were to incorporate one or more measures of problem visibility? What changes in this "mix" would occur over time as the public's attention (as well as that of regulators) moved from one issue to the next? Could salience be used to explain the failure to find support for the industry dominance position? It might be the case that the issue was still too visible, or too "young", between 1976 and 1988, and that industries would not have been able to operate effectively in what would have been an emotionally-charged regulatory environment.

The importance of time, and its impacts on the politics of social regulation, should not be overlooked. This analysis represents a "snapshot" of the process of social regulation. There is reason to suspect, on the basis of works such as Bernstein's (1955) life cycle theory of regulatory commissions, that private interests (industry) may eventually come to wield a certain amount of influence in the hazardous waste policy realm. I would suggest that in addition to the failure to distinguish between the various stages of the policy process, the failure to arrive at a consensus regarding the dynamics of social regulation is a result of the fact that theorists have typically treated social regulation as a static phenomenon. It would be
interesting (as well as informative) to revisit the issue of implementation vigor at some point in the future in order to determine whether agencies charged with implementing social regulation undergo the sorts of transformations described by Bernstein, Cary (1967) or Jaffe (1954).

This analysis focused on two specific stages of the process of policymaking: origin and implementation. We have yet to address the concept of regulatory impact. Perhaps the ultimate measure of the value of any regulatory policy is the impact it has on the targeted behavior. It would be interesting to determine what, if any, impacts the delegation of implementation authority has in terms of reducing the magnitude or the severity of hazardous waste-related problems. Do states that have primacy enjoy a greater degree of protection from unwanted exposure to hazardous wastes, or do federal regulators implement Title III of RCRA more effectively than their state counterparts?
NOTES

1. These include the number of personnel available to evaluate state applications, the amount of time those personnel would have had to conduct such evaluations, as well as the attitudes of regional personnel regarding the "proper" relationship between the federal government as represented by the USEPA and the states.

2. Ingram et al. (1979): 309.

3. Bernstein identified four stages in this life cycle: gestation, youth, maturity, and old age. He argued that while the length of these periods may vary from commission to commission, and that periods may sometimes skipped, there is a "rhythm of regulation" that suggests a "natural life cycle" (1955: 74). The role of private interests comes to the forefront in the last two stages, after regulatory agencies undergo a "process of devitalization."
BIBLIOGRAPHY


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