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Report to the Chairman, Subcommittee on Environment, Energy, and Natural Resources, Committee on Government Operations, House of Representatives

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POLLUTION PREVENTION

EPA Should Reexamine the Objectives and Sustainability of State Programs

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Program Evaluation and
Methodology Division

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January 25, 1994

The Honorable Mike Synar
Chairman, Subcommittee on Environment,
Energy, and Natural Resources
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

In a January 22, 1992, letter, you asked us to initiate a review of federally-aided state pollution prevention programs and to determine how well these programs are implementing federal pollution prevention policy. This report presents our findings on these issues.

Our evaluation provides an overview of the types of state pollution prevention programs and detailed analyses of how these programs are implemented. In addition, we address the indicators used by the Environmental Protection Agency (EPA) and states to evaluate program effectiveness, as well as ways to improve such evaluation.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its date of issue. At that time, we will send copies to the Administrator of EPA and to interested congressional committees, and we will make copies available to others upon request.

If you have any questions or would like additional information, please call me at (202) 512-2900 or Kwai-Cheung Chan, Director of Program Evaluation in Physical Systems Areas, at (202) 512-3092. Other major contributors to this report are listed in appendix III.

Sincerely yours,

Eleanor Chelimsky
Assistant Comptroller General

Executive Summary

Purpose

In recent years, environmental policy has begun to focus upon preventive measures. Many policy makers and industry officials have started to realize the benefits of avoiding the production of industrial pollution. Further, the increasingly stringent matrix composed of government environmental regulations and pressure from public interest groups has provided incentives for companies to do so. In 1990, the Pollution Prevention Act was passed, and soon thereafter, the EPA "Pollution Prevention Strategy" was issued. The strategy advocates the use of state-level programs to assist industry in avoiding the creation of pollution in the first place.

The Chairman of the Subcommittee on Environment, Energy, and Natural Resources of the House Committee on Government Operations asked GAO to examine the activities of the state pollution prevention programs. Specifically, GAO was asked to address the current EPA role in these programs.

Background

Federal pollution prevention policy has been formulated over the last 10 years. The Hazardous and Solid Waste Amendments of 1984 (HSWA) amended the Resource Conservation and Recovery Act of 1976 (RCRA). HSWA set as national policy that, "wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible." This policy initially was interpreted to apply only to land. However, the Pollution Prevention Act of 1990 broadened the scope of the policy by stating that pollution "should be prevented or reduced at the source whenever feasible" for all environmental media: air, land, and water. This act establishes a four-part hierarchical system of environmental protection, with source reduction of pollution as the most desirable option. (Source reduction refers to the practice of reducing the initial production of pollution.) In cases where source reduction is not feasible or possible, the act states that waste recycling should be conducted, if feasible. Waste treatment comprises the third tier of the hierarchy, and waste disposal is considered the last resort.

State programs are viewed by EPA as prime implementors of federal pollution prevention policy. They therefore constitute the focus of the present study. GAO interviewed EPA and state officials, conducted site visits, and sent a survey questionnaire to the directors of state programs. The response rate for this survey was 84 percent.

Results in Brief

GAO identified 105 state pollution prevention programs nationwide and found major differences in how these state programs operate. Both regulatory and nonregulatory programs exist: The former require pollution prevention planning by industry; the latter promote voluntary prevention by offering technical assistance, education, and outreach activities to industry. However, GAO found that many state programs claiming to conduct pollution prevention activities were inordinately involved in waste recycling, treatment, and/or disposal. These programs obtain funding from EPA that rewards their after-the-fact strategies without looking into whether prevention was possible, which is inconsistent with the policy established by the Pollution Prevention Act. Specifically, the lack of emphasis on pollution prevention at the EPA regional offices may negatively affect the administration of EPA funding. GAO also found that many programs are dependent for their existence on EPA funding, even though this funding is not expected to be permanent. Thus, the state programs expected to implement pollution prevention were instead concentrating on other strategies and, in any case, do not appear likely to survive once federal resources are withdrawn.

GAO's Analysis

State Program Classification

Of the pollution prevention programs that are generally classified as either regulatory or nonregulatory, 20 percent are regulatory, and the rest are nonregulatory. Regulatory programs are intended either to adapt regulatory efforts already existing in the state to prevent pollution, or to develop new regulations with a pollution prevention focus. Existing regulatory programs typically require each reporting facility to submit a toxics use-reduction plan that designates a target amount of waste reduction by a certain date. The target amount is left to the discretion of the facility. In contrast, nonregulatory programs typically rely on widespread education of business and industry sectors to promote voluntary pollution prevention. These programs are often separated from the regulatory arm of state government and oriented toward providing technical assistance to companies.

Implementation of State Programs

In accordance with the Pollution Prevention Act, many state programs now provide technical assistance to industry in the areas of pollution prevention and technology transfer. However, the extent of this aid varies

by program type. Nonregulatory programs conduct more technical assistance and technology transfer than regulatory programs, but these nonregulatory programs cannot require industry to conduct pollution prevention planning and sometimes take a somewhat passive and reactive approach to their customers rather than one of active outreach. As a result, those companies in need of pollution prevention assistance that fail to seek it out for themselves may not receive it.

Indicators of Program Progress

Many state programs evaluate the progress of their program activities. However, the indicators used to monitor progress vary greatly among programs, and many of them do not sufficiently document how well programs are working. While the EPA Pollution Prevention Incentives for States grant program requires semiannual progress reports from state programs, the utilized methods invite respondent bias. As a result, these progress reports cannot be aggregated nationally and thus cannot form the basis of a national profile of state program progress.

Evaluating Program Effectiveness

Not only are current data unsuitable for aggregating nationally, but they also do not allow the determination of pollution prevention program effectiveness (or impacts), even at the state level. The barriers to evaluation are organizational rather than conceptual. Some programs have goals and objectives unrelated to pollution prevention. Many companies lack staff trained to gather data appropriate to measuring program effectiveness. Industry culture is not often conducive to the evaluation of program effectiveness. Although methods are available to gather effectiveness data, including the total cost assessment approach (see chapter 5), GAO found little evidence of their use.

Recommendations

Based on these findings, GAO recommends that the Administrator of EPA (1) ensure (by strengthening the state grant program evaluation requirements) that state pollution prevention programs are in fact emphasizing source reduction rather than recycling, treatment, and disposal of waste; (2) encourage state programs to combine various attributes of regulatory and nonregulatory pollution prevention programs to achieve more proactive and energetic outreach; (3) improve data collection processes such that state program efforts can be evaluated (a subsequent GAO report will address this issue); (4) strengthen the evaluation requirements of the Pollution Prevention Incentives for States (PPIS) grant program; (5) reinforce the presence of pollution prevention

program efforts at the 10 EPA regional offices; (6) encourage state programs to promote changes in industry culture that will foster the adaptation and evaluation of pollution prevention efforts; (7) seek to substitute state prevention activities for enforcement actions; and finally (8) establish criteria within the PPIS grant program for measuring the success of source reduction efforts undertaken by businesses.

Agency Comments

GAO discussed the results of its work with responsible agency officials and revised the report where appropriate. General agency comments are provided and addressed in chapter 6.

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Abbreviations

EPA	Environmental Protection Agency
GAO	General Accounting Office
HSWA	Hazardous and Solid Waste Amendments of 1984
PPIS	Pollution Prevention Incentives for States
RCRA	Resource Conservation and Recovery Act of 1976
SARA	Superfund Amendments and Reauthorization Act of 1986
SRRTA	Source Reduction and Recycling Technical Assistance
TCA	Total cost assessment
TRI	Toxics Release Inventory

Introduction

Since the establishment of the U.S. Environmental Protection Agency (EPA) in 1970, both the Congress and EPA have considered various mitigation strategies to control the harmful effects of hazardous and toxic wastes.[1] For many years, emphasis was placed upon "end-of-pipe" pollution controls whereby wastes were treated, stored, and disposed of with various degrees of success. Such controls are generally able to decrease the environmental harm done by hazardous wastes but now seem to have reached a point of diminishing returns. Landfill space is extremely limited, while stringent laws and community resistance restrict waste incineration and the disposal of wastes into the oceans. On the other hand, these approaches themselves are not innocuous: Their continued use means that potentially harmful residuals from such wastes may still be emitted into the air, land, and water. In addition, both the direct and the opportunity costs of environmental control technology and enforcement continue to escalate, and these costs are ultimately borne by consumers.

Because of the limitations of end-of-pipe environmental controls, the Congress and EPA have paid increased attention to at-the-source prevention of pollution by industrial processes. However, pollution prevention is not mandatory but voluntary, based on the economic incentives likely to attract industry to its practices.[2] Such incentives include lower costs for waste treatment, regulation compliance, and industrial efficiency through the conservation of raw materials and energy use. However, because pollution prevention activities sometimes require capital outlays with an uncertain payback period, it is also the case that at least one disincentive exists. Although pollution prevention has been part of national environmental policy for more than 9 years, EPA has not been

[1]"Hazardous wastes" are wastes regulated under subtitle C of the federal Resource Conservation and Recovery Act of 1976 (RCRA), its amendments, and subsequent regulations. These are wastes whose characteristics are toxic, reactive, ignitable, and corrosive. Hazardous wastes may be included in the Toxics Release Inventory (TRI), a list of 320 chemicals that certain manufacturing facilities are required to report annually. Individual states often have a more inclusive definition, which may effectively expand the universe of wastes regulated. States must include as hazardous at least those wastes that are regulated under RCRA. For this evaluation, "hazardous waste" refers to any waste considered hazardous under RCRA and any pertinent state regulations.

[2]According to EPA—Pollution Prevention 1991: Progress on Reducing Industrial Pollutants (Washington, D.C.: October 1991), p. 4—"pollution prevention" is "the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source.... [It] includes practices that reduce the use of hazardous materials, energy, water or other resources, and practices that protect natural resources through conservation or more efficient use."

successful in determining how effective this policy has been.[3] EPA has stressed the expected benefits of pollution prevention in its reports and other publications but has done little direct work with industry to determine either the extent of this policy's implementation or its effects.[4] As a result, some critics of EPA have suggested that the agency remains primarily interested in waste treatment rather than pollution prevention.

Pollution prevention and end-of-pipe pollution controls (treatment and disposal) are two vastly different approaches to dealing with the nation's waste problems. The pollution prevention philosophy stresses efficiency of resources, minimization of risks, and positive relationships between industries and the communities in which they are located. Companies using end-of pipe controls can incur great costs to treat and dispose of wastes, often increase human health risks, and may be perceived as unconcerned about community quality-of-life. Thus, while pollution prevention stresses "up-front" thinking, end-of-pipe controls continue to rely on increasingly restricted treatment and disposal options to deal with hazardous and toxic wastes.

As noted by EPA, several hundred billion dollars have been spent to mitigate environmental problems. As of 1990, the cost of all pollution control activities was estimated to be $115 billion per year, with this amount expected to increase to $170 billion annually by the year 2000. Furthermore, additional environmental cleanup expenses are borne by states, cities, counties, automobile manufacturers, and (ultimately) consumers.[5] At the same time, EPA has been spending less than 1 percent of the agency's annual budget for source-reduction activities.

The Pollution Prevention Act of 1990

With the passage of the Hazardous and Solid Waste Amendments of 1984 (HSWA) to the Resource Conservation and Recovery Act of 1976 (RCRA), pollution prevention became national policy. However, these amendments were construed as directed only toward hazardous wastes that were to be

[3]We have found serious measurement flaws in data designed to track pollution prevention progress. See Hazardous Waste: EPA's Generation and Management Data Need Further Improvement, GAO/PEMD-90-3 (Washington, D.C.: February 9, 1990); Hazardous Waste: Data Management Problems Delay EPA's Assessment of Minimization Efforts, GAO/RCED-91-131 (Washington, D.C.: June 13, 1991); Waste Minimization: EPA Data Are Severely Flawed, GAO/PEMD-91-21 (Washington, D.C.: August 5, 1991); and Waste Minimization: Major Problems of Data Reliability and Validity Identified, GAO/PEMD-92-16 (Washington, D.C.: March 23, 1992).

[4]For example, see the EPA reports Pollution Prevention 1991: Progress on Reducing Industrial Pollutants (Washington, D.C.: October 1991) and The 1986 Report to Congress: Minimization of Hazardous Waste (Washington, D.C.: October 1986).

[5]See EPA, Environmental Investments: The Cost of a Clean Environment (Washington, D.C.: Island Press, 1991).

disposed of in landfills. The enactment of the Pollution Prevention Act of 1990 has further strengthened federal policy. The Pollution Prevention Act attempts to improve on HSWA by introducing a multimedia focus.[6] While HSWA only considered the discharge of waste to the land medium, the Pollution Prevention Act expands the scope to all environmental media (that is, air, land, and water). The act states the following:

"The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner."[7]

The Pollution Prevention Act thus stresses "source reduction," which is defined as

"any practice which (1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste [pollutant] stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, and disposal; and (2) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control."[8]

Subsequent to the passage of the act, EPA refined and elaborated the working definition of "source reduction" to specifically include protecting natural resources through conservation or increased efficiency in the use of energy, water, or other materials.

The implementation of the Pollution Prevention Act has been assisted by the existing decentralized efforts of state governments, which have taken the lead role in promoting pollution prevention.[9] EPA maintains that state

[6]The term "multimedia" refers to the inclusion of air, land, and water. Pollution prevention activities that do not take a multimedia approach run the risk of merely shifting the pollution from one environmental medium to another.

[7]The Pollution Prevention Act of 1990. section 6602(b). 42 U.S.C. 13101(b).

[8]The Pollution Prevention Act of 1990. section 6603(5)(A). 42 U.S.C. 13102 (5)(A).

[9]Some state programs have existed since the early to mid-1980's. The Pollution Prevention Act of 1990 was a catalyst for the establishment of several more.

governments can be more effective than the federal government in promoting pollution prevention directly to industry, pointing out that "states have been at the forefront of the pollution prevention movement...with...programs occasionally serving as a model for federal programs."[10] EPA supports this position by observing that state agencies better understand the needs of industries within their borders, and can thus design their programs to be more effective. Furthermore, EPA suggests that states are also logistically better suited to such tasks.

In recognition of the current state-program predominance in this area, the Pollution Prevention Act contains provisions that are directly relevant to state program operations. Among these provisions are those establishing the Pollution Prevention Incentives for States (PPIS) grant program as well as a source reduction clearinghouse.

The Pollution Prevention Incentives for States (PPIS) Grant Program

In early 1991, EPA formally announced its "Pollution Prevention Strategy" and identified the congressionally mandated PPIS grant program as a method to advance that strategy. The purpose of the strategy was to provide guidance and direction for efforts to incorporate pollution prevention within EPA's existing regulatory and nonregulatory programs and to set forth a program that could achieve specific objectives in pollution prevention within a reasonable time frame. The strategy acknowledges that significant barriers to achieving pollution prevention exist, including a lack of information and capital.[11] EPA believes that state pollution prevention programs can help overcome these barriers by providing technical assistance. The purpose of the PPIS grant program was to assist states with these activities. The Pollution Prevention Act of 1990 authorizes EPA to provide matching grants to states for programs that promote source reduction techniques by businesses. Federal funds used in this program provide no more than 50 percent of the funds made available to a state in each year of state program participation. The state contributions may include dollars and/or goods and services.

[10]Pollution Prevention 1991: Progress on Reducing Industrial Pollutants (Washington, D.C.: October 1991), p. 71. For example, the New Jersey Industrial Survey of 1979 and state of Maryland environmental reporting activities served as a model for the Toxic Release Inventory (TRI) provisions of the Federal Emergency Planning and Community Right-to-Know Act.

[11]These problems are particularly critical for small businesses. Such businesses are often unaware of their environmental problems, and often lack the financial resources to pay for updates of production equipment that would prevent pollution. In addition, small businesses are more likely to rely heavily upon recommendations from vendors of waste treatment equipment, which inhibits the adaptation of pollution prevention practices.

State programs seeking to participate in the grant program must demonstrate the extent to which

- specific technical assistance will be made available to businesses seeking information about source reduction opportunities, including funding for experts to provide on-site technical advice to businesses seeking assistance and assistance in the development of source reduction plans;
- assistance will be targeted to businesses for whom lack of information is an impediment to source reduction; and
- training will be provided in source reduction techniques. (Such training may be provided through local engineering schools or by any other appropriate means.)

Under the act, EPA is also required to establish appropriate means to measure the effectiveness of the state grants in promoting source reduction techniques by businesses. Finally, state program grantees are required to make information generated under the grants available to EPA.

Since the program's inception in 1989, EPA has awarded about $20 million to 72 state and regional organizations.[12] Grant amounts have generally not exceeded $300,000 to any one program. To be eligible for PPIS grant funding, programs must operate within one of the 50 states, the District of Columbia, the U.S. Virgin Islands, the Commonwealth of Puerto Rico, or any territory of the United States. In addition, programs can exist within any agency or instrumentality of a state, including state universities, or as a part of a federally recognized Indian tribe. (Local governments, private universities, private nonprofit organizations, private businesses, and individuals are not eligible.)

EPA requires grant applications to include plans for program continuance beyond the initial project funding period. Thus, EPA expects that state programs will eventually become self-sufficient and federal funding will no longer be required.

Source Reduction Clearinghouse

The Pollution Prevention Act requires EPA to compile information about source reduction, including the creation of a computer data base. The clearinghouse is intended to serve state programs by mounting active outreach and education programs to further the adoption of source

[12]Prior to 1990, EPA awarded state grants under the Source Reduction and Recycling Technical Assistance (SRRTA) program. SRRTA was initiated in 1989. The program was renamed Pollution Prevention Incentives for States (PPIS) in 1990, in conjunction with the passing of the new Pollution Prevention Act; the $20 million figure includes total awards from both programs.

reduction technologies. Additionally, the clearinghouse is meant to collect and compile outcome and other information reported by states receiving grants from the PPIS program.

Evaluating Program Effectiveness

The Pollution Prevention Act provides for EPA to establish appropriate means for measuring the effectiveness of the federal grants used in promoting source reduction. Some programs without federal funding support also evaluate program effectiveness based on state legislative requirements. Since 1985, state program officials have participated in a national forum to promote multimedia pollution prevention. This forum, the National Roundtable of State Pollution Prevention Programs, meets twice each year to exchange technical and program information. In particular, the National Roundtable has developed a state program position on current constraints inhibiting the evaluation of program effectiveness, the details of which are summarized in the next two sections of our report.

Evaluation and the Nature of State Pollution Prevention Programs

According to the National Roundtable, pollution prevention is a long-term program objective that generally resists short-term goal setting. As a result, the relatively brief operating time of many state grant programs limits their ability to evaluate their own effectiveness. Secondly, several variables, unique to each state, severely limit the ability to aggregate effectiveness studies at the national level. Such variables include political climate, industrial base, maturity of each program, staff resources, and organizational placement of each program within the state government structure.

Limitations of Waste Generation and Release Data

Again, according to the National Roundtable, waste generation and release data, as currently reported under the Resource Conservation and Recovery Act of 1976 (RCRA) or title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), are seldom empirical and are probably inaccurate. Waste generation and/or release data do not control for several mitigating factors, including

- production level fluctuations over time;
- new treatment technologies that reduce reported amounts of waste while not changing generation rates;
- changes that shift wastes to the product itself; and

- material substitutions that result in new waste types, which in turn are regulated differently or not at all.

Objectives of This Study

The Chairman of the House Subcommittee on Environment, Energy, and Natural Resources asked us to evaluate the activities of state pollution prevention programs. In designing our evaluation, we determined that there was a need to develop a data base containing descriptive program-implementation information. Rapid personnel turnover, political changes, and increasingly stringent state-level fiscal constraints had rendered some of the existing information obsolete. In accordance with the Subcommittee's request, we also identified and assessed the soundness of the indicators used to assess program progress, and we determined what changes were needed to improve knowledge of program effectiveness in reducing waste generation and releases. We asked the following specific evaluation questions:

1. What state pollution prevention programs exist or are planned?

2. How are state pollution prevention programs implemented?

3. How sound are the indicators used to characterize the progress of state pollution prevention programs?

4. What changes are necessary to enable EPA and the states to evaluate pollution prevention program effectiveness?

Scope and Methodology

This evaluation encompasses the universe of state pollution prevention programs. In accordance with the Subcommittee's request, we emphasized state programs oriented toward source reduction or recycling.[13] We also targeted state programs that dealt in wastes regulated under the provisions of RCRA or title III of SARA. We identified these programs by obtaining the membership directory of the National Roundtable of State Pollution Prevention Programs and the EPA report Pollution Prevention 1991: Progress on Reducing Industrial Pollutants.[14] A total of 105 programs were thus identified.

[13]As noted previously, the Pollution Prevention Act places a higher priority on source reduction than on recycling. Furthermore, the PPIS grant program is exclusively for source reduction. However, some programs do utilize recycling, especially the single-media programs and those established prior to the passage of the Pollution Prevention Act.

[14](Washington, D.C.: October 1991).

We used different methodologies to address our four evaluation questions. To address the first question—"What state pollution prevention programs exist or are planned?"—we utilized EPA reports and publications of the National Roundtable of State Pollution Prevention Programs to develop a list of existing programs. Next, we verified the completeness of the list by consulting with experts and then sent a survey questionnaire to the directors of state pollution prevention programs.[15] This process resulted in a categorization of programs by state and also provided a two-part classification of the programs (that is, regulatory and nonregulatory).

For our second evaluation question—"How are state pollution prevention programs implemented?"—we conducted state-program site visits and interviewed EPA and state officials to determine how to characterize program implementation activities in relation to goals, resources expended, and monitoring activities. We developed questions to address these factors, and these questions were included as a part of the survey questionnaire. We also convened an expert panel to assist us in interpreting the survey results. This process resulted in a systematic characterization of constraints on program implementation and areas of implementation quality.

To answer our third evaluation question—"How sound are the indicators used to characterize the progress of state pollution prevention programs?"—we utilized our survey questionnaire to identify and characterize the indicators used for program evaluation efforts by state programs. We also considered survey information gathered by the National Roundtable of State Pollution Prevention Programs.

Finally, to answer the fourth evaluation question—"What changes are necessary to enable EPA and the states to evaluate pollution prevention program effectiveness?"—we interviewed state and EPA officials and conducted state-program site visits.

We conducted our evaluation between February 1992 and July 1993 in accordance with generally accepted government auditing standards.

[15]The questionnaire was pretested with state officials and revised accordingly. The questionnaire was mailed in August of 1992. We obtained a response rate of 84 percent.

Overview of State Pollution Prevention Programs

In this chapter, we address our first evaluation question, "What state pollution prevention programs exist or are planned?" Our objective was to develop a profile of the existing state programs and a classification according to program mission. To answer this evaluation question, we utilized the membership directory and other publications of the National Roundtable of State Pollution Prevention Programs and the EPA report Pollution Prevention 1991: Progress on Reducing Industrial Pollutants. In addition, we developed a survey questionnaire that was sent to these state programs. Finally, we utilized the expert panel sessions to corroborate our findings from these sources.

Locations of Programs

We sent questionnaires to a total of 105 programs in 49 of the 50 states.[1] We received responses from 88 of the programs, for a response rate of 84 percent. Appendix I provides a list of these programs by state.

Program Classification

Pollution prevention programs have varied organizational locations within state governments. Programs are located in regulatory and nonregulatory environmental agencies, as well as in state universities, economic development organizations, and nonprofit private organizations.[2] However, programs can be generally classified by the amount of emphasis they place on regulatory as opposed to nonregulatory functions.[3]

Regulatory Programs

Nearly 20 percent of the state pollution prevention programs were classified as regulatory.[4] Typically, regulatory programs are integrated into existing state environmental regulatory programs. Specifically, these programs are based on either the adaptation of existing regulatory efforts to include pollution prevention, or the development of new regulations with a pollution prevention focus.[5]

[1]Only North Dakota had no formal pollution prevention program.

[2]Some programs, while housed within regulatory agencies, administer nonregulatory functions.

[3]National Roundtable of State Pollution Prevention Programs, "Program Effectiveness Position Paper," Minneapolis, Minn., June 20, 1991.

[4]Also termed "regulatory integration" by some program officials.

[5]The New Jersey and Massachusetts state programs serve as general prototypes for this regulatory approach.

Two of the states with major regulatory pollution prevention programs, Massachusetts and New Jersey, require each reporting facility to submit a source reduction plan. For these plans, facilities are required to

- define their own production units and processes;
- construct a process flow diagram and establish a material balance that describes the operation;[6]
- calculate waste losses for each production unit in each of the media;
- calculate the cost of using each chemical by production unit; and finally,
- develop toxics use reduction options.

While these regulatory pollution prevention programs require planning, they do not require each facility to reduce waste output by a designated amount. Although the state may have an overall reduction goal, each facility makes an individual decision on the amount of its possible waste reduction.[7] The programs subscribe to the philosophy that requiring industry to set goals for pollution prevention will make company officials aware of the advantages of pollution prevention. However, under these planning requirements, no specific amount of waste reduction is required. Therefore, facilities can legitimately choose not to reduce toxics use.[8] Officials from the New Jersey and Massachusetts programs stated that if mandatory toxics use reduction planning did not seem effective, their respective state legislatures would be advised and efficiency standards likely established through legislation.[9]

These regulatory programs typically try to build pollution prevention into existing and new state environmental regulations. They are often charged with restructuring regulatory, single-medium programs to make pollution prevention a standard practice. Such restructuring is necessary because, in some cases, the existing regulations may discourage pollution prevention. Officials of the New Jersey program gave the example of companies being required to obtain preapproval for any production modifications necessary to prevent pollution.

[6]A material balance requires that raw materials be tracked from process input to process output. This procedure allows waste losses to be calculated.

[7]In Massachusetts, for example, the goal is to reduce toxics-use production by 50 percent by the year 1997.

[8]The inherent advantages of pollution prevention include cost savings, avoidance of burdens and regulations associated with obtaining environmental permits, and improvement in a company's public image. However, some companies may resist pollution prevention activities because (among other reasons) they require capital outlay with an uncertain payback period.

[9]New Jersey and Massachusetts were in the midst of implementing their mandatory facility planning efforts. Both state programs intended to evaluate these planning efforts.

These regulatory programs typically seek to implement pollution prevention by placing it as a condition of facility permitting or enforcement agreements; facilities that seek the authority to discharge certain wastes would thereby be required to implement pollution prevention actions. In addition, penalties for environmental violations can be negotiated on the condition that pollution prevention is instituted.

Nonregulatory Programs

About 80 percent of the state pollution prevention programs were classified as nonregulatory.[10] Such programs typically rely on widespread education of the business and industry sectors to promote the prevention of pollution. Nonregulatory programs are generally separate from the regulatory enforcement sector of state government and focus on a collaborative relationship with business and industry. Thus, nonregulatory programs try to avoid the adversarial relationships often present between the enforcement sector and the waste generators.

The nonregulatory programs emphasize informal and completely voluntary facility pollution prevention planning. The programs greatly emphasize technical assistance to business and industry, both on-site and via telephone, and some programs offer grants or loans to finance pollution prevention activities. In addition, many of the nonregulatory programs conduct workshops, conferences, and seminars for interested parties, publish technical information, and operate pollution prevention clearinghouses. Some of the programs aid in the design and delivery of academic courses in pollution prevention. Finally, some of the nonregulatory programs sponsor awards for businesses that are found to have successfully reduced pollution.

Summary

In this chapter, we addressed our first evaluation question, "What state pollution prevention programs exist or are planned?" State programs can be classified as either regulatory or nonregulatory. Regulatory programs emphasize mandatory facility planning of pollution prevention, while nonregulatory programs emphasize pollution prevention education and assistance. As a consequence of their divergent emphases, the two general program types have some major differences in their approaches to pollution prevention. (Chapter 3 of this report will address the advantages and disadvantages of these approaches, based on program implementation data.)

[10]Also termed "promotional" by some program officials.

Implementation of State Pollution Prevention Programs

In this chapter, we address our second evaluation question, "How are state pollution prevention programs implemented?" The aim of this question was to develop a comprehensive summary of the implementation of program activities and background data pertaining to the state pollution prevention programs. To answer this question, we conducted state program site visits, interviewed state and federal officials, and utilized our survey questionnaire to obtain general descriptive information and data on state program implementation. A total of 88 program officials responded to the survey, representing an 84 percent response rate. Of these 88 responses, a total of 17 (19.3 percent) were from regulatory programs, and 69 (78.4 percent) were from nonregulatory programs.[1]

Organization of This Chapter

Program Activities and Goals

As emphasized in EPA's 1991 "Pollution Prevention Strategy," state programs are the principal implementors of pollution prevention technical assistance for industry. This assistance, provided at the request of companies, includes on-site visits and such outreach activities as information dissemination, education, and providing information on research and development. Furthermore, as defined by the strategy, this technical assistance is meant to be used solely for advancing the employment of multimedia source reduction approaches; waste recycling, treatment, and disposal are excluded. The extent of the correspondence between the implementation of these program activities and the goals of federal policy on pollution prevention is discussed in this chapter.[2]

Program Resources

State pollution prevention programs obtain their resources from several sources. The Pollution Prevention Act of 1990 authorizes EPA to provide up to 50 percent in matching grants to state programs for implementation of the EPA "Pollution Prevention Strategy." In addition, many programs obtain funding from general state revenues. The relationship between the sources

[1]The total number of cases varied for some questions. Respondents were directed to skip questions that did not pertain to their programs. In addition, a small number of respondents did not answer every pertinent question. For the regulatory programs, the number of responses ranged from 8 to 17. For the nonregulatory programs, the number of responses ranged from 55 to 69. The regulatory/nonregulatory status of two programs was not provided, but their responses were included in the survey results.

[2]The effectiveness of state program activities, on the other hand, would need to be evaluated in terms of outcome measures, such as changes in pollution levels as a result of source reduction.

of funding and the program goals (the implementation of a multimedia source reduction strategy) is also addressed in this chapter.

Monitoring Program Activities

Monitoring of state program activities depends on industrial facilities reporting on the pollution prevention actions they engage in as a result of program assistance. In this chapter, we address how, and to what extent, state programs monitor industry's pollution prevention activities.

Discussion of Findings

We discuss our findings on state pollution prevention program implementation first by examining constraints on implementation and then by looking at individual areas of implementation quality. Under constraints on implementation, we examined the following issues:

1. State legislation—that is, what is the extent of state legislation regarding pollution prevention?

2. Facility monitoring activities—that is, what requirements exist for facilities to report pollution prevention activities to the state?

3. State program resources—that is, what are the sources and amounts of state program funding?

With regard to implementation quality, we addressed the following areas:

1. Priority emphases—that is, to what extent do state programs meet the goal of emphasizing source reduction over the recycling, treatment, and disposal of wastes?

2. Media emphases—that is, do programs meet the goal of targeting all environmental media?

3. Interagency coordination—that is, to what extent do state programs coordinate pollution prevention activities with other state agencies?

4. Technical assistance—that is, in what ways do state programs assist industry in achieving pollution prevention results by conducting site visits and other general outreach activities?

Where applicable, we discuss any divergence in these findings between regulatory and nonregulatory programs.[3]

Constraints on Implementation

State Legislation

We asked state program officials a series of 14 questions about the existence and coverage of state pollution prevention enabling legislation. Over 50 percent of all programs were backed by state legislation, but this legislation is not particularly complex or strong. (See table 3.1.) According to our analysis, legislation predominantly serves to require on-site technical assistance and information clearinghouses. To a lesser extent, the legislation requires loans or grants to be provided to waste generators, establishes state offices of pollution prevention, requires pollution prevention planning, and integrates pollution prevention into regulatory and enforcement activities. Relatively few states had legislation that encourages public scrutiny of waste generators, prohibits the sale or manufacturing of specific items, or mandates product substitution.

[3]We report our data separately for regulatory and nonregulatory programs. In addition, we combine these and add two nonclassified programs to report an "all" category. In some cases, the reported percentage for the "all" category does not appear to be a direct result of the weighted percentages (by number of cases) of the "regulatory" and "nonregulatory" categories. This apparent discrepancy resulted from the fact that (1) we were unable to classify two programs due to lack of data and (2) there were varying amounts of missing data by question and category.

Table 3.1: State-Program Enabling Legislation

Description of legislation	Type of program		
	Regulatory	Nonregulatory	All
Public sector provisions			
Establish an office of pollution prevention	37.5%	50.0%	46.8
Require on-site technical assistance to be conducted	37.5	78.9	72.3
Establish and require maintenance of information clearinghouse	75.0	78.9	78.7
Require loans or grants be given to waste generators	25.0	47.4	44.7
Integrate pollution prevention into environmental regulatory activities	50.0	31.6	34.0
Integrate pollution prevention into environmental enforcement activities	37.5	21	23.4
Private sector provisions			
Target small businesses for technical assistance	62.5	65.8	66.0
Require product substitution	0.0	0.0	0.0
Encourage public scrutiny of hazardous waste generators	37.5	10.5	14.9
Require facilities to submit pollution prevention plans	75.0	44.7	51.1
Prohibit the sale of specific items	37.5	13.2	17.0
Prohibit the manufacturing of specific items	37.5	10.5	14.9

As previously noted, a substantial number of pollution prevention programs operate without specific enabling legislation. It also appears that many programs were established through executive order rather than through formal legislation.[4] It is possible that the lack of a specific statutory basis could undermine the efficacy of some programs, especially those less well-established.

Facility Monitoring Activities

State officials were asked if any requirements existed for waste generators to report on pollution prevention activities. As shown in table 3.2, we asked if programs required the submission of pollution prevention plans, reports on waste reduction actions, and reports on waste amounts reduced. Overall, only about one third of all programs had such requirements, and regulatory programs were more likely than nonregulatory ones to have them. However, even for regulatory programs, only about half required documentation of planning activities and results.

[4]At the state level, formal legislative processes often require 2 years or more to complete.

Table 3.2: Facility Monitoring Activities Conducted by Programs

Required program activity for waste generators	Type of program		
	Regulatory	Nonregulatory	All
Submission of pollution prevention plans	52.9%	26.1%	31.8%
Submission of reports on waste reduction actions	52.9	29.0	33.0
Submission of reports on waste amounts reduced	47.1	29.0	33.0

The percentages in table 3.2 suggest that pollution prevention is largely a voluntary activity, that its planning and implementation go at least partially unmonitored, and that a majority of state programs are unable to track the results of recommended pollution prevention actions. The lack of requirements to track pollution prevention actions means that any efforts to characterize and evaluate the results of state program activities would also have to be voluntary. However, given the difficulty and the cost of conducting effectiveness evaluations, the likelihood of such work being performed on a discretionary basis does not seem high—and in fact it may not occur until federal data reporting requirements are strengthened.

State Program Resources

Overall, we found that the state programs received an average total funding of approximately $500,000 from all sources for the most recent fiscal year, and expect an average of approximately $550,000 for next fiscal year. Table 3.3 provides the mean percentages of total program funding received from the states, EPA, other federal departments, and other sources for each pollution prevention program. The percentages for next fiscal year are provided in table 3.4. During the most recent fiscal year, the states provided a mean of 46 percent of the program funding, while EPA funds accounted for 35 percent. Other federal funding comprised 5 percent, while other funding (predominantly user fees) totaled 15 percent. For the next fiscal year, state funding is expected to increase slightly to a mean of 52 percent. EPA funding is expected to decrease somewhat (to 32 percent), as are other federal funding (to 3 percent) and other funding (to 13 percent).

Table 3.3: Mean Percentage of Total Program Funding From Each Source, Most Recent Fiscal Year

Source of funding	Mean percentage		
	Regulatory	Nonregulatory	All
State	53.0%	44.0%	46.0%
EPA	37.0	34.0	35.0
Other federal sources	5.0	5.0	5.0
Other sources	5.0	17.0	15.0

Table 3.4: Mean Percentage of Total Program Funding From Each Source, Next Fiscal Year

Source of funding	Mean percentage		
	Regulatory	Nonregulatory	All
State	64.0%	51.0%	52.0%
EPA	25.0	32.0	32.0
Other federal sources	1.0	4.0	3.0
Other sources	10.0	13.0	13.0

Our findings—as shown in tables 3.3 and 3.4—support the National Roundtable's assertion that state programs exist through a "patchwork funding" approach and that support by state government adequate to provide program self-sufficiency does not exist. As shown by our results, programs are still quite dependent upon EPA funding. EPA's "Pollution Prevention Strategy" advocates that state programs attain self-sufficiency, but the percentages in these tables suggest such independence may not arrive soon. The scope and responsibilities of program efforts have recently become more complex, but commensurate funding increases have not been forthcoming. In recent times, many states have experienced fiscal shortfalls, and this trend cannot bode well for attempts to establish the self-sufficiency of state pollution prevention programs.

Areas of Implementation Quality

Priority Emphases

We asked program officials about the levels of priority assigned to source reduction, recycling, treatment, and disposal. Overall, over 95 percent of all state pollution prevention programs placed a moderate to very high priority on source reduction. However, regulatory programs were somewhat less likely than nonregulatory ones to prioritize source reduction. As table 3.5 indicates, nearly all of the nonregulatory programs placed a moderate, high, or very high priority on source reduction, in contrast to less than 80 percent of the regulatory programs.[5] Indeed, 14.3 percent of regulatory programs funded under the act placed little or no priority on source reduction. This latter fact is of some importance since regulatory programs can compel compliance. And, given their lesser

[5]However, because regulatory programs comprised only about 20 percent of all programs, the overall priority emphasis on source reduction was relatively large.

emphasis on source reduction, this could translate into a lessening of the eventual source reduction outcomes of the program.

Table 3.5: Program Emphasis on Source Reduction

	Priority emphasis				
Type of program	Little or none	Some	Moderate	High	Very high
Regulatory	14.3%	7.1%	14.3%	14.3%	50.0%
Nonregulatory	0.0	1.5	7.6	21.2	69.7
All	2.5	2.5	8.6	19.8	66.7

Although the priority emphasis on source reduction is relatively heavy, the state programs reported widespread participation in other activities. For example, as shown in table 3.6, over 90 percent of all programs assigned a moderate, high, or very high priority to recycling. Most strikingly, about 70 percent of all programs placed a moderate to high priority on waste treatment (table 3.7), and about 50 percent emphasized waste disposal (table 3.8). Nonregulatory programs tended to emphasize recycling, treatment, and disposal to a larger degree than regulatory programs.

Table 3.6: Program Emphasis on Recycling

	Priority emphasis				
Type of program	Little or none	Some	Moderate	High	Very high
Regulatory	21.4%	14.3%	7.1%	57.1%	0.0%
Nonregulatory	1.5	1.5	10.6	59.1	27.3
All	4.9	3.7	9.9	59.3	22.2

Table 3.7: Program Emphasis on Treatment

	Priority emphasis				
Type of program	Little or none	Some	Moderate	High	Very high
Regulatory	23.1%	23.1%	30.8%	23.1%	0.0%
Nonregulatory	3.1	21.5	44.6	29.2	1.5
All	6.3	21.5	43.0	27.8	1.3

Table 3.8: Program Emphasis on Disposal

	Priority emphasis				
Type of program	Little or none	Some	Moderate	High	Very high
Regulatory	23.1%	30.8%	7.7%	30.8%	7.7%
Nonregulatory	18.5	24.6	29.2	24.6	3.1
All	19.0	26.6	25.3	25.3	3.8

These findings suggest that, in accordance with the Pollution Prevention Act, most state pollution prevention programs do emphasize source reduction. However, many of the programs are concurrently emphasizing waste recycling, treatment, and disposal, which the act de-emphasizes. To understand these results better, we contacted officials at several programs with high priorities for recycling, treatment, and disposal. We found that these programs tended to be reactive toward their customers, especially the nonregulatory programs with regard to technical assistance activities.[6] Program staff told us that, in their experience, many industrial facilities are not initially motivated to implement pollution prevention as a way of addressing waste problems. Therefore, these program staff have resorted to promoting recycling, treatment, or disposal options to gain entry to such facilities and initiate a long-term relationship with the facility staff. After this relationship is established, staff members can then stress the advantages of source reduction.

In addition, time constraints affected the ability of some of these state programs to promote source reduction. Many companies, because of environmental regulations, are required to mitigate the effects of pollution immediately, and source reduction actions can take a long time to produce results. This problem can be particularly difficult for economically marginal companies. Such firms often cannot afford to wait for the benefits of source reduction investments to accrue, especially if they face fines for violating environmental regulations. As a result, state programs have often offered the "quick fix" options of treatment or disposal.

State program officials also cited technology limitations as constraints to the implementation of source reduction. For example, certain materials have no substitutes, so products cannot be modified under the requirements of source reduction. Finally, several program officials told us that, despite the existence of pollution prevention programs, the state mandates for promoting source reduction seemed unclear or ambiguous. States have a long history of working in the treatment/disposal areas and continue to support that approach overall.

In summary, our site visits reinforced our interpretation of our national data as showing some weaknesses in the state pollution programs' emphasis on source reduction and suggested some reasons for the continuing emphasis on activities not connected with prevention.

[6]The nonregulatory programs lack the legislative "hammer" provisions of the regulatory programs. As a result, they have less power to facilitate the adaptation of source reduction by industry.

Program Priority Emphases and Funding Sources

As already noted, the majority of state program funds are provided by state governments and EPA grants. These two sources are distinguishable from one another, which allows us to examine how the extent of dependence upon particular funding sources relates to where program priorities are placed—that is, on source reduction, recycling, treatment, or disposal. Therefore, we correlated the priority levels for each activity—using a range of little/no priority to very high priority—with the mean proportion (range: 0 to 1.00) of total program funding from the two major sources of this funding: EPA and the states.[7] These correlations are presented for the most recent fiscal year (table 3.9) and next fiscal year (table 3.10) and include all programs, both regulatory and nonregulatory.[8]

Table 3.9: Correlations Between Program Priority Emphases and Mean Funding Proportions, Most Recent Fiscal Year

	Program priority emphasis			
Source of funding	Pollution source reduction[a]	Recycling[a]	Treatment[b]	Disposal[b]
EPA	–0.0883	+0.0743	+0.2484	+0.1629
State	+0.0373	–0.1513	–0.2656	–0.2955

Note: Includes all programs, both regulatory and nonregulatory.

[a]N = 69.

[b]N = 67.

Table 3.10: Correlations Between Program Priority Emphases and Mean Funding Proportions, Next Fiscal Year

	Program priority emphasis			
Source of funding	Pollution source reduction[a]	Recycling[a]	Treatment[b]	Disposal[b]
EPA	–0.1802	–0.0781	+0.3092	+0.2888
State	+0.0493	–0.0768	–0.2067	–0.2425

Note: Includes all programs, both regulatory and nonregulatory.

[a]N = 61.

[b]N = 59.

[7]The correlation coefficients can range from –1.00 to +1.00, with 0.00 representing no relationship between the variables, –1.00 signifying 100 percent accuracy in predicting a negative relationship between the variables, and +1.00 representing 100 percent accuracy in predicting a negative relationship between the variables. A positive correlation between proportion of total funding and priority level indicates that, as the proportion increases (ranging from 0.00 to 1.00), the specific priority level increases (ranging from little/no priority to very high priority). Conversely, a negative correlation indicates that these variables are related in opposite ways.

[8]Statistical significance levels are not given for correlations because we included the population of state pollution prevention programs. (Significance levels are only utilized for samples.)

As shown in tables 3.9 and 3.10, for state program budgets, the proportion of EPA funding is positively correlated with priorities placed on waste treatment and disposal for the most recent and next fiscal year. Furthermore, we found no evidence that a predominance of EPA funding was associated with program emphases on source reduction. To the contrary, the proportion of EPA funding is negatively associated with source reduction priority, although this relationship is rather weak. Finally, for the most recent fiscal year, the proportion of EPA funding has a small positive correlation with the priority placed upon recycling, while this same relationship is negative for the next fiscal year.

In contrast, the proportion of state funding is negatively associated with the priority placed on waste treatment and disposal for the most recent and next fiscal years. To a much lesser extent, the same relationship exists for the priority placed upon recycling. Finally, there is a small positive relationship between the proportion of state funding and the priority on source reduction.

These results suggest that programs with greater dependence upon EPA funding (and thus lesser dependence upon state government funding) are less likely to emphasize source reduction. Furthermore, these programs tend to place higher emphases upon waste treatment and disposal. These results are distinctly at odds with the major tenets of the Pollution Prevention Act and the resulting EPA "Pollution Prevention Strategy," which seek to prioritize source reduction over the other waste options.

Media Emphases

As shown in table 3.11, nearly all of the programs currently have a multimedia approach. However, some state program officials have expressed concern that this approach may be threatened. Recent policy changes at EPA have channeled some federal funding of pollution prevention through single-environmental-medium programs. These single-medium programs have generally taken a "command and control" approach, which emphasizes compliance with environmental regulations by way of waste treatment and disposal. This approach differs from that taken in pollution prevention, especially by the nonregulatory programs, which emphasizes the avoidance of pollution production, thereby minimizing concern over compliance with environmental regulations. Although EPA guidance was intended to have the effect of integrating pollution prevention within the single media programs, to date state program officials have expressed concern (through the National Roundtable) that EPA's funding approach may lessen the emphasis upon

multimedia pollution prevention. This funding approach could negatively affect nonregulatory programs as pollution prevention becomes assimilated into the media programs, and the less established state programs may be particularly vulnerable to this trend.

Table 3.11: Media Emphases of Pollution Prevention Programs

	Medium emphasized		
Type of program	Air	Land	Water
Regulatory	88.2%	100.0%	94.1%
Nonregulatory	92.8	97.1	95.7
All	90.9	96.6	94.3

Interagency Coordination

We asked seven questions about program coordination activities with environmental agencies in the states, covering pollution prevention activities and actions taken to treat, store, and dispose of waste. (See table 3.12.) We found a rather low rate of these coordination activities. Slightly less than one half of all programs had established pollution prevention goals within state environmental agencies.[9] Some programs tended to work with environmental agencies to negotiate settlements and consent agreements, but relatively few carried out other coordination activities. The percentages shown in table 3.12 indicate that state pollution prevention implementation activities have not become institutionalized within state agencies that address post hoc waste actions. As a result, the pollution prevention approach has not yet become dominant at the state government level.

[9]At the federal level, the Pollution Prevention Act of 1990 requires EPA to coordinate source reduction activities with other federal agencies, such as the Departments of Defense and Energy.

Table 3.12: Pollution Prevention Programs Characterized by Interagency Coordination Efforts

	Type of program		
Program characteristic	**Regulatory**	**Nonregulatory**	**All**
Established pollution prevention goals within state environmental agencies	35.3%	47.8%	45.5%
Worked with state environmental agencies to provide fast-track permit application processing	11.8	13.0	12.5
Worked with state environmental agencies to provide fee concessions	11.8	8.7	9.1
Worked with state environmental agencies to negotiate mitigation/ enforcement settlements and consent agreements	35.3	29.0	29.5
Worked with state environmental agencies to treat or dispose of hazardous waste	35.3	10.1	14.8
Worked with state environmental agencies to levy treatment, storage, or disposal fees/penalties	17.6	13.0	13.6
Worked with state environmental agencies to offer industry tax credits	5.9	13.0	11.4

Technical Assistance

As noted earlier, the EPA "Pollution Prevention Strategy" puts a great deal of emphasis on technical assistance to business and industry. Technical assistance consists of pollution prevention outreach activities provided for industry, including information dissemination, education, and research and development. These outreach activities often occur as a part of on-site visits by state program staff. Typically, technical assistance is conducted at the request of companies and is used to identify potential and actual waste problems that could be prevented at the source.

General On-Site Technical Assistance

We ascertained the extent and nature of general on-site technical assistance activities through a series of survey questions. We found that over 80 percent of all programs conducted site visits "sometimes" or "frequently." Nonregulatory programs conducted these site visits more frequently than regulatory programs. All of the programs gathered company background information before conducting technical assistance site visits.

However, many programs did not collect particular types of information important to technical assistance efforts. Programs tended to gather general and production process/materials background information, but often omitted regulatory/permit status and economic assessment information. (See table 3.13.) Specific information about particular companies allows state programs to provide individualized outreach information. Such information is important, given that pollution prevention activities can be economically beneficial to companies and can

negate the need to acquire regulatory and permit status authorizations.[10] Relatively few programs consistently obtained mass-balance data as a part of on-site pollution prevention technical assistance.[11] Most programs did, however, recommend appropriate pollution prevention alternatives in written reports to companies.

Table 3.13: Pollution Prevention Programs Characterized by Information Obtained and Provided for On-Site Technical Assistance

	Type of program		
Program characteristic	**Regulatory**	**Nonregulatory**	**All**
Gathered general background information on firms	100.0%	85.0%	87.7%
Gathered regulatory/permit status information on firms	61.5	45.0	47.9
Gathered economic assessment information on firms	15.4	16.7	16.4
Gathered production process/materials information on firms	76.9	90.0	87.7
Obtained mass balance data from firms	46.2	67.2	63.4
Recommended appropriate pollution prevention alternatives	100.0	100.0	100.0
Provided written reports to firms	76.9	94.9	91.7

On-Site Walk-Throughs

Many programs conducted on-site walk-throughs of facility industrial processes as a part of technical assistance activities. These walk-throughs identify waste problems and prevention options with observations of specific industrial process activities. However, the nonregulatory programs were more likely than the regulatory programs to conduct these walk-throughs.

As shown in table 3.14, the vast majority of state programs utilized the techniques of direct observation and open-ended interviews to elicit pollution prevention information from companies, and many programs also conducted exit interviews. But less than 40 percent of all programs (and a lower percentage of regulatory programs) measured waste streams as a part of the walk-throughs. Thus, many programs did not use the

[10]As noted by EPA, hazardous waste treatment, storage, and disposal activities have become more tightly regulated, and the costs of complying have increased greatly. Furthermore, acquiring the necessary regulatory permits for waste treatment activities has also become more cumbersome.

[11]Mass-balance data are developed by contrasting product material input to product material output, thereby determining the amount of waste produced as a result of a manufacturing process.

walk-throughs to develop a baseline of waste generation for each facility.[12]

Table 3.14: Pollution Prevention Programs Characterized by Observational Techniques Used for On-Site Walk-Throughs

	Type of program		
Program characteristic	Regulatory	Nonregulatory	All
Used direct observation	92.3%	96.7%	95.9%
Used open-ended interviews	100.0	95.0	95.9
Conducted exit interviews	46.2	66.7	63.0
Measured waste streams	15.4	43.3	38.4

Facility Prioritization for On-Site Technical Assistance

Table 3.15 provides the summary data from several questions that address the issue of how state pollution prevention programs prioritized companies for on-site technical assistance. Nearly three quarters of all programs used a "first-come first-served" approach, providing services to companies in the order of requests received. Pending enforcement actions are more likely to drive prioritization for the regulatory programs than for nonregulatory ones; in fact, pending enforcement actions helped prioritize on-site assistance only about one third of the time. The prior relationship of the program with the facility, as well as legislative priorities, are occasionally important factors behind facility selection strategies, but facility location is rarely an issue.

Table 3.15: Pollution Prevention Programs Characterized by Methods of Prioritizing Facilities for On-Site Technical Assistance

	Type of program		
Program characteristic	Regulatory	Nonregulatory	All
Used "first-come first-served" approach	53.8%	76.7%	72.6%
Considered pending enforcement actions	46.2	30.0	32.9
Considered facility location	15.4	6.7	8.2
Considered prior relationship with facility	46.2	31.7	34.2
Considered legislative priorities	23.1	36.7	34.2

The pollution prevention programs did not often link their on-site assistance to pending enforcement actions, missing an important connection to existing waste problems. As a result, companies with the

[12]It is true that waste generation data for each firm can be obtained from reports filed with EPA or the state environmental regulatory department. However, such reports are completed by facility personnel, in the absence of state or federal officials, and tend to be unreliable and invalid. [See Waste Minimization: EPA Data Are Severely Flawed, GAO/PEMD-91-21 (Washington, D.C.: August 5, 1991) and Waste Minimization: Major Problems of Data Reliability and Validity Identified, GAO/PEMD-92-16 (Washington, D.C.: March 23, 1992).] If state programs have sufficient resources, program officials could utilize on-site walk-throughs to gather and ascertain the quality of waste generation data.

largest need for on-site technical assistance may be overlooked. In addition, most programs did not offer on-site technical assistance on an ongoing basis, since targeting based on a prior relationship with a facility was only important about one third of the time.

Knowledge and Skills Required for On-Site Technical Assistance

We found that nearly 80 percent of the staff from all programs deemed as "essential" the ability to ask questions and gain an understanding of facility processes. Active listening skills are extremely important when conducting site visits because of the need to gain the trust of facility personnel. We also asked program staff about the knowledge and skills deemed necessary to conduct on-site technical assistance, given that most programs work with diverse industry types. Despite the myriad of industry types, program staff viewed specific industry knowledge as somewhat less important than industrial process knowledge.[13] Program staff stated that they could learn several common industrial processes and then apply the knowledge across several industry types.

General Outreach Activities

Although on-site technical assistance was a central state pollution prevention activity, programs also typically conducted several other general outreach activities. These activities were conducted in the areas of (1) information dissemination, (2) education, and (3) research and development.

Information Dissemination

Several types of prevention information were provided for industry by state pollution prevention programs. As shown in table 3.16, these types included case studies on successful pollution prevention efforts, newsletters, telephone hot lines, fact sheets, and regulatory information. In addition, some programs maintained information clearinghouses that centralized many types of information. Overall, regulatory programs disseminated less information to industry than did their nonregulatory counterparts.

[13]Specific industrial processes are often common across several industries. For example, electroplating is an industrial process that occurs in both the semiconductor and automobile industries.

Table 3.16: Pollution Prevention Programs Characterized by Types of Information Disseminated to Industry

Program characteristic	Type of program		
	Regulatory	Nonregulatory	All
Distributed case studies on successful pollution prevention efforts	64.3%	89.7%	85.5%
Distributed newsletters	53.3	54.5	54.9
Maintained telephone hot line	50.0	67.2	64.6
Distributed fact sheets	64.3	85.3	80.7
Distributed regulatory information	88.2	69.2	72.3

Note: Medium and high priority levels are combined.

In general, state programs highly emphasized the distribution to and collection from industry of successful pollution prevention effort case studies.[14] Over 85 percent of all programs assigned a medium to high priority to these efforts, and a similar percentage distributed pollution prevention fact sheets. A majority of the programs assigned a medium to high priority to the distribution of newsletters and operation of a telephone hot line for industry. In accordance with their mission, regulatory programs distributed more regulatory information than did the nonregulatory ones.

Almost three quarters of all state programs maintained centralized pollution prevention information clearinghouses, with nonregulatory programs dominating the regulatory programs in this area. (See table 3.17.) Predominantly, these clearinghouses contained pollution prevention case studies and publications, as well as bibliographies. To a lesser extent, the clearinghouses also maintained data bases and technical-assistance request tracking systems. Relatively few of the clearinghouses were formally associated with university libraries. The programs used these clearinghouses to a moderate extent for drafting pollution prevention reports.

[14]Chapter 4 discusses the use of such case studies as a method to assess program progress.

Table 3.17: Programs Characterized by Presence and Nature of Pollution Prevention Clearinghouse

	Type of program		
Clearinghouse characteristic	**Regulatory**	**Nonregulatory**	**All**
Clearinghouse was present	52.9%	78.3%	73.6%
Contained bibliographies	55.6	87.3	83.1
Contained environmental data base	44.4	47.3	46.2
Maintained technical assistance request tracking system	33.3	50.9	47.7
Contained on-line pollution prevention data bases	33.3	47.3	44.6
Contained pollution prevention publications and case studies	77.8	92.7	90.8
Was formally associated with a university library	22.2	18.2	18.5
Was used to draft reports in most or all cases	66.7	64.6	64.8

These results suggest that pollution prevention programs are fairly aggressive about disseminating pollution prevention information to industry. Overall, the state programs were generally supporting the technology transfer provisions of the EPA "Pollution Prevention Strategy," although regulatory programs could improve their efforts.

Education

State pollution prevention programs utilized a variety of formal approaches to provide pollution prevention education. These approaches included sponsoring training sessions; working with universities; conducting conferences, seminars, and workshops; and conducting other promotional activities. The summary data for these activities are provided in table 3.18.

Table 3.18: Programs Characterized by Pollution Prevention Education Activities

	Type of program		
Program characteristic	**Regulatory**	**Nonregulatory**	**All**
Conducted training for specific industries	68.8%	86.8%	83.3%
Conducted training for other government agencies	53.8	75.4	71.8
Conducted training for community organizations	61.5	51.6	53.2
Participated in teaching college courses on pollution prevention	35.3	52.2	47.7
Participated in college curriculum development on pollution prevention	29.4	30.4	29.5
Participated in conducting college workshops on pollution prevention	76.5	69.6	69.3
Provided pollution prevention technical assistance in cooperation with universities	52.9	49.3	48.9
Conducted pollution prevention research and development in cooperation with universities	35.3	37.7	36.4
Conducted demonstration projects in cooperation with universities	35.3	34.8	34.1
Assigned medium to high priority to conducting conferences and seminars	68.8	91.3	87.2
Assigned medium to high priority to conducting facility/agency-specific workshops	70.6	73.1	72.9

A substantial majority (over 80 percent) of all programs conducted pollution prevention training for specific industries. About three quarters of the programs also conducted training for other government agencies, while over half conducted training for community organizations. The nonregulatory programs were more likely than the regulatory ones to conduct training for industries and other government agencies.

We also found that many programs offered pollution prevention education in conjunction with universities. College workshops on pollution prevention were a major activity; nearly 70 percent of the programs conducted these. Furthermore, about half of the programs offered college-level courses or provided pollution prevention technical assistance in cooperation with universities. Fewer than 40 percent of the programs conducted other activities in cooperation with universities, including research and development, demonstration projects, and curriculum development.

A large majority of all pollution prevention programs placed a medium to high priority on conducting conferences and seminars and on holding facility- or agency-specific workshops. However, nonregulatory programs were more likely to prioritize conferences and seminars than were their regulatory counterparts.

Research and Development

We asked state program officials about their participation in pollution prevention research and development activities. (See table 3.19.) Overall, slightly more than one half of the programs supported such activities. However, while nearly two thirds of the nonregulatory programs generally supported research and development, only one third of the regulatory programs did. This suggests that, while the regulatory programs generally required pollution prevention planning by industry, they may be less able than nonregulatory programs to develop innovative techniques to achieve waste reduction goals.[15] In general, then, many pollution prevention programs appeared to function as practitioners rather than researchers of pollution prevention techniques.

Table 3.19: Pollution Prevention Programs Characterized by Research and Development Activities

	Type of program		
Program characteristic	Regulatory	Nonregulatory	All
Generally supported research and development activities	35.3%	61.2%	55.3%
Conducted research and development demonstration programs	23.5	40.6	36.4
Conducted technology development	23.5	34.8	31.8
Conducted research and development feasibility/ marketability research	17.6	15.9	15.9
Conducted environmental/economic impact studies	17.6	17.4	17.0
Conducted research and development case studies	17.6	34.8	30.7

Summary and Conclusions

In this chapter, we addressed our second evaluation question, "How are state pollution prevention programs implemented?" To comply with the Pollution Prevention Act, state programs must provide technical assistance to industry on multimedia source reduction. While many programs did conduct technical assistance for multimedia source reduction, a substantial number also emphasized waste recycling, treatment, and disposal actions. Thus, we conclude that the primary goal of the Pollution Prevention Act of 1990 is not currently being met, clearly a problem for program implementation quality. However, it is also the case that the implementation of multimedia source reduction programs is a long-term process, and our findings suggest that many state programs were moving toward better compliance, although gradually.

The quality of state program implementation was deficient in other ways. For example, many programs were unable to assess their progress, since many industrial facilities were not required to report pollution prevention actions taken and results achieved. As a result, we conclude that assessing

[15]Nonregulatory programs did not usually require pollution prevention planning.

the viability of state programs cannot occur until complete and accurate monitoring information is received from industrial facilities. In addition, given that many programs continued to rely on EPA funding, we conclude that the programs may have difficulty attaining financial self-sufficiency, a goal of the EPA "Pollution Prevention Strategy."

In summary, state pollution prevention program implementation suffered from a lack of attention to federal policy directives. We believe that the varied nature of state programs (reflecting the wide variety of industry) further complicated the ability to implement programs according to federal pollution prevention policy. While only one federal pollution prevention policy exists, state programs had, in many cases, modified the policy in such a way that program implementation quality was negatively affected. To ensure the effectiveness of the Pollution Prevention Act, state programs must refocus on the policy as stated in the act, while becoming less dependent on EPA funding resources.

Indicators Used to Characterize State Pollution Prevention Program Progress

In this chapter, we address our third evaluation question, "How sound are the indicators used to characterize the progress of state pollution prevention programs?"[1] To answer this question, we used a survey questionnaire (sent to 105 programs) to identify the types of indicators used by the programs to measure progress in preventing pollution. In addition, we utilized information from a study conducted by the National Roundtable of Pollution Prevention Programs of its membership and synthesized the information concerning indicators of progress used within the state programs.

Measuring Program Progress

As discussed in chapter 3, state pollution prevention programs are very diverse, often reflecting the needs of specific types of industry. Overarching standards that dictate how all of these programs are to be assessed for progress do not exist. Programs have various stakeholders and clients, and funding sources differ significantly. As a result, there is no uniform assessment of state program progress in reducing hazardous waste production. However, states do assess their progress, and three major reasons for conducting such assessments seem to exist. First, programs that receive Pollution Prevention Incentives for States (PPIS) grant funding from EPA are required to assess program effectiveness.[2] Second, other programs must respond to state legislative requirements to demonstrate how well the programs are meeting their goals. Finally, programs may establish internal assessment procedures of their activities without regard to federal or state legislative requirements; such efforts can be used to initiate self-improvement efforts.

In particular, the PPIS grant funding requirements result in one specific set of indicators from progress reports, while the state assessment methods (whether in response to legislative requirements or not) result in a wide array of other indicators. In the next section of our report, we discuss the PPIS grant program and the indicators used to assess program progress, as well as the indicators used by states in their assessments. We elaborate on the usefulness of these indicators in determining the extent to which federal pollution prevention policy is achieving its objectives.

[1]We initially intended to evaluate the design and methodological soundness of existing state pollution prevention program evaluations. Despite our requests in the survey questionnaire sent to state program officials, we were unable to obtain enough copies of these evaluations to conduct a systematic assessment. However, many officials did provide information on the types of indicators used to assess program progress.

[2]In our survey, over 65 percent of the programs currently received funds from EPA. However, many of the programs that received funding from the PPIS grant program changed each fiscal year. As a result, the vast majority of state programs have received (or will receive) grant funds at some point.

Pollution Prevention Incentives for States (PPIS) Grant Program

In response to the legislative requirements of the Pollution Prevention Act, EPA developed a list of specific application eligibility criteria for the PPIS program. Grant proposals must address each of the following:

1. The proposal should seek to build state pollution prevention capabilities or test, at the state level, innovative pollution prevention approaches or methodologies.

2. Multimedia opportunities and effects should be identified.

3. Significant needs of the state or region should be addressed and areas for significant risk reduction targeted and integrated into overall pollution prevention goals and implementation strategies.

4. The pollution prevention activities of other programs or organizations in the state or region should be integrated and leveraged into the proposed program, as appropriate.

5. Measures of success should be identified.

6. Proposals should also identify plans for long-term implementation of a multimedia pollution prevention program beyond the initial project funding period.

Federal Evaluation Requirements for State Programs

State programs funded by EPA are expected to fulfill agreed-upon tasks delineated in the PPIS grant proposals, including evaluation of their effectiveness. To meet the statutory evaluation requirements, EPA has directed state program grantees to submit semiannual progress reports. In addition, EPA conducts on-site evaluations for each grant project.

EPA has issued guidance to state programs for developing the semiannual progress reports. The following issues are intended to be addressed by the reports:

1. Progress to date:

- accomplishments to date;
- problems encountered and their method of resolution;
- type of support EPA can provide to address problem issues in the future;
- revisions to the scope of the project work plan and schedule to accommodate changing circumstances or new opportunities;

- comparison of actual expenditures to budgeted amounts and the causes of any major differences;
- changes in the program work plan, schedule, and/or budget that will affect project's results and proposed products.

2. Progress over the next 6 months:

- tasks planned for accomplishment over the next 6 months;
- anticipated problems;
- specific EPA assistance required.

3. Impacts/results:

- indicators developed to measure the success of the program;
- noticeable changes in the recycling or pollution prevention practices of citizens/industry;
- other ways the program has encouraged pollution prevention initiatives;
- additional initiatives developed to introduce larger waste reduction efforts in the state;
- coordination efforts with other agencies or departments; difficulties encountered and successes in integrating pollution prevention efforts with other programs.

Indicators Used in EPA Progress Reports

Although the Pollution Prevention Act requires EPA to "... establish appropriate means for measuring the effectiveness of the State grants made ... in promoting the use of source reduction techniques by businesses,"[3] the manner in which program effectiveness will be determined is not mandated by the act. EPA complies with this requirement by assessing the effectiveness of the state programs only in promoting the use of source reduction by businesses.[4] EPA collects this information from semiannual progress reports. However, these reports use indicators that do not measure program effectiveness. For each progress report, EPA provides the list of issues shown in the preceding section. However, this method of assessing program progress is based entirely on respondent opinion, as opposed to the objective measurement expected in program evaluation of the actual effects of the program. In this case, EPA allows a great deal of latitude in responding and does not require hard evidence of

[3]See The Pollution Prevention Act of 1990 (P. L. 101-508).

[4]EPA utilizes the TRI reporting system to collect data that will serve as a national measure of progress on pollution prevention. In addition, pertinent data are collected through the RCRA hazardous waste minimization program. We discuss the limitations of these data in chapter 6.

waste reduction results.[5] Personal opinions are not substitutes for empirical data, and respondent bias always drives opinion to an unknown extent. In addition, under the current system, difficulties and problems in implementing the program could actually be concealed, and accomplishments exaggerated. Furthermore, as noted by the National Roundtable of State Pollution Prevention Programs, the state programs suffer from a lack of standards, making it difficult to judge even the opinion data that are produced. (For example, what objective pollution prevention efforts might it be reasonable to expect over the time period funded by the grant?) As a result, under the current system, real knowledge of the effectiveness of the state programs is not obtainable via the progress reports.

Indicators Used by State Programs

Over 80 percent (n = 82) of the state programs conducted some type of evaluation of their program services. We identified the indicators used to evaluate program activities. These are listed in table 4.1.

Table 4.1: Indicators Used to Evaluate State Pollution Prevention Program Efforts

Indicator[a]	Evidence
Quantity of service provided[a]	Number of grants disbursed; on-site facility visits; reports, case studies, newsletters, and policy statements written; permits granted; inspections completed; workshops, conferences, and training sessions delivered; pollution prevention programs established in industry; and governor's awards conferred. Time spent on-site at facilities, on the telephone with facilities, researching pollution prevention issues, promoting pollution prevention, writing reports, following up on industry actions, preparing and delivering conferences, and conducting training sessions
Rates of compliance with pollution prevention planning efforts[b]	Assessment of the compliance rate with plan-filing requirements
Customer assessment[c]	Of program service quality, of number of customer referrals of program to other businesses, of number of customer follow-up requests, and of effects of training and conferences on expertise of facility personnel

[a]Used by 70 percent of programs.

[b]Used by 55 percent of programs.

[c]Used by 50 percent of programs.

[5]The National Roundtable of State Pollution Prevention Programs concluded that pollution prevention is a long-term program objective that resists short-term goal setting. While we are in agreement with this conclusion, EPA could still greatly improve the monitoring of the PPIS grant program by constructing questions that require the provision of rigorous evidence rather than opinion.

As shown in table 4.1, state programs tend to emphasize indicators that tap the quantities of service units provided to industry, rates of compliance with pollution prevention planning efforts, and customer assessments.

Problems With Quantity of Services Provided

Nearly 70 percent of the programs used indicators that addressed the quantity of services provided to their customers/clients. These indicators measured inputs, or the aggressiveness of program outreach activities. However, the approach provided no evidence about outcomes, or of how successful these activities have been. Furthermore, since regulatory programs provide fewer outreach services than nonregulatory ones, using indicators of the quantity of services provided would not even be applicable to some programs. Finally, such indicators cannot be used to draw comparisons among the state programs, since each state has different needs for its specific industrial community. For example, highly industrialized states may necessarily require more frequent program services than states with less industry.

Problems With Rates of Compliance

About 55 percent of the programs used indicators that measured rates of compliance with these pollution prevention planning efforts. Generally, these plans require companies to document pollution prevention goals. Although rates of compliance with simply filing these plans are easily calculated, the waste data and reduction amounts submitted are likely to be invalid and unreliable. In the past, these data have not been linked to individual production processes. As a result, changes in production amounts and product types have biased the reported waste types and amounts.[6]

Because the quality of waste data has been questioned, two regulatory programs are currently involved in improvement efforts. The programs in Massachusetts and New Jersey have recently initiated requirements for companies to report on toxic use reduction within particular production processes or on a facility-wide throughput basis. This method of analyzing toxic use reduction allows a more detailed understanding of the reasons

[6]For elaboration on this issue, see the following GAO reports: Hazardous Waste: EPA's Generation and Management Data Need Further Improvement, PEMD-90-3 (February 9, 1990); Hazardous Waste: Data Management Problems Delay EPA's Assessment of Minimization Efforts, RCED-91-131 (June 13, 1991); Waste Minimization: EPA Data are Severely Flawed, PEMD 91-21 (August 5, 1991); and Waste Minimization: Major Problems of Data Reliability and Validity Identified, PEMD-92-16 (March 23, 1992).

for waste fluctuations. Overall, however, few states currently have mandates that require the reporting of such information.[7]

Problems With Customer Assessment

The Pollution Prevention Act of 1990 and state legislation encourage a "business development" orientation in which the programs are oriented toward helping their customers reduce waste while maintaining economic viability.[8] Such an orientation requires programs to be receptive to the business needs of their customers. As a result, one half of the state programs used assessments of their customers/clients to evaluate pollution prevention activities. Programs often depended upon customer assessment data to report progress to state legislatures. This approach was the main method by which programs ascertained program outcomes.

There are several pitfalls of the customer assessment approach to evaluating state pollution prevention programs. The effectiveness of pollution prevention program activities varies according to the needs of a particular customer, and may be understandable only in the immediate context of a specific facility. As a result, customer assessment evaluations are difficult to generalize, compare, or aggregate.

Indeed, a customer-centered approach can limit the effectiveness of programs. By depending on customer evaluations, programs may obtain an inaccurate reading of the value of specific pollution prevention activities. Customers may not recognize or realize which pollution prevention efforts are truly valuable. Indeed, it is possible that taking a prescriptive rather than a reactive evaluative stance could result in pollution programs becoming more effective and efficient, since state officials often maintain more technical expertise than their customers.[9]

The Case Study Approach

Many state programs have documented their successful technical assistance efforts with case studies that used the indicators discussed earlier. Typically, these case studies are developed by utilizing information gathered from follow-up visits and telephone calls by state program

[7]Regulatory programs may show more promise than nonregulatory ones in waste data improvement efforts, since they have more stringent data reporting requirements. However, as already noted, regulatory programs constitute only 20 percent of the existing pollution prevention programs.

[8]The nonregulatory programs are more likely than their regulatory counterparts to be customer-driven, because of their dependence on companies asking for assistance. Regulatory programs, as might be expected, engage in much less customer-centered assistance.

[9]Some companies are resistant to pollution prevention. If such customers evaluate state programs, they may give high ratings to programs that are not proactive about pollution prevention.

officials. These case studies are often used to promote and publicize the state program to potential customers. Such studies are developed with permission from the participating facilities and often use anecdotal information.

The case study approach potentially can demonstrate successful pollution prevention efforts, but several factors limit its usefulness as an assessment method. We found that, in general, state programs publicized only their successful pollution prevention activities; less successful results were generally not highlighted. Thus, a case study evaluation does not have comparison groups from which to draw conclusions, and the findings from case studies cannot readily be generalized to other companies. In addition, not all successful companies want the state programs to publicize their pollution prevention efforts, since confidentiality issues may be central.[10] Finally, conducting case studies takes an extensive amount of time, and program officials rarely have such time available.

Future Prospects for EPA Evaluation

Until recently, the PPIS grant program was administered chiefly through the Pollution Prevention Division in the Office of Pesticides and Toxic Substances at EPA headquarters. Starting in fiscal year 1993, the agency began to delegate the program's administration to the 10 EPA regional offices. This decentralization may have adverse effects upon the focus of the grants program and, hence, its evaluation. Regional offices will have trouble maintaining the definition of "pollution prevention" since they have many other concerns and responsibilities. A concise and specific definition of "pollution prevention" must be maintained to evaluate whether state program grantees are fulfilling the requirements of the program, or the program may be in danger of supporting waste treatment instead of pollution prevention. There are many other problems for national-level knowledge that will result from decentralization unless EPA headquarters keeps its control not only of definitions but also of what data are collected and whether they can form an aggregate.

Summary and Conclusions

In this chapter, we addressed our third evaluation question, "How sound are the indicators used to characterize the progress of state pollution prevention programs?" We reviewed the indicators used for the evaluation procedures of the PPIS grant program and determined that these indicators may invite respondent bias and imprecise representations of state

[10]For example, companies may not want their production processes described for fear that competitors would gain confidential information.

pollution program activities. We also described indicators of program progress used by state assessment efforts. State programs tended to use indicators that tap the quantity of services provided, planning effort compliance, and assessment of program quality by customers. Of these indicators, only the customer assessment approach characterizes program outcome. The other types of indicator merely characterize program processes, and these do not allow the determination of the ultimate effects of the programs. As a result, neither the indicators used for the PPIS grant program nor those employed by independent state program assessments were able to demonstrate program effectiveness. And, in the absence of indicators that demonstrated program effectiveness, the progress of the EPA "Pollution Prevention Strategy" could not be ascertained.

Evaluating Program Effectiveness

In this chapter, we answer our fourth and final evaluation question, "What changes are necessary to enable EPA and the states to evaluate pollution prevention program effectiveness?" To address this question, we interviewed state and federal officials and conducted program site visits. For the purposes of this question, we define "effectiveness" in terms of the impacts of state pollution prevention programs on actual waste reduction.[1] In order to determine these impacts, the amounts and types of waste reduced must be quantified in a reliable and valid manner. We believe that quantifiable amounts of reductions in wastes generated are required to ascertain the effectiveness of federal pollution prevention policy.

The National Roundtable of State Pollution Prevention Programs has issued a position statement on the difficulty of evaluating program effectiveness. Among other points, this statement asserts that effectiveness evaluations of state pollution prevention programs must consider the mission of the program or program activity and the need to use new measures of effectiveness, that pollution prevention is a long-term process, and that much of the pollution prevention process originates in the private sector. Taking this position as a baseline, we identify several changes that could aid in resolving the problems of conducting effectiveness evaluations. These changes include the clarification of program goals and objectives, utilization of the total cost assessment (TCA) approach, and training of industry staff in the complex methods of pollution prevention effectiveness evaluation.

Clarification of Program Goals and Objectives

Given that many of the state pollution prevention programs engage in activities unrelated to pollution prevention, including waste treatment and disposal, this suggests that state program goals and objectives have been overexpanded.[2] As a result, it is nearly impossible to isolate source reduction actions and develop operational definitions to be used in effectiveness studies of these actions. Therefore, before initiating any study of program effectiveness, these goals and objectives must be more clearly directed toward source reduction activities.

[1]The definition of "effectiveness" has been a cause of controversy among the state programs. Some programs defined the term to refer to quantifiable reductions in wastes generated or toxics used. Others argued that a qualitative interpretation of the term should be used, by assessing whether customers value program services.

[2]Programs are free to claim that pollution prevention is their focus even though they may promote other waste actions. Any state program is allowed to join the National Roundtable of State Pollution Prevention Programs merely by paying a small annual fee; National Roundtable membership does not imply that programs are certified.

The clarification of these goals and objectives can only occur once each program's "audience" is defined. As noted by the Northeast States Pollution Prevention Roundtable, some state programs are accountable to state environmental agency heads, while others are accountable to industry and thus reactive to their customers. For the programs that are accountable to industry, there is often no authority to collect data appropriate to tracking facilities or evaluating the effects of pollution prevention actions. As a result, it is difficult to collect outcome data from individual facilities that can be generalized, compared, or aggregated.

Total Cost Assessment

For many companies, economic maximization remains the main incentive for pollution prevention. The Total Cost Assessment (TCA) approach has recently emerged as a method by which pollution prevention results can be ascertained.[3] TCA extends the cost/benefit inventory and time horizon and uses long-term profitability indicators to develop a more comprehensive evaluation of industrial pollution prevention investments. This approach documents the direct, indirect, and liability costs of pollution prevention investments over a time frame of 5 years or longer. By definition, pollution prevention investments are designed to reduce these costs. For example, a pollution prevention project is designed to reduce or eliminate compliance costs of waste production, including permitting, reporting and monitoring, the operating costs of on-site pollution control equipment, and off-site transportation of wastes. TCA is designed to demonstrate the extent to which such costs are being reduced or eliminated. Therefore, such cost data can serve as a proxy measure of the amount of waste produced (and reduced), especially since TCA can focus upon particular production processes.

TCA is not without measurement flaws. For example, liability costs (for instance, penalties and fines, or legal settlements) are difficult to use as indicators of waste production since they depend upon the somewhat random nature of the enforcement process. Further measurement development is needed in this area. Nonetheless, the great advantage of TCA is that the method can generate the kind of data that would make case studies generalizable and thus provide a means to evaluate both the funded activities and their outcomes—that is, not only pollution prevention initiatives but also changes in levels of waste generated at either state or national levels. TCA is especially applicable to long-term

[3]A comprehensive discussion of TCA is given in Alternative Approaches to the Financial Evaluation of Industrial Pollution Prevention Investments (prepared for the New Jersey Department of Environmental Protection by the Tellus Institute, Boston, Massachusetts, November 1991).

efforts, which are the most difficult to evaluate; it may be less congruent with those efforts that require a rapid payback of capital investments.

Training of Industry Staff

According to National Roundtable officials, facility staff are capable of generating data that could help track state pollution prevention program effectiveness, but they may not have the knowledge necessary for proper monitoring and tracking. However, these staff are often unaware of how their particular process contributes to the overall waste discharge of a facility; the narrow scope of their work may not motivate them to understand these effects. Furthermore, this lack of knowledge is perpetuated by the rapid turnover in facility environmental staff positions. These symptoms may indicate an inadequate level of commitment to pollution prevention in the private sector. As noted by one state program official, "lack of corporate commitment is one of the most formidable opponents of waste reduction." According to this official, a detailed written corporate pollution prevention policy is necessary for each company. Such a policy should outline all policies and procedures for dealing with waste, as well as detail corporate and staff responsibilities for all waste-oriented activities.

In essence, the knowledge and skills of facility staff members may need to be upgraded to obtain the data necessary for evaluating program effectiveness. To accomplish this, changes in facility corporate culture may also be necessary. Given the proper approach, state programs—whether regulatory or nonregulatory—can help facilitate these changes. If these programs were to adopt a more proactive orientation, industrial facilities might be encouraged to institutionalize pollution prevention. As for regulatory-program requirements, such as formal pollution prevention plans, these may compel industrial facilities to integrate pollution prevention within corporate structures. Such changes would, of course, necessitate that facility staff have the knowledge and skills necessary to obtain program effectiveness data.

Summary and Conclusions

In this chapter, we addressed our fourth and final evaluation question, "What changes are necessary to enable EPA and the states to evaluate pollution prevention program effectiveness?" We conclude that the limitations to evaluation are largely organizational rather than conceptual, since many programs have goals and objectives that support after-the-fact waste treatment strategies. Further, the needed evaluation methods exist, and knowledge and skills to apply them are a matter of training. As a

result, we believe that the existing industry culture may not support meaningful efforts to collect program effectiveness data, and that efforts to develop these data will need first and foremost to address that culture.

Conclusions and Recommendations

Conclusions

Nearly all states have what are termed "pollution prevention" programs, but the types and mandates of these programs tend to vary significantly. As a result, the source reduction approach is not becoming institutionalized as it should be within the state programs. Given that a majority of the programs emphasize waste recycling, treatment, and disposal, we conclude that the source reduction emphasis of the Pollution Prevention Act of 1990 is inconsistently supported on a nationwide basis. Furthermore, EPA funding of many programs seems to reward after-the-fact pollution control strategies rather than source reduction. Finally, given the inconsistencies and measurement problems associated with indicators of program progress, we conclude that these indicators cannot be used to demonstrate the extent of program success or failure.

Recommendations

Based on the foregoing conclusions, we recommend that the Administrator of EPA

- ensure (by strengthening the state grant program evaluation requirements) that state pollution prevention programs are in fact emphasizing source reduction, rather than the recycling, treatment, and disposal of waste;
- encourage state programs to combine various attributes of regulatory and nonregulatory state pollution prevention programs to achieve more proactive and energetic outreach;
- improve data collection processes such that state program efforts can be evaluated (a subsequent GAO report will address this issue);
- strengthen the evaluation requirements of the Pollution Prevention Incentives for States (PPIS) grant program;
- reinforce the presence of pollution prevention program efforts at the 10 EPA regional offices;
- encourage state programs to promote changes in industry culture that will foster the adaptation and evaluation of pollution prevention efforts;
- seek to substitute state prevention activities for enforcement actions; and finally,
- establish criteria within the PPIS grant program for measuring the success of source reduction efforts undertaken by businesses.

Agency Comments and Our Evaluation

After its review, EPA submitted several comments to us, both general and specific. The latter have been incorporated into the draft report where appropriate. Here we provide EPA's major comments and our evaluation of them.

EPA noted that the Pollution Prevention Act (for the PPIS grant program) requires the agency to develop the means for assessing the effectiveness of state programs only in promoting the use of source reduction by businesses. The act does not require EPA to establish criteria for measuring the actual success of the source reduction efforts in question.

While the agency is technically correct about this issue, we believe that an assessment of promotional activities without regard to the outcome of these efforts is not helpful in determining progress made toward preventing pollution under the act.

EPA indicated that state programs have different mandates and objectives, and that the PPIS grants thus emphasize different approaches to source reduction. As a result, the agency suggests that there is no single measure or set of measures for evaluating program effectiveness. However, while state programs can differ substantially, we believe that program effectiveness can still be determined. Evaluation frameworks can be designed that allow the assessment of disparate program approaches.

EPA has suggested that quantitative data on source reduction can be obtained from media-specific programs under the RCRA hazardous waste minimization program and the TRI reporting system. As required under the Pollution Prevention Act, TRI is designed to track pollution prevention progress and the use of state programs by industry. Unfortunately, as noted in several previous GAO reports, data collected under the RCRA reporting system are likely to be flawed.[1] As a result, no determination can be made regarding source reduction progress. Further, information supplied by TRI about state program usage and source reduction is quite limited. Industry respondents are merely asked if state program services were utilized; no information is gathered on the extent, frequency, or specific types of services provided. A forthcoming GAO report will specifically examine TRI and source reduction.

[1]See Hazardous Waste: EPA's Generation and Management Data Need Further Improvement, GAO/PEMD-90-3 (Washington, D.C.: February 9, 1990); Hazardous Waste: Data Management Problems Delay EPA's Assessment of Minimization Efforts, GAO/RCED-91-131 (Washington, D.C.: June 13, 1991); Waste Minimization: EPA Data Are Severely Flawed, GAO/PEMD-91-21 (Washington, D.C.: August 5, 1991); and Waste Minimization: Major Problems of Data Reliability and Validity Identified, GAO/PEMD-92-16 (Washington, D.C.: March 23, 1992).

List of Identified State Pollution Prevention Programs

State	Pollution prevention program
Alabama	Environmental Institute for Waste Management Studies
	Pollution Prevention Program
	Project ROSE (Recycled Oil Saves Energy)
Alaska	Pollution Prevention Office
	Waste Reduction Assistance Program
Arizona	Waste Minimization Program
Arkansas	Biomass Resource Recovery Program
	Pollution Prevention Program
California[a]	City of San Francisco Chief Administrative Officer's Hazardous Waste Management Program
	City of Berkeley Toxics Program
	City of Irvine Environmental Affairs Office
	City of Los Angeles Hazardous and Toxic Materials Office
	County of Los Angeles Pollution Prevention Program
	City of San Francisco Pollution and Hazardous Waste Reduction Program
	Pollution Prevention and Public/Regulatory Assistance Program
	State of California, Waste Minimization Branch, Department of Toxic Substances Control
	University of California at Los Angeles Chemical Engineering Department
Colorado	Pollution Prevention and Waste Reduction Program
Connecticut	Department of Environmental Protection
	Technical Assistance Program
Delaware	Pollution Prevention Program
Florida	Center for Solid and Hazardous Waste Management
	Waste Reduction Assistance Program
Georgia	Hazardous Waste Management Program
	Waste Reduction and Environmental Compliance Program
Hawaii	Solid and Hazardous Waste Branch
Idaho	Division of Environmental Quality
	Hazardous Materials Bureau
Illinois	Hazardous Waste Research and Information Center
	Office of Pollution Prevention
Indiana	Office of Pollution Prevention and Technical Assistance
	Pollution Prevention Program
Iowa	Comprehensive Solid Waste Management Planning Office
	Waste Reduction Assistance Program
	Waste Reduction Center

(continued)

State	Pollution prevention program
Kansas	Bureau of Waste Management
	Great Plains-Rocky Mountains Hazardous Substance Research Center
	Kansas State University Pollution Prevention Program
Kentucky	Department of Environmental Protection
	PARTNERS—State Waste Reduction Center
Louisiana	Alternative Technology Research and Development Office
	Office of Policy and Planning
Maine	Office of Pollution Prevention
	Pollution Prevention Through Understanding and Managing Chemicals
Maryland	Hazardous and Solid Waste Management Administration
	Technical Extension Service
Massachusetts	Center for Environmental Management
	Office of Technical Assistance for Toxics Use Reduction
	Toxics Use Reduction Act Implementation Team
	Toxics Use Reduction Institute
Michigan	Cooperative Extension Service
	Office of Waste Reduction Services
Minnesota	Pollution Control Agency
	Pollution Prevention Program
	Technical Assistance Program
Mississippi	Comprehensive Waste Reduction/Waste Minimization Program
Missouri	Hazardous Waste Program
Montana	Department of Health and Environmental Sciences
Nebraska	Hazardous Waste Section
	University of Nebraska Department of Civil Engineering
Nevada	University of Nevada Business Environmental Program
New Hampshire	Pollution Prevention Program
	Wastecap
New Jersey	Office of Pollution Prevention
	Technical Assistance Program for Industrial Pollution Prevention
New Mexico	Municipal Water Pollution Prevention Program
	Solid Waste Bureau
New York[a]	Bureau of Pollution Prevention
	Center for Waste Reduction Technologies
	Erie County Office of Pollution Prevention
	Suffolk County Water Authority Source Reduction Program
	Technical Advisory Services Division
North Carolina	Office of Waste Reduction
	Western Carolina University—Pollution Prevention Pays Program

(continued)

State	Pollution prevention program
North Dakota	(No program identified)
Ohio	Cleveland Advanced Manufacturing Program
	Pollution Prevention Section, Ohio EPA
	Pollution Prevention Technical Assistance Office
	Thomas Edison Program
Oklahoma	Waste Reduction Program
Oregon	Hazardous and Solid Waste Reduction Division
Pennsylvania	Center for Hazardous Materials Research
	Division of Waste Minimization and Planning
	Technical Assistance Program
Rhode Island	Pollution Prevention Center
	Pollution Prevention Program
South Carolina	Center for Waste Minimization
South Dakota	Waste Management Program
Tennessee	University of Tennessee Center for Industrial Services
	Waste Reduction Assistance Program
Texas	Center for Hazardous and Solid Waste Studies
	Hazardous Waste Research Center
	Office of Pollution Prevention and Conservation
Utah	Department of Environmental Quality
Vermont	Pollution Prevention Division
	Source Reduction Resource Center
Virginia	Waste Management Program
Washington	Toxics Reduction, Waste Reduction, Recycling, and Litter Control Program
West Virginia	Pollution Prevention and Open Dump Program
Wisconsin	Office of Pollution Prevention
	Solid and Hazardous Waste Education Center
Wyoming	Pollution Prevention Program

[a]California and New York supported several programs at the city/county level. These programs were coordinated with state government and were members of the National Roundtable of State Pollution Prevention Programs.

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