

GAO

Report to the Chairman, Subcommittee
on Transportation and Hazardous
Materials, Committee on Energy and
Commerce, House of Representatives

June 1991

HAZARDOUS WASTE

Data Management Problems Delay EPA's Assessment of Minimization Efforts



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United States
General Accounting Office
Washington, D.C. 20548

**Resources, Community, and
Economic Development Division**

B-243609

June 13, 1991

The Honorable Al Swift
Chairman, Subcommittee on Transportation
and Hazardous Materials
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As requested, we are reporting on the Environmental Protection Agency's (EPA) development of data to measure progress in minimizing the generation of hazardous waste. Our report contains recommendations aimed at improving the quality and timeliness of this effort.

As arranged with your office, unless you publicly announce its contents earlier, we will make no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to other appropriate congressional committees; the Administrator, EPA; and the Director, Office of Management and Budget. We will make copies available to other interested parties upon request.

This work was performed under the direction of Richard L. Hembra, Director, Environmental Protection Issues, (202) 275-6111. Other major contributors to this report are listed in appendix III.

Sincerely yours,



J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

The industrial facilities that produce the nation's goods also generate millions of tons of hazardous waste. These wastes, such as toxic chemicals used in manufacturing, pose a threat to public health and the environment and must be controlled and disposed of properly. However, the sheer volume of these wastes challenges control systems and treatment/disposal capacity. An estimated 275 million metric tons were generated by 211,000 facilities in 1985 (the latest available data). A solution, at least partially, is to reduce or minimize waste generation through recycling and changes in production processes.

The Environmental Protection Agency (EPA), states, and industry are giving waste minimization more attention, but data to measure their efforts are not available. Concerned about progress in minimizing waste, the Chairman, Subcommittee on Transportation and Hazardous Materials, House Committee on Energy and Commerce, asked GAO to determine the status of EPA's efforts to develop the data.

Background

The Resource Conservation and Recovery Act of 1976 (RCRA) required EPA to establish a program to regulate industrial hazardous waste from its generation to disposal. As health and environmental concerns grew, the Congress passed the Hazardous and Solid Waste Amendments of 1984 to expand the types of waste and activities covered by the program. The amendments also declared it national policy to eliminate or reduce, as expeditiously as possible, the amount of waste generated. EPA was directed to report to the Congress by October 1986 whether a regulatory program to require waste minimization by industry was feasible and desirable.

EPA's report noted that the agency needed more time to collect and evaluate information on waste minimization. This information, including baseline and trend data on the volume and toxicity of hazardous waste and industry's minimization activities, was to be the basis for a December 1990 report to the Congress on the need for a mandatory regulatory program. EPA noted that a critical factor in deciding on the need for a program was assessing the results of industry's voluntary actions.

As EPA began developing waste minimization data, it used other major data collections already in place. EPA was conducting a special national survey of about 10,000 large-quantity industrial generators on their waste generation and waste management activities in 1986 (referred to as the 1986 generator survey). In addition, under RCRA, hazardous waste

generators are required to submit biennial reports to EPA. Agency officials added questions to the 1986 generator survey as it was being developed and revised and expanded biennial reporting requirements. The generator survey was to serve as the baseline data, and subsequent biennial reports—starting with 1987—were to be the trend data.

Results in Brief

Although EPA and the states have made progress in implementing the voluntary waste minimization program, EPA's assessment of industry's minimization efforts has been delayed because of problems in the design of the generator survey and biennial data collection instruments and in the process for collecting and aggregating the data. EPA officials attributed these problems to staffing and funding constraints, other higher-priority work, the complexity of the data collection effort, and inconsistent and late state reporting. EPA now anticipates having baseline data by mid-1991 and trend data by mid-1992.

The data collection design problems may limit the data's usefulness for measuring waste minimization because the data do not include "small-quantity" generators, which RCRA defines as facilities that produce less than 2,200 pounds of hazardous waste per month. However, these facilities collectively may contribute a significant percentage of total hazardous waste. The data collection design also does not account for changes in toxicity (the concentration of hazardous constituents in the waste) that are needed to accurately measure the success of industry's efforts. Furthermore, some data are reported by generators in an inconsistent manner and cannot be accurately compiled on a national basis.

EPA did not have a data management plan defining data requirements, establishing how to obtain the needed data, and identifying the resources and time frames for completion. With such a plan, the agency may have been able to avoid or reduce the data collection design problems and set more realistic completion dates for the effort.

Principal Findings

Delays in Developing Waste Minimization Data

According to EPA officials, the agency underestimated the complexity of developing baseline and trend data for hazardous waste minimization. For example, EPA's discussions with state, industry, congressional, and environmental group representatives after issuance of EPA's 1986 report

to the Congress revealed additional policy questions on waste minimization that demanded a broader focus by EPA than the agency had originally thought necessary. These issues, such as the need to be able to focus minimization efforts on specific wastes, had to be considered during the development of data collection instruments, requiring more time and resources than planned.

Staff turnover, resource constraints, and competing priorities within EPA also limited the agency's efforts to obtain timely waste minimization data. EPA assigned waste minimization data collection a low priority, relative to some other RCRA program activities competing for funding and staffing. For example, while the number of recipients to be surveyed was initially about 3,000 generators, 10,000 were surveyed to meet the data needs of various other program activities. Funding was not increased, delaying completion of the work for almost a year.

GAO also found that over half the states nationwide used some of their own forms rather than EPA's for collecting and reporting biennial data to EPA, making the agency's job of verifying, analyzing, and summarizing the data much more complex and lengthier than EPA had anticipated. Under RCRA regulations, states have to submit data equivalent to that required by EPA, but the data do not have to be identical. According to EPA officials, the agency is planning to amend the regulations to require consistent state reporting of biennial data.

EPA's Waste Minimization Information Has Major Design Problems

Neither the 1986 generator survey nor the biennial reporting system included small-quantity generators, as defined under RCRA. EPA is currently considering the advisability of including those generators because they might actually be large producers of hazardous wastes when their wastes that are regulated under the Clean Water Act are also considered. An EPA official noted that, because of differences in industrial processes, some small-quantity generators may produce wastes smaller in volume but more concentrated and toxic than those of large-quantity generators.

EPA's waste minimization data will not enable the agency to accurately measure how the toxicity of the waste has changed. Toxicity is an important factor in measuring waste reduction because a generator could reduce the total volume of its waste by reducing its water content, thereby leaving the hazardous constituents unchanged but more concentrated and potentially more harmful to the environment. EPA is currently considering how best to assess changes in toxicity.

Furthermore, some hazardous waste data are not comparable because generators report waste quantities at different points in their waste generation and disposal processes. While currently considering whether to require point-of-generation reporting, EPA has not previously done so to avoid imposing a burden on generators not having record-keeping systems compatible with such reporting.

EPA is now at a crossroads in its development of hazardous waste minimization data. On the basis of experience to date, the agency has a better understanding of the hazardous waste industry and the complexities of measuring waste minimization. EPA officials are beginning to rethink their data needs and how to meet them.

Recommendations

GAO recommends that the Administrator, EPA, work with the states and industry to define data requirements to meet current and future information needs for hazardous waste minimization. As part of this effort, GAO also recommends that EPA set out how these data requirements will be met; who will be responsible for data collection, analysis, and management; and what the time frames and resources for completion of these tasks will be. To ensure that this new approach to measuring waste minimization meets congressional needs and expectations, the plan should be made available to the cognizant congressional oversight committees, which may want to explore the approach and options in more detail with EPA.

Agency Comments

As requested, GAO did not obtain official agency comments on this report. However, GAO discussed the information presented with EPA officials. These officials generally agreed with the information contained in the report. Their comments were incorporated as appropriate.

Contents

Executive Summary		2
Chapter 1		8
Introduction	Hazardous Waste Legislation Stresses Minimization	8
	RCRA-Regulated Hazardous Wastes	10
	EPA's Preferred Approach for Managing Hazardous Waste	11
	The EPA/State Partnership Under RCRA	11
	The Importance of Waste Minimization Data	12
	Objectives, Scope, and Methodology	13
Chapter 2		15
EPA's Development of Baseline and Trend Data Has Been Delayed	EPA's Initial Plans	15
	Current Status and Plans	16
	Reasons for Problems and Delays	18
	Other Agency Data Management Problems	21
Chapter 3		24
EPA's Waste Minimization Data Collection Instruments Have Design Problems	Small-Quantity Generators Not Accounted for	24
	Toxicity Is a Significant Factor in Measuring Minimization Progress	26
	Changes in Production Need to Be Considered When Measuring Waste Minimization	27
	Options for Supplementing the Biennial Reporting System	29
Chapter 4		32
Conclusions and Recommendations	Recommendations to the Administrator, EPA	33
Appendixes		
	Appendix I: EPA's Hazardous Waste Minimization Activities	34
	Appendix II: State Waste Minimization Activities	37
	Appendix III: Major Contributors to This Report	44

Abbreviations

EPA	Environmental Protection Agency
GAO	General Accounting Office
HSWA	Hazardous and Solid Waste Amendments of 1984
IRM	Information Resources Management
OMB	Office of Management and Budget
OSW	Office of Solid Waste
RCRA	Resources Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RENEW	Resource Exchange Network for Eliminating Waste
TRI	Toxic Release Inventory

Introduction

The factories and other operations that produce the goods we use in everyday life also generate millions of tons of hazardous wastes each year—an estimated 275 million metric tons in 1985 (the latest available data). Federal and state regulatory and industry management efforts have helped to reduce the threat that the disposal of these wastes poses to public health and the environment. Noncompliance with regulations designed to ensure proper control and disposal has been persistent, and toxic chemicals have contaminated the land and air at many waste sites across the nation. In addition, the continuous generation of large amounts of these wastes will mean that additional treatment and disposal capacity will be needed. The public, however, is highly concerned about the expansion of existing treatment and disposal sites and the location of new sites. Cleaning up past problems, properly managing the wastes now being generated, and providing the additional disposal and treatment capacity could cost millions of dollars.

These costs and the potential for further environmental harm can be minimized through recycling and changes in production processes to generate less hazardous waste. According to a recent Environmental Protection Agency (EPA) report,¹ federal rules and permits have reduced the volume of mismanaged hazardous waste but waste minimization efforts need greater emphasis. According to EPA officials, industry is giving greater attention to minimization. Unfortunately the data to measure this increase in minimization activity and its success in reducing waste generation are not available.

Hazardous Waste Legislation Stresses Minimization

The Resource Conservation and Recovery Act of 1976 (RCRA) required EPA to implement a comprehensive regulatory program to manage hazardous waste from its generation to disposal. The Hazardous and Solid Waste Amendments of 1984 (HSWA) revised RCRA to impose new and far-reaching requirements, particularly in restricting land disposal and expanding the types of wastes and the number of waste-generating activities to be regulated. HSWA also declared it to be national policy that whenever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible.

To further the goals of waste minimization, HSWA required hazardous waste generators to identify in biennial reports to EPA their efforts to reduce the volume and toxicity of waste generated and the reductions in

¹The Nation's Hazardous Waste Management Program at a Crossroads: The RCRA Implementation Study, Office of Solid Waste and Emergency Response, EPA/530-5W-90-069 (July 1990).

volume and toxicity actually achieved.² HSWA also required generators to certify on their manifests (tracking forms accompanying the off-site shipment of waste) that they have programs in place to reduce the volume and toxicity of their waste to the extent economically practicable. Furthermore, HSWA directed EPA to evaluate and report to the Congress by October 1986 on the feasibility and desirability of legislative changes or regulatory measures to compel industry's adoption of waste minimization techniques.

EPA issued its report to the Congress in October 1986. The report, entitled Minimization of Hazardous Waste, concluded that mandatory programs for waste minimization would not be desirable or feasible at that time. EPA stated that it needed more time to collect and evaluate additional information, including baseline data on the volume and toxicity of wastes generated, and trend data on source reduction, recycling, and treatment and disposal capacity. According to the report, EPA was to prepare a follow-up report to the Congress in December 1990. The follow-up report was to evaluate whether existing incentives have been sufficient to promote waste minimization or whether some form of mandatory program is necessary to implement the national waste minimization policy. (The current status of EPA's plans to issue its follow-up report is discussed in ch. 2.) In the meantime, EPA planned to carry out a nonregulatory program of technical assistance and information transfer to promote waste minimization.

The Pollution Prevention Act of 1990 broadened the emphasis on waste minimization by requiring EPA to establish an office of pollution prevention to develop and implement a strategy to promote across-the-board source reduction of hazardous pollutants released or emitted into the air, land, and water. The strategy is, among other things, to identify, where appropriate, measurable goals for source reduction, the tasks to achieve the goals, dates to accomplish the principal tasks, required resources, organizational responsibilities, and the means to measure progress in meeting the goals. EPA is required to report to the Congress within 18 months after the effective date of the act and biennially thereafter on its implementation of the strategy. In addition, the act authorizes \$8 million annually for fiscal years 1991 to 1993 to administer the program and an additional \$8 million annually for matching grants for state programs. EPA's current strategy is to focus on 15 to 20 high-risk

²RCRA required generators to report biennially on their activities to EPA, including the quantities and nature of the hazardous wastes generated. HSWA added the reporting requirements for waste minimization.

toxic chemicals. The RCRA program is contributing to the strategy and continuing efforts to minimize the generation of other waste types regulated under RCRA.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, commonly known as Superfund, is related to RCRA. Superfund gives EPA the authority and funds to clean up contamination at the worst of the nation's abandoned or inactive hazardous waste sites when willing and able responsible parties cannot be found. If the controls and minimization efforts called for by RCRA and the Pollution Prevention Act are not effective, additional sites may be added to the hundreds of contaminated sites already eligible for cleanup under Superfund.

RCRA-Regulated Hazardous Wastes

RCRA broadly defines as "hazardous" those wastes that pose a threat to human health or the environment and requires EPA to identify the particular wastes that are to be regulated as hazardous.³ Thus far, the agency has identified over 450 specific wastes and 4 general characteristics of hazardous waste: ignitability, corrosivity, reactivity, and toxicity. A generator's waste—which may be a solid, liquid, semi-solid, or gaseous waste—is to be regulated as hazardous under RCRA if it exhibits any one of the four hazardous characteristics or if EPA specifically lists it as hazardous. RCRA, however, exempts from regulation as hazardous such wastes as domestic sewage, industrial wastewater discharges regulated under the Clean Water Act, nuclear materials regulated under other legislation, oil and gas production wastes, mining wastes, wastes from the combustion of coal and other fossil fuels, wastes returned to the soil as fertilizers, and household wastes. (Hereafter in this report, unless otherwise noted, the term "hazardous waste" is used to mean those wastes regulated as hazardous under RCRA.)

EPA's estimate of 275 million metric tons of hazardous waste generated in 1985 represents the amount of hazardous waste regulated under RCRA. It does not include the above-mentioned wastes that RCRA excludes from consideration as hazardous. For example, EPA has estimated that the hazardous waste discharged in wastewater and regulated under the Clean Water Act rather than RCRA may be almost half of all hazardous waste. The other excluded categories, such as household waste, may

³Specifically, RCRA defines a hazardous waste as a waste which may cause, or significantly contribute to, an increase in mortality or in serious, irreversible or incapacitating, reversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

also include some wastes that exhibit hazardous characteristics. According to EPA, the RCRA-regulated community consists of 211,000 facilities that generate hazardous waste and 4,700 treatment, storage, and disposal facilities consisting of about 81,000 waste management units.

EPA's Preferred Approach for Managing Hazardous Waste

EPA prefers waste minimization over other approaches to managing hazardous waste. An August 18, 1976, Federal Register notice (41 Fed. Reg. 35050) issued by EPA noted that the desired approach to hazardous waste management should be source reduction (reducing the volume and toxicity of hazardous waste generated at the source through production process changes). EPA's next preferred approach was recycling, which also minimizes the total quantity of waste generated through reuse of waste, followed by waste treatment (including incineration) to eliminate or reduce the waste's hazardous characteristics. Land disposal was the least desirable option because of the continuing threat of a release of contaminants.

Despite its stated preference for waste minimization, EPA has concentrated its efforts, especially in the first 10 years after RCRA was enacted, on developing and implementing the regulatory program to control hazardous waste after its generation. EPA's position was that a strong regulatory program governing the generation, transportation, treatment, storage, and disposal of hazardous waste would help bring these wastes under control and, because of the increased cost, would provide sufficient incentives for waste minimization efforts on the part of industry. However, because of continuing concerns about the large amounts of hazardous wastes being generated, EPA is now increasing its waste minimization activities. (A brief description of these activities is contained in app. I.)

The EPA/State Partnership Under RCRA

Like many other environmental laws, RCRA provides for states to assume the responsibility of implementing and enforcing the RCRA hazardous waste program (called authorization) and EPA oversees the states' programs. The rationale for encouraging the states to implement the RCRA program is that each state is more familiar with regulating its own community and, therefore, is in a better position to more effectively administer the program and respond to local needs than is the federal government. To receive authorization from EPA, a state program must be at least equivalent to the federal program and provide for adequate enforcement. As discussed in appendix II, some states have decided to

impose requirements for waste minimization that are more stringent or broader in scope than the federal requirements.

As of January 1991, 44 states, the District of Columbia, and Guam were administering all or part of the RCRA program. EPA administers the RCRA program in the remaining states and territories. States receive financial assistance from EPA for 75 percent of their programs' cost in the form of annual matching grants. EPA also assists the states by providing them with program guidance, which clarifies and interprets regulatory provisions. EPA oversees the state programs by monitoring the states' activities.

The Importance of Waste Minimization Data

National policy, as stated in HSWA and reaffirmed in the Pollution Prevention Act, is to eliminate or reduce the generation of hazardous waste as expeditiously as possible. Quantifiable data that track industry's minimization efforts and the reductions achieved in amounts generated and toxicity are needed for EPA to know whether and how effectively this policy is being implemented, or whether additional actions, such as a regulatory program, are needed. These data are especially important for compliance monitoring and enforcement if a regulatory program is established.

In our July 1988 report,⁴ we noted the importance of waste minimization to properly manage the nation's hazardous waste and concluded that EPA needs to establish specific, quantifiable goals as the criteria by which to objectively judge the overall progress of its waste minimization program. EPA has established a 25-percent waste reduction goal for municipal solid waste but has not yet established such a goal for hazardous waste. The Pollution Prevention Act confirms the need for such goals by requiring EPA to identify, where appropriate, measurable goals for source reduction of hazardous pollutants and to periodically report to the Congress on progress toward them. As discussed in chapter 3, EPA's pollution prevention strategy establishes reduction goals for total releases of certain toxic chemicals into the air, land, and water. Baseline and trend data on industry's waste minimization activities and the reductions achieved would be needed to set and monitor progress toward such goals for hazardous waste.

⁴Hazardous Waste: New Approach Needed to Manage the Resource Conservation and Recovery Act (GAO/RCED-88-115, July 19, 1988).

Reliable baseline and trend data are also important to the states. Several state officials we talked to said that the lack of these data has hindered them in assessing their minimization programs. For example, some officials said that their states have not established waste reduction goals, in part, because of the absence of good data to establish a baseline and then measure progress toward the goal. On the other hand, some states had established goals but were uncertain of how progress could be measured because of the lack of data.

Objectives, Scope, and Methodology

Concerned about the nation's progress in minimizing the generation of hazardous waste, the Chairman, Subcommittee on Transportation and Hazardous Materials, House Committee on Energy and Commerce, requested that we examine EPA's waste minimization efforts. Specifically, we agreed to determine the status of EPA's efforts to develop baseline and trend data.

We conducted our work primarily at the Office of Solid Waste and the Office of Pollution Prevention at EPA headquarters. In addition, we interviewed program officials in EPA Region 6, including Texas and Louisiana, two of the nation's leading states in the generation of hazardous waste. We contacted environmental agency officials in seven states—California, Illinois, Massachusetts, Minnesota, New Jersey, North Carolina, and Oregon—by telephone. The seven states were identified by EPA officials as among the most active in hazardous waste minimization. Thus, the 9 states we selected in total may not be representative of all 50 states.

The major focus of our work was on the availability of complete and accurate data on the volume and toxicity of hazardous waste generated and industry's waste minimization efforts. However, we also collected information on EPA and state waste minimization activities.

For the above objective, we interviewed EPA officials in the Office of Solid Waste responsible for developing baseline and trend data on hazardous waste minimization—principally EPA's 1986 generator survey and its biennial reporting system—and representatives of the major contractors assisting them. We also reviewed pertinent agency files, including documents and reports, such as contract statements of work, contractors' monthly progress reports, EPA decision papers, and requests for approval by the Office of Management and Budget (OMB) to conduct the 1986 survey and the 1987 and 1989 biennial reports.

To identify the major problems, delays, and causes related to EPA's development of data, we reviewed pertinent documents, interviewed agency personnel, and analyzed the Office of Solid Waste's written responses to a series of questions we raised.

Our audit work was conducted between March 1990 and February 1991 in accordance with generally accepted government auditing standards. We discussed the factual information in the report with EPA officials, who generally agreed with the information presented. However, as requested we did not obtain formal comments from EPA on a draft of this report.

EPA's Development of Baseline and Trend Data Has Been Delayed

EPA has not developed baseline and trend data on hazardous waste minimization. Agency officials cited problems with the design of the data collection instruments and the process for collecting and aggregating the data as major reasons for the delay. The officials attributed these problems to staffing and funding constraints, higher-priority work, and the complexity of the task. States' late reporting and use of different formats in collecting and summarizing their generators' biennial reports also contributed to the delays. As a result, EPA has revised its plans for reporting to the Congress and is uncertain whether a report will be issued and what type it will be. EPA is also beginning to reconsider its overall approach to developing minimization data.

EPA has had difficulty in obtaining the data it needs to formulate general policies, implement programs, and measure their success. In 1988, we made recommendations to help improve the agency's information resources management.

EPA's Initial Plans

EPA initially planned to use a special national survey of hazardous waste generators as the baseline to measure waste minimization progress. This survey of about 10,000 facilities generating large quantities of hazardous wastes, conducted in 1987, was intended to gather data on, among other things, waste minimization activities and the types and volumes of hazardous wastes generated during calendar year 1986. (EPA refers to the survey as the 1986 generator survey.) EPA was to conduct the survey, analyze the results, and prepare a summary report by July 1988.

EPA planned to use the existing biennial reporting system required by RCRA to establish trend data. Under the system, each even-numbered year large-quantity generators and waste management facilities report on waste generation and on management activities conducted during the previous (odd-numbered) year. The generators' reports are sent to EPA regions or to states in cases where they have been authorized to implement the RCRA program. The regions and states provide summaries of the reports to EPA headquarters, which compiles the data and publishes a national report. Reporting cycles covering 1981, 1983, and 1985 have been completed, and EPA is nearing completion of the 1987 reporting cycle.

EPA modified biennial reporting for 1985 to incorporate the 1984 HSWA requirement that generators' submissions also include (1) their efforts to reduce the volume and toxicity of their waste and (2) the reductions

actually achieved. However, EPA did not specify the reporting format; it required only a narrative description. EPA personnel later found it impossible to use these narrative descriptions because they provided insufficient detail.¹ Thus, EPA decided to use the 1986 generator survey, rather than the 1985 biennial report, as the baseline and subsequent biennial reports—1987 and beyond—as the trendline.

EPA extensively revised the reporting format for the 1987 biennial cycle to provide for facilities to report in a consistent format, which would lend the forms to better analysis. The data were to be collected between mid- and late-1988 and fully analyzed and reported sometime in 1989, in time to serve as the first point of trend data for the planned December 1990 report to the Congress.

For the 1989 reporting cycle, EPA made only minor changes in the waste generation and minimization activities sections of the reporting forms. EPA's Office of Solid Waste (OSW) officials anticipate that the cycle will be completed by May 1992.

Current Status and Plans

According to OSW officials, the latest estimate for baseline data (the 1986 generator survey) is April or May 1991, over 2-1/2 years later than initially planned (July 1988). These officials also told us that they intend to use the 1989 biennial report rather than the 1987 report as the first point of trend data. The officials said that the 1987 biennial report is also late, and EPA will not make an in-depth analysis of the part of the facilities' biennial reports dealing with their waste minimization activities because of inconsistencies in the data submissions. As previously stated, EPA plans to complete the 1989 cycle by May 1992.

According to the Deputy Director of OSW, the agency has had problems both adequately designing the data collection instruments and managing the process for collecting and aggregating the data for the biennial reports. The reason for these problems and delays are discussed later in this chapter.

The promised December 1990 report to the Congress has not been issued. In absence of baseline and trend data as originally envisioned,

¹ According to Office of Solid Waste officials, requiring more specific data elements would have involved proposing the new requirements in the Federal Register, analyzing public comments on the proposed requirements, and receiving OMB approval for a change in the reporting form. The officials said that this process would have been lengthy, and the agency did not have enough time before the forms had to be sent to the generators.

OSW officials are uncertain whether a report will be issued and what type it will be. According to the officials, OSW, along with other program offices, is working with EPA's Office of Pollution Prevention to produce a national pollution prevention report that will include a discussion of, among other things, federal, state, and industry efforts to promote waste minimization. In addition, to contribute to EPA's response required under the Pollution Prevention Act, OSW officials are preparing a Pollution Prevention Action Plan. According to OSW officials, the national report or the action plan may serve, at least in part, as the promised report to the Congress.

The action plan is to include the budget and schedule of activities for the first 4 years of a general plan to incorporate waste minimization in RCRA standards, permits, inspections, enforcement, and reporting requirements, and in training and grant programs. In the latter part of 1991, OSW expects to publish the action plan as part of a report discussing its waste minimization activities to date, waste minimization progress in industry, an analysis of the responses to EPA's request in the October 5, 1990, Federal Register for comments on desirable and feasible incentives to reduce or eliminate the generation of hazardous waste² and the results of the discussions of focus groups formed to advise OSW on development of the plan.

Members of the focus groups are to represent other EPA programs, regional offices, states, industry, the environmental community, and other interested parties. One focus group is likely to be asked to advise OSW on the best method of measuring waste minimization progress. OSW's action plan is to be part of the implementation of the agency's overall pollution prevention strategy.

With regard to how to measure hazardous waste minimization progress, OSW officials told us that, on the basis of their past experiences and greater knowledge of industry, they no longer believe that it is feasible to track exact minimization progress year to year from a set base year on a facility-by-facility basis, considering the diversity of industry production processes and changing product mixes and production/waste ratios. They stated that OSW had planned for the 1986 report to the Congress to develop this type of data to establish the viability of industry-

²As part of the efforts to identify ways to encourage waste minimization on October 5, 1990, EPA issued a notice in the Federal Register to (1) provide information to the public on a range of possible incentives to industry for waste minimization and (2) obtain comments from industry and other interested parties on the feasibility of these incentives. EPA also anticipated that the responses might indicate the type of waste minimization data that the agency needs to collect.

specific performance standards that would be enforceable against individual firms. They told us that they have come to believe that performance standards are not viable, and the need for baseline and trend data is diminished. According to the officials, they plan to develop a different approach to measuring waste minimization progress but have not yet decided what that approach will be.

The osw officials' current thinking is that they will continue to compare the 1986 generator survey results and biennial reports to get a sense or indication of the progress being made and to identify the types of wastes or particular industries where there appear to be major opportunities for minimization. In addition, osw officials said that they are looking at how to integrate other agency data systems such as the Toxic Release Inventory (discussed in more detail in chapter 3) with the biennial reporting system to provide the means to monitor progress and focus minimization efforts.

osw officials told us that, because of the problems EPA has had in obtaining timely, accurate, and complete biennial report data, other data systems such as the Toxic Release Inventory may become—at least in the short term—the major system for monitoring waste minimization. However, the officials plan to continue to improve the biennial reporting system.

Reasons for Problems and Delays

osw officials cited various reasons for the delays and problems they experienced in developing baseline and trend data for waste minimization. These reasons included an underestimation of the task's difficulty, inadequate resources, staff turnover, and inconsistent and late state reporting.

Unanticipated Complexity

osw staff told us that they originally underestimated the complexity of developing national baseline and trend data to capture industry's progress in waste minimization, and the effort was fraught with unexpected difficulties. The officials noted that their knowledge of the industry and the data needed to measure waste minimization grew as they carried out the effort. For example, they noted that after submitting the 1986 report to the Congress, discussions with state, industry, congressional, and environmental group representatives brought to light additional policy questions on waste minimization that needed to be examined for the subsequent report to the Congress. According to these officials, accounting for these additional policy issues, which included such issues

as the concept of multimedia (i.e., land, air, or water) pollution prevention and the need to target waste minimization/pollution prevention efforts to specific wastes, took time and resources to investigate and also made data collection more complex.

EPA officials further told us that they did not anticipate the amount of effort that was to be involved in administering the generator survey, ensuring or checking the quality of the reported data, and analyzing the results. For example, many generators responding to the survey did not complete about two-thirds of the survey questions. Consequently, more time than anticipated was required to make telephone calls to generators to complete the survey responses.

Resource Constraints and Competing Priorities

According to OSW officials, resource constraints delayed the data collection effort. For example, the officials said that initial funding for the generator survey was adequate, but as other EPA program offices realized that they could obtain useful information from the survey for their own purposes, requests were made to increase the size of the sample and the information being requested. According to an OSW official, the survey sample grew from about 3,000 generators to about 10,000 without a funding increase for the greater amount of quality control work to verify the accuracy of the data. In addition, turnover of key staff contributed to an unstable workforce and less timely and concerted efforts to manage the data collection projects. As a result, completion of the work was delayed almost a year.

OSW officials cited competing priorities as a reason why the generator survey and biennial report did not receive the needed staff and funding. According to these officials, the generator survey and 1987 biennial report, as technical data collection efforts, were not accorded as high a priority as the Resource Conservation and Recovery Information System (RCRIS), an administrative system containing information on permits, enforcement actions, and so forth. Also, during the same period that facilities were being asked to complete the generator survey, the 1987 biennial reporting cycle was beginning. EPA instructed those facilities also participating in the survey to first complete their biennial reporting, which is legislatively mandated. This action also contributed to the delay in the generator survey.

OSW officials also were not able to put their entire focus on waste minimization data collection. For instance, as they were developing and conducting the 1986 generator survey, they were also developing and

conducting a survey of treatment, storage, disposal and recycling facilities. Both surveys were primarily initiated to support regulatory development for land disposal restrictions required by HSWA but also had to be designed to support waste minimization and many other programmatic areas. At the same time, OSW was involved in the biennial reporting system.

EPA officials were unable to provide unaggregated cost figures for the generator survey because it and another survey were funded using a series of work orders charged to a number of different contracts. The work orders and contracts covered both surveys, and it is very difficult to break out the costs of just the generator survey. However, the cost data EPA provided indicates that the generator survey and the 1987 biennial report in total have cost EPA several million dollars.

Inconsistent and Late State Reporting

The states' use of different forms for the 1987 biennial reporting cycle made EPA's subsequent tasks of verifying, analyzing, and summarizing the data on a national basis more complex and lengthier than anticipated. Under EPA policy and federal regulations, EPA can require those states authorized to implement the RCRA program to provide certain data for the biennial reporting system. The information that these states provide has to be consistent with and equivalent, but not necessarily identical, to that required by EPA. Thus, these states can use their own survey forms to obtain the data from generators and their own summary formats to provide the collected data to EPA.

For the 1987 and 1989 reporting cycles, EPA asked all states to use a specific data collection instrument consisting of questionnaire forms for waste generation and management and a separate waste minimization form. The 4 unauthorized states plus 16 of the 46 authorized states agreed to use EPA's forms for reporting both waste generation and waste minimization activities. An additional 18 states, for a total of 38 states, agreed to use the form for reporting waste minimization activities. The remaining 12 states used their own rather than any of EPA's forms.

Because all states did not use EPA's forms, there are inconsistencies in the data reported by the various states. For example, while performing our review in the states of Texas and Louisiana, we found that Texas requires generators to report the total volume of hazardous waste, including both wastewater and the residual sludge left after the wastewater is treated, while Louisiana requires its generators to report only

the residual sludge. These reporting variances make a substantial difference in the amounts of waste reported.

OSW officials responsible for RCRA data collection activities told us that the agency intends to revise its regulations and the biennial report form to require states to collect and report all EPA-required data in a standard format. However, this revision may not be completed in time for the 1993 biennial report cycle. OSW officials told us that the new regulatory requirement for standardized data is expected to be completed in December 1991. However, states have 2 years to enact the new requirement, which would be December 1993, just before the start of the 1993 biennial report cycle, which would end around 1996.

Reporting delays were also experienced. Under an EPA regulation, March 1 of even-numbered years is the deadline for generators to submit their biennial reports to EPA or authorized states. However, for the 1987 biennial reporting period, the generators received the reporting forms late, and EPA extended the generators' reporting deadline by 2 months to May 1, 1988, with site-specific extensions to July 1, 1988. EPA had revised the reporting forms for the 1987 cycle and submitted them to OMB in December 1987 for approval. OMB approved use of the forms in late February 1988; hence the forms were made available to generators later than scheduled.

EPA also extended the period for the authorized states and EPA regions to collect, verify, and submit the generator data to EPA headquarters for analysis and summarization. However, many states did not meet the revised deadline of July 21, 1989. For example, two states—California and Massachusetts—had not submitted their data as of January 1990.

According to OSW officials, to help avoid such delays for the ongoing 1989 cycle, the states' timely submission of data has been established as one of the work commitments in some regions' agreements with the states on the use of management grant funds. They were not certain if a similar commitment had been reached for the 1987 cycle.

Other Agency Data Management Problems

The Office of Solid Waste's problems in developing baseline and trend data for hazardous waste minimization are similar to those previously reported in EPA's monitoring and enforcement activities and illustrate the need for the agency to improve its information resources management (IRM). These problems were associated with an evolving understanding of data requirements and difficulties in establishing and

obtaining sufficient priority and resources to accomplish timely and successful completion of the effort.

Obtaining accurate, complete, and timely technical and management data on a national basis to administer EPA's programs and activities is a formidable task. And the agency has had problems over the years obtaining these data. For example, an April 1986 study by American Management System, Inc., entitled Improving Information Support for EPA Compliance Monitoring and Enforcement concluded that information systems generally have not been fully effective in helping EPA to maintain hazardous waste inventories, detect violations, select enforcement responses, analyze performance, use resources efficiently, and develop strategies and policies. Five of the eight major national systems addressed by the study had unreliable data, seven were not useful for managerial control or strategic decision making, and four did not have timely data.

More recent studies have shown that EPA continues to have problems meeting its data needs. For example, our June 1990 report, Drinking Water: Compliance Problems Undermine EPA Program as New Challenges Emerge,³ pointed out that because EPA is missing key information, it cannot determine accurate compliance rates for many drinking water contaminants. In addition, our September 1990 report, Disinfectants: Concerns over the Integrity of EPA's Data Bases,⁴ noted that three EPA pesticide data systems contained inaccurate and/or incomplete data.

In our August 1988 report, Environmental Protection Agency: Protecting Human Health and The Environment Through Improved Management,⁵ we identified agency management improvements that EPA could make. In the management of information resources, these improvements include (1) developing an IRM organizational framework that will establish high-level management authority for directing and implementing IRM activities and (2) linking IRM more closely with the agency's long-range goals through more effective mission-based planning and budgeting.

In response to the report's recommendations, EPA is developing a long-range plan on the use and value of information necessary to achieve the

³GAO/RCED-90-127.

⁴GAO/RCED-90-232.

⁵GAO/RCED-88-101.

agency's mission. According to EPA, the plan will establish information management priorities on a uniform basis and give the Office of Information Resource Management a leadership role in acquiring and building information resources capabilities agencywide.

The RCRA Implementation Study Task Force drew some similar conclusions about the RCRA program's information management, especially with regard to major shortcomings in the data needed to track progress toward goals and objectives. For example, one recommendation to help overcome insufficient environmental information was for program managers to develop an information management strategy that will provide the blueprint for collection and management of environmental information to measure success. Another recommendation to help the program leverage its information management resources was to build information management accountability into existing activities. A cited example of how to implement the recommendation was to require each regulatory development effort to have an information management plan that describes how data will be collected, maintained, and made accessible after the effort is complete, and how the data's quality will be ensured.

EPA's Waste Minimization Data Collection Instruments Have Design Problems

The RCRA data collection and reporting systems that EPA looks to for hazardous waste minimization data, as currently designed, do not include all generators and their wastes. The systems also do not provide certain information, such as changes in production and toxicity that are needed to accurately measure the success of waste minimization efforts. Other data collection methods and information systems may be alternatives to further expanding the biennial reporting system.

Small-Quantity Generators Not Accounted for

EPA did not include small-quantity generators in the 1986 generator survey and up to this point has not required them to submit biennial reports. The agency decided to exclude them from the 1986 survey because a 1985 small-quantity generator survey conducted for EPA estimated that although there were 600,000 to 660,000 small-quantity generators, they accounted for only about 1.04 million tons of hazardous waste. This amount, according to EPA, represented less than 1 percent of the total hazardous waste generated nationally. Small-quantity generators were also subsequently excluded from biennial reporting requirements as a result of a 1986 RCRA regulatory change, because EPA did not believe that their waste generation volume was significant and wanted to reduce small firms' regulatory and paperwork burden.

EPA is currently considering the advisability of including small-quantity generators in the biennial reporting process. The agency now believes that these generators may be producing a much greater percentage of total hazardous waste than EPA had earlier thought. In addition, some agency officials are concerned that their wastes, as discussed below, may be more concentrated and thus more toxic than that produced by large-quantity generators.

The 1986 generator survey and the biennial reporting system were designed to collect data from large-quantity generators, that is, companies that generate in any single month 1,000 or more kilograms of hazardous waste treated, stored, or disposed of by RCRA-regulated units. If a company met EPA's large-quantity generator criteria, it had to report both the waste regulated under RCRA as well as hazardous waste disposed of as wastewater and regulated under the Clean Water Act. EPA believes that hazardous waste regulated under the Clean Water Act may constitute about half of the total amount of hazardous waste generated. In this regard, some firms generate large volumes of hazardous wastewater that are discharged into publicly owned wastewater treatment

works or into rivers, streams, or other waters under a permit issued by EPA or an authorized state under the Clean Water Act.¹

Because of EPA's criteria, a company defined as a small-quantity generator could in actuality be a large generator of hazardous waste. A company, for example, could generate 100,000 kilograms of acidic wastewater per month, treat the wastewater in its own wastewater treatment plant producing 900 kilograms of hazardous sludge, and discharge the treated wastewater into a nearby river under its water permit. The 900 kilograms of sludge to be treated in a RCRA-regulated unit would be less than the 1,000 kilograms that would make the company a large-quantity generator under EPA's criteria. However, if the acidic wastewater had been treated in a RCRA-permitted neutralization pond, rather than discharged under a water permit, the 100,000 kilograms of hazardous waste would have substantially exceeded the 1,000-kilogram benchmark for large-quantity generators.

EPA estimates that more than 90 percent of the waste generated by large-quantity generators is contaminated wastewater, which may contain only 1 or 2 percent toxic waste. An EPA official noted that if the nonhazardous constituents were removed, the waste produced by these large-quantity generators would be similar in volume and toxicity to waste produced by many small-quantity generators. In addition, some state officials have expressed concern about small-quantity generators because they may be less likely than large-quantity generators to have the resources to implement waste minimization technologies and more likely to require off-site waste disposal capacity, such as in hazardous waste landfills.

In the summer of 1990, EPA formed the Biennial Report Regulatory Work Group, comprising OSW, state, and EPA regional representatives to examine how the biennial reporting system can be improved to meet the information needs of the RCRA program. As part of this effort, the work group is considering the need to include small-quantity generators in biennial data collection. The 1993 cycle, which would be completed about 2 or 3 years later, would be the earliest that these generators could be included.

¹These hazardous wastewaters are required by Clean Water Act regulations to be treated before their discharge.

Toxicity Is a Significant Factor in Measuring Minimization Progress

Although the amount that must be properly handled, stored, treated, and disposed of is an important factor in waste management, hazardous waste receives the special attention that it does because of its potential threat to public health and the environment. Thus, a given waste's toxicity (concentration of hazardous constituents) is also a significant consideration in waste management and an important factor in measuring waste minimization progress. For example, by removing water or other nonhazardous constituents from hazardous waste, generators could report a lower quantity of wastes, giving the appearance that hazardous waste minimization is being achieved. In reality, however, the total amount of hazardous constituents would remain the same and the toxicity of the hazardous waste could be greater because of the higher concentrations of toxic substances. EPA collects some data on toxicity but not what would be needed to quantify changes in toxicity over time.

EPA's 1986 generator survey and the biennial reporting system have not captured sufficient data to measure how much toxicity has changed. The survey and the 1987 biennial data collection instruments only asked facilities if waste minimization activities increased or decreased the toxicity of their waste. They did not attempt to obtain data measuring or quantifying the change in the concentration of hazardous constituents. Thus, the measure is a qualitative rather than a quantitative one. To simplify reporting, the question on toxicity was deleted for the 1989 biennial cycle.

A May 1990 paper prepared by EPA, state, and private industry representatives on the difficulties in measuring pollution progress noted that assessing toxicity reductions is more difficult and expensive than assessing quantity reductions. According to the paper, baseline data on the concentration of individual waste constituents and trend data capturing the change over time would be necessary to assess the degree of toxicity reduction achieved. The paper noted that baseline concentration data alone can be very burdensome to report and EPA has never required generators to submit these data.

The chairman of the Biennial Report Regulatory Work Group told us that the group is considering how best to assess toxicity and what data are needed to do so. According to the chairman, EPA will probably collect more information on toxicity from hazardous waste generators during the 1991 biennial reporting cycle. For example, EPA plans to again include—as it did in the 1987 cycle—toxicity change codes to capture

whether there was an increase, decrease, or no change in the concentration of hazardous constituents and whether there was a substitution of more or less hazardous constituents in the waste.

Changes in Production Need to Be Considered When Measuring Waste Minimization

The volume of hazardous waste generated over time varies with the amount of industrial production that produces the waste. Accordingly, to know the amount of hazardous waste minimization that has actually occurred, it is important to measure changes in the amount of waste generated per unit of production.

In a February 1990 report we noted that EPA's data collections will not result in valid data on changes in waste generated per unit of production.² We reached this conclusion because EPA's minimization measures for waste generated per unit of production do not account for the production of different products from one year to the next that may generate unequal amounts of hazardous waste. For example, a generator in the semiconductor industry in Texas told us that it operates over 100 waste-generating activities and has a rapidly changing mix of products. Under the biennial reporting system, this generator is required to report data on its total waste but not on the products it makes, even though manufacturing different products can result in substantially different quantities of hazardous wastes. Without information on the products produced, EPA cannot identify whether and how much waste generation reductions were due to minimization activities or to product changes.

We also noted in our February 1990 report that product changes could possibly average out on an industrywide basis and, consequently, the data that EPA collects could give relatively valid information on waste minimization for an entire industry. In some industries this may be true, but in others, it is more likely that the production mix varies from year to year, depending on seasonal or other market factors. In such industries, the absence of data on product mix would preclude analysis of waste minimization activities on both a generator and industrywide basis.

A related data problem is that individual companies base their biennial reports on waste quantities at different points in their waste generation and disposal processes. To link waste quantities with the industrial processes generating them, it is necessary to measure wastes at the

²Hazardous Waste: EPA's Generation and Management Data Need Further Improvement (GAO/PEMD-90-3, Feb. 9, 1990).

point of generation, before they are mixed with other wastes from other industrial processes or before their amount or toxicity has been reduced through waste treatment techniques.

An October 1990 discussion paper, prepared for the Biennial Report Regulatory Work Group, points out that because generators report their waste generation at different points in their production process, the national total for hazardous waste generation represents a mix of both primary industrial wastes and residuals from waste treatment. For example, the paper states that, when the mixing of wastes occurs within industrial plants, the RCRA designation assigned to the waste by the generator in its biennial reports usually does not represent an adequate characterization of the waste.³ Consequently, EPA cannot determine how much of a particular waste is generated within a given period of time.

Although EPA recognizes the need to obtain hazardous waste data at the point of generation, it has not decided whether to develop regulations requiring generators to report this way. Although such data would provide a more accurate indication of generators' efforts to reduce hazardous waste, the agency has avoided imposing a substantial reporting burden on certain generators not having record-keeping systems compatible with point-of-generation reporting.

The problems discussed in this chapter are data collection instrument design problems. These problems raise concerns about the usefulness of the data for analyses of waste minimization trends. These design problems have affected EPA's ability to meet the congressional mandate for hazardous waste minimization assessments. Under a separate congressional request, our Program Evaluation and Methodology Division is evaluating whether these design problems actually result in data validity and reliability problems, the extent to which data problems are random or systematic in nature, and the extent to which these problems are threats to the validity of waste minimization trends assessments.

³For example, EPA cannot determine a waste's composition if a generator (1) produces different hazardous waste streams from separate production processes that subsequently flow together into a wastewater treatment plant and (2) reports the combined waste under a single waste code at the point it enters the plant.

Options for Supplementing the Biennial Reporting System

Because of problems with the system, EPA may need to use other data collection methods and information systems to supplement the biennial reporting system. Optional data collection methods include special surveys, which may be conducted on a national basis or for a particular industry or waste type. An example of another information system is the Toxic Release Inventory (TRI) established by section 313 of the Emergency Planning and Community Right-to-Know Act of 1986. TRI will be used by EPA to measure industry's progress in meeting the agency's goals for pollution prevention.

TRI is EPA's only system that provides for tracking releases at specific facilities on a multimedia basis. Under section 313, certain manufacturers are required to report annually the amount of more than 300 toxic chemicals that are released directly into air, land, or water or transferred to treatment, storage, and disposal facilities. However, the system does not include all RCRA-regulated wastes and includes some industrial wastes not regulated under RCRA.

According to EPA, TRI is already being used widely by industry, the states, and environmental groups to assess pollution prevention efforts. Several states have used TRI as the basis for legislative efforts. For example, Louisiana has a law mandating a 50-percent reduction in toxic air emissions by 1994. Other states have instituted a fee system based on TRI emissions to provide an economic incentive to reduce emissions.

TRI Limitations

According to EPA, the TRI data base currently has limitations that reduce its usefulness for measuring pollution prevention and waste minimization progress. For example, it does not cover all pollutants or sources. The current list of reportable chemicals does not include every chemical of concern. In addition, TRI does not cover small commercial enterprises, such as dry cleaners or automotive repair shops, that, according to EPA, make a significant contribution to environmental problems. In addition, companies subject to TRI are required only to estimate their releases and transfers of the specified chemicals after recycling, treatment or disposal. As a result, it is difficult to determine whether reductions are due to changes in the production process, reduced use of toxic raw materials, or the way in which facilities calculate their emission levels.

According to EPA, it is proposing to add chemicals to the TRI list and will consider making additional types of industrial plants subject to TRI reporting requirements. The agency is also amending the TRI reporting

form to require all facilities to provide data quantifying the effectiveness of preventive measures in reducing wastes prior to recycling, treatment, or disposal.

Section 313(k) of the Emergency Planning and Community Right-to-Know Act requires us to review how EPA and the states have implemented the TRI program. Our review is scheduled for completion in June 1991.

The Biennial Reporting System and TRI Are Not Integrated

EPA did not design the TRI reporting system to complement the biennial reporting system. Although EPA has not made a detailed analysis to determine what portion of the hazardous waste captured by the biennial reporting system is also captured by TRI, there is a significant overlap between the reporting populations for the two systems.

EPA attempts to avoid duplication of effort by including a question on one reporting instrument that asks if the facility has completed the form for the other system. If the response is "yes," only the nonduplicative information is required. However, the instruments for the two systems measure some of the same attributes in different ways, requiring different responses. These differently measured attributes include the waste characteristics that determine appropriate management methods, the management methods actually used, and some of the information on waste minimization.

An example of how the two systems could complement each other is that TRI obtains information from generators on the concentrations of toxic substances in RCRA-regulated wastes. However, this information cannot be used to supplement RCRA information because it is not cross-referenced to the total quantity of the RCRA-regulated wastes in which these chemicals are found.

The RCRA implementation study report concluded that the RCRA program can leverage its information management resources by building on and integrating with existing processes and by finding lower-cost solutions to information management problems. One recommendation for accomplishing this was to use the TRI mechanism to collect data for RCRA facilities. The study report noted that although TRI data are fundamentally different from RCRA data, there is an opportunity to integrate RCRA data collection for some facilities with the TRI mechanism, if senior managers

Chapter 3
EPA's Waste Minimization Data Collection
Instruments Have Design Problems

in both the RCRA and toxic substances programs agree it is a high priority. According to OSW officials, they have been working with the Office of Toxic Substances to analyze how TRI can be used in the RCRA program.

Conclusions and Recommendations

When it becomes available, the hazardous waste minimization data that EPA has been working to develop may have major validity and reliability problems. Data collection design problems that have been identified to date include problems in the areas of small-quantity generators, production, and toxicity, as well as others. EPA has also experienced problems in managing the process for collecting and aggregating the data.

We recognize the complexity of developing these data on a national scope but also believe that EPA did not give enough attention to defining data requirements, determining how best to obtain the data in a timely and consistent manner, committing the needed resources, and establishing realistic time frames and expectations for the effort. These actions would have been the key elements of a comprehensive plan that would have better assured EPA's success or an earlier realization that it would not be able to develop this type of data by the date it had promised the Congress in its 1986 report. Or, as EPA officials pointed out, better data management may have led the agency to discover sooner the impracticality of developing the type of baseline and trend data originally planned and perhaps enabled them to initiate a new approach sooner than they have.

EPA is now at a crossroads in its development of hazardous waste minimization data. On the basis of its experience to date, the agency has a better understanding of the hazardous waste industry and the complexities of measuring waste minimization. Agency officials are beginning to rethink their data needs and how they can meet them. We continue to believe that EPA needs to be able to measure waste minimization progress, and support its actions to reassess its approach to doing so. To avoid a continuation of the problems it has experienced, we believe EPA needs to work with the states and industry as users and providers of the data to better define data requirements. Efforts under way, such as the Biennial Report Regulatory Workgroup, may serve as the mechanism to define requirements.

The data requirements, collection methodology, time frames, and resources need to be established in a comprehensive plan for top management approval. Such a plan may not in itself ensure that problems associated with staff turnover, limited resources, and the complexity of the undertaking will not occur. Rather, we believe the plan should provide for a clearer understanding of specifically what data are required; how the data will be obtained; who will be responsible for providing, collecting, and aggregating it within what time frame; what resources will be required to complete the effort as outlined; and what the impact

would be and what actions should be taken if sufficient resources are not available or other problems develop.

As part of a data management plan, EPA also needs to consider options for obtaining the data, especially if substantial expansion of the biennial reporting system would be required. These options could include performing special surveys or using other systems such as TRI.

Recommendations to the Administrator, EPA

To build on current agency efforts to reassess its hazardous waste minimization data needs and how to meet them, we recommend that the Administrator, EPA, take the following actions:

- Work with the states and industry to establish data requirements to meet current and future needs, including the specific data elements needed to fill critical information gaps for small-quantity generators, toxicity, and changes in production.
- Develop a plan that sets out what data are already obtained in an adequate manner; how additional data will be obtained; who will be responsible for data collection, analysis, and management; what the time frames will be for the completion of these tasks; what resources are needed; and what the impact on time frames would be if the needed resources are not made available. To ensure that the planned approach to measuring waste minimization meets congressional needs and expectations, the plan should be made available to the cognizant congressional oversight committees, which may want to explore the planned approach and options in more detail.
- In exploring how best to obtain the needed data, consider the range of available options, including the biennial reporting system, special surveys, the Toxic Release Inventory, or a combination of these.

EPA's Hazardous Waste Minimization Activities

Although increasing, EPA's hazardous waste minimization efforts have been relatively recent and limited. From the beginning of the RCRA program in 1976, EPA has focused primarily on developing and implementing regulations to control or manage hazardous waste once it has been generated. In May 1980, EPA promulgated regulations covering the identification and listing of hazardous wastes; standards for hazardous waste generators and transporters; permitting procedures; interim standards for hazardous waste treatment, storage, and disposal facilities; and requirements and procedures for states to be authorized to implement the RCRA program. In 1982, EPA promulgated technical standards and financial responsibility requirements for treatment, storage, and disposal facilities and permitting standards for land disposal facilities. In implementing these regulations, EPA has concentrated on permitting hazardous waste management facilities, assessing facilities to determine whether releases to the environment have occurred, and authorizing state programs. EPA officials believe that its hazardous waste regulations, although not directed at waste minimization, encourage industry to minimize waste generation by making control and disposal more costly.

Technical Assistance and Outreach

EPA's principal waste minimization activities have been in providing guidance, technical assistance, and outreach to industry. Major examples of these activities are the following:

- The publication in 1987 of a brochure entitled Waste Minimization: Environmental Quality With Economic Benefits. (About 150,000 copies were distributed to state agencies and companies.)
- The development of a video entitled Less Is More: Pollution Prevention is Good Business. (A total of 350 copies were mailed out to state agencies and companies).
- The development of a waste minimization bibliography, a computerized waste minimization information clearinghouse, and a brief telephone hotline on waste minimization activities. The hotline takes calls, answers questions on EPA Office of Solid Waste activities, and researches technology options in the computerized clearinghouse. (According to an EPA official, the clearinghouse received over 8,000 calls in 1990.)
- The issuance in June 1989 of Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program.
- The publication of Waste Minimization Opportunity Assessments Manual, a handbook for plant managers to do an in-plant waste minimization audit.

- The publication of a waste minimization brochure on Metals Parts Cleaning.

Supporting State Efforts

To foster state waste minimization efforts, EPA provides information exchange, grant funds, and technical assistance. EPA has supported the National Roundtable of State Waste Reduction Programs,¹ which meets semiannually. EPA develops and distributes copies of the proceedings. In addition, EPA has provided about \$14 million in grants to states for technical assistance in the area of waste minimization and pollution prevention. States submit proposals for use of these funds, and EPA awards the grants on a competitive basis, considering such factors as the planned projects' goals and objectives, multimedia opportunities and impacts, and plans for the implementation of a long-term pollution prevention program. About 30 states have received grants thus far. States can use the grants to support the initial establishment of a program or to conduct activities such as on-site technical assistance to industry. Furthermore, EPA completed a profile of state waste minimization programs in 1988 and entered it in the clearinghouse. EPA is tracking state programs, and this information, clearinghouse information, and technical information are available to state officials.

HSWA Certifications

The Hazardous and Solid Waste Amendments of 1984 established two certification requirements relating to hazardous waste minimization. First, generators that ship waste off-site are required to certify on their hazardous waste tracking forms or manifests that they have hazardous waste reduction programs in place to reduce the volume or toxicity of their waste to the degree that they determine to be economically practicable. Second, generators that treat, store, or dispose of their wastes on-site are required to annually certify to EPA that they have these programs in place. EPA officials told us that the criteria for the certification, the determination of compliance, and the determination of what is economically practicable rest with the generator or facility making the certification. As a result, EPA receives the certifications but does not verify whether they are accurate.

¹The Roundtable is a national forum promoting the development, implementation, and evaluation of efforts to avoid, eliminate, or reduce the amount of waste released into the air, land, and water. As of February 1991, the Roundtable comprised waste management and waste minimization officials representing 45 states.

Expanding Future Activities

EPA is also exploring ways to emphasize or encourage additional waste minimization efforts by industry through means other than outreach or technical assistance. These include incorporating waste minimization into facilities' operating permits and enforcement settlements and emphasizing minimization during compliance activities. In addition, source reduction of hazardous wastes controlled under RCRA is a major part of the strategy EPA is developing in response to the Pollution Prevention Act of 1990.

State Waste Minimization Activities

In recent years, more and more states have established or strengthened their hazardous waste minimization programs. The following is a brief summary of the programs of nine states that we contacted for information. Seven of them—California, Illinois, Massachusetts, Minnesota, New Jersey, North Carolina, and Oregon—were cited by EPA officials as among the most active states in hazardous waste minimization. Thus, the states we selected may not be representative of all the states. According to EPA officials, however, all the states are doing something in waste minimization, but to different degrees.

The states we contacted generally provide technical assistance to industry via telephone, clearinghouses, distribution of fact sheets and other information, and/or, in some cases, on-site technical assistance. This assistance is provided directly to companies, usually at their request or through trade associations. In addition, several states require or encourage companies to develop waste minimization or pollution prevention plans. (According to EPA, 13 states nationwide have laws that require multi-media pollution prevention planning by individual facilities.) Furthermore, several states have established waste reduction goals.

California

According to a state environmental official, the state's hazardous waste minimization program started around 1984. Under the program, the state hosts conferences, provides speakers, and makes fact sheets and other literature available to companies and others. To try to reach small-quantity generators, the state works with trade associations, provides leaflets, holds workshops, and so forth. Inspectors distribute fact sheets and other literature on the benefits of waste minimization to facilities found in violation of environmental law. In addition, the state has a program of grants and loans or loan guarantees to provide financial support to companies wishing to implement waste reduction and recycling changes. The state's waste minimization budget is about \$4 million, of which \$495,000 is a pollution prevention grant from EPA.

According to the state official, California has a policy that the amount of waste to be incinerated must be reduced because of inadequate incinerator capacity. The state has identified the largest generators of incinerable waste and offers technical assistance, consultation, and expertise to help them overcome barriers to achieving waste reduction.

Legislation enacted in 1989 requires generators of 12,000 kilograms or more of waste a year to develop source reduction plans. These plans will

usually remain on-site as part of the facilities' operating records, but the state can call in the plans for review. During inspection of the facilities for compliance with environmental laws and regulations, inspectors will spot-check a few items in the plan to ensure that the specified activities are being carried out.

Illinois

According to a state environmental official, Illinois started a hazardous waste minimization program in 1984 to provide information and technical assistance to industry. The Illinois Toxic Pollution Prevention Act, which was enacted in July 1989, established the Office of Pollution Prevention in the state Environmental Protection Agency to review toxic pollution prevention plans submitted by industry. The act further directed the Hazardous Waste Research and Information Center to conduct research on waste reduction. The Center also acts as a clearinghouse for technical information and provides a number of other services to help generators better manage and reduce their hazardous waste. These services include technical assistance, on-site consultation, and outreach. In addition, the Center provides matching funds (up to \$50,000) to firms wishing to develop practical methods of recycling or waste reduction. According to a state official, the Center receives and answers about 400 requests a year for its services. State environmental officials also told us that the budget in (state) fiscal year 1991 for the Office of Pollution Prevention and the Center's waste reduction activities are approximately \$2.6 million, of which around \$300,000 were federal funds.

Louisiana

According to a state environmental official, the Louisiana Waste Reduction Act, enacted in 1987, established waste reduction as an issue of primacy and specified that a statewide source reduction and recycling program be initiated by August 1988. At the time of our review, the state was in the process of establishing a clearinghouse of waste reduction activities and collecting data on other states' waste minimization programs. In addition, the state had used the Toxic Release Inventory to identify the top facilities in terms of the amount of toxic pollutants released to the environment. The top 12 dischargers in each of the 3 media—air, land, and water—for a total of 30 facilities (some were on more than one list) were identified. According to a state official, the Department of Environmental Quality met with these companies and essentially gave them 2 months to produce voluntary reduction plans. If the plans are not provided or are not adequate, the department will consider forcing reduction through actions such as establishing source

reduction as a permit requirement. The state had also expanded public reporting on top generators compiled from the Toxic Release Inventory. The program's budget was \$200,000, of which \$100,000 was from federal funds.

The Waste Reduction Act further requires the Department of Environmental Quality to consider granting regulatory and fee concessions that reward companies for actual and significant waste reduction, but no concessions have yet been granted under this provision. On the other hand, the state was considering a bill to increase hazardous waste disposal fees and establish a tax on its transportation as a way to make waste more costly and encourage efforts to reduce its generation.

Massachusetts

State hazardous waste minimization efforts began around 1983 with the hosting of annual source reduction conferences. The commonwealth began offering technical assistance around 1986.

The Massachusetts Toxics Use Reduction Act of 1989 set a statewide goal of a 50-percent reduction in toxic waste generation by 1997. The act established a waste reduction program and set up an institute to conduct training, outreach, seminars, and research on methods of source reduction. Currently, the commonwealth provides technical assistance during on-site visits or through trade associations. The on-site visits take place if a company requests one or if a publicly owned treatment works refers a company to the Department of Environmental Protection for discharging pollutants in excess of permitted amounts. A major provision of the Toxics Use Reduction Act is the requirement that businesses report on the chemicals and the amounts that they use. The businesses will then be assessed fees on their use as a way to encourage them to reduce their usage and the resulting amount of toxic wastes that they generate. The commonwealth's budget for the fiscal year ending June 30, 1991, is \$1.4 million, of which \$250,000 is from federal funds.

Minnesota

According to a state environmental official, the Minnesota Technical Assistance Program was established in 1984 to help small to medium-sized companies with regulatory compliance and to provide assistance on waste management. The program operates mostly in a reactive mode to requests for assistance. Under the program, the state organizes workshops, provides technical assistance on-site and via telephone, publishes fact sheets and pamphlets, and conducts a student intern project. The

interns work on-site to help companies reduce their waste. The information they gather from these experiences is synthesized into fact sheets and pamphlets. In addition, the state offers industrial waste reduction grants. According to the official, the program's budget for the fiscal year ending June 1991 is \$672,000, of which \$60,000 is from federal funds.

The Minnesota Toxic Pollution Prevention Act of 1990 requires large-quantity generators to develop toxic emission reduction plans and report on the results to the Minnesota Pollution Control Agency. The state goal is a 40-percent reduction in toxic emissions by 2009.

New Jersey

According to state environmental officials, the New Jersey Department of Environmental Protection established the Office of Pollution Prevention in 1989 to implement a multimedia pollution prevention program. The state is considering legislation to formalize the program. The legislation would also establish a goal of a 50-percent reduction in hazardous waste discharges to all media over a 5-year period and require facilities to develop pollution prevention plans.

The state has created a technical assistance program, operated through the New Jersey Institute of Technology, called the New Jersey Technical Assistance Program for Industrial Pollution Prevention. This program provides free, confidential information and technical assistance to industries in the state. Program services include literature searches on economic and technical information including case studies, a hotline, mailings, and site visits. According to a state environmental official, the budget for the Office of Pollution Prevention and the technical assistance program is \$107,000, of which \$65,000 is from federal funds.

North Carolina

In 1983, the state established a Pollution Prevention Program which provides free technical assistance to North Carolina industries on ways to reduce, recycle, and prevent wastes before they become pollutants. This multimedia, non-regulatory program addresses water and air quality, toxic materials, and solid and hazardous waste. The program has been designated as the lead for carrying out the state's waste reduction strategy, and reports directly to the Deputy Secretary of the Department of Environment, Health, and Natural Resources. The major services and assistance available under the program are as follows:

- An information clearinghouse that provides access to literature sources, contacts, and case studies on waste reduction techniques for specific industries or waste streams.
- Specific information packages prepared by program staff and containing facility or waste-stream-specific waste reduction reports for industries and communities to identify cost-effective waste reduction options.
- On-site technical assistance by program staff to collect detailed process and waste stream information, and subsequently prepare a report detailing waste reduction options.
- Outreach by program staff giving presentations to industries, trade associations, professional organizations and citizens groups on topics that range from an overview of the state's Pollution Prevention Program to in-depth discussions of technologies for specific industries.
- Challenge (matching) grants providing funds for the cost of equipment, personnel, materials, or consultants needed to undertake pollution prevention projects. Since 1985, about 80 pollution prevention and waste reduction efforts have been funded.

The program manager told us that the program's budget is \$500,000, none of which includes federal funds.

Oregon

The state's Toxic Use Reduction and Hazardous Waste Reduction Act of 1989 is designed to achieve in-plant changes that reduce, avoid, or eliminate the use of toxic substances and the generation of hazardous wastes by (1) providing technical assistance to industry, (2) monitoring the use of toxic substances and the generation of hazardous waste, and (3) requiring industry to engage in comprehensive planning and to develop measurable performance goals.

The act requires large users of toxic chemicals and hazardous waste generators to develop use reduction and waste reduction plans. The plans are to consist of the following:

- A written policy statement articulating upper management and corporate support for the planning process and a commitment to implement the plan's goals.
- A written statement of the plan's goals, scope, and objectives.
- Numerical reduction goals for certain toxic substances and hazardous waste streams.
- An analysis of toxics use and hazardous waste streams and development of cost-identifying accounting systems.

- The identification of reduction opportunities and implementation strategies.
- The establishment of employee awareness and training programs.
- The implementation of technically and economically practicable toxins use and hazardous waste reduction options and institutionalization of the program to ensure an on-going effort.

The act requires that firms provide annual reports on their progress in implementing the plans to the Department of Environmental Quality. These progress reports are to consist of a written description of how the plan is being implemented and data showing progress made in reaching reduction goals. For large users and generators, the initial plans are due by September 1, 1991. For small-quantity generators, the initial plans are due September 1, 1992.

According to a state environmental official, Oregon's Department of Environmental Quality has had a waste minimization program since late 1987. Under the program, the state has provided workshops and out-reach. The program is to be expanded to include on-site assistance, training workshops, an information clearinghouse, and a public recognition program for companies that are successful in reducing their wastes. The official said that the program's budget is about \$500,000. EPA provided a \$50,000 grant to provide a guidance manual on how to comply with the new waste reduction planning requirements for facilities.

The official also told us that Oregon, along with Alaska, Idaho, and Washington, formed the Pacific Northwest Hazardous Waste Advisory Council in 1987. The Council has recommended that hazardous waste minimization programs be developed in the Northwest. It has established a goal of a 50-percent reduction in the generation of hazardous waste by 1995.

Texas

In 1987, the Texas legislature passed Senate bill 92 requiring the Texas Water Commission to establish a hazardous and industrial waste exchange program to promote the reuse and reclamation of discarded materials. Subsequently, the Commission's Division of Hazardous and Solid Waste created the Resource Exchange Network for Eliminating Waste (RENEW), which began operating in the last quarter of 1988. RENEW is an automated system that actively matches listed nonhazardous and hazardous materials and wastes with markets able to reuse or recycle the materials. The goal of the RENEW program is to reduce environmental pollution, conserve resources, and minimize waste.

In 1989, the Texas legislature directed that two important steps be taken by the Commission in the area of waste minimization. The first directive was that a Waste Reduction Advisory Committee be formed to advise the Commission on the development of a waste minimization program for the state. The Committee includes representatives from environmental and public interest groups and the regulated community. The second directive was that a waste minimization unit be formed within the Commission. Such a unit was established in the fall of 1989. The primary activities planned for the unit include information-gathering on industry successes, information transfer and training, and the development of incentives to encourage waste minimization. The unit also plans to develop methods to measure the effects of waste minimization activities in order to monitor industry progress in meeting the Commission Chairman's established statewide goal to reduce hazardous waste generation by 50 percent by 1995.

According to a Texas Water Commission official, the state's budget for the RENEW program, the Waste Reduction Advisory Committee, and the waste minimization unit is \$400,000. Of this amount, \$150,000 is from federal funds.

Major Contributors to This Report

**Resources,
Community, and
Economic
Development Division,
Washington, D.C.**

Peter F. Guerrero, Associate Director
Edward A. Kratzer, Assistant Director
Raymond H. Smith, Jr., Assignment Manager

Dallas Regional Office

Robert C. Gorman, Regional Management Representative
David P. Marks, Evaluator-in-Charge
Vijaykumar J. Barnabas, Evaluator

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