United States General Accounting Office

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Report to Congressional Requesters

December 1987

HAZARDOUS WASTE

Corrective Action Cleanups Will Take Years to Complete

Released

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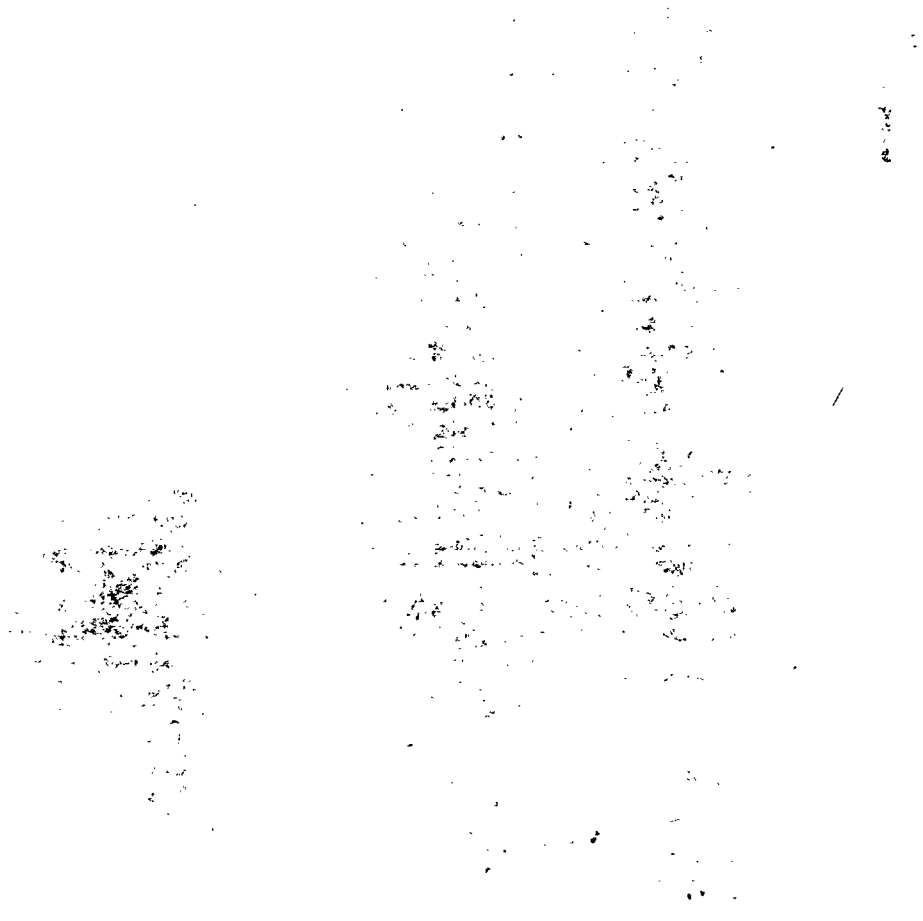


GAO

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

Resources, Community, and
Economic Development Division

B-219849

December 9, 1987

The Honorable Thomas A. Luken
Chairman, Subcommittee on
Transportation, Tourism,
and Hazardous Materials
Committee on Energy and Commerce
House of Representatives

The Honorable James J. Florio
House of Representatives

Pursuant to your request of December 19, 1986, we have reviewed the Environmental Protection Agency's (EPA) progress in implementing the corrective action provisions of the 1984 amendments to the Resource Conservation and Recovery Act (RCRA) of 1976. These amendments greatly expanded EPA's authority to implement corrective action at hazardous waste facilities, which are covered by RCRA. The expanded RCRA corrective action program is a cleanup program for all hazardous waste facilities, whether they are operating or closing, and is similar in purpose to EPA's Superfund program, which is generally directed at cleaning up abandoned or inactive hazardous waste sites using enforcement authorities or trust funds provided for this purpose. The expanded RCRA corrective action provisions apply to all treatment, storage, and disposal facilities that have accepted hazardous waste since November 19, 1980. RCRA requires that these facilities clean up contamination caused by their hazardous and nonhazardous waste operations. The expanded RCRA corrective action program is in its initial stages, and EPA is in the process of formulating regulations to implement the program.

This report responds to the following five questions raised in your request.

- How many RCRA facilities are likely to require corrective action?
- How long will it take to implement corrective action?
- What system will be used to identify priorities among the RCRA facilities awaiting corrective action?
- What cleanup standards will be applied to corrective action at such facilities, and how do these standards compare with the standards applicable to Superfund cleanup actions?
- How and when will a decision be made that a facility cannot be addressed by corrective action and should instead be transferred to the Superfund program?

In summary, EPA expects that as many as 2,500 RCRA facilities will require corrective action and that it may take until fiscal year 2005 before all facilities have such actions initiated. In addition, some corrective actions could take up to 20 years to complete, extending the cleanup projection to fiscal year 2025. Because many facilities will require corrective action, EPA is developing a system to address the most environmentally significant facilities first. EPA is also developing cleanup standards to be applied at RCRA facilities and plans on making the standards as consistent as possible with those already in use at Superfund sites. Of the estimated 2,500 facilities requiring corrective action, EPA projects that over 800 of them may go bankrupt or be unwilling to complete the necessary actions, which will result in their being transferred to the Superfund program for cleanup.

Many RCRA Facilities May Require Substantial Corrective Action

Although EPA has not specifically identified which of the over 4,800 RCRA treatment, storage, and disposal facilities will require corrective action, EPA estimates that close to 2,500 may need cleanup. EPA believes that of those requiring action, many may require extensive cleanup. If these estimates hold true, the size and scope of the RCRA corrective action program may be as large as the projected cleanup program under Superfund—which, according to EPA, may also reach 2,500 sites and cost up to $22.7 billion.

Corrective Action Will Take Many Years

Because EPA has not specifically identified how many RCRA facilities will require corrective action, it does not know with certainty how long it will take to clean up facilities under the corrective action program. However, at our request, EPA developed a long-range projection using its fiscal year 1988 budget model based on the estimated universe of approximately 4,800 facilities,[1] of which about 2,500 are estimated to require corrective action. The results of EPA's model showed that it will take until fiscal year 2005 before corrective action is initiated at all of the facilities requiring cleanup. In addition, EPA estimates that many facilities will have cleanup actions that could take up to 20 years to complete. As a result, completed cleanup could be extended until fiscal year 2025.

[1]The number 4,826, used later in this report, is based on facilities identified by EPA's budget staff at the time it developed the fiscal year 1988 budget estimate. As such, this number is used in the appendixes of this report. The number is constantly being updated either as facilities move in and out of regulatory control or when EPA identifies new facilities subject to RCRA regulations.

However, these estimates are based on assumptions of an annual 10-percent growth rate in EPA resources for the corrective action program and the transfer of at least 800 RCRA facilities to the Superfund program for cleanup. If these assumptions are overly optimistic, then the RCRA corrective action program will take longer than this projection indicates. In addition, the length of the program will be affected if more or fewer than the estimated 2,500 facilities require corrective action or if the universe of 4,800 facilities becomes larger or smaller.

Priorities Are Currently Driven by Deadlines for Permits

EPA recognizes that it cannot address corrective action at all facilities immediately. The 1984 RCRA amendments require EPA to issue permits to land disposal facilities by November 1988 and to incinerators by November 1989. Treatment and storage facilities need not receive permits until November 1992. Currently, EPA's strategy (through fiscal year 1988) is to initiate corrective action at almost 400 operating land disposal facilities by the November 1988 mandated deadline and at over 140 operating incinerators by the November 1989 deadline. EPA is also conducting preliminary studies at about 660 land disposal facilities that are closing[2] to determine if they are causing contamination. Under the current strategy, however, many of the closing land disposal and incinerator facilities, as well as many operating and closing treatment and storage facilities, will not have corrective action addressed for several years.

Because EPA recognizes that some of these facilities may pose serious environmental risks, it is planning to amend its current strategy and begin an environmental priorities initiative in fiscal year 1989. Under the environmental priorities initiative, EPA is considering combining all RCRA facilities for which corrective action has not yet been addressed with Superfund sites not yet addressed. EPA is planning to then use Superfund resources to determine which facilities and sites pose the greatest environmental risks and should be cleaned up first.

[2]"Closing facilities" are facilities that have accepted hazardous wastes after November 19, 1980, but that have since decided to cease their hazardous waste treatment, storage, and disposal operations and not apply for an operating permit. These facilities must comply with applicable closure and corrective action requirements.

RCRA and Superfund Cleanup Standards May Be Similar

EPA has not yet proposed additional or revised cleanup standards stipulating the level of cleanup required at RCRA facilities as a result of the expanded corrective action provisions of the 1984 RCRA amendments. According to EPA officials responsible for developing these standards, the proposed cleanup standards in all likelihood will be similar to those used at Superfund sites and should be proposed in early 1988. It should be noted that we reviewed cleanup standards for groundwater and surface waters only. EPA officials for both programs stated that they hope to achieve as much consistency as possible between the two programs' approaches to cleanup and selection of cleanup standards. EPA officials for both programs also stated that regardless of which specific standards are used, the standards will be protective of human health and the environment.

EPA has established work groups to achieve as much consistency as possible in selecting RCRA and Superfund cleanup standards. On the basis of discussions with work-group representatives, EPA appears to be de-emphasizing the current requirement of cleaning up contamination at RCRA facilities to levels that existed prior to the facilities' operations and the resulting contamination. Instead, EPA is considering using available health-based or environmental estimates (numerical values for concentrations of chemicals where possible health or environmental effects will be observed) that may be less stringent than levels that existed prior to the facilities' operations. EPA's reasons for de-emphasizing the current requirement are that these levels, in many cases, may be technically infeasible to achieve or unnecessarily stringent.

Because EPA is planning to use health-based estimates in developing both RCRA and Superfund cleanup standards, we reviewed data to determine how many chemicals or other contaminants (hereafter referred to as chemicals) have health-based estimates. We found that 48 percent of chemicals found at and tested for at RCRA facilities and 25 percent of the most commonly found chemicals at Superfund sites do not have health-based estimates developed. EPA expects that all of the chemicals we reviewed that are tested for at RCRA facilities will have health-based estimates by 1991 and that most of the chemicals commonly found at Superfund sites without these data are less hazardous or are by-products of other chemicals with health-based estimates. Therefore, getting health data for the additional Superfund chemicals is a low priority.

Many RCRA Facilities May Be Transferred to Superfund

EPA issued a policy in June 1986 stating the conditions under which facilities could be cleaned up under Superfund rather than RCRA. These conditions include when (1) the facility owner/operator is bankrupt, (2) the facility owner/operator has lost EPA authorization to operate under RCRA and is unwilling to clean up the facility, or (3) on a case-by-case basis, the facility has not lost authorization to operate, but is deemed unwilling by EPA to clean up the facility under RCRA. Since the policy went into effect, two bankrupt RCRA facilities have been transferred to Superfund. An additional 43 RCRA facilities are under final review for possible transfer to Superfund. As was stated previously, the EPA budget model projects that eventually over 800 facilities could be transferred to Superfund for cleanup.

Scope and Methodology

We performed our work between February and October 1987 in accordance with generally accepted government auditing standards. Because the corrective action program is still in the formative stage, we performed our work primarily at EPA headquarters in Washington, D.C. We reviewed EPA policy and guidance documents relating to the formulation of the corrective action program. We also worked closely with EPA's Office of Waste Programs Enforcement budget personnel in determining the number of RCRA facilities that may need corrective action and how long corrective action at these facilities may take. We interviewed personnel responsible for developing cleanup standards for the RCRA and Superfund programs in EPA's Office of Solid Waste and Office of Emergency and Remedial Response. Appendix I of this report provides details on our objectives, scope, and methodology.

We discussed the contents of a draft of this report with EPA officials responsible for administering the RCRA and Superfund programs and have included their comments, where appropriate. As you requested, we did not ask for official EPA comments on a draft of the report. As agreed with your offices, unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to appropriate congressional committees; the Administrator, EPA; the Director, Office of Management and Budget; and other interested parties.

Please call me at (202) 275-5489 if you would like additional information on this report. Major contributors to this report are listed in appendix VII.

Hugh J. Wessinger
Senior Associate Director

Contents

Abbreviations

ARAR	Applicable, or Relevant and Appropriate Requirements
CMI	corrective measures implementation
CMS	corrective measures study
EPA	Environmental Protection Agency
GAO	General Accounting Office
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
RCED	Resources, Community, and Economic Development Division
RCRA	Resource Conservation and Recovery Act
RFA	RCRA facility assessment
RfD	Reference Dose
RFI	RCRA facility investigation
RSD	Risk-Specific Dose

Background

At thousands of hazardous waste sites across the country, toxic chemicals are seeping into the nation's groundwater and surface waters and contaminating the land and the air. This situation is the result of years of poor management practices engaged in by many facilities that treat, store, or dispose of materials that contain hazardous chemical wastes. The magnitude of the environmental threat posed by these leaking hazardous waste sites was initially recognized by the Congress when it enacted RCRA. This act gave EPA the authority to manage hazardous waste from its generation to disposal.

However, after a number of incidents involving major contamination at abandoned or inactive hazardous waste sites were uncovered in the late 1970s, the Congress recognized that new legislation was needed to give EPA the authority to initiate cleanup at these sites to limit further contamination. In 1980 the Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund, to provide EPA with funds and the authority to initiate corrective action and cleanup at abandoned or inactive leaking hazardous waste sites. These sites are referred to as Superfund sites. In addition, in 1984 the Congress amended RCRA to, among other things, provide EPA with greatly expanded authority to initiate corrective action and cleanup as part of its overall management at leaking hazardous waste facilities that were not abandoned or inactive. These facilities are referred to as RCRA facilities.

Because of concern that a potentially large number of RCRA facilities may be leaking and require corrective action, the Chairman of the Subcommittee on Commerce, Transportation, and Tourism, House Committee on Energy and Commerce, asked us to evaluate various aspects of EPA's implementation of its RCRA corrective action program.

Regulatory Control of RCRA Facilities

RCRA, which was enacted in 1976, provides for the regulatory control of 4,826[1] hazardous waste treatment, storage, and disposal facilities and requires, among other things, that facilities receive permits. Because it was recognized that facilities would not immediately receive permits, EPA allowed facilities in operation on or before November 19, 1980, to operate under interim status until their permits were issued or denied. During the interim-status period, regulations regarding corrective action

[1]This number is based on facilities identified by EPA's budget staff at the time it developed the fiscal year 1988 budget estimate. As such, this number is used in the appendixes of this report. This number is constantly being updated either as facilities move in and out of regulatory control or when EPA identifies new facilities subject to RCRA regulations.

were limited. However, the 1984 RCRA amendments expanded EPA's authority to require corrective action during the interim-status period.

Hazardous waste facility operations are often very complex because various methods are used to treat, store, and dispose of many different types of both hazardous and nonhazardous waste. Some of these methods include the use of tanks; incinerators; various surface impoundments, such as ponds and lagoons; drums and containers; and landfills. Because of the complexity of its operations, a facility usually includes many solid waste management units. Generally, two types of solid waste management units may be located at a facility. These are (1) regulated hazardous waste units where hazardous waste is currently or has been treated, stored, or disposed of and (2) nonregulated waste units where nonhazardous or combined hazardous and nonhazardous waste has been treated, stored, or disposed of. It is not uncommon for many of the RCRA facilities to have several solid waste management units, both regulated and nonregulated.

When the 1980 regulations were promulgated, facilities with interim status were required only to monitor the groundwater at regulated units where hazardous waste was being disposed of on the land, such as surface impoundments or landfills. During the interim-status period, the facilities were not required to clean up any leaks they identified as the result of monitoring the regulated units. However, once the facilities received permits, they were required to address corrective action at the contaminated regulated units for groundwater releases only. The facilities were not required to address corrective action at nonregulated units.

The 1984 RCRA amendments mandated that EPA require that all facilities, regardless of whether they were under interim status or had received a permit, determine whether any of the regulated or nonregulated units at the facilities were leaking and, if so, require the facilities to initiate corrective action. In addition, the 1984 amendments mandated that EPA require the facilities to initiate corrective action beyond the facilities' boundaries, where necessary to protect human health and the environment. (The facility boundary is defined as the property or fence line of the facility.) As a result of the 1984 amendments, the facilities could be required to initiate corrective action not only at both regulated and nonregulated units but also in areas beyond their boundaries.

Because many facilities are expected to use up their capacity and may not accept additional hazardous waste and because they may be unable to meet regulatory requirements as specified by the 1984 amendments, a

large number of facilities may decide to close their solid waste management units and not seek permits. Currently, EPA estimates that about 1,100 of the almost 1,500 land disposal facilities plan to close. Regardless of whether a facility plans to continue operating and seek a permit or to close, both types of facilities will be required by EPA to initiate corrective action at any leaking solid waste management unit. For the facilities seeking a permit, EPA will generally use the permit process to require corrective action. For the facilities planning to close, EPA will generally use an enforcement order to require corrective action.

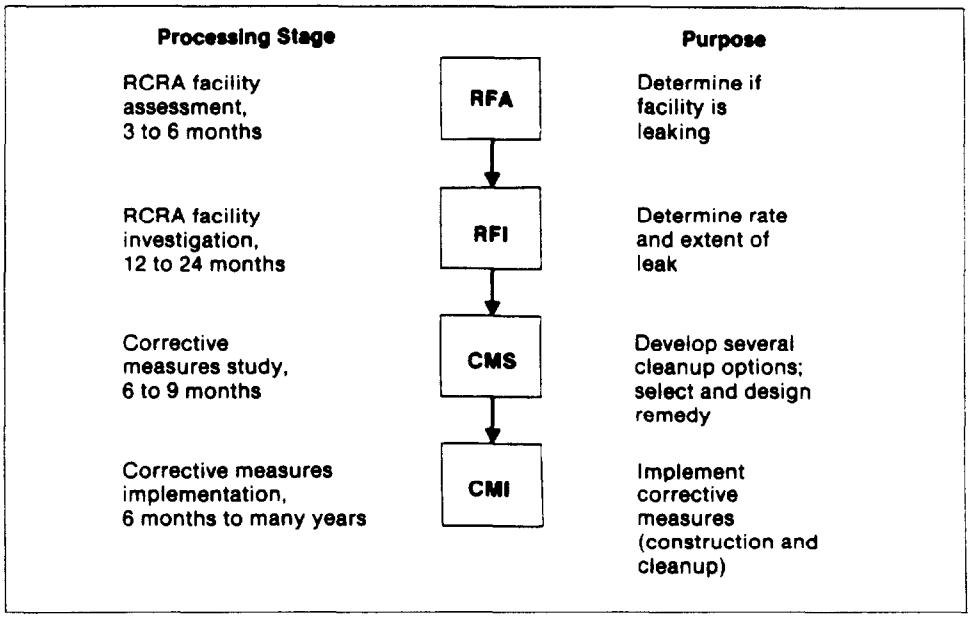
Because of the 1984 RCRA amendments, EPA plans to revise its regulations regarding cleanup standards and the approach used at RCRA facilities to include specific cleanup standards for nonregulated units. Regarding the cleanup approach used, when facility owner/operators decide to close their regulated units, EPA is considering requiring that facilities clean up to the unit boundary for both regulated and nonregulated units. (The unit boundary is defined as the point source of contamination, such as the boundary of a lagoon or landfill.) EPA is also considering allowing operating facilities to continue to operate without cleaning up their solid waste management units immediately unless the contamination has spread beyond the facility boundary and as long as it presents no threat to human health or the environment. EPA believes that letting operating facilities continue to operate, as long as contamination does not get worse and is contained within the facility boundary, minimizes the number of facilities going out of business and related reductions in needed capacity. In cases where contamination has spread beyond the facility boundary, all facilities, whether operating or closing, must clean up all off-site contamination exceeding selected standards. In addition, if an operating facility was contaminating the groundwater and posed a threat to human health and the environment, EPA would require cleanup of on-site contamination as well.

EPA classified the need for improved procedures to implement the corrective action program as a material weakness in December 1985 and December 1986 reports required under the Federal Managers' Financial Integrity Act of 1982. In accordance with the act, EPA is tracking its progress in correcting this weakness.

RCRA Corrective Action Process

The intent of the RCRA corrective action program is to have the facilities clean up their leaking solid waste management units and for EPA to approve the various stages in the process and monitor the cleanup activities. Although the identification of leaking facilities and the determination of corrective action for these facilities follow a logical process, EPA can require facility owner/operators to take appropriate interim measures in the event of an immediate threat to human health or the environment. As illustrated in figure I.1, the process generally includes four major stages—the RCRA facility assessment (RFA), the RCRA facility investigation (RFI), the corrective measures study (CMS), and the corrective measures implementation (CMI).

Figure I.1: RCRA Corrective Action Process



Note: Interim measures can occur at any point in the corrective action process.

EPA performs the RFA to identify actual and potential releases from all solid waste management units. The RFA includes, among other things, a file review, a site inspection, and, often, sampling. The purpose of this assessment is to determine whether sufficient evidence of a release exists to require the facility owner/operator to undertake more detailed investigations. EPA currently estimates that the RFA stage will take between 3 and 6 months per facility.

An RFI is the next stage if EPA determines that sufficient evidence of a release of hazardous waste or hazardous chemicals does exist at a facility. The RFI characterizes the nature, extent, and rate of migration for releases. If necessary, interim corrective measures can be implemented to protect human health and the environment. EPA estimates that the RFI stage will take between 12 and 24 months per facility.

Once the RFI stage is completed, EPA will evaluate the results and determine whether corrective measures are needed. If corrective measures are needed, the facility owner/operator is required to complete a CMS. The CMS details various proposed cleanup remedies. EPA will then select the remedy it believes will best address corrective action at the facility. EPA plans to require the facility owner/operator to demonstrate the financial ability to pay for the required corrective action. EPA has not yet decided, however, at what point in the process to require such a demonstration. According to a branch chief in the Office of Solid Waste, EPA may more specifically define when financial assurance will be required when it proposes corrective action regulations in early 1988. EPA estimates that the CMS stage will take between 6 and 9 months per facility.

The implementation of the selected remedy by the facility owner/operator is the CMI. During this stage, EPA will require the facility owner/operator to design, construct, operate, maintain, and monitor the corrective measures. EPA estimates that the CMI stage will take between 6 months to many years to complete per facility.

Regulations in effect since July 1982 require EPA and the facility owner/operator to complete the corrective action process through the design stage for regulated hazardous waste units by the time the permit is issued. However, EPA, concerned that the time required to complete these stages of corrective action would take too long and not allow EPA to meet RCRA-mandated permit deadlines, amended this requirement in a June 22, 1987, Federal Register notice to allow RCRA facilities to complete the CMS stage and the balance of the corrective action process after the issuance of their permits.

Relationship of RCRA Facilities to Superfund Sites

The types of environmental problems posed by RCRA facilities and Superfund sites are essentially the same. Current and past practices at the individual sites are likely to cause contamination of the groundwater, surface water, soil, and air. The corrective action program under RCRA is designed to hold facility owner/operators responsible for contamination caused by their facilities' operations. The objective is to get facility owner/operators to implement the necessary corrective action and pay the cost for cleaning up the contamination caused by their operations. The Superfund program is intended to address environmental problems posed by abandoned and/or inactive sites in which the companies' owner/operators are unavailable, unwilling, or financially unable to clean up contamination caused by their companies' operations. For Superfund sites, the federal and state governments can pay for the cleanup required, using trust funds established for this purpose; then, if the parties responsible for the contamination can be identified, EPA can sue the parties to recover expended funds. EPA is also authorized under Superfund to use enforcement authorities to get responsible parties to pay for the cleanup initially and not use trust funds. Because many RCRA facilities can be expected to ultimately become Superfund sites, EPA believes as much consistency as possible should be maintained in performing corrective actions and cleanup under the two programs, while at the same time recognizing that statutory and programmatic differences exist.

Objectives, Scope, and Methodology

On December 19, 1986, the Chairman, Subcommittee on Commerce, Transportation, and Tourism,[2] House Committee on Energy and Commerce, requested that we evaluate EPA's progress in implementing the corrective action provisions of the 1984 RCRA amendments. Specifically, we were asked to determine

- How many RCRA facilities are likely to require corrective action?
- How long will it take to implement corrective action at (a) facilities that are closing and (b) facilities that are receiving permits?
- What system will be used to identify priorities among the hundreds, if not thousands, of RCRA facilities awaiting corrective action?

[2]At the start of the 100th Congress, this Subcommittee was renamed the Subcommittee on Transportation, Tourism, and Hazardous Materials. Although the name changed, the Subcommittee continued to have the jurisdiction for environmental matters. As agreed with the new Subcommittee Chairman's office, this report is also being addressed to Congressman James J. Florio, the prior Subcommittee Chairman.

- What cleanup standards will be applied to corrective action at such facilities, and how do these standards compare to the standards applicable to Superfund remedial actions?
- How and when will a decision be made that a facility cannot be addressed by corrective action and should instead be transferred to the Superfund program, for either a fund-financed or enforcement response?

To obtain information on the number of treatment, storage, and disposal facilities that may require corrective action, we reviewed an EPA analysis of RFAs completed through early fiscal year 1987. We reviewed two EPA studies that projected the scope of the corrective action program. We also interviewed responsible officials in the Office of Solid Waste and the Office of Waste Programs Enforcement.

To estimate how long it may take to implement the corrective action program at operating and closing facilities, we asked EPA to make projections using a budget model it uses for estimating the costs of the corrective action program. EPA has accounted for various stages in the corrective action process in the model, made assumptions on the amount of time required to complete each stage, and estimated the number of facilities required to undergo corrective actions at each stage. Although EPA's budget model is not designed to project long-term resource requirements, EPA staff modified the model to enable us to project how long the corrective action program may take to complete.

To determine what priorities EPA will use in implementing the program, we reviewed the RCRA Implementation Plans and various documents relating to the corrective action program. We also interviewed responsible officials in EPA's Office of Solid Waste, Office of Waste Programs Enforcement, and Office of General Counsel.

To determine what cleanup standards EPA will use at RCRA facilities requiring corrective action and how they compare to Superfund, we reviewed numerous policy documents, including a position paper sent to the EPA Administrator outlining various cleanup options. To determine EPA's progress in developing health data, we developed our own inventory of health-related standards that exist for over 200 chemicals found at RCRA and/or Superfund sites. To develop this inventory, we integrated data from several EPA program offices. We also interviewed responsible officials in the Office of Solid Waste, Office of Waste Programs Enforcement, Office of Emergency and Remedial Response, Office of Drinking

Water, Office of Groundwater Protection, and Office of Health and Environmental Assessment.

To obtain information on when EPA will decide to transfer a facility from the RCRA corrective action program to Superfund for cleanup, we reviewed appropriate EPA documents and two individual RCRA facility cases that have recently been transferred to Superfund for cleanup. We also interviewed responsible officials in the Office of Waste Programs Enforcement and the Office of Solid Waste.

We conducted our work between February and October 1987 in accordance with generally accepted government auditing standards. We discussed the contents of a draft of this report with EPA staff responsible for implementing the corrective action and Superfund programs. Their comments have been incorporated in the report, where appropriate. However, as requested by the Chairman's office, we did not ask EPA to officially comment on a draft of this report.

Many RCRA Facilities May Require Substantial Corrective Action

The RCRA corrective action program is in its initial implementation stages, and EPA does not have an official projection of how many facilities will require corrective action. However, on the basis of an analysis of RFAs completed through March 1987, EPA's RCRA enforcement budget staff projected that corrective action may be required at almost 2,500, or over 50 percent, of the approximately 4,800 facilities that EPA has identified.

In addition, two EPA contractor studies indicated that many of the treatment, storage, and disposal facilities have a substantial number of individual solid waste management units. Many of these units could be leaking and eventually require corrective action. Because of the number of RCRA facilities that may be leaking and the substantial number of individual solid waste management units located on the facilities, corrective action at many of these facilities could be expensive and complex and could approach EPA's projected cleanup efforts under its Superfund program.

Need for Corrective Action Is Likely at Many RCRA Facilities

EPA's Office of Waste Programs Enforcement budget staff estimates that about 2,500 RCRA facilities may require some type of corrective action. This estimate is based on a projection developed from the budget staff's analysis of 550 RFAs completed at RCRA facilities as of March 1987. The budget staff analyzed these RFAs so that it could estimate how many RCRA facilities may be leaking and require corrective action. According to EPA's budget staff, the analysis was necessary to determine EPA's budget resources needed for the corrective action program and to better understand the resource implication of the corrective action program over the next 5 years.

In reviewing the 550 completed RFAs, EPA's budget staff determined the number of completed RFAs at both operating and closing land disposal facilities. However, the budget staff does not yet have the data to separately compute the number of RFAs completed at operating and closing incinerator facilities or operating and closing treatment and storage facilities. As a result, the budget staff did not distinguish between operating and closing facilities for RFAs completed at these facilities.

The results of EPA's budget staff analysis showed that 77 percent of the operating land disposal facilities, 70 percent of closing land disposal facilities, and 56 percent of the operating and closing incinerator and treatment and storage facilities may be leaking and may require RFIs. The EPA budget staff discussed this analysis with the staffs responsible

for implementing the corrective action program in the Office of Solid Waste and the Office of Waste Programs Enforcement to determine if the analysis completed for these 550 RFAs could be projected to the universe of RCRA facilities. The program staffs expressed a high degree of confidence in the land disposal projections; they had a lower confidence level in the treatment and storage facility projection since the sample size reviewed was small in comparison to the universe of treatment and storage facilities. The budget staff applied the above percentages to the universe of 4,826 facilities to project the resources needed for the corrective action program. On the basis of this projection, the EPA budget staff estimated that almost 2,500 RCRA facilities may need corrective action, as shown in table II.1.

Table II.1: Many RCRA Facilities May Require Corrective Actions

	Type of facility			
	Operating land disposal	Closing land disposal	Operating and closing incinerator and treatment and storage	Total facilities
Total number of facilities in universe	393	1,095	3,338	4,826
Projected number of facilities requiring RFIs	303 (77%)	776 (70%)	1,869 (56%)	2,938
Projected number of facilities requiring corrective action	243	652	1,589	2,484

As shown in table II.1, after applying the same percentages that may require RFIs to the universe of facilities, the budget staff computed that a total of about 2,950[1] facilities will either experience a leak or be suspected of leaking and most will require an RFI. Of the approximately 2,950 facilities, the staff estimates that about 450 will not require a CMS because EPA will determine, after conducting the RFI, that the facilities were either not leaking or the cleanup action required will be relatively minor, such as moving drums from an outside location to a warehouse. The remaining almost 2,500 facilities were projected to require cleanup. The 2,500 facilities include over 800, or about 32 percent, which EPA projects may be transferred to the Superfund program for cleanup at some time during the corrective action process because these facility owner/operators will be either unwilling or unable to pay for cleanup of

[1]During discussions of this report with EPA's budget staff in the Office of Waste Programs Enforcement, the budget staff expressed a preference to use estimates rather than exact numbers because all of these numbers are based on projections and subject to change. Therefore, all numbers in the narrative discussion have been rounded.

their facilities. As a result, the EPA budget model projection indicates that almost 1,700 facilities may remain financially viable and their owner/operators may be capable of paying for cleanup under the RCRA corrective action program. If these estimates hold true, the projected cost of the corrective action program could be comparable to EPA's projected cost for the similarly sized Superfund cleanup program. EPA has estimated that its Superfund program may eventually clean up to 2,500 sites at a cost of up to $22.7 billion.[2]

Extent of Corrective Action Needed at Each Facility May Be Substantial

EPA does not know how many facilities have solid waste management units that may be leaking. However, two draft studies, both dated in January 1987, indicate that many facilities may have numerous leaking units to be cleaned up.

The first study[3] focused on determining how many treatment, storage, and disposal facilities had nonregulated units and whether these units were leaking or suspected of leaking. On the basis of available data characterizing hazardous waste facilities analyzed by the contractor, EPA projected that approximately 70 percent of the over 4,800 facilities, or about 3,400 facilities, would have at least 1 nonregulated unit and that an average of 6.6 nonregulated units, such as tanks, lagoons, and landfills, were located at each facility. In addition, according to the study, facility owner/operators reported that between 27 and 54 percent of their nonregulated units have leaked. The study cautioned that the owner/operators of these facilities tend to underreport both the number of nonregulated units at their facilities and the number of units leaking. Thus, the study concluded that more nonregulated units at the facilities may be leaking than were reported by the owner/operators. In addition, according to the study, although the average number of nonregulated units at these facilities was 6.6, many facilities had more than 10 and some had more than 100 nonregulated units.

The second study[4] focused on reviewing 103 completed RFAs to, among other things, assist EPA in determining national trends relevant to the

[2]Superfund Section 301(a)(1)(C) Study, EPA, Dec. 1984. However, in our March 1985 report entitled Cleaning Up Hazardous Wastes: An Overview of Superfund Reauthorization Issues (GAO/RCED-85-69), we reported that EPA may have to clean up between 1,500 and 4,200 sites at a cost ranging from $6.3 to $39.1 billion.

[3]Overview of the Regulatory Problem to Be Addressed by the Section 3004(u) Rulemaking on Corrective Action, EPA, Jan. 23, 1987.

[4]A.T. Kearney, Analysis of RCRA Facility Assessments, for EPA, Jan. 19, 1987.

RCRA corrective action program. The study attempted to identify all solid waste management units located at each facility and the number of units that are or have the potential to leak into the groundwater, surface water, soil, or air. The results of the study showed that the 103 facilities had an average of 35.5 solid waste management units, such as hazardous and nonhazardous landfills, tanks, and lagoons. Of the 35.5 solid waste management units at each facility, about 20 percent, or 7.1 units, were regulated and 80 percent, or 28.4 units, were nonregulated units. The majority of the facilities, according to the study, had the potential to leak in at least one of the environmental media. For example, 93 of the 103 facilities had the potential to leak into the groundwater. However, according to the chief of the corrective action section in the Office of Solid Waste, the contractor reviewed RFAs primarily at very large facilities, such as complex chemical plants, and the results of this analysis may not be typical of conditions occurring at other treatment, storage, and disposal facilities.

Corrective Action Will Take Many Years to Complete

EPA does not have an official projection of how long it will take to complete corrective action. On the basis of projections developed for us by EPA's Office of Waste Programs Enforcement budget personnel, however, it will be fiscal year 2005 before cleanup at the estimated 1,700 facilities that will remain under RCRA, rather than be transferred to Superfund, will be initiated.[1] In addition, some corrective actions could take up to 3 years to complete, extending the cleanup projection until fiscal year 2025.

Results of Long-Range Projection

Because EPA does not have an official projection of how long the RCRA corrective action program will take to complete, we asked EPA's budget staff in the Office of Waste Programs Enforcement to make a projection based on its fiscal year 1988 RCRA enforcement budget model, using the latest information available for corrective action activities. EPA used a 10-percent annual growth rate in resources for the corrective action program in the model because it believed that to be a reasonable assumption. As stated in appendix II, EPA's budget model assumptions regarding the number of facilities that may be required to undergo corrective action are based on an analysis of RFAs completed through March 1987. On the basis of that analysis, about 2,500 RCRA facilities were projected to require cleanup: almost 1,700 facilities were estimated to be cleaned up under RCRA, and over 800 facilities requiring cleanup were to be transferred to Superfund. On the basis of the results of EPA's Office of Waste Programs Enforcement budget model, it was estimated that corrective action implementation activities (the actual design and construction of the cleanup remedy) would be implemented at the almost 1,700 facilities estimated to be cleaned up under RCRA by fiscal year 2005. (See figs. III.1-III.4.) In addition, figures III.1 through III.4 illustrate activities projected to be completed in 5-year increments from fiscal years 1987 through 2005. The results of the analysis project that for the over 4,800 facilities by fiscal year

- 1987, about 1,000, or 21 percent, of the RFAs should be completed,
- 1992, about 2,550, or 53 percent of the RFAs; 900, or 40 percent, of the RFIs; 650, or 36 percent, of the CMSs; and 50, or 3 percent of the CMIs should be implemented,

[1] Although we have estimated when all facilities may complete the corrective action process, we were unable to break out the information by operating facilities and closing facilities because the EPA budget staff does not yet have these data. The data will become available as the permit deadline for treatment and storage facilities—November 1992—draws nearer and facilities decide whether they want to continue to operate or close.

- 1997, all of the over 4,800 RFAs should be completed; and almost 2,000, or 88 percent, of the RFIs; 1,330, or 73 percent, of the CMSs; and 650, or 38 percent, of the CMIs should be implemented,
- 2002, all of the approximately 2,275 RFIs and all 1,825 CMSs should be completed; and about 1,380, or 81 percent, of the CMIs should be implemented, and
- 2005, all of the approximately 1,700 CMIs should be implemented.

As previously stated, some corrective actions could take up to 20 years to complete, extending the cleanup projection to fiscal year 2025.

The model results also identified specific years when resource needs would be the greatest and the years' specific activities, such as RFAs and RFIs, should be completed. The results of this analysis showed that

- fiscal years 1996 and 1997 are when resource demands would be at their highest level, with EPA monitoring about 850 RFIs, over 500 CMSs, and almost 300 CMIs;
- RFAs would be completed at all facilities by fiscal year 1995;
- RFIs would be completed by fiscal year 2000;
- CMSs would be completed by fiscal year 2001; and
- CMIs would be implemented by fiscal year 2005.

Figure III.1: Cumulative RFA Actions

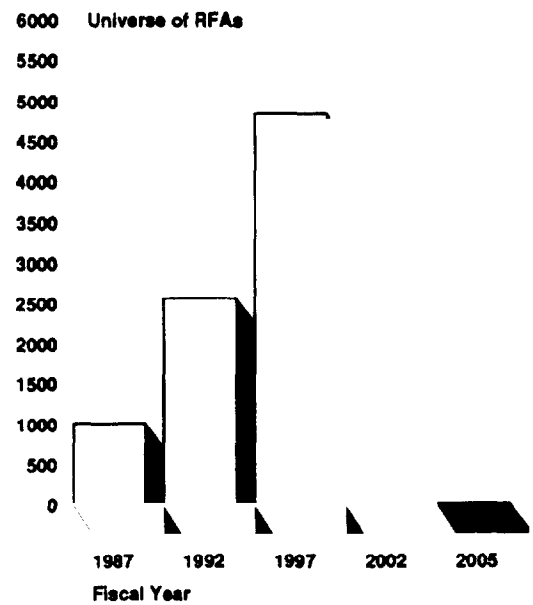


Figure III.2: Cumulative RFI Actions

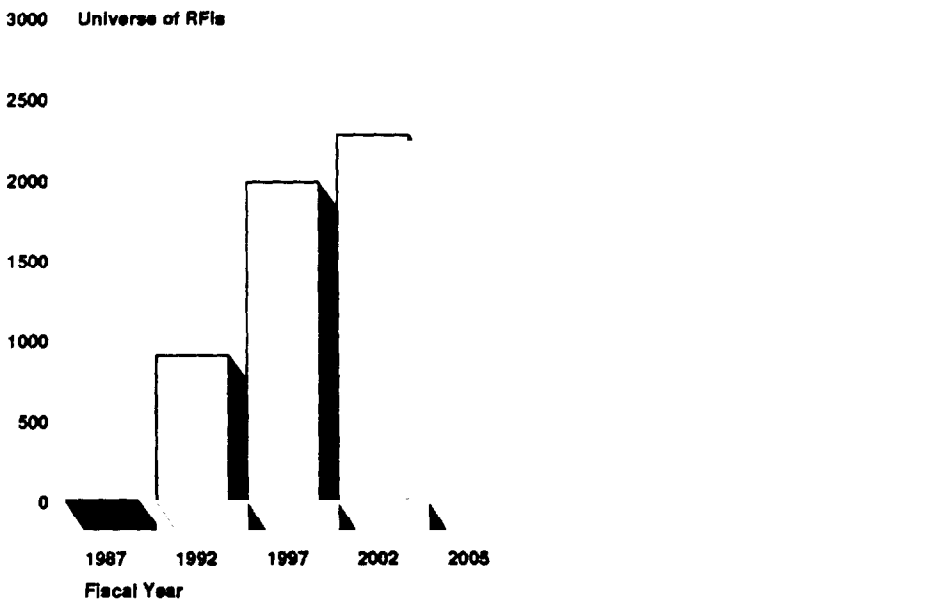


Figure III.3: Cumulative CMS Actions

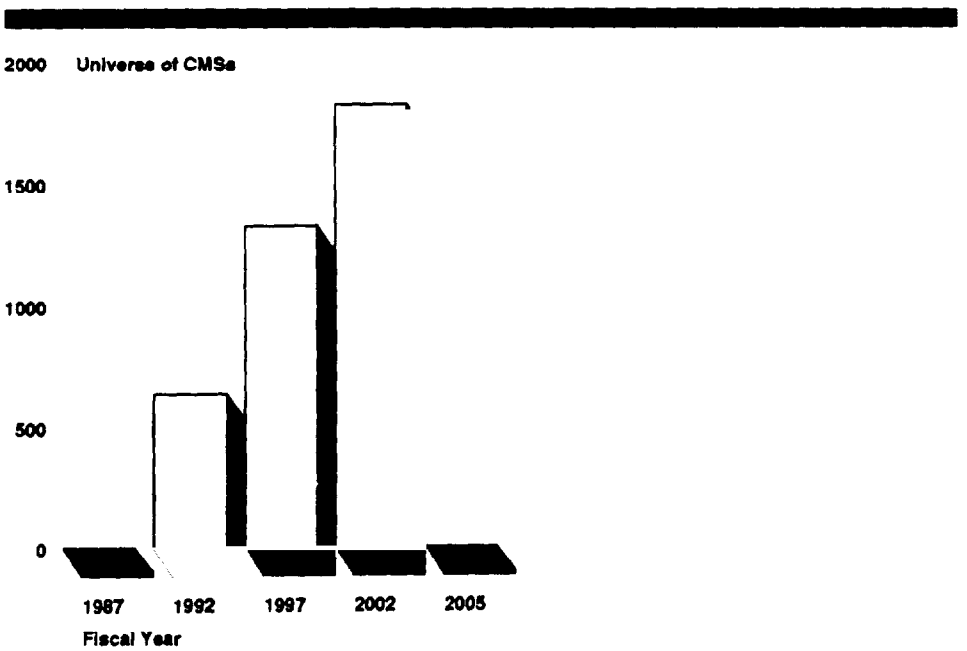
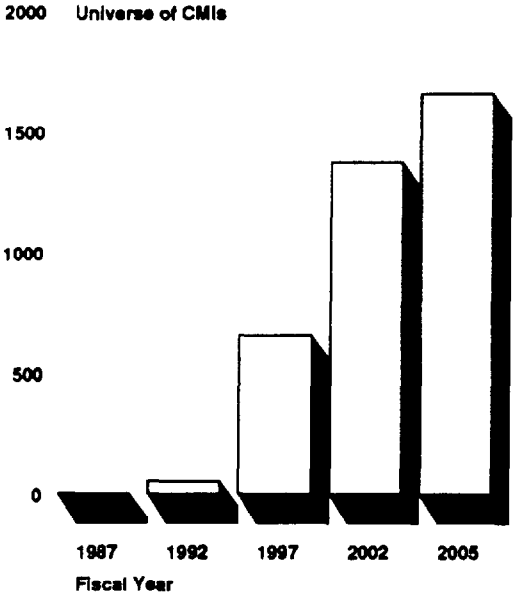


Figure III.4: Cumulative CMI Actions



Budget Model Assumptions and Limitations

The model used to develop this long-range projection is typically used as a tool by the Office of Waste Programs Enforcement in preparing annual budget submissions. EPA extended the model to project over a 5-year period to allow EPA staff to better understand longer-term resource requirements. At our request, EPA modified the model to allow a projection of how long it may take to initiate and complete corrective action at RCRA facilities estimated to be leaking.

Specifically, the model provides estimates for time and resources to initiate and complete activities such as RFAs; RFIs, including drafting and finalizing the permit or order; processing permit/order appeals; litigating against facilities, when necessary; CMSs; providing for public comment at various steps in the process; and CMIs (design and construction activities). The model assumes the following time requirements: 6 months for the RFA to be completed at an operating land disposal facility and 3 months at closing land disposal and treatment and storage facilities; 18 months for the RFI to be completed at all facilities; and 9 months to complete a CMS at all facilities. In addition, 30 months is assumed for the completion of a CMI. EPA developed these estimates from time frames experienced under the Superfund program for similar activities. If the time frames for the RCRA corrective action program differ from those of the Superfund program, then the

estimated time needed to complete the RCRA corrective action program will also differ.

It should be noted that if less than a 10-percent annual growth occurs in resources, or fewer than the estimated 800 facilities are transferred to Superfund for cleanup, it may take longer than projected to complete the RCRA corrective action program. In addition, if more facilities than the projected 2,500 are found to be leaking or EPA identifies more than 4,800 facilities, the corrective action program could take longer to complete. The converse of these situations is also true.

We did not conduct a detailed review of the EPA budget model nor did we conduct, or ask EPA staff to conduct, analyses to determine how critical various model assumptions are to estimating the time required to initiate or complete stages of the RCRA corrective action process. Consequently, model results should be viewed as a general indication of the level of effort required to substantially complete corrective action activities.

Corrective Action Program Priorities Are Currently Driven by Permit Deadlines

EPA currently does not have a formal, systematic process for prioritizing corrective action activities on the basis of the extent of environmental threats posed by the over 4,800 RCRA facilities. Instead, unless EPA becomes aware of a facility that poses an imminent threat to human health or the environment, its current strategy (through fiscal year 1988) is to perform corrective action activities in conjunction with the congressionally mandated deadlines for granting permits to the approximately 540 operating land disposal and incinerator facilities and limited corrective action on about 660 closing land disposal facilities. Under the current corrective action strategy, EPA does not know when it will address corrective action at the remaining 3,630 facilities, including about 440 closing land disposal facilities, about 40 closing incinerators, and about 3,150 operating and closing treatment and storage facilities. EPA recognizes that some of the 3,630 facilities that it does not plan to address by fiscal year 1988 may pose serious environmental risks, and it is in the process of developing an alternative approach to prioritize corrective action activities at these facilities.

Current Corrective Action Strategy

The 1984 RCRA amendments required that land disposal facilities receive permits by November 1988; incinerators, by November 1989; and treatment and storage facilities, by November 1992. These permit deadlines are the driving force behind EPA's current strategy for addressing corrective action through fiscal year 1988. Under EPA's current corrective action strategy, EPA generally plans to use permits or enforcement orders to perform corrective action at those facilities requiring it. Thus, EPA is now addressing corrective action at operating land disposal facilities and incinerators in conjunction with the upcoming deadlines. However, EPA is also performing limited corrective action at closing land disposal facilities and, according to EPA, will address corrective action at any facility that it is aware of as posing an imminent threat to human health or the environment.

Through fiscal year 1987, EPA has focused its corrective action activities at land disposal facilities. As part of the permit process, EPA is completing the corrective action RFAs at the approximately 400 land disposal facilities that require permits by November 1988. If EPA deems that further action is needed, then an RFI will be required. However, EPA does not believe it has enough time to complete the RFI stage at all units of operating land disposal facilities by the November 1988 permit deadline and, therefore, may not complete the RFI stage for many of these facilities until after the permits have been issued.

EPA also completed RFAs on about 330 of the approximately 1,100 closing land disposal facilities in fiscal year 1987. According to EPA officials responsible for implementing the corrective action program, some of these closing land disposal facilities may pose serious environmental risks; therefore, it is important to identify which ones may be leaking. EPA, according to the Director of the RCRA Enforcement Program, will generally use its enforcement authorities to address corrective action at the closing facilities. EPA recognizes that it will not be able to issue enforcement orders and initiate RFIs at all closing land disposal facilities that may require them until a number of years in the future. EPA is currently working on an environmental priorities initiative to address this problem. This initiative is discussed in more detail later in this appendix.

For fiscal year 1988, EPA plans to continue its corrective action activities in conjunction with its congressionally mandated permit deadlines by performing RFAs and, if needed, requiring RFIs at the approximately 140 operating incinerators.[1] EPA also plans to conduct RFAs at an additional 330 closing land disposal facilities. In addition, EPA plans to monitor the corrective action programs at the operating land disposal facilities that are suspected of leaking by requiring the facility owner/operators to conduct RFIs as a condition of their facilities' permits.

EPA recognizes that under its current corrective action strategy described above, most of the facilities in its universe will not be addressed until sometime after 1988. These facilities include about 440 closing land disposal facilities, about 40 closing incinerators, and about 3,150 operating and closing treatment and storage facilities. EPA also recognizes that some of these facilities may pose serious environmental risks and need to be addressed as expeditiously as possible. As a result, EPA has an initiative underway to determine how to prioritize corrective actions at RCRA facilities in the future.

Initiative Underway to Prioritize Corrective Actions

EPA's environmental priorities initiative is based on the assumption that EPA will not be able to address all treatment, storage, and disposal facilities requiring corrective action in a timely manner with existing RCRA resources. In order to identify and clean up facilities posing significant threats to human health or the environment, EPA is considering using

[1]To avoid double counting, the incinerator category includes incinerator-only facilities. It does not include incinerators at facilities that have other disposal or treatment and storage activities.

Superfund resources to complete initial assessments and, in some cases, more detailed investigations, at RCRA facilities.

Specifically, EPA plans to use a relatively quick screening process to identify RCRA facilities that should receive initial assessments first. It is currently considering allowing each region to develop its own screening process to identify facilities that warrant priority action. EPA is also considering using Superfund resources, under certain conditions, to conduct the more detailed investigations designed to identify the rate and extent of contamination at some RCRA facilities. According to the Director of the RCRA Enforcement Program, the EPA regions will have to make management decisions, based on guidance that EPA headquarters will issue, on which facilities will receive the detailed investigations under the Superfund program. EPA has not yet decided whether to score these facilities using the hazard-ranking system[2] prior to initiating these detailed investigations, as is the practice with Superfund sites. As a result of this initiative, EPA believes that the worst facilities and sites would be assessed for corrective action needs in an expedient manner. Unless the facilities are transferred to Superfund, actual cleanup will be performed by facility owner/operators. As of September 1987, EPA hoped to implement this initiative in fiscal year 1989.

[2]The hazard-ranking system, currently under revision, is a formal scoring system used in the Superfund program to identify sites posing the most significant threats to human health and the environment. It considers factors such as exposure to hazardous substances for humans and sensitive environments and develops a score for each release or potential release to groundwater, surface water, and air. The three scores are then weighted and combined to yield an estimated hazard-ranking score ranging from 0 to 100, with 28.5 as the cutoff for inclusion on a National Priorities List that establishes eligibility for long-term cleanup action under Superfund.

EPA Intends to Make RCRA Cleanup Standards Consistent With Superfund Standards

EPA is considering revising and expanding the current RCRA cleanup standards to make them more consistent with those now being used under the Superfund program. EPA is considering this action because, under EPA's expanded authority in providing corrective action at RCRA facilities, the type and magnitude of cleanup required at both RCRA facilities and Superfund sites will be similar.

To date, EPA has concentrated its efforts to develop cleanup standards in the groundwater and surface water areas. Currently, EPA is also considering the development of cleanup standards that encompass air and soil areas as well. At the time of our review, however, EPA's development of air and soil cleanup standards had not progressed as far as groundwater and surface water cleanup standards. As a result, we are discussing only those groundwater and surface water cleanup standards that have been promulgated for the Superfund program and are being considered for the RCRA corrective action program. This appendix also discusses EPA's progress in developing the fundamental health data that will be used in setting site-specific cleanup standards.

Current Superfund Cleanup Standards

In the 1986 Superfund Amendments, the Congress directed EPA to use existing federal or state environmental standards or criteria in determining at what level to clean up Superfund sites. Collectively, the list of available standards or criteria to be used are referred to as Applicable, or Relevant and Appropriate Requirements (ARAR). "Applicable" requirements are those cleanup standards or criteria promulgated under federal or state law that specifically address, among other things, a hazardous chemical or other contaminant. "Relevant and appropriate" requirements are cleanup standards or criteria promulgated under federal or state law that, while not applicable to a hazardous chemical, address problems or situations sufficiently similar to those encountered at a Superfund site so that their use is well suited to the particular site. Although a number of ARARs could be used by EPA in cleaning up Superfund sites, EPA expects to use the following three most often:

- Maximum Contaminant Levels (MCL).[1] These are drinking water standards set under the Safe Drinking Water Act. They establish maximum allowable concentrations in drinking water for 30 chemicals or contaminants. Additional MCLs are under development. These standards are based on health considerations as well as the technical and economic feasibility of achieving the standards.
- State environmental standards. These standards have the dual purposes of establishing state water quality goals for specific bodies of water and serving as the regulatory basis for establishing water quality-based controls beyond the levels of treatment required by the Clean Water Act. The presence of technological or economic considerations varies by state.
- Federal Water Quality Criteria. These are guidelines developed under the Clean Water Act for states to use in developing their own water quality standards. Health estimates are derived to protect people and aquatic life when they are exposed to chemicals in the surface water. These estimates do not reflect technological or economic considerations.

EPA realizes that by using the above-mentioned ARARs in determining cleanup levels at Superfund sites, many chemicals for which no ARARs exist may have to be cleaned up. This may occur because MCLs currently cover only 30 chemicals, states may not have developed their own cleanup standards, and water quality criteria may apply to surface water contamination and not groundwater contamination. As a result, EPA is developing additional guidance and criteria to be used in determining cleanup standards for particular chemicals at Superfund sites. The additional guidance or criteria include the following:

- Proposed MCLs. These are the same types of drinking water standards as MCLs, but they have not yet been promulgated. Currently MCLs for 43 chemicals or contaminants are in the proposal stage.
- Risk-Specific Doses (RSD). These are verified or not-yet-verified health-based risk estimates ranging from a 1 in 10,000 to a 1 in 10,000,000 lifetime cancer risk for carcinogenic chemicals extrapolated from human and animal studies. EPA uses these estimates as the basis, or starting

[1]Considerable controversy has arisen over EPA's decision to use MCLs rather than Maximum Contaminant Level Goals (MCLG). MCLGs were promulgated as part of the Safe Drinking Water Act and are nonenforceable, pure health-based standards for public drinking water systems that, unlike MCLs, do not consider cost or technical feasibility. In practice, MCLGs have the same value as MCLs for noncarcinogens; for carcinogens, MCLGs should equal zero, and MCLs are set at a threshold level where there are no adverse health effects. Some Members of Congress maintain that MCLGs were intended in the 1986 Superfund amendments to be the primary ARAR, rather than MCLs. EPA contends that MCLs are protective of human health while taking technology and costs into consideration.

point, for developing many types of standards for carcinogenic chemicals.

- Reference Doses (RfD). RfDs are verified or not-yet-verified health-based estimates for noncarcinogenic chemicals from human and animal studies where the estimate indicates a level at which no adverse effects may be observed. EPA uses these estimates as the basis, or starting point, for developing many types of standards for noncarcinogenic chemicals.

When RSDs, RfDs, and proposed MCLs do not exist, EPA will review other available health data. EPA's progress in developing RSDs and RfDs is discussed later in this appendix.

The selection of the particular standard or criteria to be used to clean up specific chemicals depends on a number of site-specific factors. These factors include (1) the use and potential use of the water, such as whether the contaminated water is from a drinking water source, (2) whether the contaminated water is groundwater or surface water, (3) the specific chemicals found at the site, and (4) whether the particular state in which the site is located has developed its own standards. Regardless of which particular standards or criteria are used to determine cleanup for Superfund sites, EPA believes that all standards or criteria chosen will be protective of human health and the environment. However, because the Superfund legislation contains a fund-balancing provision, cases may occur where the Superfund site cleanup may not attain the selected ARARs. Under the fund-balancing provision, if EPA determines that the cost of attaining an ARAR for a particular site would be too high and dilute the Superfund moneys available for other cleanup efforts, EPA could require a less stringent, though still protective, level of cleanup. To date, EPA has used the fund-balancing provision only twice.

RCRA Corrective Action Cleanup Standards Under Consideration

Currently, EPA has established RCRA cleanup standards only for groundwater contamination occurring at leaking regulated units. These standards provide that contaminated groundwater at such units be cleaned up to MCL levels where such standards exist or to background levels where MCLs do not exist. (Background levels for chemicals are derived from levels monitored in up-gradient groundwater monitoring wells, which are not influenced by the facility's hazardous waste operations.) Facility owner/operators can also petition EPA to use an alternate concentration limit, which can be more or less stringent than background levels or MCLs, if they can demonstrate to EPA that the levels set will not pose a substantial present or potential hazard to human health or the environment.

As stated previously, the 1984 RCRA amendments expanded EPA's regulatory authority to require corrective action at both regulated and nonregulated units at RCRA facilities. EPA's July 1985 rule codifying the corrective action portion of the amendments provided the authority to require corrective action at nonregulated units as well as regulated units; however, the rule did not specify the cleanup standards to be used. In early 1988 EPA plans to amend its existing regulations by proposing additional or revised corrective action cleanup standards as a result of its expanded corrective action authority.

EPA's goal is to develop consistent cleanup standards between the RCRA and Superfund programs. As of September 1987, EPA had not made final decisions on these standards and was still holding work-group discussions on setting additional or revised cleanup standards under the RCRA corrective action program. As a result, our description of EPA's position on setting cleanup standards is based on what is currently being discussed in work groups and is subject to revision.

The cleanup standards under consideration, which EPA program officials expect to propose in early 1988, include MCLs, applicable state environmental standards, and federal water quality criteria, when available. When these three standards and criteria are not available, EPA is considering the use of proposed MCLs, RSDs and RfDs, other available health data, and, in rare cases, background levels. As in the Superfund program, the selection of the particular standard to be used to clean up specific chemicals will depend on a number of site-specific factors. EPA believes that all standards and criteria under consideration will be protective of human health and the environment.

The fundamental changes between the current RCRA cleanup standards and those under consideration appear to be a de-emphasis on using background levels as cleanup standards and an elimination of alternate concentration limits. Instead, when MCLs are not available, EPA appears to be considering moving toward using health-based or environmental estimates such as RSDs and RfDs, which, as stated previously, stipulate at what levels no adverse health effects can be expected.

EPA is considering this de-emphasis and use of health-based estimates because background levels may, in some cases, be technically infeasible to achieve or unnecessarily stringent. As a result, a health-based or environmental estimate may be selected to clean up the contamination. In addition, EPA is considering eliminating alternate concentration limits

because the use of this standard would require significant resources and the use of RSDs and RfDs would basically serve the same purpose.

Comparison of Current Superfund Cleanup Standards and Those Under Consideration for RCRA

Under the RCRA cleanup standards being considered and the existing Superfund standards, both programs appear to share similar cleanup goals regarding standards to be used for cleanup of groundwater and surface water contamination. Both programs must set cleanup standards that are protective of human health and the environment. In addition, the specific standards that will be used to clean up specific contamination at both RCRA facilities and Superfund sites appear to be similar.

For groundwater contamination, both the RCRA and Superfund programs will clean up the contamination generally by using MCLs, when available. When MCLs are not available, the cleanup standards used under both programs will be applicable state environmental standards or, if such standards are unavailable, proposed MCLs, RSDs, or RfDs, depending on the specific chemical requiring cleanup. In addition, both programs have a certain amount of flexibility for determining the particular cleanup standards to be used, depending on the use or potential use of the groundwater. For example, if the groundwater is highly saline and not likely to be used for drinking water, both programs may not require cleanup to MCLs even when MCLs exist. Rather, both programs may allow cleanup to a less stringent level.

For surface water contamination, both programs plan to use federal water quality criteria as the preferred standard. If federal water quality criteria are not available, both programs prefer to use applicable state standards, MCLs, or, when MCLs are not available, proposed MCLs or RSDs and RfDs, depending on the specific chemical to be cleaned up.

Although both the RCRA and Superfund programs appear to be consistent in their use of standards to clean up groundwater and surface water contamination, two differences could affect the particular cleanups conducted at RCRA facilities and Superfund sites. One difference concerns the use of relevant and appropriate state environmental standards in selecting a particular cleanup standard; the other difference concerns the fund-balancing provision of the Superfund program.

Under Superfund requirements, the Superfund program must use relevant and appropriate (in addition to applicable) state requirements identified for a specific site cleanup unless these requirements are not available or EPA can demonstrate that other standards or criteria are

more protective. Under RCRA, however, the facility will have to comply with applicable requirements. EPA is currently not bound to comply with relevant and appropriate requirements for RCRA corrective actions. EPA does not yet know how this difference could affect its goal of developing consistent cleanup standards between the Superfund and RCRA programs.

As previously stated, the Superfund legislation contains a fund-balancing provision that could prevent some Superfund sites from attaining the selected ARARs because the cost to require cleanup to that level would be too high. The RCRA legislation contains no such provision. As a result, EPA could require a RCRA facility to clean up to similar levels even though the cost would be high, while a Superfund site, under similar circumstances, may not require cleanup to the ARAR level. EPA officials responsible for the RCRA and Superfund programs recognize that this situation could occur, but they believe that it would occur only in isolated cases.

Health Data Incomplete for Cleanup Standards Development

As discussed previously, when MCLs or other health-based standards are not available, both RCRA and Superfund officials intend to use verified and not-yet-verified RSDs and RfDs to set cleanup standards. Not all chemical contaminants found at RCRA facilities or Superfund sites, however, have RSDs or RfDs.

To determine the extent to which EPA has developed health-based data for various chemicals for both the RCRA and Superfund programs, we evaluated the availability of health-based data for chemicals commonly found or tested for at both RCRA and Superfund sites. For RCRA facilities, we reviewed a list commonly referred to as the Appendix IX list. (Appendix IX is a list of chemicals that are required to be monitored for in the groundwater at RCRA facilities.) For Superfund sites, we reviewed a list commonly referred to as the Hot 100 list. (The 1986 Superfund amendments, required EPA and the Agency for Toxic Substances and Disease Registry to prepare a list, in order of priority, of at least 100 substances that are most commonly found at Superfund sites. This list was published in April 1987.)

The appendix IX list has a total of 222 chemicals, of which 20 had MCLs. Of the remaining 202, 29 have verified RSDs, 48 have verified RfDs, and 18 have RSDs/RfDs not yet verified. The remaining 107, or 48 percent, of Appendix IX chemicals have no health data (RSDs or RfDs). According to the section chief for health assessment in the Office of Solid Waste, EPA

expects to have RSDs and RfDs developed for 90 percent of the 107 chemicals by 1990. EPA expects the remaining 10 percent will have RSDs and RfDs by 1991.

The Hot 100 list contains some grouped chemicals that we separated into individual chemicals. For our purposes, the list includes 114 constituents. Of the 114 chemicals, 18 have MCLs. Of the remaining 96 chemicals, 31 have verified RSDs, 27 have verified RfDs, and 9 have not-yet-verified RSD and RfD data. The remaining 29, or 25 percent, have no RSDs or RfDs. According to the section chief for health assessment, the 29 chemicals without RSD or RfD data are generally not a high priority because the chemicals either are less hazardous or are by-products of other chemicals for which RSDs or RfDs are available.

Many RCRA Facilities May Be Transferred to the Superfund Program

EPA's preference is to require facility owner/operators who are subject to RCRA authorities to pay for and clean up contamination caused by their facilities' operations. However, RCRA facilities can be transferred to Superfund if the facility owner/operator becomes bankrupt; if the facility loses the authority to operate under RCRA, and the facility owner/operator indicates an unwillingness to undertake corrective action; or if, on a case-by-case determination, the facility owner/operator is unwilling or uncooperative with EPA in cleanup efforts. As of September 1987, two RCRA facilities that had gone bankrupt had been transferred to Superfund. An additional 43 RCRA facilities were under formal review by EPA for possible transfer to Superfund. In addition, as was stated previously, the EPA budget staff estimated that over 800 RCRA facilities may eventually be transferred to the Superfund program for cleanup.

Policy for Transferring RCRA Facilities to Superfund for Cleanup

EPA outlined three conditions for transferring a RCRA facility to the Superfund program for long-term cleanup actions. In a June 1986 Federal Register notice, EPA stated that RCRA facilities must meet at least one of three conditions to be listed on the National Priorities List under Superfund and, thus, be eligible for cleanup funds or enforcement actions under Superfund authorities. These conditions and EPA's rationale behind them are

- bankruptcy. Once a RCRA facility owner/operator declares bankruptcy, the facility's assets are protected by the courts. In such cases, EPA is not assured that funds will be available in a timely manner for RCRA cleanup actions.
- loss of authorization to operate and probable unwillingness of the owner/operator to carry out RCRA corrective action. RCRA facilities can lose their authorization to operate for several reasons, such as EPA's denial of a permit to operate or EPA's termination of a facility's interim status for being out of compliance with groundwater or financial responsibility requirements. In addition, these facilities may have a history of not complying with EPA enforcement actions and be deemed unwilling to carry out necessary corrective action.
- case-by-case determinations of facility unwillingness to perform RCRA corrective action. Current guidance covering this condition is not very specific; however, according to the June 1986 Federal Register notice, EPA plans on providing more specific guidance in the future. Examples provided by EPA of RCRA facilities that may meet this condition include those that have not submitted or implemented an adequate plan to close the facility and those that have not adequately complied with a RCRA enforcement action or permit condition requiring corrective action.

RCRA Facilities Added to the National Priorities List

Two RCRA facilities were added to the Superfund National Priorities List in July 1987—Parsons Casket Hardware Co., in Belvedere, Illinois, and Palmetto Recycling, Inc., in Palmetto, South Carolina. Both companies were transferred to Superfund because the owner/operators are bankrupt.

Parsons Casket Hardware Co. manufactured metal fittings for caskets from 1898 until August 1982, when it filed for bankruptcy. According to EPA records, the company generated various wastes, including electroplating sludge; cyanide plating and cleaning solutions; and bronze, nickel, and brass sludges. These wastes were stored in drums, above-ground and below-ground tanks, and an unlined lagoon. The company's operations were located in a residential area where residents received their drinking water from municipal wells that were located within 3 miles of the site. In addition, the company's operations were located adjacent to a river that was used for fishing and recreation. Although the drums and the lagoon have been cleaned up by both the current owners and the state, heavily contaminated soil from the lagoon and the tanks remains. In addition to cleaning up the soil, EPA must further investigate the extent of contamination remaining at the site and take appropriate cleanup action.

Palmetto Recycling, Inc., reclaimed lead primarily from lead acid batteries from 1979 until 1982. It filed for bankruptcy in February 1983. According to EPA, at the time the company filed for bankruptcy, wastes found at the site included acid wastes in an unlined pit, drums of liquid caustic wastes, and an unstabilized pile of battery casing scraps. The company was located in a rural area, but one that provided drinking water to a population of over 4,000 people. The drinking water wells were located within 3 miles of the site. In addition, the site was surrounded by numerous lakes, streams, and rivers, some of which are used for recreational purposes. Contamination had been detected in on-site soils and in stream sediments both on- and off-site.

In September 1983 a U.S. bankruptcy judge issued a court order requiring the trustee of the property to clean up the identified waste and contaminated soil. These cleanup activities were completed in March 1986. As with the Parsons site, EPA still must assess the extent of contamination remaining at the site and take appropriate cleanup action.

Status of RCRA Facilities Proposed for Inclusion on the National Priorities List

EPA has proposed 43 other RCRA facilities for inclusion on the National Priorities List. EPA is currently reviewing them to determine if they meet one of the three conditions for Superfund cleanup. Since the June 1986 policy was implemented, only two RCRA facilities have actually been transferred to Superfund. It should be pointed out that the RCRA corrective action program is only in its formulation stage. As EPA works through the RCRA correction action process, many additional RCRA facilities will be identified as requiring corrective action, and the probability becomes greater that a number of additional RCRA facilities may need to be transferred to Superfund to accomplish cleanup. As was stated previously, the EPA budget staff, in determining future budget resources needed to perform RCRA corrective action, estimated that over 800 RCRA facilities may eventually be transferred to the Superfund program for cleanup.

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