United States General Accounting Office

GAO

Report to the Ranking Minority Member, Committee on Commerce, House of Representatives

July 1999

SUPERFUND

Half the Sites Have All Cleanup Remedies in Place or Completed

GAO

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GAO/RCED-99-245

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

Resources, Community, and
Economic Development Division

B-283212

July 30, 1999

The Honorable John D. Dingell
Ranking Minority Member
Committee on Commerce
House of Representatives

Dear Mr. Dingell:

Almost 20 years after the Congress established the Superfund hazardous waste program, about half (595) of the 1,231 sites in the program either are cleaned up or have the methods—remedies—in place to achieve cleanup. The Congress is now debating how much longer and how many more resources it will take to select remedies and complete cleanups at the remaining sites. To assist in this debate, you asked us to determine (1) the status in the Superfund cleanup process of the sites on the Environmental Protection Agency's (EPA) list of the nation's most hazardous sites, called the National Priorities List (NPL),[1] and (2) for the 609 NPL sites we included in our review where cleanups have not been completed, what work has been accomplished, what work remains, and when the remaining work will be completed.[2]

To answer these questions, we analyzed data from EPA's Superfund management information system. In addition, for the 609 NPL sites included in our review, we used Internet technology to administer a survey to the responsible EPA site managers. These sites were those that EPA had not yet designated in its information system as "construction complete." This term means that, for a particular site, all selected remedies have been constructed or implemented, all immediate risks have been addressed, and all long-term risks are under control. The results of our survey for each site are reported at http://www.gao.gov/RCED-99-245/. Because sites differ in size; in the type, amount, and location of their contamination; and in the number and types of remedies under way or selected, it is difficult to respond to the second objective and summarize what work has been accomplished and what work remains across sites. For example, it is difficult to measure and compare the percentage of contamination addressed at two different sites through two very different remedies—at one, placing in the deed to the property a restriction that limits its future

[1]We did not include sites that are on federal property and are being managed by federal agencies other than EPA. These sites are known as federal facilities. EPA had 156 such sites on the NPL as of July 1, 1999, and had removed another 9 of these sites from the NPL since the beginning of the program.

[2]We did not include 27 sites because they were added to the NPL after we began our review or were transferred to programs other than Superfund for cleanup.

use and at the other, using microorganisms to biologically treat hundreds of cubic yards of contaminated soil. Therefore, we responded to the second objective by summarizing the work accomplished and remaining by individual remedies rather than by entire sites.

Results in Brief

As of June 30, 1999, a majority of the 1,231 NPL sites had progressed to the later steps in the Superfund cleanup process:

- At some 595 sites, the cleanup had been completed, all remedies were in place to achieve cleanup, or there was no further need for the site to be included on the NPL.
- At another 424 sites, at least one of the remedies had been selected, was under way, or had been completed, according to EPA site managers.[3]
- At an additional 135 sites, no remedies had yet been selected; however, managers reported that short-term cleanup actions had addressed some of the contamination at a majority of these sites.[4]

At sites where cleanups were not complete, a significant amount of work had already been accomplished, and the remainder of the work was scheduled to be completed in the near future:

- Two thirds of the remedies selected for the 609 sites in our survey were under way or completed, the managers reported.
- These remedies had already addressed large portions of the contaminated soil, solid material, and liquid wastes found at the sites.
- EPA expected to complete work for a majority of the planned or ongoing remedies for the 609 sites by 2002.

Background

The Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, thereby establishing the Superfund program to clean up highly contaminated hazardous waste sites. To decide whether to include a site on the NPL, EPA uses its hazard ranking system to review available data for the site and determine whether it presents high enough health or environmental risks to qualify for a long-term cleanup under CERCLA. If so, and the relevant state

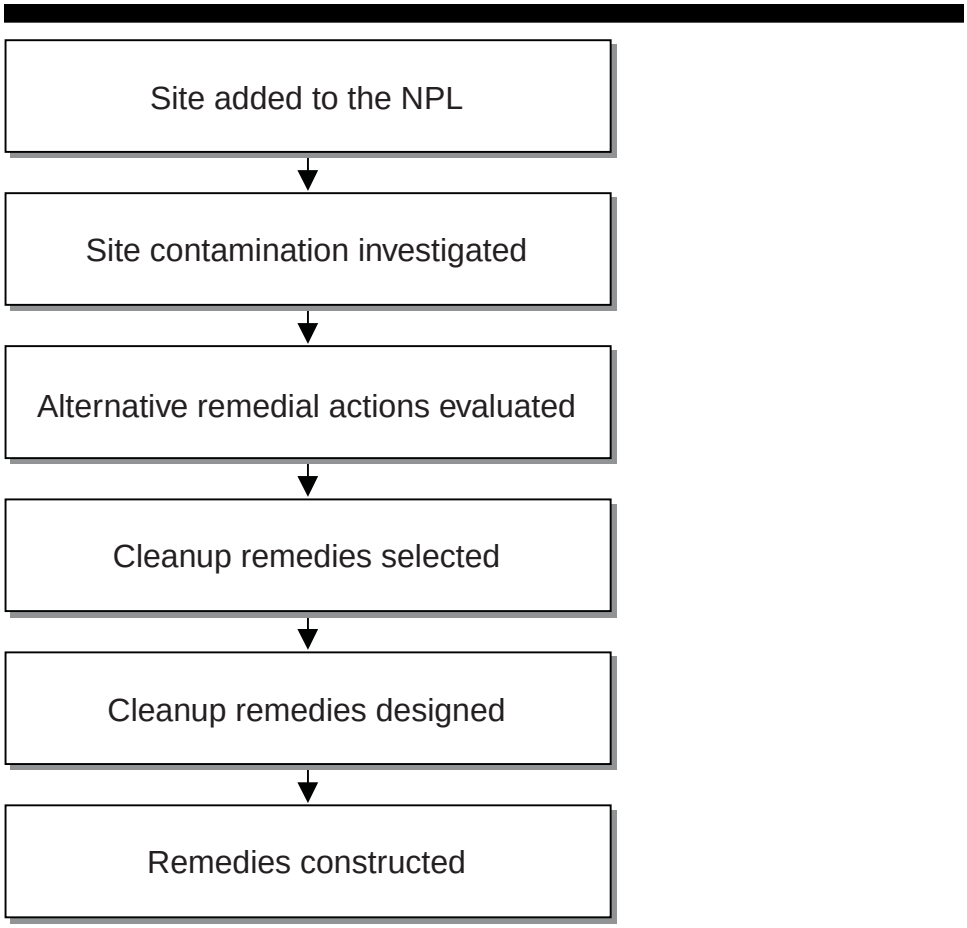
[3]For 44 sites, our survey data showed that EPA had signed a record of decision on the remedies selected; however, EPA cleanup managers did not provide data on the type of remedies chosen or their progress.

[4]Of the remaining 33 sites, we included 6 in our survey but did not receive enough data on them to categorize their status. We excluded 4 because they were transferred to programs other than Superfund and 23 because they were added to the NPL after we initiated our survey.

environmental agency agrees, EPA will include the site on the NPL. Under CERCLA, parties responsible for the contamination at an NPL site are liable for conducting the cleanup.[5] If these parties do not initially agree to do so, EPA can fund the cleanup and subsequently compel the parties to reimburse the agency for its costs.

Once a site is on the NPL, EPA or responsible parties, with EPA's oversight, generally conduct two studies—an extensive investigation of the risks the site poses and an evaluation of alternative remedies to address these risks. Figure 1 outlines the steps in the Superfund cleanup process.

Figure 1: Superfund Cleanup Process



Source: EPA.

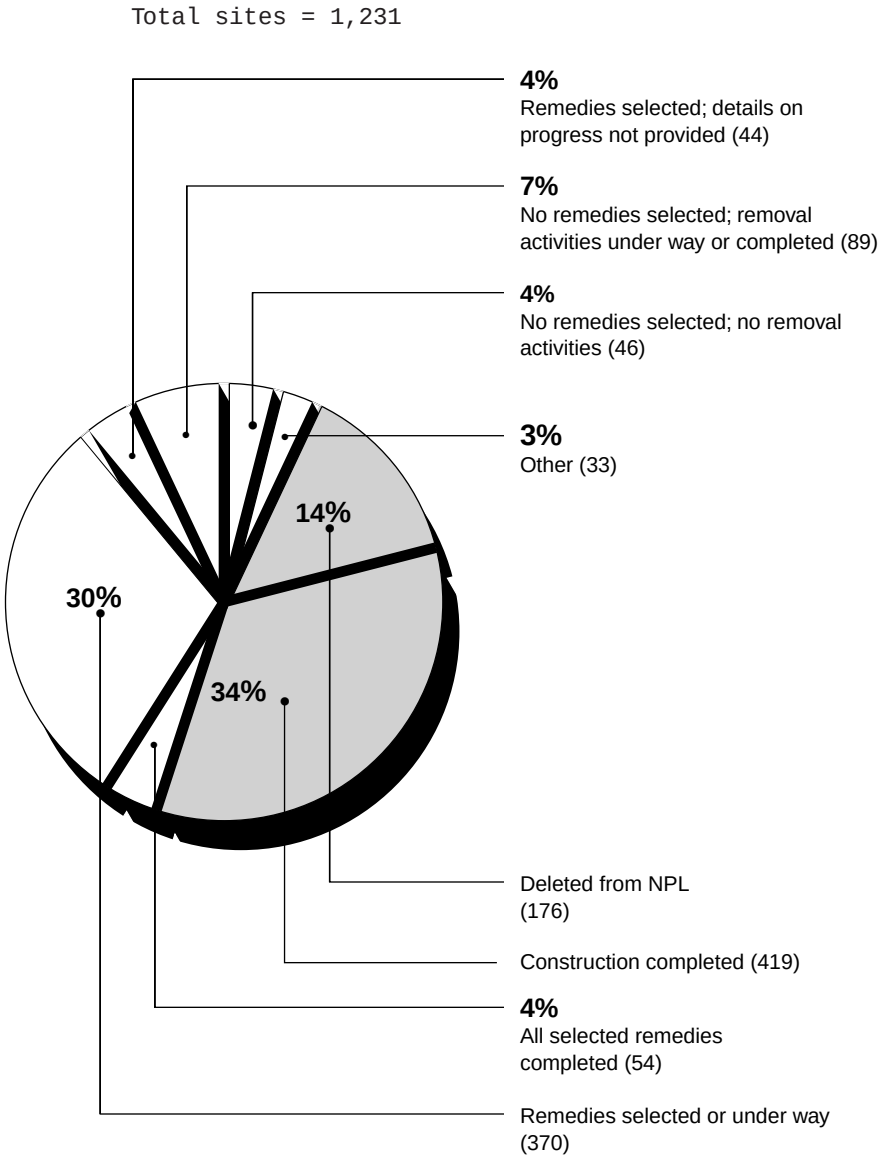
[5]Responsible parties may include, among others, waste generators, waste haulers, and site owners and operators.

After these studies have been completed, EPA selects one or more cleanup actions, called remedies, to conduct at the site, such as excavating and treating contaminated soil. An individual site can have from 1 to more than 50 remedies. EPA formally documents its selection in one or more records of decision. Then, either EPA or responsible parties design and construct the cleanup methods and technologies. When the construction is finished and all risks are under control, EPA classifies the site as construction complete. This category also includes sites whose cleanup actions do not involve actual construction, such as sites that use a deed restriction. Finally, this category may include sites where long-term cleanup actions have been implemented but cleanups are not yet complete. For example, a system may have been constructed to pump and treat groundwater, but parties will have to operate it for more than 30 years until contaminants in the water are reduced to acceptable levels. Once EPA, in consultation with the state in which the site is located, has determined that the work at the site has achieved the desired cleanup goals, the site can be deleted from the NPL.

At Half the Sites, Cleanups Had Been Completed or All Remedies Were in Place to Achieve Cleanup

As of June 30, 1999, EPA had classified about half, or 595, of the 1,231 sites placed on the NPL since the beginning of the program as either construction complete (419)—all remedies were in place and all risks under control—or as no longer needing to remain on the NPL (176). Figure 2 highlights the status of the sites that were placed on the NPL.

Figure 2: Status of NPL Sites in the Superfund Cleanup Process



(Figure notes on next page)

Note: The shaded area represents sites (1) where cleanups had been completed or all remedies were in place to achieve cleanup or (2) that had been removed from the NPL.

Source: EPA and GAO's survey data.

The remaining half, or 636 sites, had progressed through varying steps in the Superfund cleanup process, according to EPA site managers. At 54 sites, all remedies selected to date had been completed. Some of these sites may have additional remedies implemented in the future, and some may soon be categorized as construction complete. Another 370 sites had progressed to the later steps of the Superfund cleanup process and had at least one remedy selected, being implemented, or completed. For 44 sites, our survey data showed that EPA had signed a record decision on the remedies selected; however, EPA cleanup managers did not provide data on the type of remedies chosen or their progress. Data in EPA's Superfund managment information system indicate that remedies are or will soon be under way at some of these sites. Some 135 sites had no remedies selected; however, 115 of them had progressed to the step in the cleanup process that involves study to identify risks and appropriate cleanup alternatives, and 112 had undergone short-term cleanup actions to address some contamination.[6] Finally, 33 sites had recently been added to the NPL or transferred to other programs for cleanup.

Two factors are helping EPA complete the cleanup process at more sites now than in the past. First, the majority of NPL sites have been in the Superfund program for several years and have moved to the later steps in the cleanup process. In March 1997, we reported that, on average, it was taking more than 10 years to construct the remedies at Superfund sites.[7] More recently, EPA stated that for sites added to the NPL in the 1990s, it was taking an average of 8 years to reach this milestone. Second, we also reported that since 1994, the agency's priority has been to finish cleaning up sites that are already in the program rather than add new ones. Consequently, the agency has moved funds from site assessment to construction.

[6]Short-term cleanup actions called removals are also undertaken at sites to mitigate immediate and significant threats, such as those stemming from contaminated drinking water or unrestricted access to sites. These actions are generally of a short-term and emergency nature, such as providing alternative drinking water supplies and cleaning up chemical spills caused by transportation accidents.

[7]Superfund: Times to Complete the Assessment and Cleanup of Hazardous Waste Sites (GAO/RCED-97-20, Mar. 31, 1997).

At Sites Where Cleanups Were Not Complete, Two-Thirds of the Required Work Was Under Way or Done

As of June 30, 1999, EPA and private parties had selected a total of 2,046 remedies to construct and implement across the 609 sites in our survey.[8] Site managers reported that construction or implementation was complete for 617 of these remedies, was under way for another 617, and had not begun for 724. Managers did not provide the data needed to categorize the 88 remaining remedies. About a third of the remedies address contaminated soil; another third address contaminated groundwater; and the remainder address contaminated solid wastes, such as wastes generated from processing raw materials; sediments; surface water; debris; sludge; leachate (runoff); liquid waste, such as wastewater generated from industrial processes; and air.

To gauge the environmental impact of these cleanup actions to date, it is important to consider not only the number but also the type of remedies implemented. CERCLA establishes a preference for remedies that permanently treat the contamination and thus help to eliminate the risks it poses. According to our survey results, only 7 percent of the soil remedies but 39 percent of the groundwater remedies permanently treat the contamination. Overall, more than half of these treatment remedies were under way or completed. About another half of the soil remedies and another quarter of the groundwater remedies are classified as support actions because they make it easier to treat the contamination. For example, directional wells provide a treatment technology with better access to contaminated groundwater, and soil washing extracts contaminants so that they can be treated. About two-thirds of both the soil and groundwater remedies that support treatment were also under way or completed. Table 1 shows the status of various types of remedies, by environmental medium.

[8]For our universe of sites, we initially included any nonfederal NPL site that had not been designated as construction complete as of Aug. 1998. We subsequently deleted any site that had reached this designation by June 30, 1999. This resulted in a total survey universe of 609 sites. Since Aug. 1998, EPA has added another 23 sites to the NPL that we did not include in our survey.

Table 1: Type and Status of Selected Remedies, by Environmental Medium, as of June 30, 1999

	Status of remedy						
	Selected		Under way		Completed		Total
Medium/type of remedy	Number	Percent[a]	Number	Percent	Number	Percent	number[a]
Soil	**227**	**35**	**179**	**27**	**251**	**38**	**657**
Permanent treatment	16	34	19	40	12	26	47
Support actions[b]	98	35	69	25	110	40	277
Disposal	23	32	14	19	36	49	73
Containment	41	42	31	32	26	27	98
Stabilization	18	50	10	28	8	22	36
Institutional controls	23	34	14	21	31	46	68
Other[c]	8	14	22	38	28	48	58
Groundwater	**279**	**44**	**211**	**33**	**141**	**22**	**631**
Permanent treatment	116	47	88	36	41	17	245
Support actions	58	36	59	38	41	26	157
Monitoring	35	58	23	37	4	6	62
Containment	14	37	9	24	15	39	38
Discharge	3	27	7	64	1	9	11
Institutional controls	24	69	10	29	1	3	35
Other	30	36	15	18	38	46	83
Other media[d]	**215**	**33**	**212**	**32**	**226**	**35**	**653**
Total	**721**	**100**	**602**	**100**	**618**	**100**	**1,941**

Note: Some percentages do not total 100 because of rounding.

[a]We did not receive sufficient data to categorize 105, or 5 percent, of the remedies included in this table.

[b]These include actions that support the implementation of treatment remedies.

[c]These include numerous other approaches selected to address contamination, such as relocating populations and providing alternative drinking water supplies.

[d]These include all other media addressed by these actions.

Source: GAO's survey data.

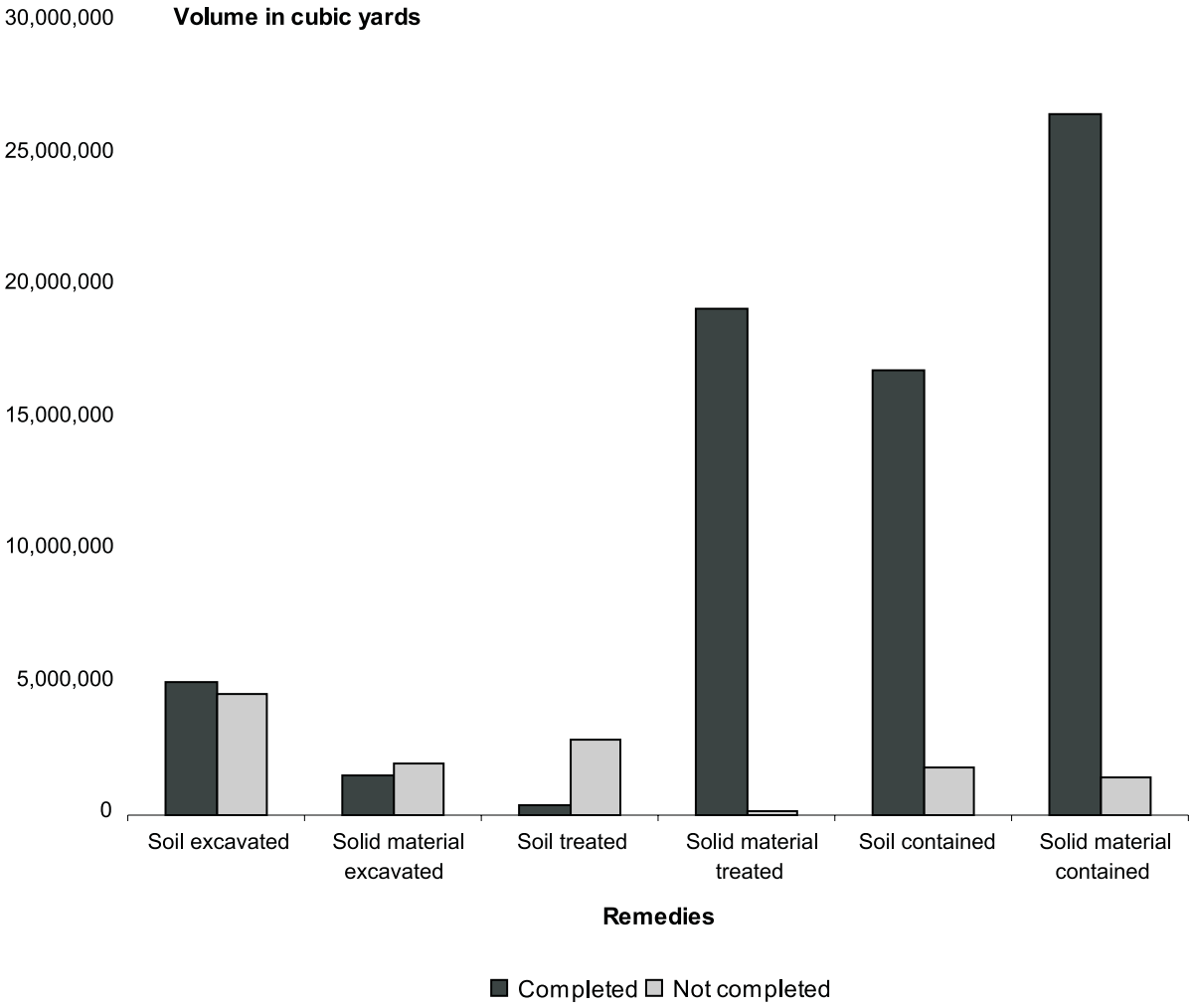
Other remedies leave the contamination in place but reduce its risks by containing or stabilizing it. For example, a layer of impermeable clay may be placed over contaminated soil so that the contaminants do not migrate. Of such remedies, about 56 percent for soil and 63 percent for groundwater were under way or completed. Still other remedies, called institutional controls, limit the risk from exposure to contaminants but do

not involve construction. These include a wide range of options, from fencing, to deed restrictions, to restrictions on recreational uses. Of such remedies, about two-thirds for soil and one-third for groundwater were under way or completed.

As another measure of accomplishment for some cleanups, we were able to obtain information on the amount of contamination addressed.[9] We obtained such information for a number of remedies that addressed contamination in soil, other solid material, and some liquids. Because EPA site managers provided this information in different measures, such as cubic yards and tons, we could not calculate overall how much of a particular medium had been addressed or remained to be addressed. However, site managers estimated that more than half of 9.6 million cubic yards of soil needing to be excavated had been excavated, as well as most of an additional 1.4 million tons of soil. While treatment had been completed for only 12 percent of 3.2 million cubic yards of soil, almost 89 percent of another 0.6 million tons of soil had been treated. Figures 3 and 4 show EPA site managers' estimates of how much soil and other solid material had been excavated, treated, and contained and how much remained to be addressed. These estimates, which the managers provided when data were available, are expressed in cubic yards and in tons.

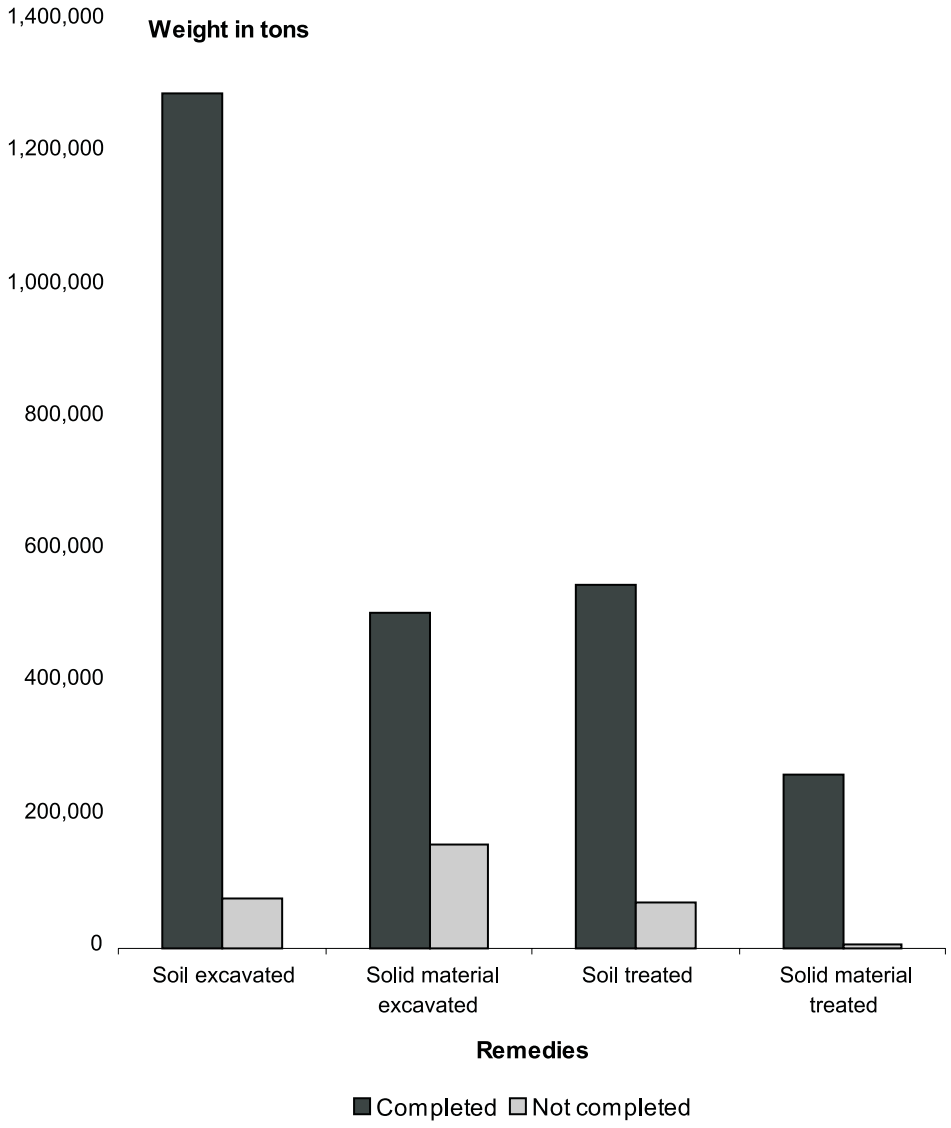
[9]EPA site managers could not provide us with data on the amount of contamination addressed by all remedies. For example, they could not provide data on the volume of contaminated groundwater addressed because they could not estimate how many gallons of water might exist in large underground aquifers. Furthermore, systems may have to pump out, treat, and return groundwater to an aquifer for 30 or more years until the level of contaminants is low enough to meet cleanup standards. Therefore, the number of gallons of groundwater pumped is not a meaningful measure of accomplishment for groundwater cleanups.

Figure 3: Cubic Yards of Soil and Other Solid Material Excavated, Treated, and Contained



Source: GAO's survey results.

Figure 4: Tons of Soil and Other Solid Material Excavated and Treated



Note: In addition, 4,000 tons of soil were contained and 5,000 tons of other solid material remain to be contained.

Source: GAO's survey results.

In addition, according to our survey results, more than half of 6,350 acres needing to be contained had been addressed, and almost 60 percent of 20.5 billion gallons of liquid wastes, other than groundwater, needing treatment had also been addressed.

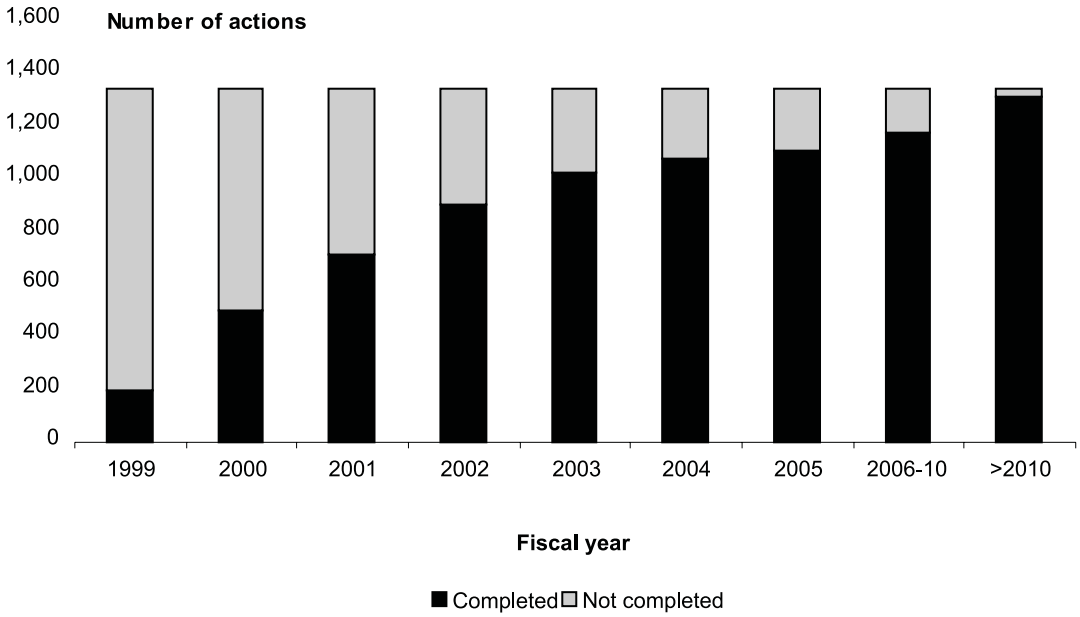
Short-Term Cleanup Accomplishments

Besides these longer-term cleanup remedies, EPA and responsible parties had implemented shorter-term removal actions at 62 percent of the sites in our survey, further addressing contamination. EPA and parties had completed 1,596 removal actions and were implementing 321 more actions. Several of these removal actions were restrictions imposed on the use of a site to reduce the risk of exposure to contamination. However, a number of these actions had also removed a large amount of contamination and, in some cases, had treated it. For example, our survey data show that removal actions treated about 2.5 billion gallons of liquid wastes, excavated 2.6 million cubic yards of contaminated soil, and treated another 0.2 million cubic yards of soil, helping to reduce the risks of exposure to contamination.

Expected Completion Dates for Remaining Work

According to our analysis of our survey results, EPA site managers estimated that construction or implementation would soon be complete for most of the remedies that had been selected or were in progress. See figure 5.

Figure 5: Expected Completion Dates for Construction of Remedies



Note: Of a total of 2,046 remedies in our survey, EPA cleanup managers provided the expected completion dates for 1,314 of the 1,341 remedies that were planned or under way. Managers reported another 617 remedies were completed and did not provide sufficient data to categorize the 88 remaining remedies.

Source: GAO's survey data.

EPA site managers expected the majority of the remedies that had been selected or were under way to be constructed or implemented by the end of fiscal year 2002. In addition, they expected 82 percent of the selected remedies to be completed by the end of fiscal year 2005 and 87 percent of them to be completed by the end of fiscal year 2010. Similarly, they expected a majority of the remedies that treat and thus directly address contamination in soil and groundwater to be constructed or implemented by fiscal year 2003. In general, the remedies expected to extend beyond fiscal year 2005 addressed contaminated groundwater (e.g., monitoring it, pumping and treating it, and allowing the contamination in it to naturally attenuate, or thin out, over a period of years) or required long-term operations and maintenance.

Cleanup activity in the Superfund program will not cease after the remedies in our survey have been constructed or implemented. Either responsible parties or states will need to continue operating a portion of the remedies—some for 30 years or more—until all contamination has been addressed as required in the records of decision for the applicable sites. In addition, CERCLA requires EPA to periodically monitor the effectiveness of remedies where contaminants are left on-site. EPA also has to monitor cleanups by private parties to ensure that settlement agreements reached with them are being implemented. Furthermore, sites that are currently in the program's early stages will require cleanup work after EPA selects remedies for them. For example, EPA site managers estimated that 88 percent of any new records of decision they could identify for the sites in our universe would be signed no later than the end of fiscal year 2001. While some of these decisions will find that no further action is required because all contamination has been reduced to acceptable levels of risk, other decisions will select new remedies that will take several more years to design and implement. Additionally, EPA recently placed another 23 sites on the NPL that we did not include in our survey; these sites will entail some number of additional records of decision and new remedies to implement.

Finally, EPA will also add some sites to the NPL in the future, further extending the cleanup workload. How many sites EPA will add is difficult to predict, especially now that the states are assuming responsibility for more sites. In November 1998, for example, we reported that EPA and the states still had to negotiate whether the federal or a state government would manage cleanups for another several hundred sites awaiting cleanup decisions.[10] In April 1999, we also reported that the states are now better able to manage cleanups and often choose to do so rather than refer sites to EPA for Superfund consideration.[11] As evidence of this trend, EPA, responding to a 1995 congressional request, began requiring its regions to obtain the appropriate governor's concurrence before adding a site to the NPL. We reported that as of February 1999, governors had opposed the listing of 31 sites and supported the listing of 123. Because of this increased state involvement, EPA expects to add fewer sites to the NPL each year—at most, about 40 sites per year, compared with 76, on average, from the late 1980s to the early 1990s.

[10]Hazardous Waste: Information on Potential Superfund Sites (GAO/RCED-99-22, Nov. 30, 1998).

[11]Superfund: Progress Made by EPA and Other Federal Agencies to Resolve Program Management Issues (GAO/RCED-99-111, Apr. 29, 1999).

Scope and Methodology

To help ensure the validity and reliability of our data, we designed our survey so that when an EPA manager accessed it, data available in the agency's Superfund management information system would automatically be placed in the appropriate response boxes.[12] Such data included background information on a site, the types of remedies that had been selected or were under way, and the actual or projected dates of completion for these remedies. We asked each manager to verify the accuracy of these data and to provide original data in response to any remaining questions, particularly for questions on the amount of contamination addressed, since these data are not included in EPA's information system. We also asked each manager to indicate the source of the original data provided, such as formal site records or personal knowledge. We did not independently verify the accuracy of the data the managers reported to us because the time and cost to do so would have been prohibitive for the large number of sites in our survey. We conducted our review from April 1998 through July 1999 in accordance with generally accepted government auditing standards. Appendix I includes a more detailed discussion of our survey's scope and methodology.

Agency Comments

We provided a copy of the information on each site to the respective EPA site manager and asked each manager to provide us with any necessary changes. We were able to update the data for 93 percent of the sites in our survey. We were unable to update the data for the remaining sites because we did not receive responses from the managers. In addition, we met with officials in EPA's Office of Emergency Response and Remediation who manage the Superfund program, including the Director of the Planning, Analysis, and Resources Management Center. We reviewed the results of our summary analyses with these officials. In general, they were appreciative of the amount of data we had collected on the program and said that the information would help them as they assessed the future of the program.

EPA officials made several general points about the results of our summary analyses. First, they recommended we emphasize that the dates EPA site managers provided to us represent the dates the site managers expect the remedies to be constructed or implemented, not the dates they expect the cleanups themselves to be complete. The EPA officials believed it was important to make this distinction so that decisionmakers would recognize that additional time would be required to complete cleanups. We revised

[12]This system is the Comprehensive Environmental Response, Compensation, and Liability Information System, version 3, more commonly known as CERCLIS 3.

our report to emphasize this point. Second, the officials acknowledged that, for the percentage of remedies that permanently treat contamination, the agency had publicly reported a higher rate than we determined through our survey. According to the officials, this difference occurred because EPA's rate includes both treatment remedies and support actions taken to make treatment easier. We did not categorize support actions as treatment remedies because support actions only temporarily manage the contamination.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to Senator Max Baucus, Senator Christopher S. Bond, Senator John Chafee, Senator Frank Lautenberg, Senator Barbara Mikulski, and Senator Robert C. Smith and to Representative Thomas Bliley, Representative Sherwood L. Boehlert, Representative Robert A. Borski, Representative Alan B. Mollohan, Representative James L. Oberstar, Representative Michael G. Oxley, Representative Bud Shuster, and Representative James T. Walsh in their capacities as the Chairs and Ranking Minority Members of the Senate and House Committees and Subcommittees with jurisdiction over the Superfund program. We are also sending copies of this report to Carol M. Browner, Administrator, EPA. Copies will also be made available to others upon request.

If you or your staff have any questions, please contact me at (202) 512-6111. Key contributors to this report are listed in appendix II.

Sincerely yours,

David G. Wood

David G. Wood
Associate Director, Environmental
Protection Issues

Objectives, Scope, and Methodology

At the request of John D. Dingell, Ranking Minority Member of the House Committee on Commerce, we were to determine (1) the status in the Superfund cleanup process of the sites on the Environmental Protection Agency's (EPA) list of the nation's most hazardous sites, the National Priorities List (NPL),[1] and (2) for the 609 NPL sites we included in our survey where cleanups have not been completed, what work has been accomplished, what work remains, and when the remaining work will be completed.

To answer these questions, we obtained and analyzed EPA's data on nonfederal NPL sites. We used this information to determine the total number of sites that (1) have been placed on the NPL since the beginning of the program, (2) have been deleted from the list, and (3) have completed the construction or implementation of all necessary remedies and are candidates for deletion.

In addition, we developed an automated survey instrument that we sent to EPA site managers to obtain information on the remaining NPL sites that EPA had not designated as "construction complete" as of August 1998. The survey comprised several sections of questions that addressed

- the background of the site, including its name, size, and location; information on prior activities that caused contamination at the site; the contaminants present; and the condition of the site at the time EPA added it to the NPL;
- the status of the site in the Superfund cleanup process, such as the estimated or actual dates of completing risk and feasibility studies, deciding on the cleanup actions to be taken, or designing the cleanup methods to be used; and
- the nature and extent of any short-term (removal) and long-term (remedial) cleanup actions taken at the site and the parties conducting these actions.

To better understand the cleanup process and the types of data available to respond to our objectives, we met with cleanup managers in EPA's Office of Emergency Response and Remediation, who are responsible for the cleanup program and CERCLIS 3, and with Superfund cleanup managers from EPA's Region V. We also talked to officials at the U.S. Army Corps of Engineers who manage cleanup work to obtain information on available technologies. We reviewed supporting documentation, including

[1]We did not include sites that are on federal property and are being managed by federal agencies other than EPA. These sites are known as federal facilities. EPA had 156 such sites on the NPL as of July 1, 1999, and had removed another 9 of these sites from the NPL since the beginning of the program.

Superfund manuals, CERCLIS 3 documentation, and information from EPA on the various approaches available for cleaning up sites.

Once we designed the survey questions, we conducted two pretests, making necessary revisions. We administered the pretests to EPA regional staff responsible for managing cleanups at individual sites, called remedial project managers, in regions I and V.

We then designed an electronic survey instrument that would be posted on GAO's home page on the Internet. As part of this design and at EPA's request, we obtained available data from CERCLIS 3 for each site that provided answers to some of our survey questions, including data on the site's background and on the types and dates of cleanup actions. CERCLIS 3 does not contain information on the amount of contamination addressed. We designed the survey so that when a site manager accessed it electronically, any relevant CERCLIS data would appear in the appropriate response boxes. To accomplish this electronic link, we worked with EPA staff responsible for maintaining CERCLIS 3. We also worked on-site with the contractor that EPA uses to support this database. We asked each manager to verify that the CERCLIS 3 data were accurate and to make any necessary corrections and additions.

To ensure security and data integrity, we provided each manager responsible for sites in our universe with a password that would allow the manager to access and complete a survey for each of the manager's sites. No one else could access that survey or edit its data. Also, after transmitting a completed survey to GAO, the manager could not change any of the data but could ask us to make any necessary changes. We conducted 11 pretests with site managers in regions III, IV, and V to ensure that the managers could easily access and complete the surveys and transmit the data electronically.

We made the survey accessible to managers on April 6, 1999. We designed the survey so that if a respondent had a question, that person could immediately send us an electronic message and we would provide an answer. We also handled a number of phone calls from respondents to assist them in completing the survey.

We initially included in our review any site on the NPL that, as of August 1998, EPA had not designated as construction complete. However, we eliminated many sites from our universe after learning through our survey responses that, for example, a site had been completed after our

cutoff date or had been referred to another cleanup program. Therefore, we are reporting on a final universe of 609 NPL sites.

We did not independently verify any of the data that the managers provided because the time and costs required to do so would have been prohibitive. However, we did ask the managers to identify their sources for the different types of data they provided. For example, we asked the managers to indicate which of the following sources they used to supply cleanup data:

- the signed record of decision for the site,
- formal status reports generated during the cleanup,
- formal reports submitted to verify the completion of a cleanup method's construction,
- the CERCLIS 3 database,
- other EPA personnel with knowledge of the site, and/or
- personal knowledge.

To ensure the consistency and accuracy of our data, we sent a completed table of survey results for each site to the relevant manager and asked the manager to review the table to make sure that it accurately represented the data that the manager had provided. We received responses for 568 of the 609 sites in our survey, or 93 percent. We revised these tables and our database as appropriate following the managers' reviews. Therefore, our site data are current as of June 30, 1999.

We conducted our review from April 1998 through July 1999 in accordance with generally accepted government auditing standards.

GAO Contacts and Staff Acknowledgments

GAO Contacts

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Acknowledgments

In addition to those named above, Alice Feldesman, Mitch Karpman, Pauline Lichtenfeld, Lynn Musser, Judy Pagano, Steve Palincsar, and Derek Updegraff made key contributions to this report.

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