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Report to Congressional Requesters

May 2010

SUPERFUND

EPA's Estimated Costs to Remediate Existing Sites Exceed Current Funding Levels, and More Sites Are Expected to Be Added to the National Priorities List

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GAO-10-380

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May 2010

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Highlights

Highlights of GAO-10-380, a report to congressional requesters

SUPERFUND

EPA's Estimated Costs to Remediate Existing Sites Exceed Current Funding Levels, and More Sites Are Expected to Be Added to the National Priorities List

Why GAO Did This Study

At the end of fiscal year 2009, the Environmental Protection Agency's (EPA) National Priorities List (NPL) included 1,111 of the most seriously contaminated nonfederal hazardous waste sites. Of these sites, EPA had identified 75 with unacceptable human exposure, 164 with unknown exposure, and 872 with controlled exposure that may need additional cleanup work. EPA may fund remedial actions—long-term cleanup—from its trust fund, and compel responsible parties to perform or reimburse costs of the cleanup. GAO was asked to determine (1) the cleanup and funding status at currently listed nonfederal NPL sites with unacceptable or unknown human exposure; (2) what is known about EPA's future cleanup costs at nonfederal NPL sites; (3) EPA's process for allocating remedial program funding; and (4) how many NPL sites some state and EPA officials expect to be added in the next 5 years, and their expected cleanup costs. GAO analyzed Superfund program data, surveyed and interviewed EPA officials, and interviewed state officials.

What GAO Recommends

To better identify potential NPL sites, GAO recommends that the EPA Administrator determine the extent to which EPA will consider vapor intrusion in listing NPL sites and its effect on the number of sites listed in the future. In commenting on a draft of this report, EPA agreed with GAO's recommendation and noted that the report contains substantial useful information.

View GAO-10-380 or key components. For more information, contact John Stephenson at (202) 512-3841 or Stephensonj@gao.gov.

What GAO Found

At over 60 percent of the 239 nonfederal NPL sites with unacceptable or unknown human exposure, all or more than half of the work remains to complete the remedial construction phase of cleanup, according to EPA regional officials. By the end of fiscal year 2009, EPA had expended $3 billion on the 75 sites with unacceptable human exposure and $1.2 billion on the 164 sites with unknown exposure. Despite the relatively high level of expenditures at sites with unacceptable exposure, EPA officials told GAO that, in managing limited resources, some sites have not received sufficient funding for construction to be conducted in the most time and cost efficient manner.

EPA's future costs to conduct remedial construction at nonfederal NPL sites will likely exceed recent funding levels. EPA officials estimate that EPA's costs will be from $335 to $681 million each year for fiscal years 2010 to 2014, which exceed the $220 to $267 million EPA allocated annually for remedial actions from fiscal years 2000 to 2009. In addition, these cost estimates are likely understated, since they do not include costs for sites that are early in the cleanup process or for sites where a responsible party is currently funding remedial construction but may be unable to do so in the future. Also, according to EPA officials, EPA's actual costs are often higher than its estimates because contamination is often greater than expected.

EPA allocates funds separately for preconstruction activities—such as remedial investigation and remedial design—and remedial actions. EPA headquarters allocates funds for preconstruction activities to the regions for them to distribute among sites. For remedial actions, headquarters works in consultation with the regions to allocate funds to sites. EPA officials told GAO that EPA prioritized sites to receive the $582 million in American Recovery and Reinvestment Act funds in a manner similar to the way EPA prioritizes sites for remedial actions. Limited funding has delayed preconstruction activities and remedial actions at some sites, according to EPA officials.

EPA regional officials estimated that from 101 to 125 sites—about 20 to 25 sites per year—will be added to the NPL over the next 5 years, which is higher than the average of about 16 sites per year listed for fiscal years 2005 to 2009. Most of the 10 states' officials GAO interviewed also expect an increase in the number of sites listed from their states. However, neither EPA regional officials nor state officials were able to provide cost estimates for cleaning up many of the sites. In addition, the number of sites eligible for listing could increase if EPA decides to assess the relative risk of vapor intrusion—contaminated air that seeps into buildings from underground sources—a pathway of concern among EPA regional officials and state officials interviewed. Although sites with vapor intrusion can pose considerable human health risks, EPA's Hazard Ranking System—the mechanism used to identify sites that qualify for NPL listing—does not recognize these risks; therefore, unless a site with vapor intrusion is listed on some other basis, EPA cannot clean up the site through its remedial program.

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Abbreviations

CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
EPA	Environmental Protection Agency
HRS	Hazard Ranking System
NPL	National Priorities List
PAHs	polycyclic aromatic hydrocarbons
PBB	polybrominated biphenyl
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PCP	pentachlorophenol
ROD	record of decision
TCE	trichloroethylene

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United States Government Accountability Office
Washington, DC 20548

May 6, 2010

The Honorable Barbara Boxer
Chairman
Committee on Environment and Public Works
United States Senate

The Honorable Frank R. Lautenberg
Chairman
Subcommittee on Superfund, Toxics
and Environmental Health
Committee on Environment and Public Works
United States Senate

To protect human health and the environment from the effects of hazardous substances, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, which established the Superfund program.[1] The Environmental Protection Agency (EPA), the principal agency responsible for administering the Superfund program, has since identified more than 47,000 hazardous waste sites potentially requiring cleanup. As of the end of fiscal year 2009, 1,269 of the most seriously contaminated sites were included on EPA's National Priorities List (NPL):[2] 1,111 nonfederal sites and 158 federal facilities.[3] At the time of listing, EPA had determined that these sites posed relatively high risks to human health or the environment from releases or threatened releases of hazardous substances, such as lead and polychlorinated biphenyl (PCB). These substances can cause a variety of health issues—such as birth defects, cancer, and developmental disorders—in people exposed to them. Of the nonfederal sites listed on the NPL at the end of fiscal year 2009, EPA identified 75 that have "unacceptable human exposure"—actual or reasonably expected

[1]Pub. L. No. 96-510 (1980), codified, as amended, at 42 U.S.C. §§ 9601-9675 (2010).

[2]In addition to the 1,269 sites that were listed on the NPL at the end of fiscal year 2009, EPA had listed and subsequently deleted 333 sites from the NPL because it determined, with state concurrence, that no further site response was needed. Additionally, 5 sites were proposed for listing but were deleted before being finalized on the NPL. As of the end of fiscal year 2009, there were a total of 1,607 final and deleted NPL sites.

[3]The 158 federal facilities are owned and operated by federal agencies, such as the Departments of Defense, Energy, and the Interior.

exposures of an individual to hazardous substances, pollutants, or contaminants at levels that present an unacceptable risk—to contaminants for people living, recreating, and/or working in the surrounding areas. In addition, another 164 of the sites listed on the NPL at the end of fiscal year 2009 may potentially pose serious risks since EPA does not yet know if there is unacceptable human exposure at these sites.[4] At the remaining 872 sites, EPA has determined that human exposure has been controlled, but additional work to clean up the sites may still be needed.

Cleanup efforts at NPL sites are typically expensive and can take many years. The cleanup process begins with site discovery or notification to EPA of the possible release of hazardous substances posing a threat to human health or the environment. Once a site is discovered, EPA, sometimes in conjunction with the state, conducts initial investigations to assess the potential threat. EPA then decides if it will list a site on the NPL based on a number of factors, usually including the site's score on the Hazard Ranking System (HRS), which is a tool used to determine a site's relative threat to human health and the environment based on potential pathways of contamination; the availability of alternative state or federal programs that could clean up the site; and state concurrence with the listing. Sites listed on the NPL are typically cleaned up through the Superfund remedial program.[5] As part of this program, EPA conducts or arranges for a remedial investigation and feasibility study to (1) identify the nature and extent of contamination, (2) quantify the potential risks to human health and the environment, and (3) evaluate the potential remedies to achieve cleanup goals. EPA then selects a remedy and documents this decision in a record of decision (ROD). EPA then plans the selected remedy in the remedial design phase and implements it with construction activities in the remedial action phase. EPA designates a site as "construction complete" when all physical construction activities at a site are finished, all immediate threats have been addressed, and all long-term threats are under control. Of the 1,111 nonfederal sites listed on the NPL as of the end of fiscal year 2009, 695 had reached EPA's construction complete milestone, while the remaining 416 had not. However, even after

[4]EPA refers to sites with unacceptable human exposure as "current human exposures not under control" and sites with unknown human exposure as "insufficient data to determine human exposure control status."

[5]In addition to sites listed on the NPL, some non-NPL sites may be cleaned up through the Superfund remedial program by using the Superfund alternative approach, under which responsible parties enter into an agreement with EPA to clean up the site. Remedial actions at these non-NPL sites are not funded by the Superfund trust fund.

sites have reached EPA's construction complete milestone, final cleanup at a site may not be achieved for many years, because it may take decades to clean up contamination to the selected standards.

Responsible parties are liable for conducting or paying for site cleanup of hazardous substances.[6] EPA is responsible for identifying potentially responsible parties and may take enforcement actions against these parties to compel them to clean up sites. In some cases, however, parties cannot be identified or may be unwilling or financially unable to perform the cleanup. In addition, federal agencies are responsible for funding the cleanup at the sites that they own. CERCLA also authorizes EPA to pay for remedial cleanups at sites on the NPL, as well as to seek reimbursement from the potentially responsible parties. To fund EPA-led cleanups at nonfederal NPL sites, among other Superfund program activities, CERCLA established the Hazardous Substance Superfund (trust fund). Historically, the trust fund was financed primarily by taxes on crude oil and certain chemicals, as well as an environmental tax on corporations based on their taxable income; however, the authority for these taxes expired in 1995, and shortly thereafter the balance in the trust fund started diminishing. Since 2001, appropriations from general revenues have been the largest source of funding for the trust fund. Superfund program appropriations have averaged about $1.2 billion annually since 1981, although the annual level of these appropriated funds has generally declined in recent years when adjusted for inflation. By the start of fiscal year 2009, the balance of the trust fund had decreased in value from its peak of $5.0 billion in 1997 to $137 million. As part of the American Recovery and Reinvestment Act of 2009 (Recovery Act),[7] EPA's Superfund remedial program received an additional $600 million.[8]

In this context, you asked us to determine (1) the cleanup and funding status at currently listed nonfederal NPL sites with unacceptable or

[6]Under CERCLA, potentially responsible parties include current or former owners or operators of a site or the generators and transporters of the hazardous substances. For purposes of this report, we use the term responsible parties to refer to those potentially responsible parties who are accepting liability or for whom liability is proven.

[7]The American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, was enacted with the purpose to promote economic recovery, make investments, and minimize and avoid reductions in state and local government services, among other things.

[8]Of the $600 million, EPA allocated $582 million to remedial cleanup activities and $18 million to internal EPA activities related to the management, oversight, and reporting of Superfund Recovery Act funds.

unknown human exposure; (2) what is known about the future costs to EPA to conduct remedial actions at nonfederal NPL sites that are not construction complete; (3) the process EPA uses to allocate remedial program funding; and (4) the number of sites EPA and selected state officials expect will be added to the NPL over the next 5 years, and what they expect the costs of cleaning up those sites will be.

To determine the status of cleanup and funding at nonfederal NPL sites with unacceptable or unknown human exposure and what is known about future EPA costs to conduct remedial construction at nonfederal sites, we conducted an electronic survey of branch chiefs from the 10 EPA regions to collect information about NPL sites relevant to these two objectives. We also interviewed these officials to obtain clarification and additional information regarding their responses, and we analyzed data on cleanup status and expenditures at these sites from EPA's Comprehensive Environmental Response, Compensation, and Liability Information System and Integrated Financial Management System. To describe EPA's process for allocating remedial program funding, we analyzed EPA guidance and planning documents and interviewed EPA headquarters and regional officials. To determine the number of sites that EPA and selected state officials expect will be added to the NPL over the next 5 years, and what they expect the costs of cleaning up those sites will be, we interviewed officials from EPA's 10 regions, 10 selected states—chosen to include one from each of EPA's regions and varying numbers of sites listed over the past 10 years; as well as officials from the Association of State and Territorial Solid Waste Management Officials.[9] In addition, we discussed all of these issues with officials from EPA headquarters. To assess the reliability of the data from EPA's databases used in this report, we analyzed related documentation, examined the data to identify obvious errors or inconsistencies, and worked with agency officials to identify data problems. We determined the data to be sufficiently reliable for the purposes of this report. A detailed description of our objectives, scope, and methodology is presented in appendix I. The questions from our electronic survey of branch chiefs from the 10 EPA regions are listed in appendix II.

We conducted this performance audit from March 2009 to May 2010, in accordance with generally accepted government auditing standards. Those

[9]We spoke with hazardous waste agency officials from the states of California, Iowa, Kentucky, Louisiana, Maine, Michigan, Montana, New Jersey, Virginia, and Washington.

standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

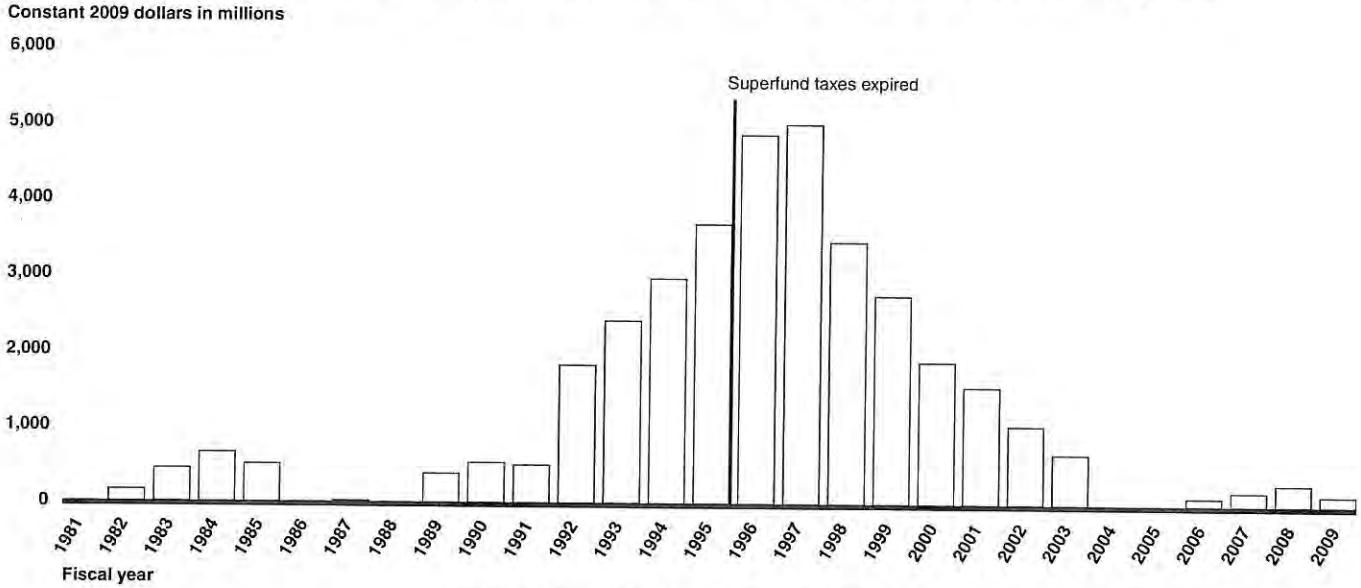
Background

CERCLA was passed in late 1980, in the wake of the discovery of toxic waste sites such as Love Canal,[10] and it created a mechanism for responding to existing contamination. CERCLA established a trust fund from which EPA receives annual appropriations for Superfund program activities. The Superfund trust fund has received revenue from four major sources: taxes on crude oil and certain chemicals, as well as an environmental tax assessed on corporations based on the taxable income; appropriations from the general fund; fines, penalties, and recoveries from responsible parties; and interest accrued on the balance of the fund. In the program's early years, dedicated taxes provided the majority of revenue to the Superfund trust fund. However, in 1995, the authority for these taxes expired and has not been reinstated.[11] Since 2001, appropriations from the general fund have constituted the largest source of revenue for the trust fund. After the expiration of the tax authority, at the start of fiscal year 1997, the trust fund balance reached its peak of $5.0 billion; in 1998, the trust fund balance began decreasing. Figure 1 shows changes in the balance of the Superfund trust fund from fiscal years 1981 through 2009. At the start of fiscal year 2009, the trust fund had a balance of $137 million.

[10]Love Canal was a toxic waste site near Niagara Falls, New York, where housing was built upon a former landfill for toxic chemicals, and residents began developing cancer and other illnesses from the residual waste. In August 1978, President Carter announced a national emergency at Love Canal and called for the allocation of federal funds for the site.

[11]The budget proposed by the administration for fiscal year 2011 reflects legislative proposals to reestablish a tax to support the Superfund program.

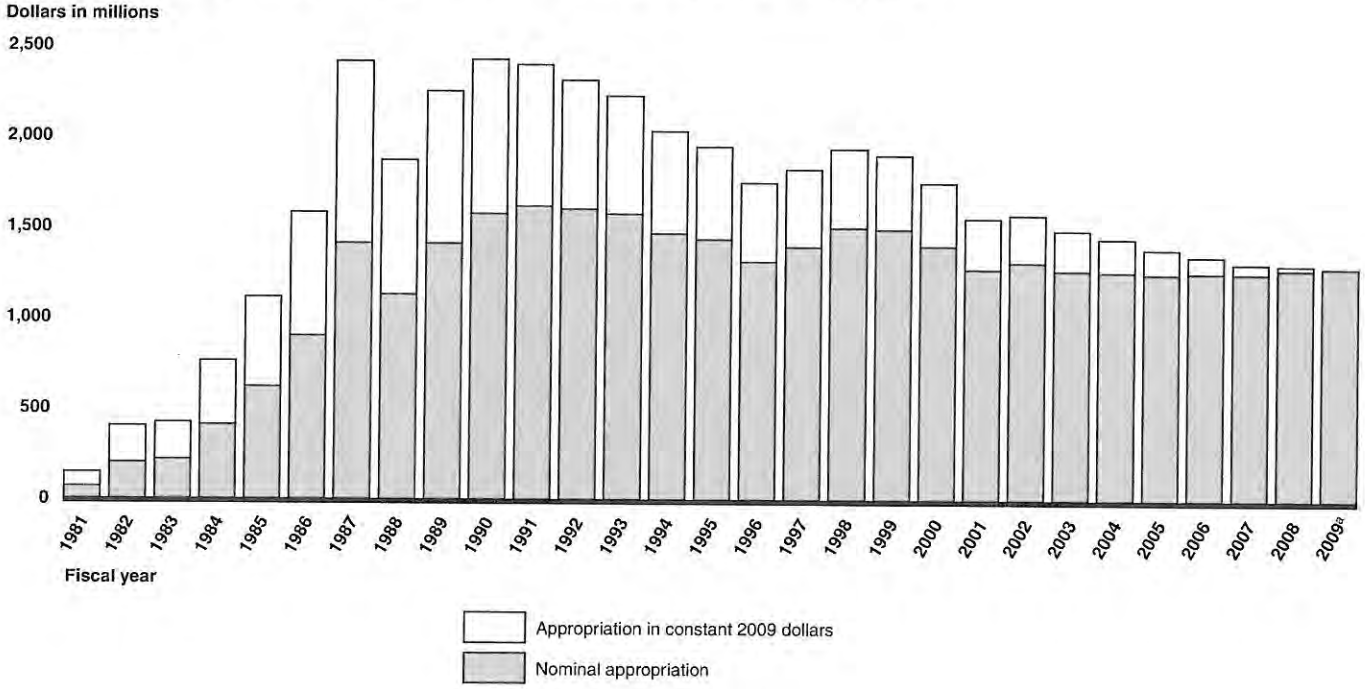
Figure 1: Balance of the Superfund Trust Fund at the Start of Each Fiscal Year, Fiscal Years 1981 through 2009



Source: GAO analysis of data from the President's Budget Appendixes.

EPA's Superfund program receives annual appropriations from the trust fund, which is in turn supported by payments from the general fund. Since fiscal year 1981, the annual appropriation to EPA's Superfund program has averaged approximately $1.2 billion in noninflation adjusted (nominal) dollars. Since fiscal year 1998, however, congressional appropriations have generally declined when adjusted for inflation. Figure 2 shows appropriation levels in nominal and constant 2009 dollars since fiscal year 1981.

Figure 2: EPA's Superfund Program Appropriation, Fiscal Years 1981 through 2009



Source: GAO analysis of appropriations laws and data from the President's Budget Appendixes.

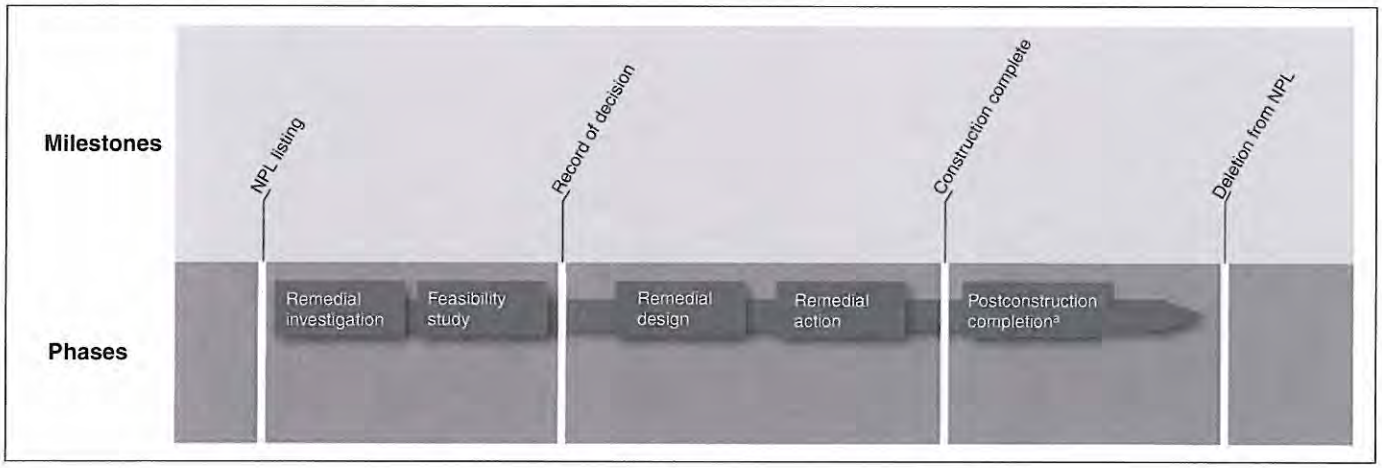
[a]The fiscal year 2009 appropriation does not include the $600 million in Recovery Act funds that the program received.

The Superfund cleanup process begins with the discovery of a potentially hazardous site or the notification to EPA of possible releases of hazardous substances that may threaten human health or the environment. Citizens, state agencies, EPA regional officials, and others may alert EPA to such threats. EPA regional offices use a screening system, called the HRS, to numerically assess the potential of sites to pose a threat to human health and the environment. The HRS scores sites on four possible pathways of exposure: groundwater, surface water, soil, and air. Those sites with sufficiently high scores are eligible for proposal to the NPL. EPA regions submit sites to EPA headquarters for possible listing on the NPL on the basis of a variety of factors, including the availability of alternative state or federal programs that may be used to clean up the site. EPA has considered the NPL the "tool of last resort"; thus, EPA has looked to alternative EPA and individual state programs for hazardous waste cleanup before listing a site on the NPL. However, according to EPA headquarters officials, EPA's use of the NPL as a tool of last resort has

recently changed, and EPA now views the NPL as one of a number of cleanup options and uses whichever option is most appropriate for site cleanup. In addition, EPA officials noted that, as a matter of policy, EPA seeks concurrence from the Governor of the state or environmental agency head in which the site is located before listing the site. Sites that EPA decides that it would like to list on the NPL are proposed for listing in the *Federal Register*. After a period of public comment, EPA reviews the comments and decides whether to formally list the sites as "final" on the NPL.

Once EPA lists a site, it initiates a process to investigate the extent of the contamination, decide on the actions that will be taken to address contamination, and implement those actions. This process can take many years—or even decades. Figure 3 outlines the process EPA typically follows, from listing a site on the NPL through deleting it from the NPL.

Figure 3: Phases of the Remedial Process at NPL Sites



Source: GAO analysis of EPA data.

Note: Phases of the remedial process may overlap, and multiple phases may be concurrently under way at a site.

[a]Postconstruction completion includes activities such as operation and maintenance, long-term response actions, and 5-year reviews, which ensure that Superfund cleanup actions provide for the long-term protection of human health and the environment.

Specifically, after a site is listed, EPA or a responsible party will begin the remedial process by conducting a two-part study of the site: (1) a remedial investigation to characterize site conditions and assess the risks to human health and the environment, among other actions, and (2) a feasibility

study to evaluate various options to address the problems identified through the remedial investigation. The culmination of these studies is a ROD, which identifies EPA's selected remedy for addressing the site's contamination. Cleanup at a site is often divided into smaller units (operable units) by geography, pathways of contamination, or type of remedy. A ROD typically lays out the remedy for one operable unit at a site, and it contains the cost estimate for implementing the remedy. According to EPA guidance, EPA develops the cost estimate in the ROD to be within an accuracy range of minus 30 to plus 50 percent of the actual costs.[12] EPA may develop earlier estimates of construction costs, but as the site moves from the study phase into the remedial action phase, the level of project definition increases, thus allowing for a more accurate cost estimate. EPA may develop more refined cost estimates after the ROD. Because more information is available during remedial design and remedial action, the accuracy of these estimates is expected to be greater than the accuracy of the ROD estimates. According to GAO's cost estimating and assessment guide, every cost estimate is uncertain because of assumptions that must be made about future projections, and cost estimates tend to become more certain as actual costs begin to replace earlier estimates.[13]

The selected remedy is then designed during remedial design and implemented with remedial actions, when actual cleanup of the site begins. When all physical construction at a site is complete, all immediate threats have been addressed, and all long-term threats are under control, EPA generally considers the site to be construction complete. Most sites then enter into the operation and maintenance phase when the responsible party or the state maintains the remedy, and EPA ensures that the remedy continues to protect human health and the environment. However, for certain remedial actions, additional work at a site may be required after construction is completed, such as continuing groundwater restoration efforts or monitoring the site to ensure that the remedy remains protective. For EPA-lead remedial actions that have a groundwater or surface water restoration component, EPA funds the necessary activities—known as long-term response actions—for up to 10 years before turning over these responsibilities to the state. Eventually, when

[12]EPA, *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, EPA 540-R-00-002 (Washington, D.C.: July 2000).

[13]GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, GAO-09-3SP (Washington, D.C.: March 2009).

EPA and the state determine that no further site response is needed, EPA may delete the site from the NPL. Although most sites progress through the cleanup process in roughly the same way, EPA may take different approaches based on site-specific conditions.

In fiscal year 2009, EPA received about $1.29 billion for the Superfund program, of which $605 million was for the remedial program. Of this amount, EPA allocated $125 million for preconstruction activities—remedial investigation, feasibility study, and remedial design activities—as well as other nonconstruction activities, including conducting prelisting activities through cooperative agreements with states, oversight of all responsible party-lead activities, and providing general support and management. In addition, EPA allocated $267 million for remedial actions. EPA allocated the remaining $213 million for headquarters and regional personnel to implement and oversee the overall program; for site management; and for providing technical and analytical support for all non-NPL sites as well as proposed, final, and deleted NPL sites.

In addition to remedial actions, the Superfund program conducts removal actions at both NPL and non-NPL sites that are usually short-term cleanups for sites that pose immediate threats to human health or the environment. Examples of removal actions include excavating contaminated soil, erecting a security fence, or taking abandoned drums to a proper disposal facility to prevent the release of hazardous substances into the environment. CERCLA limits EPA removal actions paid for with trust fund money to actions lasting 12 months or less and costing $2 million or less, although these limits can be exceeded if EPA determines that conditions for such an exemption are met.

To document and communicate environmental progress toward cleaning up Superfund sites, EPA adopted a human exposure indicator in fiscal year 2002. The indicator was applied to Superfund to communicate progress made in protecting human health through site cleanup activities. In addition, EPA uses the indicator in its annual Government Performance and Results Act reporting. Specifically, on an annual basis, EPA reports the number of Superfund sites at which human exposure was controlled during the most recent fiscal year. EPA identifies a site as having unacceptable human exposure when data indicate that the level of contamination and the frequency or duration of human exposure associated with certain pathways—or routes of exposure—at the site present unacceptable risks to humans. EPA assesses human exposure on a site-wide basis; therefore, if any part of a Superfund site has unacceptable human exposure, EPA classifies the whole site as such. If sufficient and

reliable information is not yet available to determine whether a site has unacceptable human exposure, the site is classified as having insufficient data to determine whether there is unacceptable human exposure, or "unknown."

Threats to human health and the environment may be present in the four pathways scored on the HRS—groundwater, surface water, soil, and (outdoor) air; however, contaminants may also migrate from groundwater or soil and seep into the air of homes or commercial buildings. This movement of contaminants—typically from petroleum or chlorinated solvents—to indoor air is known as vapor intrusion and has been the subject of increasing research and scientific discussion since the 1980s. Intrusion of contaminated gases into indoor air may lead to fire; explosion; and acute, intermediate, and chronic health effects. Though EPA conducts investigations of vapor intrusion for some sites on the NPL, the HRS does not include a separate pathway for scoring vapor intrusion threats.

Considerable Work Remains at Most Nonfederal NPL Sites with Unacceptable or Unknown Human Exposure, and Some Site Cleanups Have Not Been Funded at the Most Efficient Level

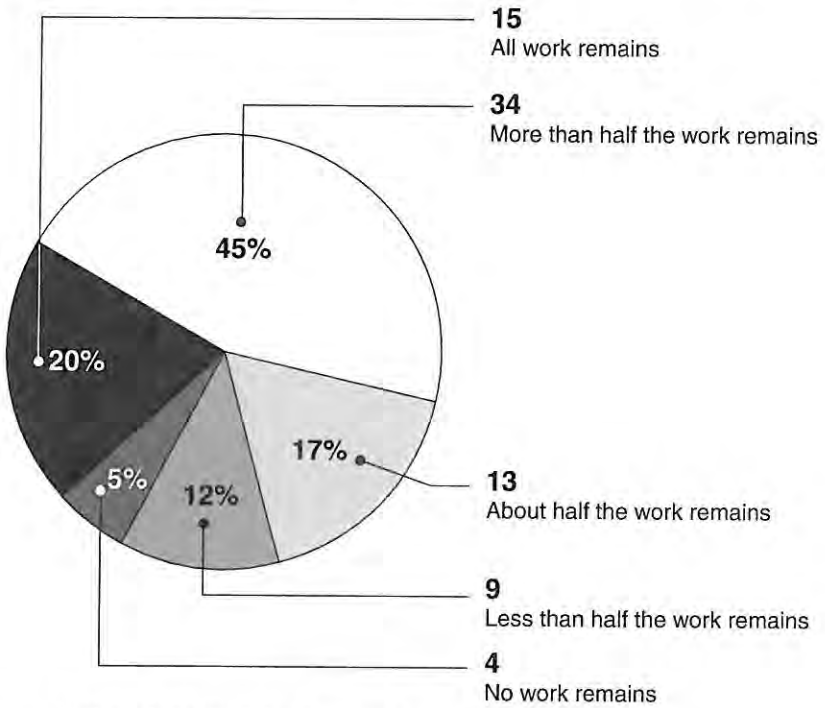
At over 60 percent of the 75 nonfederal NPL sites with unacceptable human exposure, all or more than half of the work remains to complete remedial construction, as is the case with over 60 percent of the 164 nonfederal NPL sites with unknown human exposure, according to EPA regional officials' responses to our survey. Moreover, while EPA has expended a total of $3 billion on the 75 sites with unacceptable exposure, EPA headquarters and regional officials told us that some of these sites have not received sufficient funding for cleanup to proceed in the most efficient manner.

At Most Sites with Unacceptable Human Exposure, Less than Half of the Remedial Construction Work Has Been Completed

At 49 of the 75 nonfederal NPL sites that EPA has identified as having unacceptable human exposure, all or more than half of the work remains to complete remedial construction, according to EPA regional officials' responses to our survey (see fig. 4).[14] At each of the 15 sites where none of the remedial construction work has been completed, EPA or a responsible party has conducted at least one interim cleanup action, such as a removal, and has initiated or completed a remedial investigation; however, all of the construction work remains, and EPA has determined that human exposure risks continue at these sites. In addition, at the remaining 60 sites where some construction actions have been taken, EPA has determined that human exposure risks have not yet been controlled. For example, at the Lava Cap Mine site in California, EPA has eliminated the exposure to mine tailings—finely ground waste created in the ore extraction process—in the mine area by capping it; however, recreational users of the area downstream of the mine can be exposed to mine tailings in that area, potentially leading to incidental ingestion of arsenic in soil, inhalation of contaminated airborne particulates, or skin contact with contaminated sediments along the shoreline. According to EPA Region 9 officials, EPA is currently investigating methods to stabilize and cover these mine tailings to eliminate the risk of human exposure.

[14]In surveying EPA regional officials about the amount of work remaining to complete construction at a site, we specified that they should consider the scope of the work remaining, as opposed to the amount of time needed to complete the work.

Figure 4: Amount of Work Remaining to Complete Construction at the 75 Nonfederal NPL Sites with Unacceptable Human Exposure



Source: GAO analysis of EPA regional officials' responses to our survey.

Note: EPA reported that four sites have no work remaining because these sites have already met EPA's construction completion milestone; however, EPA subsequently identified that these sites require additional work to reduce the level of contamination, and/or control the migration of contaminants. For example, the Commencement Bay, South Tacoma Channel site in Washington state reached construction completion status in 1999, but a 5-year review conducted in 2008 indicated that the initial remedy was not protective and further risks remain from contaminated drinking water. Percentages do not add due to rounding.

According to EPA regional officials' responses to our survey, EPA has plans to control human exposure at all of the 75 sites with unacceptable human exposure; however, our survey results also show that EPA regional officials expect 41 of the sites to continue to have unacceptable exposure until fiscal year 2015 or later.[15] According to an EPA headquarters official responsible for overseeing the human exposure indicator, some sites will

[15]Thirty of the 41 sites that EPA regional officials expect will continue to pose unacceptable risk until fiscal year 2015 or later are "teenager sites"—sites that have been on the NPL for at least 13 years.

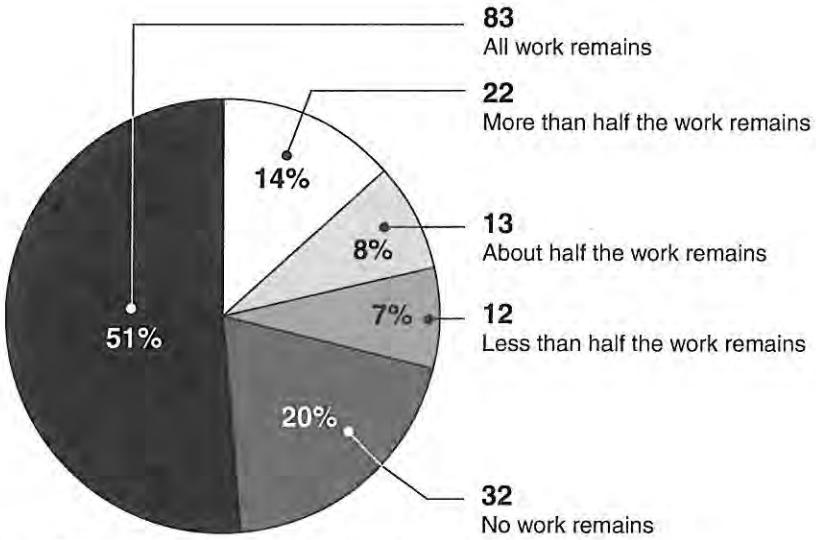
continue to pose unacceptable human exposure for a long time because of the type of contamination and cleanup required. For example, it may take several years for the risk of human exposure to be eliminated at the Sheboygan Harbor & River site in Wisconsin—which was listed on the NPL in fiscal year 1986—because of high PCB levels in fish. The site currently poses a risk of human ingestion of PCB and heavy metals, including arsenic, chromium, copper, lead, and zinc, in contaminated fish, which can cause health problems including cancer, liver disease, and problems with the immune and endocrine systems. There is a fish advisory in place, signs are posted in the area warning against fish consumption, and, for the last several years, there has been ongoing removal of sediment and soil contaminated with PCB and heavy metals. However, according to EPA, exposure to PCB may continue even after a significant amount of PCB is removed from the river, because it takes several years for PCB levels in fish to decline, and people continue to consume fish from the area. According to EPA headquarters officials, approximately one-third of the sites with unacceptable human exposure have been identified as such because of ongoing consumption of contaminated fish despite actions having been taken to prevent exposure. Appendix III contains a detailed description of the risks present at the 75 sites.

Most Sites with Unknown Risks of Human Exposure Require Considerable Work to Complete Remedial Construction

Like the sites with unacceptable human exposure, over 60 percent, or 105, of the 164 sites with unknown human exposure have all or most of the work to complete remedial construction remaining, according to EPA regional officials' responses to our survey (see fig. 5). The majority of the 83 sites with unknown human exposure that have all of the work remaining to complete construction are in the remedial investigation phase, which is when EPA usually determines a site's human exposure status, according to EPA guidance. EPA may also designate a site as having unknown human exposure during the construction phase of work, or after a site has met the construction complete milestone, if new information suggests that there may be risk at the site, or if an investigation is under way to assess a potential exposure pathway not previously analyzed, such as vapor intrusion. For example, the Waite Park Wells site in Minnesota reached construction complete status in 1999 but, during a review of the continuing effectiveness of the remedy performed in 2005, EPA found potential exposure from vapor intrusion to businesses

from trichloroethylene (TCE) in groundwater.[16] EPA Region 5 officials told us that EPA designated this site as having an unknown risk of human exposure until it evaluates a vapor intrusion assessment conducted by responsible parties. EPA expects to determine whether there is unacceptable human exposure at most of the 164 sites by fiscal year 2012.

Figure 5: Amount of Work Remaining to Complete Construction at the 164 Nonfederal NPL Sites with Unknown Risks of Human Exposure



Source: GAO analysis of EPA regional officials' responses to our survey.

Note: Two sites are not included in the figure because EPA officials indicated that they did not know how much work remained to complete remedial construction.

According to EPA regional officials' responses to our survey, human exposure risks at the 164 sites may be posed by a variety of contaminants in various media, including soil, sediment, and fish. Beginning around 2003, EPA regions began performing investigations for vapor intrusion, which they saw as an emerging problem, according to EPA officials. Currently, according to EPA regional officials' responses to our survey, 60 of the 164 sites may pose risks because of vapor intrusion. At the Lusher Street Groundwater Contamination site in Indiana, for example, EPA has

[16]TCE is a colorless liquid that is used as a solvent for cleaning metal parts. Drinking or breathing high levels of TCE may cause nervous system effects, liver and kidney damage, abnormal heartbeat, unconsciousness, and possibly death.

not yet evaluated the vapor intrusion pathway, but officials said that they know the site could pose a vapor intrusion risk to human health because a contaminated groundwater plume is present in a mixed residential and industrial area.

Some Sites Have Not Been Funded at the Most Time and Cost Efficient Levels, According to EPA Officials

From the inception of the Superfund program through the end of fiscal year 2009, EPA expended a total of $3 billion in constant 2009 dollars on the 75 sites with unacceptable exposure;[17] however, in managing limited resources, EPA regional officials noted that some of these sites did not receive funding to clean up the sites in the most time and cost efficient manner. According to EPA regional officials' responses to our survey, the estimated cost of completing construction at 36 of the 75 sites with unacceptable exposure at which EPA is funding remedial actions will be about $3.9 billion.[18] EPA regional officials said that they could not provide cost estimates for an additional 7 sites because the sites are too early in the cleanup phase. For the remaining 32 sites, these officials do not expect EPA to incur remedial construction costs because they expect responsible parties to fully fund the remedial actions at 26 sites, have identified 4 sites as construction complete, and EPA has already fully funded the remedial actions with Recovery Act funds at 2 sites. In addition, EPA expended $1.2 billion in constant 2009 dollars on the 164 sites where exposure is unknown. At 48 of the 164 sites with unknown human exposure, EPA regional officials estimated that the cost to complete construction will be about $601 million. These officials were not able to provide cost estimates for an additional 32 sites because the sites are too early in the cleanup phase. For the remaining 84 sites, these officials do not expect EPA to incur remedial construction costs because they expect responsible parties to fully fund the remedial actions at 52 sites and have identified 32 sites as construction complete.

Even though EPA officials noted that EPA does not use the human exposure indicator to determine risk or to prioritize sites for cleanup, average annual per-site expenditures for sites with unacceptable exposure have been considerably higher than for sites with unknown exposure or

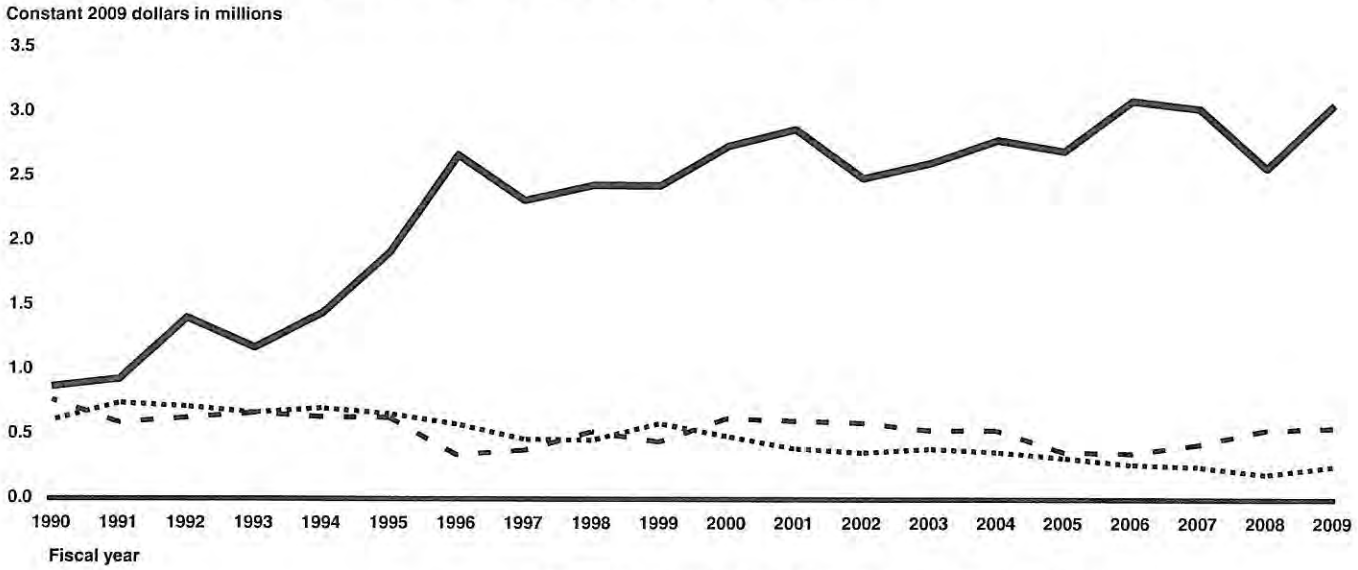
[17]This total includes construction costs and all other appropriated site-specific Superfund expenditures through fiscal year 2009, except for reimbursable and homeland security supplemental expenditures.

[18]Unless otherwise specified, these numbers are as reported by EPA, and are not adjusted for inflation by GAO.

for sites where EPA has determined that human exposure is under control. For example, in fiscal year 2009, the average per-site expenditure for sites with unacceptable human exposure was $3.0 million, compared with $0.5 million for sites with unknown exposure and $0.2 million for sites where EPA has determined that human exposure is under control. Furthermore, this difference has been increasing over time, as shown in figure 6. One reason that average per-site expenditures are higher for sites with unacceptable human exposure than for other sites is that a larger percentage of these sites are megasites—sites with actual or expected total cleanup costs, including removal and remedial action costs, that are expected to amount to $50 million or more.[19] While 47 percent of the sites with unacceptable human exposure are megasites, 13 percent of sites with unknown human exposure are megasites, and 8 percent of sites where human exposure is controlled are megasites.

[19]These costs include both EPA costs, as well as costs paid by responsible parties for site cleanup. Although EPA's data classified megasites and potential megasites separately, we grouped megasites and potential megasites together for purposes of this report.

Figure 6: Average Per-Site EPA Expenditures, Fiscal Years 1990 through 2009



Average per-site expenditures for sites with unacceptable human exposure

Average per-site expenditures for sites with unknown human exposure

Average per-site expenditures for sites with human exposure under control

Source: GAO analysis of EPA data.

Note: These data exclude reimbursable and homeland security supplemental resources, but these data include Recovery Act resources. EPA provided these data in nominal dollars, and we used inflation adjusters to modify the data to fiscal year 2009 dollars.

Despite the relatively high level of expenditures at sites with unacceptable human exposure, EPA regional and headquarters officials told us that construction has not been conducted in the most time and cost efficient manner at some of these sites because EPA had to balance annual resources among various program activities. For example, EPA officials told us that at the Bunker Hill Mining site in Idaho—where people can be exposed to metals in soil and sediments and where children's blood lead levels have been found to be above Centers for Disease Control and Prevention levels of concern—the pace of the cleanup had to be slowed down because of preconstruction and remedial action funding limitations. The site received between $13 million and $19 million per year from fiscal years 2003 to 2009, when, according to an EPA regional official, it could have used $30 million per year to clean up the site and control human exposure in the most efficient manner. Similarly, at the Eureka Mills site in Utah, people who are in contact with soil and dust contaminated with lead from mining activities face human health risks. From 2003 to 2008, the site

received $6.6 million to $10 million a year for construction, even though regional officials said that an additional $3 to $5 million per year would have allowed them to complete construction at the site 3 to 4 years earlier at a reduced overall cost. However, with the addition of $26.5 million for the Eureka Mills site in fiscal year 2009 from Recovery Act funding, officials said that they will be able to complete construction at least 1 year earlier than planned and control human exposure at the site. In response to our survey, EPA regional officials noted that they are using Recovery Act funding to partially or completely control the unacceptable human exposure at 20 NPL sites. However, despite EPA's use of Recovery Act funds to control human exposure at these sites, EPA officials noted that EPA's constrained funding had delayed the control of human exposure at some sites.

EPA's Costs for Conducting Remedial Construction at Nonfederal NPL Sites Will Likely Exceed Recent Funding Levels for These Activities

EPA's annual costs for conducting remedial construction at nonfederal NPL sites that are not yet construction complete from fiscal years 2010 through 2014—as estimated by EPA regional officials—exceed recent annual funding allocations for these activities. In addition, these estimates do not include costs for all remedial actions at all sites or costs for sites that have a responsible party who is currently funding remedial actions but may be unable to do so in the future. Furthermore, according to EPA officials, experience has shown that EPA's actual costs are almost always higher than its cost estimates.

Estimated Costs for Conducting Future Remedial Actions Exceed Past Funding Levels

EPA's annual costs to conduct remedial construction in the most efficient manner at nonfederal NPL sites for fiscal years 2010 through 2014 may range from $335 million to $681 million, according to EPA regional officials' estimates (see table 1).[20] These estimates include EPA's costs to conduct remedial actions at 142 of the 416 nonfederal sites that are not construction complete. Of the remaining 274 sites, EPA regional officials

[20]Our survey asked EPA regional officials to provide the approximate projected costs to EPA to complete construction at a site in the most efficient manner, given what is currently known about contamination at a site. EPA regional officials provided cost estimates based on various information, including ROD estimates, estimates developed during remedial design or construction, and estimates developed during remedial investigations and feasibility studies. According to EPA officials, cost estimates for individual fiscal years for a site may change because of a number of factors, such as a site's construction readiness and contracting delays.

were unable to provide cost estimates for 57 sites, expect responsible parties to fully fund remedial actions at 206 sites, and do not expect to incur additional costs to complete construction at 11 sites because these sites are already fully funded.

Table 1: EPA Regional Officials' Estimates of Costs to EPA to Conduct Remedial Construction in the Most Efficient Manner at Nonfederal Sites on the NPL, as of September 30, 2009

Dollars in millions

Fiscal year	Cost to conduct remedial construction
2010	$412
2011	681
2012	520
2013	420
2014	335
2015 and beyond	$3,036

Source: GAO analysis of EPA regional officials' responses to our survey.

Note: These data include EPA's cost estimates for 142 of the 416 nonfederal sites that are not construction complete. For the remaining 274 sites, EPA was unable to provide annual cost estimates for 57 sites, EPA indicated that responsible parties are fully funding remedial actions at 206 sites, and EPA does not expect to incur additional costs to complete construction at 11 sites. Unless otherwise specified, these numbers are as reported by EPA, and are not adjusted for inflation by GAO.

These annual cost estimates for remedial construction at these sites exceed past annual funding allocations for such actions. For example, EPA regional officials' cost estimates for remedial construction for the next 2 years—fiscal years 2011 to 2012—are $253 million to $414 million greater than the $267 million in annual funding that EPA allocated for remedial actions in fiscal year 2009. From fiscal years 2000 to 2009, EPA allocated $220 million to $267 million in annual funding for remedial actions. According to EPA headquarters officials, however, funds from additional sources—such as prior year funds, settlements with responsible parties, and state cost share agreements—may also be available to fund remedial construction from year to year. While the amount of funding available through these sources may vary substantially from year to year, according to EPA headquarters officials, approximately $123 to $199 million was available from additional sources for remedial actions in fiscal years 2007 to 2009. Our analysis indicates that, even if this level of funding was available in future years, it would not supplement EPA's annual funding allocation enough to cover the estimated costs for conducting remedial construction in fiscal years 2011 and 2012. Therefore, despite

funding from additional sources, EPA's estimated costs to conduct remedial construction will exceed available funds if funding for remedial construction remains constant.

Cost Estimates Are Likely Understated

EPA regional officials' cost estimates are likely understated. These officials were not able to provide annual construction cost estimates for 57 of the 416 nonfederal sites that are not yet construction complete because they are in the early stages of the remedial process, and EPA does not yet know the extent of the contamination and/or has not chosen a cleanup remedy for them.[21] For example, EPA Region 9 officials said that, as of October 2009, the feasibility study for the Alark Hard Chrome site in California was just beginning and that no cost estimates were available for possible remedies. For some additional sites, EPA regional officials were unable to provide cost estimates for construction at some of the operable units at the site. For example, EPA Region 3 officials were able to provide a partial cost estimate for the Crossley Farm site in Pennsylvania and noted that this estimate did not include additional remedial construction funding that will be necessary for operable units that have construction work remaining. Finally, EPA regional officials' estimates did not include costs for conducting long-term response actions—such as operating groundwater treatment facilities—that are considered part of the remedial action or for performing 5-year site reviews, both of which EPA funds from its remedial action allocation and which would, therefore, increase the cost estimate for remedial actions.

EPA's estimates also do not include construction costs for sites that currently have a potentially responsible party that may be unable to fund the cleanup. EPA officials told us that EPA has identified one or more potentially responsible parties at 206 of the 416 nonfederal NPL sites that are not yet construction complete. However, officials also said that they were slightly or not at all confident that a responsible party would fund future remedial actions at 27 of these sites. For example, EPA officials explained that the responsible parties at one site in EPA Region 4 entered into bankruptcy and that EPA is not at all confident that the responsible parties will be able to fund future remedial actions. While in some cases

[21]For 9 of the 57 sites, EPA officials did provide a broad range of costs for construction, but we did not include those costs in our analysis because EPA officials were unable to provide more precise, annual cost figures for those sites.

funds from a settlement agreement may be available for site cleanup,[22] in several instances, EPA officials reported that responsible parties may be financially unable to perform the remedy or fund future cleanup. Without responsible parties to fund remediation costs at these sites, EPA is likely to bear the costs of future remedial actions.

EPA headquarters and regional officials also told us that EPA's actual costs for construction are typically higher than its cost estimates because of a number of uncertainties they may encounter. Most importantly, according to EPA officials, the extent of contamination at a site may be greater than EPA expected when it developed the cost estimate, which can expand the scope of work and remedies needed and increase overall construction costs. For example, we recently reported that at the Federal Creosote Superfund site in New Jersey, the greater-than-expected quantities of contaminated material contributed to a $111 million increase in construction costs over EPA's estimates.[23] According to EPA officials, it is common for EPA to remove more soil than originally estimated at Superfund sites because of the uncertainty inherent in using soil samples to estimate the extent of underground contamination. Another factor that can increase construction costs is change in acceptable contaminant levels. For example, at the Arsenic Trioxide site in North Dakota, additional cleanup was necessary after the site had already been deleted from the NPL because EPA subsequently reduced the maximum contaminant level for arsenic in drinking water, which had the effect of changing the level at which the cleanup was considered protective of public health. In addition, according to an EPA official, the actual costs of goods and services—such as energy, construction materials, and labor—may increase above estimated prices, causing an increase in the actual construction cost. At the Escambia Woods site in Florida, for example, inclement weather, identification of additional contamination, and other unforeseen occurrences all contributed to increased cleanup costs of about $2.2 million. EPA officials noted that there may be some instances when construction costs are overestimated because, for example, there is

[22]EPA notes that when a responsible party enters a settlement agreement with EPA, financial assurance mechanisms are put in place to provide cleanup funds in the event that the party is no longer financially able to complete the cleanup. There are no financial assurances, however, for potentially responsible parties who have not yet entered a settlement agreement.

[23]GAO, *Superfund: Information on Cost and Other Issues Related to the Cleanup of the Federal Creosote Site*, GAO-10-277 (Washington, D.C.: February 2010).

less contamination at a site than previously thought or the prices of goods and services decrease; however, the officials commented that this is rare.

Because of the many uncertainties in cost estimating, EPA officials told us that actual construction costs never equal the cost estimated in the ROD. According to EPA guidance, because of the inherent uncertainty in estimating the extent of site contamination from early investigation data, cost estimates prepared during the remedial investigation/feasibility phase are based on a conceptual rather than detailed idea of the remedial action under consideration. The guidance states that these estimates are, therefore, intended to provide sufficient information for EPA to compare alternatives on an "order of magnitude" basis, rather than an exact estimate of a particular remedy's costs. According to EPA headquarters officials, these estimates could vary by 100 percent from the actual costs of implementing a remedy. As EPA's estimates become more refined during the remedial design phase, estimates that vary from actual costs by 100 percent are not common; however, variation by 20 to 40 percent is common, according to EPA headquarters officials. The frequent occurrence of additional unexpected costs further enhances the likelihood that EPA's costs for remedial actions over the next several years will exceed recent funding levels for these activities, and EPA may be forced to choose between funding construction at some sites in the most efficient manner or funding construction at more sites less efficiently.

EPA Allocates Remedial Program Funding Separately for Preconstruction Activities and Remedial Actions, and Limited Funding Has Caused Delays at Some Sites

EPA headquarters allocates funds to the regions for preconstruction activities—remedial investigations, feasibility studies, and remedial design activities—which the regions then distribute among sites. For remedial action funding, headquarters works with the regions to allocate funds to sites. According to EPA headquarters and regional officials, the funds for both types of activities have not been sufficient to clean up some sites in the most time and cost efficient manner.

EPA Headquarters Allocates Funding to the Regions for Preconstruction Activities for Distribution Among Sites and, in Consultation with the Regions, Allocates Remedial Action Funding on a Site-by-Site Basis

EPA headquarters determines the amount of resources that the Superfund program will allocate to the regions for preconstruction activities by using a model that distributes available funding based on a combination of historical allocations and a work-based scoring system that scores each region based on projects planned for the upcoming year.[24] Regions then prioritize sites to receive funding for preconstruction activities primarily by considering the human exposure risks present at sites while, at the same time, attempting to provide some funding for all their sites to keep them progressing toward the construction phase, according to EPA regional officials. According to EPA's *Superfund Program Implementation Manual*, at the initiation of the planning process, headquarters provides general projections of funding for preconstruction activities that will be available to the regions. On the basis of these projections, each region then develops a plan for allocating these funds to sites. Before finalizing this plan, each region holds planning discussions with headquarters to discuss actions that can be accomplished during the year and alters its plans, as needed, based on refined projections of available funding from headquarters.

To allocate funding for remedial actions, EPA headquarters, in consultation with the regions, determines funding priorities on a site-by-site basis. EPA's *Superfund Program Implementation Manual* states that sites with ongoing construction receive priority for funding over new construction work. Headquarters develops the initial plan for ongoing construction based on regional funding requests, projections of available funding, and discussions with regional officials. As part of these discussions, EPA headquarters and regional officials determine whether and how to incrementally fund remedial actions, according to EPA headquarters officials. According to an EPA headquarters official, headquarters' goal in allocating funds is to ensure that all sites with ongoing construction continue to progress toward construction completion while also funding some new construction projects. EPA officials explained that demobilizing and remobilizing equipment and infrastructure at a site once construction has begun is costly and an inefficient use of resources. Therefore, if EPA cannot fully fund ongoing construction at a site, the agency attempts to fund the site at a level that maintains at least a minimal level of construction to avoid demobilizing

[24]As part of this allocation, EPA headquarters includes funding for other nonconstruction activities, including conducting prelisting activities through cooperative agreements with states, oversight of all responsible party-lead activities, and providing general support and management.

equipment and infrastructure. In addition, EPA headquarters works with the regions to adjust the amount of funding provided to sites throughout the year as cleanup circumstances change.

For new construction, EPA's National Risk-Based Priority Panel—comprising EPA regional and headquarters program experts—evaluates the risk with respect to human health and the environment to establish funding priorities for all new construction projects in the remedial program. To evaluate sites, the panel uses five criteria and associated weighting factors to compare projects. These criteria are the extent of risks to the exposed human population; contaminant stability; contaminant characteristics; threat to a significant environment; and program management considerations, such as state involvement and high-profile projects. Using the priority ranking process ensures that funding decisions for new projects are based on the use of common evaluation criteria that emphasize risk to human health and the environment.

In addition to annual funding, EPA's Superfund program received $600 million in Recovery Act funds in fiscal year 2009 and allocated $582 million for remedial cleanup activities. EPA officials explained that EPA prioritized these Recovery Act funds in a manner similar to that for annual remedial action funding, with funds targeted first toward sites with ongoing construction and then toward new projects that were construction-ready. According to EPA officials, when identifying sites to receive Recovery Act funding, EPA also considered additional factors, such as the jobs that could be created. However, EPA officials noted that identifying the number of jobs created was difficult and that the criteria in the Office of Management and Budget's initial guidance for disbursing Recovery Act funds were not clear on how to calculate the number of jobs created. Therefore, EPA officials said that they used the ability to spend funds quickly as a surrogate for creating and retaining jobs when prioritizing sites to receive Recovery Act funds. Furthermore, EPA officials noted that it is difficult to quantify the number of jobs created because, while contractors involved in site remediation reported data on jobs created, subcontractors did not.

EPA ultimately chose 51 sites to receive Recovery Act funding. According to EPA, 25 of these sites received funding for ongoing construction, 24 received funding for new construction, and 2 received funding for both ongoing and new construction. EPA officials reported that the use of Recovery Act funding will decrease the overall cleanup costs at some sites and accelerate the pace of cleanup at a majority of the sites receiving this funding. At the Gilt Edge Mine site in South Dakota, for example, EPA

officials noted that construction for a portion of the cleanup project should be completed 1 year ahead of schedule because EPA allocated $3.5 million in Recovery Act funds to the site. Appendix IV provides additional details about sites that received Recovery Act funding.

Limited Funding Has Delayed Preconstruction Activities and Remedial Actions at Some Sites and Can Impact State Cleanup Programs

EPA officials from several regions told us that their regions currently receive about half or less than half of the funding they could use for preconstruction activities. For example, Region 2 officials said that their region currently receives about half the preconstruction funding it could use and that officials try to be flexible and creative in using the funding the region does receive to conduct work in the most efficient manner possible. Several EPA officials noted that limited funding available for preconstruction activities not only extends the length of time it takes to prepare a site for construction, but it can ultimately increase the overall costs for cleaning up the site as well. According to our survey, which collected data on fiscal years 2000 through 2009, most regions have sites that have experienced delays in the preconstruction phase because of insufficient funding. For example, officials in Region 3 noted that the Jackson Ceramics site located in Pennsylvania was delayed in fiscal year 2005 because, when prioritizing sites to receive funding for preconstruction activities, the Jackson Ceramics site was considered lower risk compared with other sites in the region and, therefore, received no funds. Instead, Region 3 funded other sites that posed a higher risk or were farther along in the preconstruction phase. In addition, Region 10 did not fully fund preconstruction activities at the Bunker Hill Mining site in Idaho from fiscal year 2003 to fiscal year 2009—which extended work schedules and stopped some design work—because of a lack of funding for preconstruction activities. Region 10 officials explained that the region reduced funding for preconstruction activities at this site so that the region could allocate funding across more sites in the region.

As previously discussed for sites with unacceptable human exposure, sites with ongoing construction have experienced delays caused by limited funding, according to EPA officials. Since fiscal year 2000, most regions have experienced delays because of insufficient funding at one or more sites with ongoing construction, according to responses to our survey. For example, the Oronogo-Duenweg Mining Belt site in Missouri received $10 million a year in fiscal years 2008 and 2009 instead of the $15 million that regional officials said they could have used to clean up the site in the most efficient manner. These officials reported that the limited funding has delayed the completion of the remedial action and resulted in significant cost increases. In addition, the New Bedford Harbor site in Massachusetts

has received $15 million per year instead of the $50 to $80 million per year that a regional official said the region could use to complete construction in the most efficient manner. According to several EPA regional officials, delays in funding for sites with ongoing construction increase the length of time it takes to clean up a site; the total cost of cleanup; and, in some cases, the length of time populations are exposed to contaminants.

In addition, funding limitations have caused delays at sites that were ready to begin new construction. According to EPA *Superfund Accomplishment Reports*, between fiscal years 2004 and 2008, 54 sites, or over one-third of all sites ready for new construction funding, were not funded in the year that they were ready to begin construction, and some sites were not funded for several years after they were construction-ready. For example, in Region 4, funding limitations caused a 2-year delay at the Sigmon's Septic Tank Service site in North Carolina—a site with potential exposure risks to residents and trespassers from contaminated soil—even though it was ready to begin construction in October 2007. EPA allocated Recovery Act funding to this site in September 2009, which allowed EPA to remove the contaminated soil, eliminating the threat of direct contact to nearby residents and trespassers at the site. According to EPA headquarters officials, 25 sites needing new construction funding in fiscal year 2009 would most likely not have received funding had Recovery Act funding not been available. A representative from the Association of State and Territorial Solid Waste Management Officials pointed to the Superfund program's ability to quickly absorb about $582 million in Recovery Act funds as evidence of limited funding for construction activities.

Limited funding can also impact state cleanup programs, which sometimes take the lead in cleaning up seriously contaminated sites that are not listed on the NPL, according to EPA and state officials. A study conducted by the Association of State and Territorial Solid Waste Management Officials found that funding for prelisting activities offers benefits beyond the Superfund program by providing valuable data, such as the data obtained during prelisting site assessments and investigations, which help state cleanup programs remediate sites that are not listed on the NPL. Several state officials said that, because their states have received less funding from EPA for these investigations than in the past, the number of assessments they have been able to perform has been limited.

Most EPA Regional and Selected State Officials Expect an Increase in the Number of Sites Added to the NPL over the Next 5 Years but Cannot Estimate the Cleanup Costs

Most of the EPA regional officials and state officials we interviewed told us they expect the number of sites listed on the NPL over the next 5 years will be greater than the number listed in the past 5 years. However, neither EPA regional officials nor state officials were able to provide cost estimates for many of the sites they expect will be added to the NPL.

EPA and State Officials Expect an Increase in the Number of Sites Listed over the Next 5 Years

EPA regional officials estimate that from 101 to 125 sites—an average of 20 to 25 sites per year—will be added to the NPL over the next 5 years. This is higher than the 79 sites—an average of about 16 sites per year—added from fiscal years 2005 to 2009. Overall, our analysis of these estimates shows that listings could increase by 28 to 58 percent. As table 2 shows, all EPA regions expect that the number of sites added to the NPL over the next 5 years from their region could increase. According to EPA headquarters officials, the number of sites proposed for listing over time has decreased as a result of the expanded use of other cleanup programs, including state programs. Most of the officials who expect an increase in listings noted that current economic conditions—which can limit states' abilities to clean up sites under their own programs and responsible parties' abilities to pay for cleanup—are a contributing factor to the expected increase in listed sites.

Table 2: Comparison of the Number of Sites EPA Listed from Fiscal Years 2005 through 2009 and the Number of Sites Projected to Be Listed from Fiscal Years 2010 through 2014, by Region

EPA region	Number of sites EPA listed from fiscal year 2005 through fiscal year 2009	Number of sites EPA regional officials project will be added to the NPL over the next 5 years	Change in the number of sites listed
1	3	3 to 5	0 to + 2
2	12	15 to 20	+ 3 to 8
3	8	10 to 15	+ 2 to 7
4	14	20 to 25	+ 6 to 11
5	14	20	+ 6
6	9	10 to 15	+ 1 to 6
7	8	10	+ 2
8	4	5	+ 1
9	4	3 to 5	-1 to + 1
10	3	5	+ 2
All regions	79	101 to 125	+ 22 to 46

Sources: GAO analysis based upon EPA data and regional officials' projections.

Most of the officials we spoke with in the 10 selected states also expect that the number of sites listed from their states over the next 5 years could increase above the number of sites listed over the past 5 years, as table 3 shows. For example, officials from the Michigan Department of Natural Resources and Environment said that they expect EPA to list five sites from Michigan to the NPL over the next 5 years, even though no sites have been listed from their state since 1996. These officials noted that the Superfund program has traditionally been a program of last resort, but declining resources in their state's cleanup program have renewed Michigan's interest in cleaning sites up through the federal program. Similarly, while EPA did not list any sites from Maine over the past 5 years, officials from the Maine Department of Environmental Protection expect that one to two sites may be added to the NPL over the next 5 years. An official explained that potential bankruptcies by responsible parties at one site may require that the state seek assistance in cleaning up the site through the federal Superfund program.

Table 3: Comparison of the Number of Sites EPA Listed from Each of the 10 States from Fiscal Years 2005 through 2009 and the Number of Sites State Officials Project May Be Listed from Fiscal Years 2010 through 2014, by State

State	Number of sites EPA listed from fiscal year 2005 through fiscal year 2009	Number of sites state officials project will be added from their states to the NPL over the next 5 years	Change in the number of sites listed
Maine	0	1 to 2	+ 1 to 2
New Jersey	6	15 to 25	+ 9 to 19
Virginia	1	1	0
Kentucky	0	0 to 1	0 to + 1
Michigan	0	5	+ 5
Louisiana	0	1	+ 1
Iowa	0	0	0
Montana	1	1 to 2	0 to + 1
California	3	5	+ 2
Washington	2	1 to 4	-1 to + 2

Sources: GAO analysis based upon EPA data and state agency officials' projections.

EPA and state officials noted that the number of sites actually listed over the next 5 years could vary from their projections because of a number of uncertainties. For example, all the EPA regional officials we spoke with told us that economic conditions can affect the number of sites added to the NPL, and several of these officials told us that the number of sites listed from their region could increase above their projection if economic conditions do not improve. Many EPA regional officials noted that sites currently being cleaned up under state programs and by responsible parties may require assistance through the federal Superfund program if these groups face financial hardship, such as bankruptcy. In addition, some EPA and state officials identified EPA's policy for obtaining state concurrence for listing as a factor that could limit the number of sites added to the NPL if EPA is unable to obtain this concurrence. Officials from several EPA regions noted that particular states are resistant to listing because of financial or political concerns, and a few EPA regional

officials and state officials mentioned difficulty in obtaining state concurrence for some sites.[25]

In addition to the number of sites that could be listed, the number of sites eligible for the NPL could increase if EPA begins to assess, as a part of its listing process, the risk of vapor intrusion caused by subsurface hazardous substances that have migrated via the air into homes and commercial properties. Although sites with vapor intrusion can pose considerable human health risks, EPA's HRS—the mechanism used to identify sites that qualify for NPL listing—does not currently recognize these risks; therefore, unless a site with vapor intrusion is listed on some other basis—such as groundwater contamination, EPA cannot clean up the site using remedial program funding. Many EPA regional officials and state officials noted that vapor intrusion is a concern, and several of these officials told us that they believe additional sites would be eligible for listing if assessments of vapor intrusion are included as part of the listing process. According to an EPA headquarters official, based on recent discussions with regional officials, up to 37 sites could be eligible for NPL listing if EPA includes vapor intrusion assessments as part of the listing process. However, according to EPA headquarters officials, EPA must first determine whether or not it can consider the vapor intrusion pathway under its existing HRS regulations, and it has not yet made such a determination. While these sites are not currently eligible for NPL listing, the EPA headquarters official noted that EPA is addressing vapor intrusion at 13 of these sites through its Superfund removal program; however, this official also told us that, when conducting removal actions, EPA is limited in its ability to fully remediate the source of contamination. For example, according to an official from the Montana Department of Environmental Quality, preliminary data collected at the Billings PCE site—which the official noted is not eligible for NPL listing—indicated vapor intrusion in buildings, and EPA conducted a removal action at this site. However, according to this official, it is unclear whether the removal action was effective in mitigating the vapor intrusion contamination, and people may continue to be exposed. In addition, this official noted that Montana has many sites with vapor intrusion from contaminants such as chlorinated solvents, which can cause cancer. If EPA cannot list these sites on the NPL on another basis, EPA will not be able to fund remedial actions at these

[25]CERCLA requires that states share the cost of any EPA-led remedy, specifically by requiring states to fund 10 percent of the remedial action and assume responsibility for a site's operation and maintenance. Before EPA lists a site on the NPL, the state in which a site is located must provide assurance that it will do so.

sites, and continued exposure to carcinogens is possible if other cleanup programs do not remove the risks at these sites.

In November 2002, EPA issued draft guidance on evaluating vapor intrusion at NPL sites.[26] However, a December 2009 EPA Inspector General's report found that EPA had not updated this guidance to reflect current science and recommended that EPA issue final guidance to establish current agency policy on the evaluation and mitigation of vapor intrusion risks.[27] EPA headquarters officials told us that, in response to this report, EPA is beginning discussions to update the vapor intrusion guidance.

EPA and State Officials Could Not Provide Cost Estimates for Many of the Sites They Expect Will Be Added to the NPL over the Next 5 Years

Neither EPA regional officials nor state officials we contacted were able to provide cost estimates for many of the sites they expect to be added to the NPL over the next 5 years. Furthermore, when these officials were able to provide cost estimates, most of them were imprecise figures based on limited knowledge and best professional judgment. For example, while New Jersey officials expect 15 to 25 sites to be added to the NPL from their state over the next 5 years, these officials noted that most of these sites are not expected to be megasites and the average cost of cleaning up most of the sites will probably be around $10 to $25 million. Officials also explained that they could not provide cost estimates for some of the sites, because the type and extent of contamination is not yet known. In addition, some officials based their 5-year projection on past listings and have not identified the actual sites that may be listed. For example, officials with the Virginia Department of Environmental Quality noted that one site in Virginia could be listed over the next 5 years, but the officials could not provide an estimated cost for cleaning up this site because it has not yet been identified. Therefore, it is impossible to accurately estimate what the cost may be to clean up these unknown sites. While EPA regional officials and state officials were not able to provide cost estimates for many of the sites they expect to be added to the NPL, we reported in July 2009 that the average amount EPA spent to clean up individual sites has

[26]The November 2002 draft guidance on vapor intrusion also applies to additional sites, such as Resource Conservation and Recovery Act Corrective Action and Brownfields sites, which are distinct from the Superfund program.

[27]EPA, Office of Inspector General, *Lack of Final Guidance on Vapor Intrusion Impedes Efforts to Address Indoor Air Risks*, 10-P-0042 (Washington, D.C.: December 2009).

increased in recent years.[28] In that report, we found that individual site costs may have increased because the sites on the NPL now are more complex than in the past, construction costs have been rising, and EPA has not been able to identify as many responsible parties to fund site cleanups as in the past, leaving a higher share for EPA to fund.

Conclusions

Congress enacted CERCLA to decrease the risk to human health and the environment posed by hazardous waste sites. However, some sites that EPA has identified as among the most seriously contaminated have involved long and costly cleanups, leading to protracted risks of human exposure to hazardous substances. Not long after the authority for the taxes that served as its main source of revenue expired in 1995, the Superfund trust fund started to diminish. Further, appropriated funding for cleanups has declined over time in real dollars, and the limited funding has caused delays in cleaning up some sites in recent years. The limited funding, coupled with increasing costs of cleanup, has forced EPA to choose between cleaning up a greater number of sites in a less time and cost efficient manner or cleaning up fewer sites more efficiently.

Compounding these challenges, EPA may not be listing some sites that pose health risks that are serious enough that the sites should be considered for inclusion on the NPL. While EPA is assessing vapor intrusion contamination at listed NPL sites, EPA does not assess the relative risks posed by vapor intrusion when deciding which sites to include on the NPL. By not including these risks, states may be left to remediate those sites without federal assistance, and given states' constrained budgets, some states may not have the ability to clean up these sites on their own. Ultimately, assessing the relative risk of vapor intrusion could lead to an increase in the number of sites listed on the NPL and thereby place additional demands on already limited funds in the Superfund program. However, if these sites are not assessed and, if needed, listed on the NPL, some seriously contaminated hazardous waste sites with unacceptable human exposure may not otherwise be cleaned up.

[28]GAO, *Superfund: Litigation Has Decreased and EPA Needs Better Information on Site Cleanup and Cost Issues to Estimate Future Program Funding Requirements*, GAO-09-656 (Washington, D.C.: July 2009).

Recommendation for Executive Action

To better identify sites that may be added to the NPL, we recommend that the Administrator of EPA determine the extent to which EPA will consider vapor intrusion as part of the NPL listing process and how this will affect the number of sites listed in the future.

Agency Comments and Our Evaluation

We provided a draft copy of this report to EPA for review and comment. We received a written response from the Assistant Administrator for the Office of Solid Waste and Emergency Response that also included comments from EPA's Office of Enforcement and Compliance Assurance and Office of the Chief Financial Officer. EPA agreed with our recommendation and noted that, while the agency currently considers vapor intrusion impacts in both the remedial and removal programs, EPA is evaluating whether vapor intrusion needs to be more specifically addressed in the HRS model. EPA also noted that our report contains substantial useful information on very important subjects relating to the Superfund Program.

In its comments, EPA also noted two issues that it believed require additional clarification. First, regarding its human exposure measure, EPA stated that it is important to highlight that people are not typically in danger of immediate harm at sites with unacceptable human exposure. EPA explained that, when acute health threats are identified, the agency takes immediate action to address the threats using its removal authority and, in other situations, works to characterize the risks at these sites. We agree with EPA and note in our report that EPA conducts removal actions at sites that pose immediate threats to human health or the environment. We also note that EPA has plans to control human exposure at all sites with unacceptable human exposure. EPA also commented that it does not use the term "unknown" when referring to sites that it has identified as having "insufficient data to determine human exposure control status." EPA noted that this term does not reflect EPA's efforts in characterizing a site to determine whether people are exposed at unsafe levels at a site. While we recognize that EPA may have collected and analyzed some data regarding a site's human exposure status, EPA's determination of insufficient data to determine human exposure control status shows that it has not yet made a determination about a site's status. For this reason—and for ease of reporting—in this report we refer to EPA's determination of "insufficient data to determine human exposure control status" as "unknown" human exposure.

Second, EPA recognized our report's finding that regional cost estimates are likely understated, since the estimates do not include funding for sites

where a responsible party is currently funding remedial construction but may be unable to do so in the future. While EPA does not dispute that the regional cost estimates are likely understated, EPA believes that we should recognize that, in cases where responsible parties are conducting remedial construction under existing settlement agreements, those agreements require those parties to maintain financial assurance mechanisms to ensure that response actions are completed. In addition, EPA noted that it has made considerable efforts to ensure that these mechanisms are in place for existing and new response settlements, and these financial assurances would provide funding for cleanup under existing settlements. EPA also acknowledged, however, that for sites where potentially responsible parties are experiencing financial difficulty and have not yet reached a settlement with EPA, the parties may be unable to complete cleanups in the future, which would increase the burden on EPA's Superfund trust fund. We agree with EPA's assessment; however, in response to our survey, EPA regional officials told us that they were slightly or not at all confident that a responsible party would fund future remedial actions at 27 sites. We also state in our report that funds from a settlement agreement may be available for site cleanup at some sites, but regional officials told us that responsible parties may be financially unable to perform the remedy or fund future cleanup at other sites and, in those situations, EPA's trust fund may have to fund future cleanup. EPA's comments are presented in appendix V of this report. EPA also provided technical comments on the draft report, which we incorporated, as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, Administrator of EPA, Director of the Office of Management and Budget, and other interested parties. The report also will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or stephensonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VI.

John B. Stephenson
Director, Natural Resources
and Environment

Appendix I: Objectives, Scope, and Methodology

This appendix provides information on the scope of work and the methodology used to determine (1) the cleanup and funding status at currently listed nonfederal National Priorities List (NPL) sites with unacceptable or unknown human exposure; (2) what is known about the future costs to the Environmental Protection Agency (EPA) to complete remedial actions at nonfederal NPL sites that are not construction complete; (3) the process EPA uses to allocate remedial program funding; and (4) how many sites EPA and selected state officials expect will be added to the NPL over the next 5 years, and what they expect the future costs of cleaning up those sites will be.

To determine the cleanup and funding status at the 75 sites with unacceptable human exposure and the 164 sites with unknown human exposure, we surveyed branch chiefs from each of the 10 EPA regions and received responses from October 2009 through November 2009. Through our survey, we obtained and analyzed information from each of the regions on the cleanup work that remains, human exposure risks, short-term planned actions to reduce exposure, long-term actions needed to eliminate exposure, expected time until human exposure risks will be under control or known, future estimated costs of remedial actions, whether American Recovery and Reinvestment Act (Recovery Act) funding will be used to control human exposure, delays due to constrained funding, and the impact of any limited funding at these sites. In addition, we obtained some limited documentation to support regional officials' cost estimates provided in the survey. We also analyzed data from EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) to determine when sites were listed, what cleanup actions have been taken at sites, which sites are construction complete, and which sites are megasites. We analyzed expenditure (outlay) data from EPA's Integrated Financial Management System for all final and deleted nonfederal NPL sites to determine how much EPA has spent on these sites. Moreover, to obtain additional information on human exposure risks, we searched EPA's Superfund Site Information System. We analyzed data on exposure risks from our survey and the Superfund Site Information System to determine the types of contaminants present, the types of contaminated media present, and the exposed populations at the sites. We also discussed the human exposure indicator with EPA headquarters and regional officials and reviewed EPA guidance on this indicator.

To determine what is known about future costs to EPA to complete remedial actions at nonfederal NPL sites, we collected data through our survey of all EPA regions to obtain information about the 416 nonfederal

sites that are not construction complete. Through our survey, we obtained and analyzed data on annual and total estimated costs to EPA to conduct remedial actions in the most efficient manner, the entity responsible for funding cleanup, and EPA's confidence in responsible parties' ability to fund future remedial actions. In addition, we obtained information on total funding amounts that EPA provided for remedial actions for fiscal years 2000 to 2009 from EPA's Office of Solid Waste and Environmental Response. Finally, we discussed the cost estimating process with EPA headquarters and regional officials and reviewed EPA's guidance on cost estimating.

To determine how EPA allocates remedial program funding, we interviewed EPA headquarters officials and regional officials from each of the 10 EPA regions about the process they use to prioritize sites to receive funding. We also discussed the process EPA used to allocate Recovery Act funding for the Superfund program with headquarters officials. Additionally, we reviewed EPA guidance and planning documents to identify the process for assigning annual and Recovery Act funding. In addition, through our survey, we obtained and analyzed information from each of the 10 EPA regions on the 51 sites receiving Recovery Act funding to determine how much funding each site received and whether the use of the funding is decreasing costs of cleanup and/or accelerating cleanup. We also obtained data through our survey on delays at sites with ongoing construction. Moreover, to identify sites that were delayed when ready to begin construction, we reviewed *Superfund Accomplishment Reports* from 2004 through 2008. In addition, we spoke with representatives from the Association of State and Territorial Solid Waste Management Officials to obtain their perspectives on delays in cleanup.

To determine how many sites EPA officials expect will be added to the NPL over the next 5 years and what they expect the cost of cleaning up those sites to be, we conducted semistructured telephone interviews of NPL coordinators in each EPA region. In addition, through these interviews, we obtained information about factors that have affected the number of listings in the past and factors that may affect the number of listings in the future. We also interviewed EPA headquarters officials to obtain their perspectives on future listings and factors—including vapor intrusion—that may affect listings. Finally, to compare the projected numbers of future listings with past listings, we analyzed data from EPA's CERCLIS database on sites that have been listed to the NPL from each region.

To determine how many sites selected state officials expect will be added to the NPL over the next 5 years and what they expect the cost of cleaning up those sites to be, we interviewed state hazardous waste agency officials from 10 states: California, Iowa, Kentucky, Louisiana, Maine, Michigan, Montana, New Jersey, Virginia, and Washington. We selected these states using a nonprobability sample, consisting of one state from each of EPA's 10 regions and selected to ensure that we would obtain information from states that vary in the total number of sites listed over the past 10 years. We conducted telephone interviews with officials from each of these states to obtain information about potential site listings from their state, the costs to clean up those sites, and factors that may affect the number of sites actually listed over the next 5 years. We also discussed the site assessment process, listing process, and potential future listings with an official from the Association of State and Territorial Solid Waste Management Officials. Finally, we compared the projected numbers of future listings with past listings by analyzing data from EPA's CERCLIS database on sites that have been listed to the NPL from each of the 10 states.

To assess the reliability of the data from EPA's databases used in this report, we analyzed related documentation, examined the data to identify obvious errors or inconsistencies, and worked with agency officials to identify data problems. To ensure the reliability of the data collected through our survey of the 10 EPA regions, we took a number of steps to reduce measurement error, nonresponse error, and respondent bias. These steps included conducting three pretests prior to distributing the survey to ensure that our questions were clear, precise, and consistently interpreted; reviewing responses to identify obvious errors or inconsistencies; and conducting follow-up interviews with officials to review and clarify responses. We determined the data to be sufficiently reliable for the purposes of this report.

We conducted this performance audit from March 2009 to May 2010, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: GAO Survey of Superfund Sites

We surveyed regional officials from EPA's 10 regions using all of the questions below as stated here. We provided these questions to the regions in an Excel spreadsheet that identified the sites pertaining to each question. We have grouped the questions below to list all questions that pertain to a particular universe of sites.

A. The following questions pertained to nonfederal NPL sites that were not construction complete, as of September 30, 2009.

1. Who is currently leading remedial actions at this site? If the site has not yet had a remedial action, who is anticipated to lead remedial actions at this site?

   a. Potentially Responsible Party(s)
   b. EPA (Fund-lead)
   c. State
   d. Federal Facility
   e. Mixed (Potentially Responsible Party & Fund-lead)
   f. Mixed (Potentially Responsible Party & State)
   g. Mixed (Potentially Responsible Party & Federal)

2. How confident are you that a viable Potentially Responsible Party(s) will fund future remedial actions at this site?

   a. Very confident
   b. Moderately confident
   c. Slightly confident
   d. Not at all confident/No viable Potentially Responsible Party(s)
   e. Don't know

3. What is the projected fiscal year the site will be construction complete?

   a. FY 2009
   b. FY 2010
   c. FY 2011
   d. FY 2012
   e. FY 2013
   f. FY 2014
   g. FY 2015
   h. FY 2016
   i. FY 2017
   j. FY 2018
   k. FY 2019
   l. FY 2020
   m. FY 2021
   n. FY 2022
   o. FY 2023
   p. After FY 2023

4. Given what is currently known about contamination at this site, how much work remains to complete construction?

   a. No work remains
   b. Less than half the work remains
   c. About half the work remains
   d. More than half the work remains
   e. All work remains
   f. Unknown

5. Given what is currently known about contamination at this site, what is the approximate projected cost to EPA to complete construction in the most efficient manner? (in millions of dollars) *If there is no cost to EPA because a Potentially Responsible Party is funding ALL remedial actions at a site, please check the box for No Cost to EPA.*

No Cost to EPA	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015 and beyond	Total Projected Cost
	$	$	$	$	$	$	$

6. What information are you using to make these cost projections?

7. If you cannot provide cost projections for one or more years, please explain why they are not available.

8. Is a Long Term Remedial Action planned at this site? If yes, please provide the estimated total cost to EPA of the LTRA (in millions).

B. The following questions pertained to nonfederal NPL sites with unacceptable human exposure, as of September 30, 2009.

1. In what fiscal year did EPA determine that there was an unacceptable risk of human exposure at this site?

   a. Prior to FY 1999
   b. FY 1999
   c. FY 2000
   d. FY 2001
   e. FY 2002
   f. FY 2003
   g. FY 2004
   h. FY 2005
   i. FY 2006
   j. FY 2007
   k. FY 2008
   l. FY 2009
   m. Unknown

2. In what fiscal year do you expect human exposure to be controlled at this site?

   a. FY 2009
   b. FY 2010
   c. FY 2011
   d. FY 2012
   e. FY 2013
   f. FY 2014
   g. FY 2015
   h. After FY 2015
   i. Unknown

3. Please provide a description of the actual or potential for human exposure. *For each site, please describe the actual or potential for current human exposure, including the physical setting, populations affected, exposure pathways, contaminants, and health risks, if known.*

4. What are EPA or other parties doing in the short-term to contain the risk of exposure or the actual human exposure?

5. What will EPA or other parties do in the long-term to eliminate the risk of exposure or the actual human exposure?

C. The following questions pertained to nonfederal NPL sites with unknown human exposure, as of September 30, 2009.

1. In what fiscal year did EPA determine that there was insufficient data to assess if there was an unacceptable risk of human exposure at this site?

   a. Prior to FY 1999
   b. FY 1999
   c. FY 2000
   d. FY 2001
   e. FY 2002
   f. FY 2003
   g. FY 2004
   h. FY 2005
   i. FY 2006
   j. FY 2007
   k. FY 2008
   l. FY 2009
   m. Unknown

2. In what fiscal year do you expect to know whether human exposure is under control at this site?

   a. FY 2009
   b. FY 2010
   c. FY 2011
   d. FY 2012
   e. FY 2013
   f. FY 2014
   g. FY 2015
   h. After FY 2015
   i. Unknown

3. Why is there insufficient data to determine whether human exposure is under control?

4. Please describe the potential for human exposure at this site.

D. The following questions pertained to nonfederal NPL sites (1) with unacceptable human exposure, (2) with unknown human exposure, and/or (3) that were not construction complete, as of September 30, 2009.

1. From FY 2000 to FY 2009, for which years, if any, were pipeline activities delayed at this site due to constrained funding?

2. Did this site receive funding to begin construction in the fiscal year when it was ready? If not, for how many years did the site not receive construction funding?

   a) Yes - site received funding when construction ready
   b) No - construction delayed 1 year
   c) No - construction delayed 2 years
   d) No - construction delayed 3 years
   e) No - construction delayed 4 years
   f) No - construction delayed 5 years
   g) No - construction delayed more than 5 years
   h) N/A - Site has not reached construction phase
   i) N/A - Construction funded by Potentially Responsible Party(s)

If cleanup was not funded when the site was construction-ready, please describe the impacts, if any, of the delay.

3. From FY 2000 to FY 2009, for which years, if any, were ongoing remedial actions delayed at the site due to constrained funding?

   a. For years in which ongoing remedial actions were delayed, how much funding was needed to clean up the site in the most efficient manner? (in millions)
   b. For years in which ongoing remedial actions were delayed, how much funding was received? (in millions)
   c. Please explain the source of the funding numbers in your responses for parts (a) and (b).
   d. What was the impact, if any, of the delay in cleanup?
   e. Have delays increased the total cost of construction at this site? Please briefly explain your response.

E. The following questions pertained to nonfederal NPL sites which EPA designated to receive Recovery Act funds.

1. How much Recovery Act, or stimulus funding, has or will this site receive? Please respond in millions of dollars.

2. Will stimulus funds be used at this site for (1) beginning new construction at a site with no previous remedial actions, (2) beginning new construction at an operable unit at a site with previous remedial actions, and/or (3) supporting ongoing remedial actions?

3. Would construction have been delayed in the absence of this stimulus funding? Please choose an option below and briefly explain your response.

   a. Yes
   b. No
   c. Unknown

4. Will stimulus funds accelerate the pace of construction? Please choose an option below and briefly explain your response.

   a. Yes
   b. No
   c. Unknown

5. Will the stimulus funds decrease the total cost of construction at this site? Please choose an option below and briefly explain your response.

   a. Yes
   b. No
   c. Unknown

6. Will the use of stimulus funding control human exposure at this site? Please choose an option below and briefly explain your response.

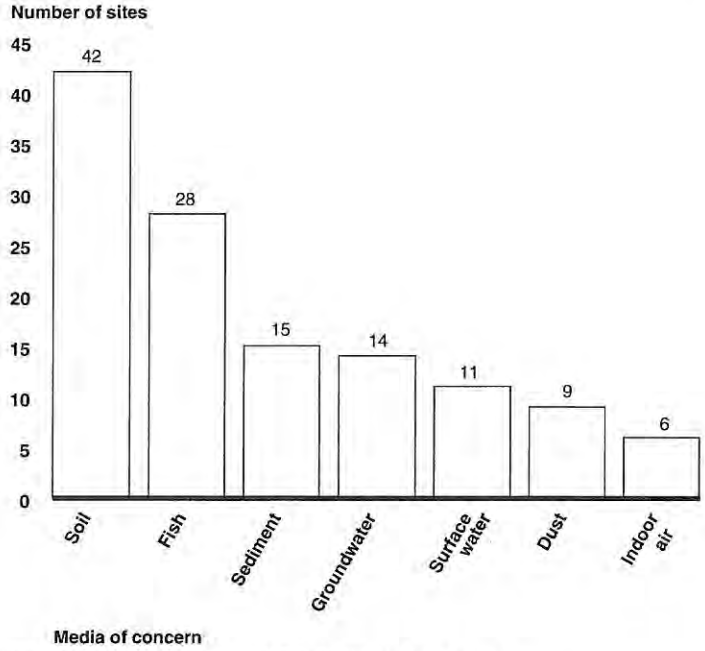
   a. Yes, completely
   b. Yes, partially
   c. No
   d. Not applicable
   e. Unknown

7. Please describe your region's involvement, if any, in identifying sites to receive stimulus funding.

Appendix III: Sites with Unacceptable Human Exposure

As of the end of fiscal year 2009, EPA identified 75 nonfederal sites on the NPL as having unacceptable human exposure. The human exposure at these 75 sites is due to a variety of contaminants that may be present in soil, groundwater, sediments, or other media at the site and may impact areas where people live, work, and recreate. As figure 7 shows, the most common medium of concern at sites with unacceptable human exposure is soil, with 42 sites containing this medium of concern. The next most common media are fish or shellfish, sediment, and groundwater. Many sites had more than one medium of concern. For example, the Caldwell Trucking Co. site in New Jersey has four media of concern: soil, groundwater, surface water, and indoor air. At this site, groundwater contaminated with solvents is seeping onto surface soils and discharging into surface-water streams in a residential area, and the solvents may have potentially migrated from groundwater to indoor air, posing a risk of vapor intrusion.

Figure 7: Media of Concern at the 75 Sites with Unacceptable Human Exposure



Source: GAO analysis of EPA regional officials' responses to our survey.

Note: Sites with more than one medium of concern were counted in each applicable category. In addition to the categories above, there are other media of concern which were less common, including mine waste, debris, and plants.

The contaminants that most commonly cause unacceptable human exposure are lead, polychlorinated biphenyl (PCB), arsenic, and metals other than lead. Some sites contained several contaminants, present in different media. For example, the Atlantic Wood Industries, Inc. site in Virginia contains polycyclic aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), dioxins, and heavy metals present in soil and shellfish, as well as creosote present in sediments. As a result of the variety of contaminants and contaminated media, there are multiple risks at the site, including risks to (1) recreational users of the river who could come into direct contact with sediments contaminated with creosote, (2) consumers of large quantities of shellfish exposed to unacceptably high levels of contaminants, and (3) workers at the Atlantic Wood Industries concrete manufacturing business who are exposed to surface soils at the site.

Residents of contaminated areas are the population most commonly exposed to unacceptable exposures at the 75 sites, with over half of the sites posing a contaminant risk to residents on or nearby the site, according to the data collected through our survey. In addition, contaminated waterways, including rivers, lakes, and harbors, pose unacceptable risks to those who consume contaminated fish caught from these areas. Risks to workers and other commercial tenants and those who recreate at contaminated sites are present at fewer sites. The exposed populations face different health risks based on the contaminants present at the site. For example, consuming PCB in fish may cause liver disease, problems with the immune and endocrine system, developmental problems, and cancer, while human health threats from arsenic include irritation of the stomach and intestines, blood vessel damage, reduced nerve function, and increased mortality rates in young adults.

According to an EPA headquarters official responsible for overseeing the human exposure indicator, the indicator demonstrates a high potential for human exposure, but it does not always indicate that *documented* human exposure is occurring at a site. The official explained that it can be difficult to obtain evidence of actual human exposure; however, EPA has been able to document exposure at some sites. For example, the Big River Mine Tailings site contains lead-contaminated soils on residential properties, and blood tests have shown elevated lead levels in children. For some risks, however, such as consumption of contaminated fish, EPA may not have evidence of actual ingestion of contaminated fish but does have information suggesting that people are fishing in the area of concern.

Table 4 provides a description of the human exposure risks at the 75 sites, as well as the fiscal year that EPA estimates human exposure will be under control at those sites.

Table 4: Description of Human Exposure Risks, Fiscal Year Site was Listed on the NPL, and the Expected Fiscal Year Human Exposure Will Be Controlled at NPL Sites with Unacceptable Human Exposure, as of the End of Fiscal Year 2009

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
CA	Lava Cap Mine	Recreational users of the area downstream of the mine (Lost Lake area) can be exposed to mine tailings, leading to incidental ingestion of arsenic in soil, inhalation of contaminated airborne particulates, or skin contact with contaminated sediments along the shoreline.	1999	2013
CA	McCormick & Baxter Creosoting Co.	The potential for human exposure stems from the consumption of contaminated fish affected by contaminated sediments in the slough adjacent to the McCormick & Baxter property. The fishing population includes local recreational anglers and subsistence fishermen. Contaminants include dioxins and PAHs that entered the slough via runoff and seep from the site. The sediment remedy was completed in 2006 but it will take several years for fish tissue concentrations to decline to acceptable levels.	1993	After 2015
CA	Modesto Groundwater Contamination	Humans are exposed to tetrachloroethylene (PCE) in indoor air in a building that houses two businesses: an operating dry cleaner and an auto parts dealership. Two sources of vapors are: (1) the operating dry cleaner and (2) subslab soil gas from historical leaks of PCE into soil and groundwater. EPA is primarily addressing indoor air risks to the auto parts dealer, since the dry cleaning business is subject to Occupational Safety and Health Administration regulations. EPA plans to install a subslab ventilation system in 2010 to address the vapor intrusion problem.	1989	2010
CA	Montrose Chemical Corp.	Primarily Palos Verdes Shelf, operable unit 5, is the cause of the uncontrolled human exposure due to the potential for people to consume contaminated fish. EPA's institutional controls program is actively working to reduce this risk, but until the fish population is cleaner, it is not possible to completely control human exposure.	1990	After 2015
CA	Omega Chemical Corp.	Exposure occurs as a result of vapor intrusion at commercial buildings adjacent to the site. The initial vapor intrusion problem was identified in a public roller skating rink adjacent to the site (potential exposed population included children, adults and workers at the site); however, the skating rink has since been demolished. Office workers in two buildings adjacent to the site are the current exposed population. The primary contaminant of concern is PCE, for which current levels exceed long-term exposure criteria for industrial/commercial exposure. The installation of a soil vapor extraction system adjacent to the affected buildings in 2010 is expected to eliminate the vapor intrusion problem.	1999	2010

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
CA	Sulphur Bank Mercury Mine	Residents near the mine may be exposed to mine tailings or soils contaminated with mercury, arsenic, or antimony. In addition, residents and recreational users of Clear Lake may be exposed to fish and other biota contaminated with mercury, although fish advisories are in place, warning of the risks of eating fish.	1990	After 2015
CA	United Heckathorn Co.	The human health exposure is from subsistence fishing in the site area. The fishing and consumption pattern of the local Laotian communities is documented in "A Seafood Consumption Survey of the Laotian Community of West Contra Costa County, California" by Asian Pacific Environmental Network. The fishing pattern is catching all available fish and consuming whole fish. There is currently a state fish advisory for the area for certain fish species.	1990	After 2015
CO	California Gulch	People can come in contact with historic mine waste. Mine waste is located across the site and is readily accessible to community members and recreational users. A potential exposure pathway exists for individuals interacting with mine waste or affected surface or groundwater. The site is composed of approximately 18 square miles of mountainous terrain. Historic mining, milling, and smelting activities resulted in the placement of mine wastes across the entire area. At the present time, warning signs are not posted in mine waste piles due to the large number of piles and community concerns associated with the signage. The primary contaminants of concern include lead and other metals.	1983	2013
CO	Central City, Clear Creek	Recreational users may come in contact with soil and water contaminated with heavy metals from historic mining activities. Contact with these source areas presents an unacceptable risk to recreational users and to ecological receptors. The Clear Creek watershed is a large area used widely by the community. The waste piles and the river are not posted due to the sprawling nature of the site.	1983	2013
CO	Standard Mine	The site is situated in a remote area outside of Crested Butte, CO. Recreational users, including hikers, snowmobile riders, and all-terrain vehicle riders, are known to visit the site throughout the year. This risk is primarily focused on children who ride all-terrain vehicles inhaling manganese dust at the site. EPA is currently studying the nature of contamination at the site and is developing a cleanup plan to address all human health risks.	2005	2013
CT	Raymark Industries, Inc.	Unacceptable exposure pathways exist for individuals who come in contact with soil contaminated with lead, asbestos, PCBs, and other contaminants above acceptable levels at approximately 30 locations throughout the town of Stratford.	1995	2012
DE	Koppers Co., Inc. (Newport Plant)	Trespassers come into contact with soils and sediments contaminated with creosote. Due to the presence of creosote nonaqueous phase liquid at the surface in both soils and sediments, there exists the potential for acute toxicity were a trespasser to be exposed to that material, as PAHs are a dermal irritant on contact.	1990	2013

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
ID	Bunker Hill Mining & Metallurgical Complex	The Bunker Hill Superfund site in northern Idaho and eastern Washington has been severely affected by more than 100 years of mining activities. Mining contamination has affected more than 166 river miles of the Coeur d'Alene River corridor, adjacent floodplains, downstream water bodies, tributaries, and fill areas. The risks are not hypothetical or potential future risks. Significant measurable risks currently exist to humans (e.g., children with blood lead levels above the national Centers for Disease Control and Prevention (CDC) standards). The contaminants are primarily metals, and the affected media are soil, sediment, surface water, and groundwater. Direct exposure to metals in soil and sediments is a source of risk for people, including recreational and subsistence users.	1983	After 2015
IL	Kerr-McGee (Kress Creek/ West Branch of DuPage River)	The current unacceptable human exposure is from gamma radiation from thorium-contaminated soils and sediments in some areas of the bank of Kress Creek and the West Branch of the DuPage River. In some areas, there is residential property along the river bank with contamination above health-based limits. Studies on thorium workers have shown that breathing thorium dust may cause an increased chance of developing lung disease and cancer of the lung or pancreas many years after being exposed. Changes in the genetic material of body cells have also been shown to occur in workers who breathed thorium dust. Since thorium is radioactive and may be stored in bone for a long time, bone cancer is also a potential concern for people exposed to thorium. The presence of large amounts of thorium in one's environment could result in exposure to more hazardous radioactive decay products of thorium, such as radium and thoron, which is an isotope of radon.	1991	2013
IL	Ottawa Radiation Areas	The site includes 16 areas of concerns; some are adjacent to the original facility, and others are in the City of Ottawa where, in the past, site-contaminated materials were used as fill. Removal actions were completed at nine of the areas, and remedial actions were completed at two of the areas, but three of the five remaining areas are designated as "current human exposures not under control" because of potential exposure via direct contact, ingestion, and/or inhalation by trespassers, construction workers, and/or commercial/industrial workers to radium-contaminated soils. These three sites include a gravel parking lot, auto storage garage, and construction company. There is no clear evidence that long-term exposure to radium at the levels that are normally present in the environment (for example, 1 pico curie of radium per gram of soil) is likely to result in harmful health effects. However, exposure to higher levels of radium over a long period of time may result in harmful effects including anemia, cataracts, fractured teeth, cancer (especially bone cancer), and death. Some of these effects may take years to develop and are mostly due to gamma radiation. Radium gives off gamma radiation, which can travel fairly long distances through air. Therefore, just being near radium at the high levels that may be found at some hazardous waste sites may be dangerous to one's health.	1993	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
IL	Outboard Marine Corp.	At Waukegan Harbor, the PCB levels in harbor-caught fish are too high to be protective of human health. EPA and others have observed both subsistence and sport fishing in the harbor area. The higher than recommended PCB levels in fish are caused by PCBs in the harbor sediment. People who eat PCB-contaminated fish can experience health problems, including cancer, liver disease, and problems with the immune and endocrine systems. During pregnancy and lactation, mothers can pass PCBs and other chemicals to their infants. Because these chemicals affect development, children through adolescence and women of childbearing age are more sensitive to their harmful effects and should be especially careful. At Outboard Marine Corp., Plant 2, the abandoned facility and some of the on-site soil, beach sand, and sediment are contaminated with PCBs above the levels recommended in the PCB spill cleanup policy. Although the grounds are generally secured by fencing and are sometimes patrolled by the City of Waukegan, there is ongoing evidence of trespassing and vandalism on the property.	1983	After 2015
IL	Southeast Rockford Groundwater Contamination	Residents in the contaminated plume area are drawing drinking water from private wells contaminated with volatile organic compounds, such as trichloroethylene (TCE). Although the City of Rockford has provided municipal water service to hundreds of residents and businesses, there are still residents who will not voluntarily connect to the city water supply. EPA does not have any clear evidence that TCE alone in drinking water can cause leukemia or any other type of cancer in humans. However, in studies using high doses of TCE in rats and mice, tumors in the lungs, liver, and testes were found, providing some evidence that high doses of TCE can cause cancer in experimental animals. Based on the limited data in humans regarding TCE exposure and cancer, and evidence that high doses of TCE can cause cancer in animals, the International Agency for Research on Cancer has determined that TCE is probably carcinogenic to humans.	1989	2011
IN	Bennett Stone Quarry	PCBs are discharging from on-site springs into Stout's Creek, and recreational users of the creek can be exposed to unacceptable PCB levels due to direct contact with the surface water and/or through ingestion of fish. Although fish consumption advisories for Stout's Creek are in place by the State of Indiana, fishing has been observed in the creek. This is a rural community, and EPA believes the fish are being consumed. There is evidence of subsistence fishing from the river. People who eat PCB-contaminated fish can experience health problems, including cancer, liver disease, and problems with the immune and endocrine systems. During pregnancy and lactation, mothers can pass PCBs and other chemicals to their infants. Because these chemicals affect development, children through adolescence and women of childbearing age are more sensitive to their harmful effects and should be especially careful.	1984	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
IN	Himco Dump	The current unacceptable human exposure is from direct contact (via showering and bathing) to arsenic and manganese in water from four private residential groundwater wells located east of the dump. This water is slightly above the acceptable risk range for direct contact exposure. Although low levels of manganese intake are necessary for human health, exposure to high manganese levels is toxic. Many reports indicate that oral exposure to manganese, especially from contaminated water sources, can produce significant health effects. These effects have been most prominently observed in children and are similar to those observed from inhalation exposure. The symptoms of manganese toxicity may appear slowly over months and years. Manganese toxicity can result in a permanent neurological disorder known as manganism with symptoms that include tremors, difficulty walking, and facial muscle spasms. These symptoms are often preceded by other lesser symptoms, including irritability, aggressiveness, and hallucinations. Some studies suggest that manganese inhalation can also result in adverse cognitive effects, including difficulty with concentration and memory problems. Human exposures to arsenic may cause irritation of the stomach and intestines, blood vessel damage, skin changes, and reduced nerve function. There is also some evidence that suggests that long-term exposure to inorganic arsenic in children may result in lower IQ scores. There is some evidence that exposure to arsenic in early life (including gestation and early childhood) may increase mortality in young adults and that inhaled or ingested inorganic arsenic can injure pregnant women or their unborn babies, although the studies are not definitive.	1990	2015
IN	Jacobsville Neighborhood Soil Contamination	The current unacceptable human exposure is from lead and arsenic in residential surface soils and soils at depth, greater than the site-specific, risk-based cleanup goals of 400 and 30 parts per million, respectively. There is a long-term threat to human health through direct contact to lead and arsenic contaminated soils. Human exposures to arsenic may cause irritation of the stomach and intestines, blood vessel damage, skin changes, and reduced nerve function. There is also some evidence that suggests that long-term exposure to inorganic arsenic in children may result in lower IQ scores. There is some evidence that exposure to arsenic in early life (including gestation and early childhood) may increase mortality in young adults. There is some evidence that inhaled or ingested inorganic arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. An enormous amount of information is available on the health effects of lead on human health. The most sensitive targets for lead toxicity are the developing nervous system, the hematological and cardiovascular systems, and the kidneys. However, due to the multimodes of action of lead in biological systems, lead could potentially affect any system or organs in the body. Studies of lead workers suggest that long-term exposure to lead may be associated with increased mortality due to cerebrovascular disease. Blood lead levels also have been associated with small elevations in blood pressure.	2004	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
IN	Lemon Lane Landfill	There is a current unacceptable human exposure because PCBs are discharging from off-site springs into Clear Creek, and users of the creek can be exposed to unacceptable PCB levels through ingestion of fish. Fishing has been observed in the creek. This is a rural community, and EPA believes the fish are being consumed. People who eat PCB-contaminated fish can experience health problems, including cancer, liver disease, and problems with the immune and endocrine systems. During pregnancy and lactation, mothers can pass PCBs and other chemicals to their infants. Because these chemicals affect development, children through adolescence and women of childbearing age are more sensitive to their harmful effects and should be especially careful.	1983	After 2015
IN	Neal's Landfill (Bloomington)	There is a current unacceptable human exposure because PCBs are discharging from on-site springs into Conard's Branch and Richland Creek. Users of the creek can be exposed to unacceptable PCB levels through ingestion of fish. This is a rural community, and EPA believes the fish are being consumed. People who eat PCB-contaminated fish can experience health problems, including cancer, liver disease, and problems with the immune and endocrine systems. During pregnancy and lactation, mothers can pass PCBs and other chemicals to their infants. Because these chemicals affect development, children through adolescence and women of childbearing age are more sensitive to their harmful effects and should be especially careful.	1983	After 2015
KS	Cherokee County	Human exposure is through contact with, or ingestion of, contaminated soil, groundwater, and surface water, in addition to consumption of affected fish and other receptors. The site is a large mining megasite that spans 115 square miles and has several million cubic yards of surficial mining wastes that have not been remediated. The site also contains affected sediments, surface water, and groundwater. The contaminants of concern are lead, cadmium, and zinc.	1983	2015
MA	Blackburn & Union Privileges	Residents at a residential lot near the site are reasonably anticipated to be exposed to lead and asbestos in soil in the floodplain of the Neponset River and the Former Mill Tailrace above acceptable levels. In addition, other nearby residents may come in contact with asbestos above acceptable levels in the sediment in Lewis Pond.	1994	2011
MA	Iron Horse Park	Exposure to lead contamination in surface soils in the rail yard area of the site presents a current unacceptable exposure. In addition, elevated blood lead levels are predicted for women of childbearing age based on occupational indoor exposures to dust from the outdoor lead-containing soil. Portions of the site that present unacceptable exposure pathways cannot be further controlled (by fencing, for example) prior to implementation of the remedy since the site contains an active rail yard.	1984	2011

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
MA	New Bedford	Unacceptable exposure pathways exist related to consumption of PCB-contaminated seafood. This Human Exposure Control determination is based on site-specific risk assessments that took the concentration of chemicals present and the frequency/duration of exposure to these chemicals, among other things, into account. EPA's full-scale dredging program began in 2004 and will continue for a number of years. Regarding the seafood consumption risk, signs are posted in multiple languages throughout the harbor describing the existing fishing ban. In addition, EPA has led an extensive outreach and education campaign called "Fish Smart." This campaign includes a wide variety of elements to dissuade the consumption of local PCB-contaminated seafood, including the education community, the medical community, social service providers, fact sheets, cable TV shows, newspaper notices, neighborhood meetings, and monthly meetings with stakeholders and local officials. However, EPA continues to receive reports that consumption of seafood from posted areas is ongoing.	1983	After 2015
MI	Allied Paper, Inc./Portage Creek/Kalamazoo River	The Allied Paper, Inc./ Portage Creek/ Kalamazoo River site has fish in the river contaminated above health-based levels for human consumption due to PCB contamination. There is evidence of subsistence fishing from the river. People who eat PCB-contaminated fish can experience health problems, including cancer, liver disease, and problems with the immune and endocrine systems. During pregnancy and lactation, mothers can pass PCBs and other chemicals to their infants. Because these chemicals affect development, children through adolescence and women of childbearing age are more sensitive to their harmful effects and should be especially careful.	1990	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
MI	Velsicol Chemical Corp. (Michigan)	Residents are likely in contact with soils contaminated with polybrominated biphenyls (PBB) in the residential area adjacent to the former chemical plant. PBB levels in the adjacent residential area show elevated risk and exceed the State of Michigan's promulgated standard for direct human contact for PBB, but not at levels which would require an emergency removal. The Velsicol site is also considered "current human exposures not under control" due to contaminants migrating from the site groundwater to the adjacent Pine River. The fish are contaminated with bioaccumulative compounds (dichlorodiphenyltrichloroethane and PBB) at levels that present a risk to humans from fish ingestion. Although fish consumption advisories are in place in the river by the State of Michigan, and warning signs are posted, fishing has been observed in the river, and EPA believes the fish are being consumed. In 1976, the Michigan Department of Public Health recruited many Velsicol workers for a PBB health study, which placed workers and their families in a registry to study the long-term effects of PBB exposure. The study, conducted in cooperation with the CDC, Food and Drug Administration, and EPA, was in operation at the time of the 1988 health assessment. Subsequent findings of this study included some evidence of an association between high PBB exposure with an elevated risk of cancers of the breast and the digestive system and of lymphomas. Because of the small number of cases, no definitive conclusions may be drawn from these findings. In addition, higher rates of neurologic, immunologic, dermatologic, and musculoskeletal health effects have also been observed in the registry cohort. However, no consistent pattern of an association between these health effects and serum PBB levels have been determined.	1983	After 2015
MN	South Minneapolis Residential Soil Contamination	Residential soils are contaminated with high levels of arsenic originally believed to have come from a pesticide formulating plant. Human exposures to arsenic may cause irritation of the stomach and intestines, blood vessel damage, skin changes, and reduced nerve function. There is also some evidence that suggests that long-term exposure to inorganic arsenic in children may result in lower IQ scores. There is some evidence that exposure to arsenic in early life (including gestation and early childhood) may increase mortality in young adults. There is some evidence that inhaled or ingested inorganic arsenic can injure pregnant women or their unborn babies, although the studies are not definitive.	2007	2011
MO	Big River Mine Tailings/St. Joe Minerals Corp.	The Big River Mine Tailings site consists of seven large lead mine waste piles in St. Francois County, Missouri. These piles have eroded into Big River and its tributaries. Lead-contaminated dust has blown from the piles to nearby residential areas. There is a risk of exposure to all age groups to lead in residential and recreational soils, surface water, sediment, and fish tissue.	1993	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
MO	Madison County Mines	Mine waste was used for fill and grading in residential settings where direct exposure is highly probable upon any disturbance of the soil. There are ongoing exposures to heavy metals. Surficial mine and mill waste is the source of the heavy metal contamination at the site, which has affected surface soil, sediment, surface water, groundwater, and fish tissue. The heavy metal of most urgent concern with regard to human health at the site is lead.	2003	2012
MO	Newton County Mine Tailings	People can be exposed to lead contamination through direct contact and ingestion of contaminated soil and dust. Uncontrolled mine waste piles containing high concentrations of lead and other heavy metals are located on approximately 1,000 acres of land throughout this county-wide site. These waste piles cause lead and other heavy metal contamination in surrounding soils, groundwater, and surface water resulting in potential exposure of people living on the site, drinking shallow groundwater, or recreating on the piles. EPA identified unacceptable levels of lead in the yard soil at approximately 300 residential properties in the site. The cleanup of those contaminated yards has been completed. However, many residences are located immediately adjacent to the uncontrolled mine waste piles. These piles are used for recreation by nearby residents including young children. The piles are also a continual source of contamination to nearby soil, including residential yards, and surface water through erosion and runoff.	2003	2014
MO	Oronogo-Duenweg Mining Belt	Uncontrolled mine waste piles containing high levels of lead, and other heavy metals, are located on approximately 7,000 acres of land throughout this county-wide site. These waste piles cause lead and other heavy metal contamination in surrounding soils, groundwater, and surface water resulting in potential exposure to people living in the site, drinking the shallow groundwater, or recreating on the waste piles. EPA identified unacceptable levels of lead in the yard soil at 2,700 residential properties in the site. The cleanup of those contaminated yards has been completed. Also, alternate sources of drinking water have been provided to homes with lead and cadmium-contaminated groundwater used as drinking water throughout the site. However, many residential properties are located immediately adjacent to lead contaminated mine waste piles. These piles are used for recreation by nearby residents including young children and are also a continual source of contamination to nearby soil and surface water through runoff. Significant development within the communities has also resulted in encroachment of new housing into contaminated mine areas with new homes being built very near mine waste piles.	1990	After 2015
MO	Southwest Jefferson County Mining	Mine waste was used for fill and grading in residential settings where direct exposure is highly probable upon any disturbance of the soil. The lead contamination in soil exceeds health-based criteria in hundreds of residential properties. As of April 20, 2009, EPA has completed remediation of soil at 129 residences. Residential soil remediation is ongoing as an additional 294 properties have been identified with elevated lead contamination that will need to be addressed.	2009	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
MO	Washington County Lead District-Old Mines	The primary risk at the site is exposure to lead from contaminated soil and groundwater/drinking water. The setting is both small town and rural with numerous residential properties contaminated with lead in surface soil and/or private well water caused by historical mining activity. The site currently covers approximately 90 square miles.	2008	After 2015
MO	Washington County Lead District-Potosi	The primary risk at the site is exposure to lead from contaminated soil and groundwater/drinking water. The setting is both small town and rural with numerous residential properties contaminated with lead in surface soil and/or private well water caused by historical mining activity. The site currently covers approximately 45 square miles.	2008	After 2015
MO	Washington County Lead District-Richwoods	The primary risk at the site is exposure to lead from contaminated soil and groundwater/drinking water. The setting is both small town and rural with numerous residential properties contaminated with lead in surface soil and/or private well water caused by historical mining activity. The site currently covers approximately 45 square miles.	2008	After 2015
MT	Libby Asbestos Site	Many areas of the site still need cleanup and present significant threats to public health. Vermiculite from the former Libby Mine contains a toxic form of naturally occurring amphibole asbestos. The site consists of residential/commercial properties in the towns of Libby and Troy, Montana, as well as the former vermiculite mine site. The former mine site is posted with warning signs. EPA has cleaned up over 1,000 residential/commercial properties and major known source areas in the towns of Libby and Troy. Residential and commercial property cleanups will continue into the foreseeable future. EPA is working with the responsible party to determine the full nature and extent of contamination at and from the former mine site.	2003	After 2015
MT	Upper Tenmile Creek Mining Area	People are likely to come into contact with arsenic, lead, and cadmium-contaminated soil and mining wastes in the community of Rimini and the Landmark subdivision, a small group of private homes approximately 10 miles from Rimini.	2000	2010
NC	Barber Orchard	There is uncontrolled access to contaminated soil at the site in a residential setting. The pathway of exposure is incidental ingestion of soil. Arsenic is the driving contaminant of concern—cancer and noncancer health risks exist.	2001	2013
NC	Ward Transformer	The source property is an industrial setting, but contaminants have migrated to wooded off-site areas including creeks and reservoirs. The site is in metro Raleigh, NC, which has a large population that is potentially affected via trespassing or fish ingestion. PCB is the contaminant of concern, posing a cancer health risk.	2003	2011
NE	Omaha Lead	Lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. As of December 2007, EPA has completed soil remediation at more than 3,800 highly contaminated residential properties at the Omaha Lead site, and these actions are ongoing.	2003	2014
NH	Fletcher's Paint Works & Storage	Unacceptable current exposure exists from consumption of fish containing PCBs above acceptable levels from the Souhegan River.	1989	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
NJ	Caldwell Trucking Co.	Contaminated groundwater continues to seep onto surface soils and discharge into surface water streams and into the Passaic River. Direct contact with the seep contamination is possible due to the location of the seep in a residential area. The contaminants of concern are volatile organic compounds, including TCE and 1,1,1 trichloroethane.	1983	2013
NJ	Martin Aaron, Inc.	Soils are contaminated with arsenic and benzo[a]pyrene that pose a direct contact threat. Although the site is fenced, there is evidence of violation of temporary controls.	1999	2011
NJ	NL Industries	Recent sediment samples taken from a nearby stream, as part of the ongoing biological sampling requirements, showed that the lead levels exceeded the cleanup standard established for sediments and stream banks in a portion of the stream at this site.	1983	2010
NJ	Roebling Steel Co.	Evidence shows repeated violations of temporary controls that have been established to prevent exposure to site-wide, contaminated soils. Soils are contaminated with elevated levels of heavy metals, including surficial lead at levels up to 69,000 mg/kg, which well exceeds the health-based residential screening level of 400 mg/kg.	1983	2015
NJ	Universal Oil Products (Chemical Division)	There is ongoing ingestion of fish and crabs from Berry's Creek and its tributaries. Fish tissue collected from these water bodies has been found to contain elevated levels of mercury.	1983	After 2015
NJ	Ventron/Velsicol	There is ongoing ingestion of fish and crabs from Berry's Creek and its tributaries. Fish tissue collected from these water bodies has been found to contain elevated levels of mercury.	1984	After 2015
NJ	Vineland Chemical Co., Inc.	There is continuing direct contact exposure to arsenic-contaminated sediments and surface water in nearby wetlands and surface water bodies, as well as exposure to arsenic in fish. Key public areas have been posted with safety/security/public health signage while EPA collects additional data and works with the state on fish consumption advisories.	1984	After 2015
NJ	Welsbach & General Gas Mantle (Camden Radiation)	The cleanup of radiologically contaminated soil in residential neighborhoods is ongoing.	1996	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
NV	Carson River Mercury Site	People are likely consuming mercury contaminated fish. The Nevada Health Division advises that game fish and carp should not be consumed from most of the site. The Lahonton Reservoir, located roughly in the middle of the site, is one of Nevada's most popular sport fishing destinations. In 1998, a walleye caught in the Lahontan Reservoir had a record high mercury tissue concentration of 16 parts per million. Based on more recent sampling results, the state Health Officer issued a health advisory that fish from the Carson River from Dayton to the Lahontan Reservoir should not be consumed. At heavily used fishing locations in and around the reservoir, the state has posted warning signs that fish from the river and reservoir should not be consumed. Despite this new health advisory, in July 2007, two men were caught at the Lahonton Reservoir with 155 fish over the legal limit. This suggests that fish consumption from the Lahontan Reservoir is still continuing on an individual basis or through commercial sales.	1990	After 2015
NY	Hudson River PCBs	There is ongoing ingestion of fish caught from the river. Fish tissue has been found to contain elevated levels of PCBs.	1984	After 2015
NY	Onondaga Lake	There is ongoing ingestion of fish caught from the lake and its tributaries. Fish tissue has been found to contain elevated levels of mercury and PCBs, and New York State has issued fish consumption advisories.	1995	After 2015
OH	Copley Square Plaza	The unacceptable human exposure is from vapor intrusion into the indoor air of residences adjacent to the site. The contaminants of concern are PCE and its degradation products. At high vapor concentrations, PCE is both a potent anesthetic agent and a cardiac epinephrine sensitizer.	2005	2011
OK	Tar Creek (Ottawa County)	People may be exposed to lead in soils, chat piles, chat bases, and mill ponds. Tribal members live throughout the area and eat plants grown on, or animals feeding near, the contaminated areas, and some people continue to trespass and use the contaminated areas for recreational purposes. The contaminated area is vast, and it is not possible to prevent all access to the waste.	1983	After 2015
OR	Portland Harbor	Portland Harbor includes approximately 11 river miles of the lower Willamette River located in the Portland metropolitan area (population over 1 million). The river is used extensively for transportation and recreation (i.e., boating and fishing) by area residents. Sediment contamination includes PCBs, dioxin, PAHs, metals, and pesticides. Exposure pathways include direct contact with beach and in-water sediment, as well as fish and shellfish consumption. Risks from consumption of resident fish are higher than other pathways, and the highest cancer and noncancer risk is associated with PCBs and dioxins.	2001	After 2015
PA	Bally Groundwater Contamination	Chemicals in vapor form have been identified in indoor air at the industrial park, which is the source of contamination at the site. Indoor air samples revealed concentrations of TCE above acceptable limits.	1987	2010
PA	Crossley Farm	People may be exposed to TCE contaminated indoor air.	1993	2011

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
PA	Havertown PCP	A potential current human exposure threat exists for a residential area called the Recreation and Open Space area of the site. This area currently contains contaminated soils that are at or above cleanup action levels for PCP and dioxin. The contamination is located at the 4- to 8-foot below grade level.	1983	2010
PA	Price Battery	Lead contamination in soil and dust exceeds health-based cleanup criteria in residential yards and interiors.	2005	2013
PA	Salford Quarry	The site continues to impact groundwater and surface water with boron and volatile organic compounds, including TCE.	2009	2015
RI	Centredale Manor Restoration Project	Nearby residents and recreational users of the Woonasquatucket River are reasonably anticipated to be exposed to unacceptable levels of dioxin and other contaminants through contact with sediment in the river and floodplain. Ingestion of fish from the Woonasquatucket River also poses an unacceptable risk. The river and riverbank are active recreational areas.	2000	After 2015
RI	Peterson/Puritan, Inc.	Unacceptable exposure pathways exist for individuals known to trespass on the site. Unacceptable current risk is posed when people come in contact with soil and debris that is primarily contaminated with heavy metals and PAHs above acceptable levels at both the Nunes parcel and J.M. Mills landfill portions of the site. The Nunes and J.M. Mills landfill parcels are partially fenced and gated to restrict access to the extent practicable, but portions of the site abut a river where fencing is not practical. EPA is aware that regular, frequent trespassing occurs. EPA continues its efforts to dissuade entry to the site, including regular replacement of locks, signage, coordination with local law enforcement, etc. However, evidence of trespassing is routinely observed.	1983	2011
TX	Jones Road Groundwater Plume	Some residents are still dependent on private wells for their domestic water supply and can be exposed to tetrachloroethene (and other chlorinated solvent degradation products) in the groundwater. Approximately 150 residential and commercial users have been connected to a water supply system that was completed in 2008. Even after installation of the water line was completed, some of the private well owners who have tetrachloroethene concentrations above the maximum contaminant level have not agreed to be connected to the water line. The Texas Commission on Environmental Quality will discontinue providing service for the filtration system to those well owners who have not chosen to be connected to the water line. After the water line is operational, and the infrastructure has been transferred to the water service provider, it will be the responsibility of each property/well owner to arrange for the installation of their own filtration system and filtration system maintenance.	2003	2012

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
TX	Petro-Chemical Systems, Inc. (Turtle Bayou)	Current human exposure is considered not controlled for soil since the Monitoring Well-109 area of the site needs to be remediated, and the remedial action is planned in spring 2010. Human exposure is also considered not controlled for groundwater. The groundwater monitoring is under way by the responsible parties before the establishment of the technical impracticality waiver zone, after which contaminated groundwater migration will be considered to be under control.	1986	2010
UT	Davenport and Flagstaff Smelters	People can potentially come into contact with soil contaminated with lead and arsenic. Remediation has been completed at two of three operable units. The unremediated operable unit has unacceptable exposure risks to workers from contaminated soil in the commercial area and to trespassers in the undeveloped area.	2003	2011
UT	Eureka Mills	People are in contact with soil and dust contaminated with lead from mining activities. The site consists of residential and mining-impacted areas with limited access.	2002	2011
UT	Jacobs Smelter	There are two potential human health exposures to soil contaminated with lead and arsenic at the site: residential and recreational. The cleanup levels are focused on lead since addressing the lead contamination will also address the arsenic contamination. The residential exposure is expected to be limited to a relatively small number of residential lots known to have soil lead contamination above cleanup levels. The recreational exposure includes an undeveloped area. The exposures to recreational users would be caused by inhalation of contaminated dust from activities such as riding all-terrain vehicles that are known to occur at the site.	2000	2013
VA	Atlantic Wood Industries, Inc.	The Atlantic Wood Industries Superfund site, located along the Elizabeth River in Portsmouth, Virginia, is a former wood-treating site that has extensive creosote contamination. The site also has heavy metals, PCP, and dioxin contamination. The site is considered "current human exposures not under control" because (1) recreational users of the river could come into direct contact with sediments contaminated with creosote nonaqueous phase liquid that could cause an acute impact with one exposure, (2) consumers of large quantities of shellfish are exposed to unacceptably high levels of contaminants, (3) Atlantic Wood Industries currently operates a prestressed, precast concrete manufacturing business at the site where workers are exposed to surface soils, and (4) workers at the Norfolk Naval Shipyard are exposed to surface soils when they trespass regularly to go from a parking area to their work areas.	1990	2014
WA	Commencement Bay, Near Shore/Tide Flats	There is direct human exposure to arsenic and lead as a result of contaminated yard soil. Almost all yards will be remediated within the next 2 years. Long-term controls will be required to prevent future exposure in unremediated areas. At other problem areas, consumption of contaminated fish and shellfish is the major issue. Although there is a "do not eat" fish advisory with signs posted throughout the site, this area is home to many low-income and non-English speaking people who are likely fishing anyway.	1983	After 2015

State	Site name	Description of human exposure risk	Fiscal year site was listed on the NPL	Estimated fiscal year human exposure will be controlled
WA	Commencement Bay, South Tacoma Channel	Well 12A is a City of Tacoma drinking water supply well that has been contaminated by releases from the Time Oil Superfund site. At this time, there is still considerable contaminant source material in the ground that provides an ongoing release to the drinking water aquifer. There is wellhead treatment at this well, but there are other supply wells in the area that the city plans to use more rigorously in the future. If they do this, they will pull the contaminant plume toward those wells.	1983	2015
WA	Lower Duwamish Waterway	Unacceptable risks are posed by consumption of contaminated fish and shellfish. Although there is a "do not eat" fish advisory with signs posted throughout the site, this area is home to many low-income and non-English speaking people who are likely fishing anyway. Also, there is a lower but not insignificant risk from direct contact with contaminated sediments.	2001	After 2015
WA	Midnite Mine	The site includes an open pit uranium mine on an American Indian reservation and mine-impacted groundwater, surface water, and sediments. EPA assessed risk based on tribal members consuming wild-harvested plants, fish, and game and spending time (either as a visitor or a resident) on site, with associated exposures (for example, residents would be exposed to site radiation, radon in air, metals, and radionuclides in drinking water). The mine area is now fenced, but affected surface water and sediments are accessible to people and the plants/animals they consume. Health advisory information likely reduces their exposure, but exposure will only be under control when site conditions result in conditions that meet media cleanup levels and resulting risk reduction.	2000	2015
WI	Sheboygan Harbor & River	The current unacceptable human exposure is due to human ingestion of contaminated fish. Fish contaminants of concern are PCBs and heavy metals, including arsenic, chromium, copper, lead, and zinc. Fishing has been observed. Fish are taken off-site, and EPA believes the fish are being consumed. People who eat PCB-contaminated fish can experience health problems, including cancer, liver disease, and problems with the immune and endocrine systems. During pregnancy and lactation, mothers can pass PCBs and other chemicals to their infants. Because these chemicals affect development, children through adolescence and women of childbearing age are more sensitive to their harmful effects and should be especially careful.	1986	2015

Sources: EPA data and regional officials' responses to our survey.

Appendix IV: Sites Receiving Recovery Act Funding

EPA identified 51 sites to receive Recovery Act funding. Table 5 provides the amount of Recovery Act funds EPA allocated to each site and the planned use of these funds.

Table 5: Amount and Planned Use of Recovery Act Funds for Superfund Sites

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
CA	Frontier Fertilizer	2.5	EPA is nearing completion of the design for an in-place electrical resistive heating system to treat pesticide-contaminated soil and groundwater to a depth of 80 feet below ground. However, recently collected data indicate much higher levels of contamination at greater depths, which will require additional infrastructure and power to treat. Given these additional needs, EPA will use Recovery Act funds to fund the expansion of the heating system and associated power costs to address the deeper contamination. EPA anticipates that this additional treatment will accelerate cleanup by removing greater contaminant mass in soil and, thereby, reducing the contaminants affecting groundwater resources, a potential source of drinking water.
CA	Iron Mountain Mine	20.2	EPA will use Recovery Act funds to reduce the time needed to dredge, treat, and dispose of heavy metal-contaminated sediment located in the Spring Creek Arm of the Keswick Reservoir. This accelerated activity will take approximately 18 months to complete rather than the previously anticipated 3 years. EPA will construct pipelines and pump stations to move contaminated sediment from the Spring Creek Arm of Keswick Reservoir to a disposal cell. Removing these contaminated sediments will allow the Central Valley Project to produce $3 to $6 million of additional peak power per year. This additional power production will be possible because current operational constraints imposed to prevent contaminated sediment releases to the Shasta Dam and the Spring Creek Power House will no longer be needed.
CA	Sulphur Bank Mercury Mine	1	EPA will use Recovery Act funds to start the cleanup of mine wastes. EPA's primary efforts will be planning and coordinating activities with the Elem Pomo Tribe; the procurement of a construction subcontractor; the initiation of work to provide temporary water supply, sewer service, and access for Elem Indian Colony residents during the cleanup; and planning efforts to assure the performance of mine waste excavation and disposal efforts.
CO	Central City, Clear Creek	1.4	EPA will use Recovery Act funds to consolidate and cap additional mine waste piles, implement sediment control and drainage controls, and treat water to mitigate heavy metal impacts to Clear Creek. Reclaimed areas will be revegetated and restored. This work moves the project one step closer to completion by assisting in the recovery of aquatic life in the North Fork of Clear Creek. Work at the site will also reduce metal loads entering the watershed supplying water to Denver area residents.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
CO	Summitville Mine	17	EPA will use Recovery Act funds to construct the Summitville water treatment plant. The plant's construction is the final long-term cleanup activity planned at the site and will lead to achievement of the site-wide construction completion milestone ahead of schedule.
DE	Standard Chlorine of Delaware, Inc.	2.7	EPA will use Recovery Act funds to complete removal of the remaining 800 totes of bulk liquid chemicals. In addition to completing the tote removal, EPA will use the Recovery Act funds to upgrade the groundwater treatment system, which will reduce future years' funding needs.
FL	Escambia Wood-Pensacola	3.5	EPA will use Recovery Act funds to speed up the ongoing cleanup of off-site properties and more quickly eliminate human exposure pathways to contaminants. The Recovery Act funding will also accelerate ongoing on-site construction, which will lead to completion of the soil cleanup earlier. Speeding up the cleanup schedule will make the site available for earlier redevelopment.
FL	Tower Chemical Co.	8.5	EPA will use Recovery Act funds to speed up ongoing cleanup activities. The funds will support the excavation and off-site disposal of the remaining contaminated soils in the immediate areas surrounding the site's former wastewater pond and burn/burial area, sediments in a shallow drainage ditch, and sediments in two wetland areas. The work will also include backfilling and revegetation of excavated areas and wetland restoration. EPA expects that removal of these remaining source soils, estimated at 28,000 cubic yards, will expedite the cleanup. A follow-up action for deeper groundwater contamination may be necessary to reach groundwater cleanup goals.
FL	United Metals, Inc.	7.4	EPA will use Recovery Act funds to begin the long-term cleanup action, which includes excavating contaminated soil and sediment. After excavation, EPA will treat the contaminated soil and sediment by solidification and stabilization. Treated soil and sediment will be placed in an on-site containment cell. The excavated areas will be backfilled and revegetated. EPA will restore the nearby wetlands after the contaminated sediment is excavated. The Recovery Act funds will allow for completion of the soil containment system.
GA	Brunswick Wood Preserving	8.3	EPA will use Recovery Act funds to speed up completion of the ongoing long-term construction, primarily to support the capping of the containment cells and groundwater treatment. EPA expects completion of these activities will eliminate the ongoing impacts to Burnett Creek.
GA	Woolfolk Chemical Works, Inc.	1.8	EPA will use Recovery Act funds to support the on-site work for the ongoing action at the former facility property. Specific work activities will consist of soil excavation, on-site soil treatment, backfilling, stockpiling for off-site disposal, grading, closure, and revegetating the property.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
ID	Bunker Hill Mining & Metallurgical Complex	15	EPA will use Recovery Act funds to expedite the Coeur d'Alene Basin residential cleanup program, which is a top priority for the site and key to protecting public health. EPA estimates that the basin residential cleanup will be completed in fiscal year 2015. With the Recovery Act funding, EPA believes that this aspect of the site's cleanup could be completed 2 years earlier, by the end of fiscal year 2013.
IL	Outboard Marine Corp.	18	EPA will use Recovery Act funds to conduct the demolition of a facility contaminated with PCBs and to excavate and dispose of off-site PCB-contaminated soil and sediment. Demolition of the building will enable the property to be redeveloped, in accordance with the city's plans, while groundwater restoration steps are under way.
IN	Continental Steel Corp.	6	EPA will use Recovery Act funds to support cleanup actions related to the groundwater and slag processing area. To address the large portion of the aquifer contaminated with volatile organic compounds, EPA will use the Recovery Act funds to install groundwater extraction wells, operate the wells to contain the existing contaminant plume, and remove contaminated groundwater and send it off-site for treatment. EPA also will use the Recovery Act funds to regrade the slag pile and to install a protective soil cover over the area once the regrading is complete.
IN	Jacobsville Neighborhood Soil Contamination	13	EPA will use Recovery Act funds to conduct all of the cleanup and restoration work at approximately 125 homes in the first operable unit. Lead and arsenic-contaminated residential soils will be excavated to the depth of elevated concentrations, a maximum depth of 2 feet. EPA will dispose of contaminated soil off-site. Yards will then be reseeded and returned to their original condition. This cleanup will be the start of the first long-term cleanup action at the site. Use of the Recovery Act funds will allow EPA to speed up the cleanup of the first operable unit, which will result in the reduced exposure of residents to contaminants.
KS	Cherokee County	15	EPA will use Recovery Act funds to support cleanup activities at the Badger, Lawton, Baxter Springs, and Treece subsites. At the Badger and Lawton subsites, EPA will use the funds to support the initial base year of cleanup work consisting of excavation, consolidation, capping, and revegetation of approximately 120 acres or 700,000 cubic yards of mine waste. This activity will address all surface mine and mill wastes at these subsites. The funding will enable the project to be completed in a 3-year time frame. At the Baxter and Treece subsites, the Recovery Act funds will support the ongoing excavation, consolidation, capping, and revegetation activities associated with approximately 380 acres, or 2.1 million cubic yards, of mine waste. EPA anticipates that the funding will support the completion of these activities, which are addressing the final area of surface mine and mill waste at the site. EPA expects that Recovery Act funds will expedite the projected 10-year cleanup.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
MA	Hatheway & Patterson	20	EPA will use Recovery Act funds to fully implement the comprehensive site remedy and achieve site-wide construction completion of the site. Cleanup construction activities will involve the excavation of approximately 31,000 cubic yards of soil exceeding cleanup levels. Soils containing dioxin and oily material will be disposed of off-site at a licensed facility, while soils containing pentachlorophenol, semivolatile organic compounds, and arsenic will be consolidated on-site under a low-permeability cover. EPA expects that a portion of the site will be reused as a commuter railroad parking facility. Other areas of the site will also be made ready for future commercial uses and/or open space as a result of cleanup actions.
MA	New Bedford Harbor	30	EPA will use Recovery Act funds to supplement existing funds for ongoing dredging efforts, which will accelerate cleanup activities. While the entire cleanup effort will extend beyond the use of this additional funding, the funds will speed up these efforts by allowing the dredging of a larger volume of contaminated sediment from the highly contaminated upper harbor. The accelerated cleanup will help facilitate the city's plans to develop shoreline public access, recreational boating, competitive rowing, and wetland restoration in the upper and lower harbor areas.
MA	Silresim Chemical Corp.	14	EPA will use Recovery Act funds to achieve site-wide construction completion for the Silresim site. The specific activities EPA will conduct with these funds include cleaning up contaminated soil using thermally enhanced soil vapor extraction, which involves heating 67,000 cubic yards of contaminated soil over an approximately 1.25-acre area, and removing and treating the contaminated vapor from these soils. EPA will also complete construction of the final cover on the Silresim property, which will make a portion of the site ready for potential future reuse.
MN	South Minneapolis Residential Soil Contamination	20	EPA will use Recovery Act funds to conduct all cleanup and restoration work at the approximately 500 remaining residential properties with soils above the arsenic soil cleanup standard. The activities include the excavation and off-site disposal of all contaminated soil above the cleanup standard, with excavation to occur to a depth of 12 inches in lawn areas, and 18 inches in garden areas. If confirmation samples from the base of the excavation show arsenic levels above the acute arsenic cleanup standard, EPA will continue excavating soil until the acute standard is met or foundation depth is reach. Once excavation is complete, the properties will be restored to their original condition. The activities also include establishing institutional controls on properties where excavation is not possible due to access restrictions.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
MO	Madison County Mines	11.1	EPA will use Recovery Act funds to support ongoing excavation, replacement, and disposal of approximately 205,000 cubic yards of lead-contaminated residential soil at approximately 800 residential properties. Consistent with EPA's overall site cleanup approach, this activity will address the highest priority and greatest risk to human health at the site—exposure of young children to lead-contaminated residential soil. EPA anticipates that the Recovery Act funding will allow for the projected 4- to 5-year cleanup to be completed on an expedited schedule.
MO	Oronogo-Duenweg Mining Belt	10	EPA will use Recovery Act funds to support excavation and disposal of the site's contaminated mining wastes, soils, and sediments. Recovery Act funds also will support capping of the disposal areas, backfilling and revegetating excavated areas, and constructing wetlands to improve surface water cleanup. The additional funding will expedite the ongoing cleanup action by addressing an additional 600 to 800 acres of contaminated mining waste and soil.
MT	Upper Tenmile Creek Mining Area	6.5	EPA will use Recovery Act funds to expedite the ongoing cleanup and to start new work. Ongoing work to be supported by Recovery Act funds includes the removal of waste from residential yards in the community of Rimini and the Landmark subdivision, removal of waste at the Lee Mountain Mine, placement of waste in the Luttrell Repository, and additional stabilization and partial capping of the repository. New work to be performed with Recovery Act funds will be the removal of waste from the Rimini Road area.
NC	GMH Electronics	1.5	EPA will use Recovery Act funds to extend the existing City of Roxboro's municipal drinking water line to the area affected by the contamination. Residences that have contamination attributable to the site in their private drinking water wells, or are located within a 500-foot buffer area of the contaminated groundwater plume, will be offered a connection to this public water supply. A follow-up action will be needed to address contaminated sources, contaminated groundwater, and any other contaminated media caused by the site.
NC	Sigmon's Septic Tank Service	1	EPA will use Recovery Act funds to begin cleanup activities to excavate contaminated soil. After being excavated, EPA will dispose of the contaminated soil off-site. EPA will backfill and revegetate the excavated area.
ND	Arsenic Trioxide Site	13.8	EPA will use Recovery Act funds to accelerate the project to bring safe drinking water to approximately 180 remaining rural households and to expand the water treatment and distribution facilities to handle the increased demand. EPA estimates that the project schedule will be accelerated by 1 year. Specific activities include drilling two additional water supply wells, installing an additional water treatment filter, constructing an additional reservoir and pump house, modifying four existing reservoirs, and extending water distribution lines.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
NE	Omaha Lead	25	EPA will use Recovery Act funds to significantly increase the pace of ongoing long-term soil cleanup and lead-based paint stabilization activities. Small businesses with incentives to hire and purchase materials locally will conduct the work. While EPA will need to continue work at this site in future years, the funding will help expedite implementation of the final cleanup approach for the site, estimated to be completed in 5 to 10 years.
NH	Ottati & Goss/Kingston Steel Drum	2	EPA will use Recovery Act funds to support the next round of the ongoing in situ chemical oxidation work.
NJ	Cornell Dubilier Electronics Inc.	30	EPA will use Recovery Act funds to accelerate the cleanup of contaminated soil and debris. Contaminated soils will be treated on-site using low temperature thermal desorption. Soils that cannot be cleaned through on-site treatment will be transported off-site for disposal. Addressing the contaminated soils will allow redevelopment to begin at the industrial park, which is part of a Borough of South Plainfield-approved redevelopment plan.
NJ	Emmell's Septic Landfill	3	EPA will use Recovery Act funds to accelerate the cleanup of PCB-contaminated soil remaining at the site. The funds will support the start of excavation and off-site disposal of contaminated soil, backfilling of the excavated soil, and revegetation of the affected area. This action will alleviate potential risks associated with direct contact with PCB-contaminated soil and the potential inhalation of contaminated dust. While addressing the site's contaminated soil, EPA will begin interim cleanup activities to address groundwater, which calls for the on-site construction of a groundwater extraction and treatment system to control movement of the contaminated groundwater off of the site property.
NJ	Horseshoe Road	5	EPA will use Recovery Act funds to accelerate the cleanup of the remaining on-site soils that act as a source of contamination to the groundwater and surface water, which drain into the Raritan River.
NJ	Imperial Oil Co., Inc./Champion Chemicals	25	EPA will use Recovery Act funds to accelerate the cleanup of the remaining contaminated soil components, which are the major source of contamination to the groundwater beneath the site. Accelerating the cleanup of the site soils is expected to reduce the overall site cleanup cost and hasten the reuse/redevelopment of the site.
NJ	Monitor Devices	3	EPA will use Recovery Act funds to start groundwater cleanup activities.
NJ	Price Landfill	16	EPA will use Recovery Act funds for construction and operation of a groundwater extraction and treatment system near the site property. This system will control further migration of groundwater contamination. After implementation of the source control action, which includes capping of the landfill, a groundwater remedy will be put into place to address the down-gradient portion of the groundwater contaminant plume. The goal of this remedy is aquifer restoration. Accelerating the implementation of the source control action will reduce the cost associated with restoring the aquifer.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
NJ	Roebling Steel Co.	27	EPA will use Recovery Act funds to remove approximately 242,000 cubic yards of contaminated sediments from the Back Channel Delaware River and Crafts Creek. The sediments are contaminated with varying degrees of metals, including, lead, copper and zinc, and PAHs. The project will include dredging and dewatering contaminated sediments, placement of sediments in the slag area, stabilization of Back Channel shoreline, and wetland restoration of affected areas. EPA expects that cleanup of the contaminated sediments will accelerate the overall site cleanup, which may increase reuse and redevelopment potential.
NJ	Vineland Chemical Co., Inc.	20	EPA will use Recovery Act funds to accelerate the cleanup of the remaining stretches of Blackwater Branch. The associated contaminated sediments are the major remaining source of arsenic contamination to the Maurice River (designated as a scenic river) and Union Lake (the second largest lake in New Jersey). EPA anticipates that accelerating the cleanup of the Blackwater Branch will reduce the overall cleanup of the site by approximately 2 years.
NJ	Welsbach & General Gas Mantle (Camden Radiation)	22	EPA will use Recovery Act funds to clean up the radiologically contaminated soils around the former General Gas Mantle facility in Camden. The EPA believes the cleanup of the General Gas Mantle property will serve as a catalyst for redevelopment of the area.
NM	Grants Chlorinated Solvents	4	EPA will use Recovery Act funds to expedite the construction of the groundwater remedy, which includes the installation of wells for enhanced biological treatment, in situ chemical oxidation, and thermal desorption to destroy the chlorinated solvents in the groundwater. EPA will be flexible in constructing the individual components of the remedy at the site. Installation of the groundwater remedy will eliminate the source of the indoor air contamination and ensure that the vapor mitigation systems currently being installed on 14 houses above the groundwater plume function as intended. Installation of the groundwater remedy will also protect the source of the area's drinking water by preventing contamination from migrating to the deeper aquifer.
NY	Lawrence Aviation Industries, Inc.	5	EPA will use Recovery Act funds to implement a portion of the groundwater remedy for the site, which consists of an extraction and treatment system and the in situ chemical oxidation process. These actions, aimed at source control, will prevent the further migration of groundwater contaminants beyond the plant site boundary. Over time, the actions also will eliminate further contamination of down-gradient surface waters and sediments in Old Mill Pond and Old Mill Creek in Port Jefferson.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
NY	Old Roosevelt Field Contaminated GW Area	10	EPA will use Recovery Act funds to accelerate the cleanup of the contaminated groundwater and to protect two municipal well fields that extract water from the site's sole-source aquifer. EPA anticipates that accelerating the cleanup of the groundwater will eliminate the need for treatment of the public water supply in the future. Given the risks associated with chlorinated solvent contamination in groundwater, shortening the cleanup time frame will be protective of the more than 8,000 people who get their drinking water from the public water supply.
OK	Tar Creek (Ottawa County)	34.5	EPA will use Recovery Act funds to continue the ongoing voluntary relocation efforts of Picher, Cardin, and Hockerville residents. EPA projects that the relocations will be completed within 3 years. Additional funds will be used to accelerate the start of the chat excavation from the remote areas of the site and from area streams. Other additional work to be performed includes constructing a repository, providing alternate water supply to two rural residential properties, and conducting cleanup of rural residential yards. EPA is currently negotiating with several mining companies to complete the work on their operating areas of the site. EPA expects that the use of Recovery Act funds will accelerate the overall cleanup. As chat at Tar Creek is addressed, the land will become available for agricultural development.
PA	Crossley Farm	6.5	EPA will use Recovery Act funds to start the construction necessary to begin the site's groundwater cleanup activities. Once this project is completed, and the plume is addressed, EPA will focus future cleanup efforts on the source area.
PA	Havertown PCP	4.2	EPA will use Recovery Act funds to complete cleanup activities at the site. The remaining cleanup activities include work to improve the performance of the groundwater treatment system, which among other actions, will involve installing an additional deep recovery well. Other cleanup activities include excavating the open recreational area and backfilling it with clean soil, removing a portion of the abandoned sewer line, installing three new extraction wells and up to five new monitoring wells, and implementing ecological sampling to demonstrate habitat and fish community recovery. EPA also plans to implement institutional controls to protect the site's cleanup.
SD	Gilt Edge Mine	3.5	EPA will use Recovery Act funds at the Ruby Repository portion of the site to grout unlined portions of the clean-water ditches and to repair/replace existing liners. The repair of these ditches will reduce the volume of acid rock drainage collected and treated at the water treatment plant. The Recovery Act funding is expected to lead to a long-term cleanup completion of operable unit 3 and enable future funding to focus on the remaining site cleanup.
TX	Garland Creosoting	6	EPA will use Recovery Act funds to expedite achievement of site-wide construction completion.

Dollars in millions

State	Site name	Amount of Recovery Act funds provided	Description of the planned use of Recovery Act funds[a]
UT	Bountiful/Woods Cross 5th S. PCE Plume	5	EPA will use Recovery Act funds to start the cleanup work at operable unit 2, which will consist of installing additional groundwater extraction and monitoring wells and constructing a water treatment system.
UT	Eureka Mills	26.5	EPA will use Recovery Act funds to accelerate the cleanup of mine waste and residential areas by 1 year. Specific work to be performed includes the stabilization and capping of three large mine waste areas, construction of drainage control features to contain contaminated runoff so that cleaned up areas are not recontaminated, and the cleanup of the lead-contaminated soils at approximately 160 residential properties.
VA	Atlantic Wood Industries, Inc.	3.7	EPA will use Recovery Act funds to start cleanup approximately 1 year earlier than expected. EPA anticipates that initial cleanup activities will include stabilization of creosote-soaked soils, construction of an earthen berm to contain some of the contaminated sediments that will be dredged in a future phase, shoreline stabilization work, soil excavation and consolidation, and wetland mitigation work. EPA expects that the work at this site will create job opportunities and create redevelopment opportunities once completed.
VT	Elizabeth Mine	8	EPA will use Recovery Act funds to begin the final phase of a non-time critical removal action to control the three major source areas responsible for acid rock drainage and leachate. This work will contribute to the cleanup actions targeted to eliminate acid rock drainage from the site's waste piles and will also reduce the leachate generated by the tailing impoundments. The final phase is a 3- to 4-year project, a portion of which will be funded via the Recovery Act. This funding will allow EPA to begin and complete this phase sooner than planned, which will shorten the time period for improvement of water quality.
WA	Commencement Bay, Near Shore/Tide Flats	5	EPA will use Recovery Act funds to support activities at the Ruston/North Tacoma study area, which encompasses approximately 950 acres located in a 1-mile circle around the former Asarco Tacoma smelter. Both the smelter and the study area are part of the larger site. Recovery Act resources applied to this area will complete residential cleanup involving excavation of contaminated soils from residential yards, park lands, and rights-of-way.
WA	Wyckoff Co./Eagle Harbor	2.3	EPA will use Recovery Act funds to upgrade and supplement existing groundwater extraction wells and to install an additional one. The funds will also be used to demolish existing structures at the site so that the sheet-pile wall can be completed, and the soil cap can be constructed. EPA projects that the entire containment remedy will be completed in 5 to 7 years with assistance from the Recovery Act funds.

Sources: EPA data and regional officials' responses to our survey.

[a]EPA may currently be implementing these planned actions, and some actions may be complete.

Appendix V: Comments from the Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 21 2010

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

Mr. John B. Stephenson, Director
Natural Resources and Environment
Government Accountability Office
Washington, DC 20548

Dear Mr. Stephenson:

Thank you for the opportunity to comment on the draft report entitled "EPA's Estimated Costs to Remediate Existing Sites Exceed Current Funding Levels, and More Sites Are Expected to be added to the National Priorities List (GAO -10-380)." We appreciate the collegial working relationship and dialogue with GAO as this report was developed. We also want to commend GAO for undertaking this important study with respect to budget issues in the Superfund Remedial Program.

I am responding on behalf of the Office of Solid Waste and Emergency Response (OSWER) as well as the Office of Enforcement and Compliance Assurance (OECA) and the Office of the Chief Financial Officer (OCFO). Their comments have been incorporated into this consolidated EPA response. Below are our most significant comments on the report's one recommendation and on the information provided in the report itself. Other technical comments are included in the Enclosure.

Recommendation

GAO recommends that "the EPA Administrator determine the extent to which EPA will consider vapor intrusion in listing NPL sites and its effect on the number of sites listed in the future".

EPA agrees with this recommendation. While EPA currently does consider vapor intrusion impacts in both the remedial and removal cleanup programs, as part of its Integrated Cleanup Initiative, the Agency is evaluating whether vapor intrusion needs to be more specifically addressed in the Hazardous Ranking System (HRS) model. In addition, the Office of Solid Waste and Emergency Response is developing a final version of its Vapor Intrusion Guidance, establishing a vapor intrusion website, and producing technical papers to improve our ability to address this issue.

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General Comments

With respect to the overall funding situation, EPA's Administrator and the Administration face extremely difficult decisions about where to allocate scarce resources, and the funding level requested as part of the President's Budget request represents what the Administration believes is the best balance of funding decisions across many competing environmental priorities. We recognize that the Superfund remedial program has the capacity to use additional resources if and when they are available, as is evident in its utilization of the $600 million provided through the American Reinvestment and Recovery Act (ARRA). The President's budget in both FY2010 and FY2011 proposed reinstating the Superfund tax, and that would provide additional funds for Congress to appropriate. Given currently available resources, EPA will continue to work to make sure that it uses its Superfund resources in the most effective manner possible to complete work at sites as expeditiously as possible with the funding we receive.

In FY2010, EPA launched the Integrated Cleanup Initiative (ICI) to increase the pace and efficiencies of EPA's land cleanup programs. As part of the ICI, we have committed to a new publically reported performance measure of Superfund remedial action project completions. This new measure, which will begin in FY2011, will provide greater accountability and transparency of the detailed, incremental actions necessary to bring site cleanup to completion, and ultimately reuse. As part of the ICI, we will identify opportunities to maximize program resources and identify additional efficiencies. The ICI will evaluate all phases of our cleanup programs including 1) starting cleanups; 2) advancing cleanups and; 3) completing cleanups.

There are, however, two issues that EPA has determined require more clarification within the report. First, it is important to highlight early in the report that people are not typically in danger of immediate harm at "sites with unacceptable human exposure," which we label Human Exposure Not Under Control sites or HE NUC sites. When acute health threats are identified, the Agency takes immediate action to address them using our time critical removal authorities. It should be noted as well that funding for these actions comes from a different part of the Agency's Superfund budget, so it is not in competition with the remedial program's budget. Otherwise, EPA is taking longer-term actions to characterize the risks and/or address the threats to human health at these sites. In addition, it should be noted, that EPA does not use the word "unknown" when classifying a site as Human Exposure Insufficient Data (HE ID). We believe to label it as "unknown" fails to reflect the Agency's efforts to develop the site characterization necessary to determine whether people are exposed at unsafe levels at a site.

In addition, GAO notes that the Regional cost estimates are likely understated, since they do not include funding for sites where a responsible party is currently funding remedial construction but may be unable to do so in the future. In this regard, GAO should recognize that in cases where responsible parties are conducting remedial construction under existing settlement agreements; those agreements require those parties to maintain financial assurance mechanisms to ensure that response actions are completed if the parties are unable to do so. Over the last several years, EPA has made considerable efforts to ensure that financial assurance mechanisms are in place for existing response settlements and to ensure that financial assurance mechanisms for all new response settlements are put in place in a timely fashion. Thus, in addition to

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Superfund appropriations, these financial assurance mechanisms are an additional potential source of funding for cleanup under existing response settlements. With respect to GAO's concerns about the effects on future funding, it is more likely that the Trust Fund would bear the cost of completing cleanups at sites where PRPs are experiencing financial difficulty but have not yet settled with EPA. They therefore may be unable to complete cleanups in the future, which would increase the burden on the Trust Fund.

In closing, we believe that there is substantial useful information in this report and applaud GAO for looking into these very important subjects. We hope to build off of the cooperative nature in which this review was performed and continue to work with GAO to improve the Superfund program. If you have any questions or concerns regarding our comments or responses to recommendations, EPA would be happy to meet with you prior to GAO finalizing this report. Please feel free to contact me or Robin Richardson at 703-603-9048 if there is any additional follow up required.

Sincerely,

Mathy Stanislaus
Assistant Administrator

Enclosure

cc: Barbara Bennett, OCFO
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Appendix VI: GAO Contact and Staff Acknowledgments

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Staff Acknowledgments

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