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Federal Liabilities Under Hazardous Waste Laws

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CBO STUDY ON FEDERAL AGENCY COSTS OF MEETING HAZARDOUS WASTE LAWS

A Congressional Budget Office study, *Federal Liabilities Under Hazardous Waste Laws*, examines the large and growing costs that federal agencies face to comply with current laws on the management, disposal, and cleanup of hazardous wastes. The Congress has enacted two major statutes--the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980--that require federal facilities, as well as private operations, to meet certain standards when handling or disposing of hazardous wastes or when cleaning up contamination caused by improper disposal. In addition, federal agencies must comply with all state hazardous waste laws. Estimates of the potential costs to improve current hazardous waste practices at federal facilities and to clean up contaminated federal sites are preliminary but could exceed $150 billion over the next three decades.

The Departments of Energy and Defense account for the largest share of federal facilities with hazardous waste compliance and cleanup requirements and, consequently, the bulk of federal liabilities. Almost every federal agency, however, handles some hazardous wastes and thus incurs some compliance or cleanup costs. This study describes the types and extent of the hazardous waste responsibilities that federal agencies face. It also discusses the numerous uncertainties behind current estimates of the budgetary impacts of addressing these federal responsibilities. Perhaps the greatest uncertainties in future federal costs for hazardous wastes stem from each agency's lack of detailed knowledge about the extent of contamination that exists at its facilities and the standards for cleanup that will eventually be required.

A status report on each federal agency's hazardous waste problems and its progress in complying with the major hazardous waste laws is provided in *Federal Agency Summaries*, a supplement to the CBO study. These agency summaries include information from the Federal Agency Hazardous Waste Compliance Docket, compiled by the Environmental Protection Agency, and from discussions with officials of these federal agencies.

This study was requested by the Senate Committee on Governmental Affairs and has been published, along with its supplement, as Senate Print 101-95.

Questions about the study should be directed to Mollie Quasebarth of CBO's Natural Resources and Commerce Division at (202)226-2940. The Office of Intergovernmental Relations is CBO's Congressional liaison office and can be reached at 226-2600. For additional copies of the study, please call CBO's Publications Office at 226-2809. For copies of the *Federal Agencies Summaries*, please call CBO's Natural Resources and Commerce Division at 226-2940.

CONGRESSIONAL
BUDGET OFFICE
Second and D Streets, S.W.
Washington, D.C. 20515

FEDERAL LIABILITIES UNDER HAZARDOUS WASTE LAWS

The Congress of the United States
Congressional Budget Office

PREFACE

The Congress has passed several major environmental statutes regulating how hazardous wastes are to be managed and disposed and how contamination is to be cleaned up. These legislative requirements were primarily directed at the hazardous wastes generated by industrial and commercial operations. Recently, however, hazardous waste problems at federal facilities have received increasing attention. As a result, federal agencies are beginning to address their own hazardous waste responsibilities under federal and state statutes.

This Congressional Budget Office study, prepared at the request of the Senate Governmental Affairs Committee, examines the growing financial liabilities that federal agencies face under hazardous waste requirements. While any projections of the federal costs involved are uncertain at this time, the costs of hazardous waste compliance and cleanup activities at federal facilities could exceed $150 billion over the next three decades. In keeping with CBO's mandate, this study makes no recommendations.

Mollie Quasebarth of CBO's Natural Resources and Commerce Division wrote this study, under the direction of W. David Montgomery, Roger Dower, and Roger Hitchner. Douglas Kendall gathered much of the information provided in the *Federal Agencies Summaries*, a supplement to this study. Bonita Dombey and Elizabeth Chambers, both formerly in CBO's National Security Division, prepared much of the information on the Department of Defense's hazardous waste activities. Harriet Komisar, of CBO's Human Resources and Community Development Division, and Ben Wolters, of CBO's Budget Analysis Division, provided valuable suggestions on earlier drafts. Numerous federal and state officials also responded to the many requests for information. Helpful comments from many individuals outside CBO, namely, Carl Bannerman, Mark Holt, Peter Johnson, and Edward J. Yang, are also appreciated. Sheila Harty edited the study and supplement. Gwen Coleman typed the numerous drafts, and Kathryn Quattrone prepared the paper for publication.

Robert D. Reischauer
Director

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SUMMARY AND INTRODUCTION

Hazardous wastes resulting from the activities of federal agencies are extensive, but their consequent costs of cleanup are as yet undetermined. Legal requirements for the proper management, disposal, and cleanup of hazardous wastes were originally conceived to regulate commercial and industrial activities, although not to the exclusion of federal activities. Recently, extensive hazardous waste problems have become apparent at federal facilities. Consequently, federal agencies are incurring large costs to improve current practices as well as to clean up contamination from past activities.

A broad range of federal activities generates, treats, and disposes of hazardous wastes. In addition, thousands of currently and formerly owned federal sites may be contaminated with hazardous wastes, as well as privately owned sites where federal agencies may have contributed. For the most part, federal agencies are only now learning the extent of their hazardous waste problems and their consequent costs under federal and state statutes.

Since 1976, the Congress has passed and amended two major environmental laws that establish federal programs to regulate how hazardous wastes are handled and to clean up sites where hazardous wastes were improperly disposed. States were given a large role in administering these programs and have often gone beyond the federal requirements. By becoming more aggressive in enforcing hazardous waste laws at federal facilities, states increase federal costs to greater but yet unknown levels.

These laws and their regulatory programs pose a substantial impact on the federal budget. Pressure will mount for funds to fulfill these responsibilities. Overlapping and changing regulations at the federal and state level make compliance and cleanup costs difficult to project. The federal costs of complying with federal and state hazardous waste laws could exceed $150 billion. Realistic estimates will require reliable information on:

- Types of hazardous wastes and their risks;
- Number of federal facilities and sites that require cleanup;
- Severity of the problems at each site; and
- Costs of cleanup at each site.

HAZARDOUS WASTES AND THEIR RISKS

Hazardous wastes are generally considered as solid and liquid wastes with the potential to affect human health or the environment adversely. In the Resource Conservation and Recovery Act of 1976, the Congress defined hazardous wastes as:

> Solid, liquid, or gaseous wastes, or combinations thereof, that may "cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness," or that may "pose a substantial present or potential threat to human health or the environment" when improperly handled.

The United States generates roughly 250 million metric tons of regulated hazardous wastes each year (see Box 1). The amount of hazardous wastes generated at federal facilities is uncertain. The Environmental Protection Agency (EPA) is currently awaiting response from federal agencies to a survey for information on this issue, which should be available in mid-1990. In the meantime, EPA estimates that the federal government owns about 1 percent of all facilities that generate hazardous wastes and about 8 percent of all facilities that transport, store, or dispose of hazardous wastes.

In the past, hazardous wastes were usually discharged directly into streams and rivers, dumped in the ocean, or disposed in landfills or surface impoundments, such as shallow unlined ditches, ponds, and waste pits. To comply with current laws, most hazardous wastes now are disposed in licensed facilities or destroyed by various treatment

processes. These processes include burning in high temperature incinerators, neutralizing to less toxic levels (such as adding an acid to an alkaline waste), changing into a solid form that is easier to handle

BOX 1
TYPES AND SOURCES OF HAZARDOUS WASTES

Hazardous wastes are what remains of commercial, industrial, and household chemical products after use. These wastes contain harmful substances that are carcinogenic, corrosive, ignitable, toxic, and reactive. When disposed in the air, water, or soil, hazardous wastes may pose significant risks and endanger human health and the environment.

The Environmental Protection Agency (EPA) regulates about 500 chemicals and substances that are subject to federal requirements for hazardous waste management or cleanup. The list includes toxic chemicals, such as trichlorethylene, benzene, dioxin, and polychlorinated biphenyls (PCBs); heavy metals, such as cadmium and lead; industrial by-products, such as fuels, oils, solvents, paints, and sludges; as well as pesticides, explosives, and asbestos.

The Congress and EPA specifically exclude certain categories of hazardous wastes from federal regulation: domestic sewage, agricultural wastes, some recycled industrial liquids, and household wastes (cleaning fluids, fuel oils, pesticides, and paints). EPA also excludes certain categories of high-volume, low-hazard wastes, such as ash and sludge from fossil fuel plants, cement kiln dust, gas and oil drilling fluids, and uranium and other mining wastes.

The federal government generates many of the same types of hazardous wastes at its maintenance and repair facilities, research laboratories, and military bases as do commercial and industrial operations. Some federal activities, however, produce hazardous wastes not generally found elsewhere. These federal activities include the production of munitions, nerve gases, and other chemical weaponry through the Department of Defense and the manufacture and testing of nuclear weapons through the Department of Energy. Some components in these highly radioactive and extremely toxic wastes remain lethal for hundreds, even thousands, of years. For some radioactive contamination, no cleanup technology yet exists. Cleanup efforts at some radioactive waste sites are expected to take decades and to cost extraordinary sums.

and less likely to migrate to the surrounding area, and separating components either to obtain end products that can be disposed separately or recycled. As a result of a law enacted in 1984, waste treatment and incineration are replacing land disposal for many types of hazardous wastes.

Hazardous wastes pose a risk because of their potential to endanger human health and to damage or destroy natural resources. The potential health risks range from topical effects, such as skin burns and rashes, to more chronic illnesses, such as cancer, brain damage, nerve and digestive disorders, and reproductive problems. These effects can occur either through direct contact with hazardous substances or, as is more likely, through indirect exposure to contaminated air or drinking water. Contamination also threatens vegetation, wildlife, and valuable natural environments, such as national parks and wetlands.

Because of improper disposal, hazardous wastes contained in landfills or shallow surface impoundments can pass through the soil and contaminate the groundwater, a major source of the nation's drinking water supply. Hazardous wastes placed in metal drums or storage tanks can corrode the containers, causing leakage into the surrounding soil and nearby surface water or groundwater. Vapors rising from uncovered waste sites can pollute the air, threatening those downwind or nearby the site. Rain and surface waters can also carry uncovered hazardous wastes off-site, contaminating the soil and groundwater of neighboring properties.

The discovery in 1978 of large amounts of wastes buried in the residential community of Love Canal in New York brought the severity of these environmental and health threats to the public's attention. The level of public and Congressional concern increased as similar sites were found across the country. Although the federal government owns a relatively small proportion of all hazardous waste sites, these federal sites contain some of the nation's most serious hazardous waste contamination.

Major Environmental Legislation on Hazardous Wastes

The major statutes that established federal programs to manage hazardous wastes and to enforce cleanup requirements at hazardous waste sites are the Resource Conservation and Recovery Act (RCRA) of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. RCRA regulates the generation, transportation, treatment, storage, and disposal of hazardous wastes. CERCLA, commonly known as Superfund, created a federal program that finances the cleanup of the nation's most contaminated waste sites. Each of these statutes had subsequent amendments--the Hazardous and Solid Waste Amendments in 1984, and the Superfund Amendments and Reauthorization Act (SARA) in 1986--which significantly strengthened and broadened the provisions of the statutes. Several other federal statutes address specific concerns posed by various types of hazardous substances (see Box 2).

The types of hazardous wastes regulated under the different federal statutes are not always consistent. For example, the Clean Water Act regulates more waste products than does RCRA. RCRA covers no radioactive waste management, but CERCLA covers hazardous waste sites contaminated with radioactive substances. Some state laws regulate hazardous wastes not covered by RCRA. For this Congressional Budget Office (CBO) study, hazardous wastes generally include what EPA specifically regulates under RCRA and CERCLA and what states regulate under their own hazardous waste programs.

Federal agencies, as well as private hazardous waste operators, face a confusing set of regulations under federal and state hazardous waste laws. These laws vary in the treatment and cleanup standards required. Some of the regulations that EPA is required to establish for treatment and cleanup under RCRA and CERCLA have yet to be issued. In addition, amendments to these laws generally result in stricter waste treatment standards and broader enforcement authority for EPA and state environmental agencies. In particular, SARA broadened the federal government's responsibilities at certain types of hazardous waste sites. The government's liabilities under some of these provisions, however, are still unclear.

BOX 2
MAJOR FEDERAL ENVIRONMENTAL LAWS

The *Federal Water Pollution Control Act of 1952* and the *Air Pollution Control Act of 1955* were the first two major statutes regulating emissions of hazardous substances in the air and water--the most likely channels for human exposure to hazardous waste. The Congress significantly strengthened these laws in the *Clean Air Amendments of 1970* (known as the Clean Air Act) and the *Federal Water Pollution Control Act Amendments of 1972* (known as the Clean Water Act).

The *Federal Environmental Pesticide Control Act of 1972* regulated the manufacture and use of pesticides and pesticide products to ensure safety according to directions on their labels. This act was amended by the *Federal Insecticide, Fungicide, and Rodenticide Act of 1975.*

The *Safe Drinking Water Act of 1974* aimed at protecting the public from various contaminants in the drinking water supply.

The *Toxic Substances Control Act of 1976* gave the Environmental Protection Agency (EPA) broader regulatory authority to identify and control chemical products that may threaten human health through their manufacture, commercial distribution, or disposal.

The *Resource Conservation and Recovery Act of 1976* (RCRA) provided for the overall management of hazardous wastes. RCRA established appropriate techniques and regulations for handling all hazardous wastes from "cradle to grave"--that is, from generation to disposal.

The *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) addressed a problem relatively ignored by RCRA--what to do about hazardous waste contamination from past disposal activities. CERCLA established a federal program, commonly known as Superfund, that would finance the cleanup of the nation's most contaminated waste sites. Superfund set detailed guidelines for cleaning up these sites and established a system of legal liability by which those responsible for the wastes would be forced to pay for their cleanup.

The *Hazardous and Solid Waste Amendments of 1984* significantly strengthened RCRA, primarily in response to EPA's slow progress in implementing it. These amendments also required the cleanup of contamination from leaking underground storage tanks, which CERCLA did not regulate.

The *Superfund Amendments and Reauthorization Act of 1986* (SARA) then strengthened CERCLA and significantly increased its fund from $1.6 billion to $8.5 billion to clean up the nation's most contaminated hazardous waste sites. SARA provided EPA with greater enforcement authority over those responsible for hazardous wastes, emphasizing permanent solutions rather than merely removal and relocation. SARA also mandated federal agencies to identify, investigate, and clean up any hazardous waste sites at their facilities.

The *Atomic Energy Act of 1954* still regulates the handling and storage of radioactive wastes, which are generated primarily at nuclear power reactors and at federal nuclear weapons plants. Although radioactive wastes are specifically excluded under RCRA, hazardous waste sites contaminated with radioactive wastes are regulated under CERCLA.

States play an important role in regulating hazardous wastes. In some cases, states were the forerunners in implementing hazardous waste treatment and disposal requirements. In other cases, states followed the federal lead in developing hazardous wastes laws and regulatory programs, including their own Superfund programs. In general, most states have responsibility for enforcing RCRA provisions at federal facilities within their jurisdictions, subject to EPA oversight. The EPA, however, enforces investigations and cleanups under CERCLA.

The extra costs imposed by requiring federal compliance with state hazardous waste laws is unknown but is almost certainly quite large. Under CERCLA, all federal facilities must meet any state hazardous waste standards, regardless of the costs. While many state environmental programs are relatively new or are still developing, several states--such as California and New Jersey--impose stricter hazardous waste standards than RCRA and CERCLA. These stricter standards may cover hazardous wastes that are excluded under the federal statutes, impose greater limits on how wastes are disposed, or set higher levels of cleanup at different types of disposal sites.

Furthermore, states have the authority to levy fines against federal agencies whose facilities do not comply with RCRA or with state standards for waste treatment. This state authority also extends to federal agencies that do not meet cleanup provisions negotiated among states, federal agencies, and the EPA. States may also force a federal facility to shut down operations that are not in compliance with hazardous waste laws. Lawsuits initiated by states or private interests against federal facilities for noncompliance may further drive up federal costs.

FEDERAL AGENCIES WITH HAZARDOUS WASTE RESPONSIBILITIES

Almost all federal agencies have previously or are currently generating or handling hazardous wastes. As a result, many agencies face potentially large liabilities for inadequate waste-handling and disposal practices, some of which have resulted in contaminated facilities. These practices may have met the standards enforced when the prob-

lems were created, but they do not meet the more stringent standards now. (See *Federal Agency Summaries* printed separately as a supplement to this CBO study.)

Federal Facilities Generating Hazardous Wastes

EPA defines a federal *facility* as an installation or landholding encompassing all contiguous land owned by a department or agency of the United States. Such federal facilities include defense installations, research laboratories, government office buildings, national parks, and national forests. A hazardous waste *site* is a specific place containing hazardous wastes and, therefore, one facility or installation may include numerous sites. The Hanford Reservation, located in Washington state, is only 1 facility, but it has over 3,000 hazardous waste sites resulting from nuclear weapons activities since the 1940s.

The Department of Defense (DoD) has, by far, the largest number of facilities that generate and dispose of hazardous wastes (1,579) and, similarly, the greatest number of hazardous waste sites (14,401). DoD installations generate hazardous wastes primarily through industrial operations to repair and maintain military equipment and through services provided by medical clinics, paint shops, fire departments, and laundries. Manufacturing and testing weapons at Army ammunition plants and proving grounds have caused some of the most serious contamination problems.

The Department of Energy (DOE) has fewer facilities with known or potential hazardous waste problems than does DoD. Yet, DOE's nuclear weapons complex has 20 facilities with highly toxic hazardous wastes--in fact, the most serious and costly contamination problem facing the federal government. DOE weapons plants generate hazardous wastes primarily through the research, development, production, and testing of nuclear weapons. Over the last five decades, large quantities of nuclear materials and toxic chemicals have accumulated, primarily in the production of plutonium. DOE also operates numerous nondefense research laboratories and electricity-generating plants that produce hazardous wastes. Many of these facilities will require cleanup.

Federal research laboratories use and dispose of many different types of hazardous materials. These laboratories are owned by EPA, the U.S. Department of Agriculture (USDA), the Department of Health and Human Services (HHS), the National Aeronautics and Space Administration (NASA), and the Department of Transportation's (DOT's) Federal Aviation Administration (FAA). The Coast Guard manages many maintenance and repair facilities that generate hazardous wastes, such as fuel oils, paints, degreasers, and other solvents. The General Services Administration (GSA) owns some federal office buildings contaminated with hazardous wastes, especially asbestos and polychlorinated biphenyls (PCBs). Other potential liabilities result from hazardous waste activities carried out at federal penitentiaries operated by the Department of Justice (DOJ). These activities include metalworking, printmaking, and woodworking by inmates.

Federal Agency Liabilities for Hazardous Wastes

Public lands--including national parks, national forests, wildlife refuges, and lands managed by the Bureau of Land Management (BLM) under the Department of the Interior (DOI)--contain many hazardous waste sites for which the federal government is liable. By law, the federal government must promote multiple uses on most public lands, ranging from recreational activities, such as camping and hiking, to various commercial activities. Thus, numerous sites for commercial mining operations and gas and oil exploration exist within the national parks and national forests. These sites, consequently, are contaminated with residual ores and chemicals used in the extraction processes. Most of these mining sites are now abandoned. The federal agencies involved are left with the responsibility of funding any cleanup efforts that CERCLA may require. Numerous municipal landfills also operate on public lands leased from these federal agencies. Some of these landfills, too, may contain hazardous wastes.

Federal lending agencies--such as the Small Business Administration (SBA), the Economic Development Administration (EDA), the Farmers Home Administration (FmHA), and the Resolution Trust Corporation--may be liable for cleaning up hazardous wastes at industrial and commercial properties acquired through foreclosure. These

agencies did not create the contamination, but CERCLA requires federal agencies to clean up properties before reselling them. A possible indirect cost of this liability is the resulting disincentive to foreclose on such properties. CERCLA also holds credit agencies liable for cleanup costs at privately owned sites where EPA determines that their loans enabled the owners to continue the activities that resulted in contamination.

The hazardous waste problems at facilities currently owned or operated by the federal government represent only part of its responsibility. The government is also responsible for hazardous waste problems that have occurred at facilities that it no longer owns or never owned. DoD itself is responsible for more than 7,000 formerly owned sites that DoD is investigating for contamination. The DOJ incurs costs of cleaning up hazardous waste at illegal drug laboratories confiscated by federal agents. Federal agencies are also liable for cleanup costs at private sites where they contributed to the contamination.

EXTENT AND DEGREE OF CONTAMINATION AT FEDERAL FACILITIES

Currently, more than 2,300 facilities owned by federal agencies handle hazardous wastes or contain hazardous waste contamination. More than 7,100 properties formerly owned by federal agencies may incur financial liabilities from contamination problems. Federal agencies will likely discover additional federal liabilities from hazardous wastes as they continue to assess their hazardous waste activities and requirements.

The Federal Agency Hazardous Waste Compliance Docket, compiled by EPA, is a list of federally owned facilities that handle or store hazardous wastes or that contain actual contamination problems. This *docket* is the primary source of information about the number of facilities with potential hazardous waste problems. The docket includes facilities that fully comply with current regulations, as well as those that require compliance or cleanup activities. Nevertheless, the docket is not inclusive. This CBO study is supplemented, therefore, with other sources of data. The docket of November 16, 1988--an

update of the original February 1988 docket--contains 1,099 federal facilities, as shown in Summary Table 1. EPA published the second docket update on December 15, 1989, listing 1,268 federal facilities. This CBO study bases its analysis on the November 1988 update in order to reflect the progress that federal agencies have made in investigating and cleaning up their facilities.

SUMMARY TABLE 1. NUMBER OF FEDERAL FACILITIES WITH POTENTIAL HAZARDOUS WASTE REQUIREMENTS, BY AGENCY

Agency	Docket Facilities	Other Facilities[a]
Department of Agriculture	39	52
Department of Defense	572	8,125
Department of Energy	66	42
Department of the Interior	263[b]	74
Department of Transportation	48	53
Other Agencies	111	11
Total	1,099[c]	8,357

SOURCE: Federal Agency Hazardous Waste Compliance Docket, November 16, 1988, update, and the Congressional Budget Office based on conversations and written information from federal agency officials.

a. Represents 7,147 formerly owned federal facilities that are not included on the docket and 1,210 currently owned federal facilities identified by the agencies. Of the latter, 1,007 are defense installations listed in the Department of Defense's *Annual Report to Congress for Fiscal Year 1989* for DoD's Defense Environmental Restoration Program. These facilities were not listed in the November 1988 docket update but may be in subsequent updates.

b. Almost 200 of these are individual hazardous waste sites, such as landfills and mines on public lands managed by the Bureau of Land Management, rather than standard federal facilities that sometimes contain multiple sites.

c. Differs from the published total of 1,170 federal facilities as some facilities were listed twice, some were not owned by the agency listed, and some did not meet the reporting requirements for inclusion.

The number of docket facilities each agency owns varies greatly. Over 50 percent of the docket facilities are DoD installations. While DOI appears to have a substantial number of facilities with potential hazardous waste problems, relative to other agencies, this number is deceiving. Almost 200 of the DOI docket entries are not standard federal facilities, which sometimes have multiple hazardous waste sites. Rather, these DOI entries represent individual hazardous waste sites, such as landfills and mines on BLM-managed public lands. EPA and DOI officials could not combine individual waste sites under specific "facilities" as they do for other docket entries, such as national parks, because of the indistinct boundaries of BLM lands.

The docket lists the number of federal facilities that generate and dispose of hazardous wastes or contain known contamination; beyond this, however, the docket has limited usefulness. The seriousness of contamination problems varies greatly among facilities. About 40 percent of the docket facilities listed had reported a hazardous waste release, but cleanup may or may not be required. Although potentially harmful, releases range from relatively minor at remote hazardous waste sites on public lands to extremely toxic radioactive wastes at nuclear weapons plants. DOE's hazardous waste problems may appear small judging by the number of DOE docket facilities. The cost of cleaning up the contamination at DOE's Hanford Reservation alone, however, may exceed the federal cleanup costs of all other agencies combined.

The National Priorities List (NPL) is a second source of information about hazardous waste problems facing the federal government. Facilities, both public and private, that are on the NPL are those judged by the EPA to present the greatest risks to human health and the environment. These facilities must be cleaned up under specific CERCLA standards, and so are sometimes referred to as Superfund sites. As of November 1989, 1,219 facilities were either listed on the NPL or proposed for future listing. Federal facilities account for 114 or about 10 percent of all NPL sites. DoD owns 92 of these. Of the remaining 22 federal facilities on the NPL, 10 are DOE weapons facilities.

This CBO study also includes 8,357 facilities that federal agencies identified as having potential hazardous waste contamination problems that the docket does not include, as shown in Summary Table 1. Of these, 7,147 are formerly federal owned facilities, and 1,210 are currently owned federal facilities. The latter are excluded from the docket primarily because the agency has not yet or has only recently reported them to the EPA. These currently owned federal facilities may appear in future docket updates.

Status of Agency Efforts to Clean Up Federal Facilities

Federal agencies have not completed much cleanup so far. Some progress has been made, however, in evaluating the extent of hazardous waste problems. Most agencies have completed initial assessments of contamination problems at their facilities on the federal docket. Yet, agencies have completed few of the more detailed investigations required at the most seriously contaminated facilities. RCRA and CERCLA specify stages of investigation and cleanup for hazardous waste sites. SARA requires initial assessments and establishes some cleanup schedules specifically for federal facilities. Over the next few years, agencies expect to continue their investigations. When completed, the investigations will provide the information needed to project the amount and timing of federal spending that cleanup will require.

Agencies have indicated that 375 of the 1,099 docket facilities--or 34 percent of all docket facilities--are not expected to need further investigation or cleanup, as shown in Summary Table 2. At the remaining 724 docket facilities that may require hazardous waste cleanup, agencies have completed only 29 comprehensive investigations, referred to as a Remedial Investigation/Feasibility Study (RI/FS). All facilities on the NPL must undergo an RI/FS. The RI/FS characterizes the type and extent of contamination, the associated risks to human health and the environment, and the types and costs of various cleanup options. The total number of federal facilities that will eventually require extensive cleanup is uncertain. Still, almost all of the 114 federal facilities on the NPL will undergo major cleanup once the required RI/FSs have been submitted to EPA.

Federal agencies indicated that only 30 docket facilities have been cleaned up. Some of these facilities had only small contamination problems; most of these were relatively minor individual waste sites located on public lands. Since these facilities were not on the NPL, the RI/FS procedure was not required. Cleanup continues at other federal docket facilities, but mostly involves only removing the hazardous wastes to reduce imminent threats to human health. At many of these

SUMMARY TABLE 2. NUMBER AND STATUS OF FACILITIES LISTED ON THE FEDERAL AGENCY HAZARDOUS WASTE COMPLIANCE DOCKET, BY AGENCY

Agency	Total Docket Facilities	No Further Action Needed[a]	Remedial Investigation/ Feasibility Study Complete	Cleanup Under Way[b]	Cleanup Complete
Department of Agriculture	39	12	0	1	1
Department of Defense	572	111[c]	25	51	3
Department of Energy	66	6	0	20	3
Department of the Interior	263	151	2	2	15
Department of Transportation	48	24	2	3	0
Other Agencies	111	71	0	9	8
Total	1,099	375	29	86	30

SOURCES: Congressional Budget Office based on conversations and written information from federal agency officials, and agency annual reports to the Congress on hazardous waste activities for fiscal year 1988.

a. As indicated by the agency; the Environmental Protection Agency has not yet determined whether further investigations or cleanup activities will be necessary at most facilities.

b. Includes interim cleanup activities, corrective actions taken under requirements of the Resource Conservation and Recovery Act of 1976, and remedial activities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

c. The Department of Defense provided no information on the number of its docket facilities where no further action was expected to be needed. The Department of Defense's *Annual Report to Congress for Fiscal Year 1989* for DoD's Defense Environmental Restoration Program stated that about 70 percent of DoD's sites that were investigated so far required further investigation or cleanup activity. This estimate of 111 facilities represents 30 percent of the 369 DoD docket facilities with completed initial assessments.

facilities, long-term cleanup projects may be needed in addition, such as treating contaminated soil or groundwater.

Similarly, agencies have initiated few detailed investigations at the 8,357 facilities that are not on the federal docket. Yet, these non-docket facilities may have significant hazardous waste problems for which the federal government is liable. Cleanup activities have been completed or at least started at fewer than 200 of these facilities, most of which represent limited cleanup at defense sites.

EFFECT OF COMPLIANCE AND CLEANUP REQUIREMENTS ON THE FEDERAL BUDGET

Federal agencies will spend over $4 billion in fiscal year 1990 striving to comply with federal and state hazardous waste laws. Until recently, the primary effect of RCRA and CERCLA on the federal budget was the administrative costs to EPA--that is, costs for designing, implementing, and enforcing the hazardous waste laws. The federal costs of complying with these laws, however, now outweighs the costs of administering them. Future compliance and cleanup costs will almost certainly rise significantly above current levels. To estimate future funding needs, several categories of costs must be considered:

- *Operational compliance* with hazardous waste treatment laws on a routine, ongoing basis at all federal facilities;
- *Corrective action* on currently improper or inadequate hazardous waste treatment and disposal practices to bring operating facilities into compliance;
- *Investigation and cleanup* of hazardous waste contamination at inactive sites, often referred to as environmental remediation or restoration; and
- *Research and development* in reducing wastes, designing better cleanup technologies, and disposing of radioactive wastes permanently.

The chart below provides examples of these categories of costs. Generally, operating facilities incur costs for corrective action under RCRA provisions, while inactive hazardous waste sites typically incur cleanup costs under CERCLA. Some active facilities, however, may contain inactive sites and thus incur costs under both RCRA and CERCLA. EPA and DOE primarily incur research costs.

Cost Category	Type of Action
Operational compliance:	Monitor soil and groundwater near hazardous waste disposal sites;
Corrective action:	Upgrade waste treatment and disposal facilities at operating facility;
Investigation and cleanup:	Remove and treat contaminated soil and groundwater; and
Research and development:	Design and demonstrate radioactive waste immobilization technologies.

Federal spending for hazardous waste requirements is not reflected in a single budget account. Agencies generally do not assign the costs of most operational compliance and many corrective actions in specific environmental budget accounts. These costs are commonly included elsewhere in agency budgets, such as the operating budgets of individual facilities. Some agencies also include remedial investigation and small cleanup costs in their operating and maintenance budgets. The federal government's radioactive waste disposal program, managed by DOE, is funded partly by fees charged for nuclear-generated electricity as well as from DOE budgetary resources.

Current Federal Spending for Hazardous Waste Management and Cleanup

The Congress appropriated about $3.3 billion in fiscal year 1989 and $4.2 billion in fiscal year 1990 to federal agencies for specific haz-

ardous waste activities, as shown in Summary Table 3. In addition, EPA's 1990 budget for managing the federal RCRA and CERCLA programs is about $2.1 billion. DOE and DoD, combined, received more than 95 percent of the 1989 and 1990 appropriations for corrective

SUMMARY TABLE 3. BUDGET APPROPRIATIONS FOR HAZARDOUS WASTE CLEANUP AND COMPLIANCE FOR FISCAL YEARS 1989 AND 1990, BY AGENCY
(In millions of dollars)

Agency	1989	1990
Department of Agriculture	5	20
Department of Defense	1,155	1,402
Department of Energy[a]	1,985	2,618
Environmental Protection Agency	1	1
Department of the Interior	16	24
Department of Justice	11	28
National Aeronautics and Space Administration	26	30
Postal Service	39	40
Tennessee Valley Authority	0	2
Department of Transportation	52	19
Veterans Administration	5	12
Total	3,295	4,196

SOURCE: Congressional Budget Office based on conversations and written information from federal agency officials.

NOTE: Only figures of the Department of Defense and the Department of Energy include hazardous waste compliance costs required under the Resource Conservation and Recovery Act of 1976; most of the funds appropriated to the other agencies cover mainly costs for investigation and cleanup of hazardous waste contamination.

a. Includes hazardous waste corrective actions, remedial activities, and waste management costs of $1,657 million in 1989 and $2,218 million in 1990, plus the costs of routine operational compliance of $328 million in 1989 and an estimated $400 million in 1990.

actions and for investigation and cleanup. DOE budget appropriations also include cost estimates of routine operational compliance. No other federal agencies had these estimates available. The budget figures for federal agencies other than DOE and DoD do not include all costs for corrective action and compliance with RCRA. While these compliance costs may be small, relative to DOE and DoD, they may be significant among all federal agencies.

Agency estimates for hazardous waste spending over the next five years are even more limited and incomplete. Only DOE has projected the full costs for its compliance, cleanup, and waste management activities between 1991 and 1995. DOE estimates these costs at more than $21 billion. This estimate represents annual hazardous waste spending over the five-year period at much more than the amount appropriated in 1990. DoD has requested $1.5 billion for fiscal year 1991, an 8 percent increase over its 1990 hazardous waste appropriations. DoD officials could not provide estimates of hazardous waste expenditures beyond 1991. In summer 1989, DoD projected its annual spending requirements for hazardous waste cleanup for the 1991-1995 period at about $500 million, the same amount spent in 1989. The Congress appropriated $601 million for these activities in 1990. DoD's budget request for hazardous waste cleanup in 1991 is now $817 million. Based on recent DoD appropriations and requests, funding estimates for DoD compliance and cleanup activities over the next five years could be as much as $9 billion.

Other federal agencies have indicated a need for budgetary resources of roughly $1.1 billion for hazardous waste activities over the 1991-1995 period. For the most part, these costs reflect hazardous waste projects planned for the next few years and not total hazardous waste spending for these agencies.

Long-Term Costs at Facilities of the Departments of Energy and Defense

Only DOE and DoD have provided preliminary estimates of the costs for carrying out anticipated hazardous waste activities in future years. In December 1988, DOE published *Environment, Safety, and Health*

Needs of the U.S. Department of Energy (known as the *Needs Report*). The *Needs Report* estimated that DOE's costs for environmental compliance and cleanup through the year 2010 would total between about $71 billion and $111 billion. These estimates reflect all environmental compliance, cleanup, and hazardous waste management costs, consistent with DOE's *Environmental Restoration and Waste Management Five-Year Plan*, published in September 1989. The estimates also include operational compliance costs but exclude costs for safety and health-related activities presented in the *Needs Report*. Estimates of the full costs of DoD's investigation and cleanup under CERCLA requirements range between $10 billion and $17 billion.

These long-term estimates of the spending requirements for hazardous waste activities at DOE and DoD are preliminary. The costs of cleanup projects now planned may decrease as new and more cost-effective technologies for waste treatment are developed. Spending will probably increase over time, however, as additional compliance and cleanup problems are discovered. This expectation is based, in part, on cleanup experience at private sites. Costs would also increase if new environmental legislation broadened federal liabilities for hazardous wastes or strengthened treatment and cleanup standards.

ISSUES BEFORE THE CONGRESS ABOUT FEDERAL HAZARDOUS WASTE REQUIREMENTS

Although difficult to estimate accurately, federal spending for compliance with federal and state hazardous waste requirements will be enormous. Federal costs for hazardous waste compliance and cleanup at defense and energy installations alone could approach $150 billion over the next 30 years. When the Congress passed RCRA, CERCLA, and, in particular, SARA and the Hazardous and Solid Waste Amendments, little knowledge was available about the effects of these programs on the federal budget.

Certain provisions in these statutes could even lead to greater federal liabilities and costs than are currently anticipated. State environmental requirements and enforcement authority over federal facilities will surely add to cleanup costs. Depending on judicial interpretations

of federal liabilities under CERCLA, federal lending agencies may incur large costs on contaminated properties acquired through foreclosure. Final determination on specific standards required of federal facilities will also have major implications for the costs of cleaning up nuclear weapons plants. Currently, DOE officials and the General Accounting Office have indicated radioactive contamination so extensive at several of these facilities, such as the Hanford Reservation, that complete cleanup may be technically and economically unfeasible. In that case, the contaminated areas, which have been referred to as *National Sacrifice Zones*, would be permanently sealed off from public access.

As the Congress faces increasing budget requests for hazardous waste cleanup, decisions must be made to allocate limited resources among contending priorities. As EPA Administrator William K. Reilly told the Senate Committee on Environment and Public Works:

> The [Superfund] program can pursue either complete cleanup at some sites, or incremental cleanup at many sites. It cannot fully accommodate both goals simultaneously.

The Congress needs to know the size and the relative risks of various hazardous waste problems in order to allocate available funds effectively. Yet, little is currently known about the direct effects of human exposure to hazardous wastes. These health risks vary according to the type of contaminant, the degree of human exposure, and the disposal of the particular waste. Approximating the relative risks to health and the benefits of hazardous waste regulations is difficult. Targeting federal resources efficiently on this limited basis is even more difficult.

How much specific cleanup standards may cost to meet is generally not a major consideration in RCRA and CERCLA provisions. CERCLA does include cost as one factor used to select appropriate cleanup technologies at Superfund sites. The technical requirements for cleanup standards, however, predominate the selection process. State environmental statutes, which federal agencies are required to meet, generally do not take costs into consideration.

The lack of a governmentwide system for evaluating the comparative risks of contamination at federal facilities poses problems for the Congress in appropriating funds. Currently, each federal agency determines how much money to request for specific environmental activities at its own facilities. Without a governmentwide priority system, the Congress cannot evaluate and compare these budget requests. A relatively minor contamination problem at a remote and abandoned mining site, consequently, may be cleaned up before a weapons site that poses more of a threat to human health.

On a broader scale, the Congress must weigh the costs and benefits of hazardous waste regulations at federal facilities against other sources of environmental pollution. A 1989 EPA report, *Comparing Risks and Setting Environmental Priorities*, placed the risks from hazardous waste sites among the lowest the agency has to address. The report concluded that the highest risks to human health came from air pollutants (such as radon), from pesticides, and from drinking water contamination. The report found that EPA had allocated substantially more resources to the relatively low-risk hazardous waste problems than to the high-risk radon and pesticides problems. Current and future costs incurred by federal agencies for hazardous waste activities must also compete with the costs of other national goals.

CHAPTER I

TYPE AND EXTENT OF HAZARDOUS WASTES AT FEDERAL FACILITIES

Most federal agencies deal with some hazardous wastes and thus face compliance with federal and state regulations. This federal responsibility differs according to the facilities where federal agencies manage hazardous materials and the activities that generate the wastes as well as to the type and degree of contamination that exists. This Congressional Budget Office study attempts to provide the Congress with a benchmark for the types of hazardous waste problems facing each federal agency and for the status of federal agencies in addressing these problems.

The federal government generates, transports, stores, and disposes of hazardous wastes in many diverse operations. The most toxic and costly problems occur in nuclear weapons production where large amounts of radioactive and other extremely hazardous wastes contaminate the facilities. The government also leases portions of the nation's public lands for commercial operations, such as landfilling and mining, which often result in contamination for which the federal government is responsible. Other federal activities involving hazardous wastes include replacing a leaking underground storage tank at a federal post office, installing a monitoring well at a federal prison to detect hazardous wastes in the soil or groundwater, and cleaning up a release of freon at a thermochemical test area at a space flight center.

About 2,300 currently owned federal facilities have compliance requirements for hazardous waste activities. The Department of Energy and Department of Defense account for the bulk of federal activities that generate hazardous wastes and the consequent contamination problems for which the federal government is liable. The government may also be liable for potential problems resulting from hazardous waste activities at more than 7,100 sites formerly owned by the federal government. In addition, the federal government may be liable for contamination problems at privately owned properties acquired

through foreclosure under federal credit programs. Further, the federal government may be liable for at least part of the cleanup costs at privately owned properties where federal agencies may have contributed to a contamination problem.

TYPES OF FEDERAL ACTIVITIES WITH HAZARDOUS WASTE REQUIREMENTS

Federal facilities differ widely in terms of the type of hazardous wastes found and the activities generating them. Thus, generalizations about contamination, compliance, or cleanup at a typical federal facility are themselves hazardous. The numerous federal activities that have led to hazardous waste contamination and the various federal liabilities that are subject to hazardous waste regulations account for the diversity of responsibilities facing the federal government. Table 1 lists federal facilities by activity to group those that may have similar hazardous waste problems.

DoD operates the largest number of facilities that generate hazardous wastes, most of which are forts and bases of the Army, Navy, or Air Force. These DoD facilities support many small industrial operations, such as vehicle and airplane maintenance, painting, and metalplating. Most of the hazardous materials found at DoD's 1,579 facilities are typical of many industrial operations: heavy metals and paint waste, solvents and degreasers, volatile organic compounds, petroleum, oil, and other fuels. The toxic by-products of manufacturing munitions and explosives have contaminated the soil and groundwater of many plants and sites operated by DoD. Some locations contain unexploded bombs and other artillery disposed on site. Extensive hazardous waste contamination exists at about 20 Army ammunitions plants and testing sites. For example, the Rocky Mountain Arsenal, which produced nerve gas and other chemical weapons, is the most contaminated DoD facility.

DOE activities at nuclear weapons research labs, production plants, and test sites have generated the most extensive and costly contamination problems. According to DOE officials, the widespread radioactive and hazardous waste contamination at many weapons

facilities reflects DOE's effort to meet the production goals of DoD's nuclear weapons program rather than to comply with hazardous waste laws. At many of these facilities, radioactive material and other toxic substances have contaminated the soil and groundwater. At some sites, the contamination has spread off-site and could endanger the

TABLE 1. NUMBER OF FEDERAL FACILITIES WITH POTENTIAL HAZARDOUS WASTE REQUIREMENTS, BY TYPE OF FACILITY

Type of Facility	Facilities
Army, Air Force, and Navy Bases (Department of Defense)	1,579[a]
Sites on Public Lands (Departments of the Interior and Agriculture)[b]	388
Nondefense Research and Testing Labs[c]	65
Hospitals and Medical Centers[d]	27
Energy Production Plants (Department of Energy and the Tennessee Valley Authority)	21
Nuclear Weapons Production Plants, Research Labs, and Weapons Test Sites (Department of Energy)	20

SOURCE: Federal Agency Hazardous Waste Compliance Docket, November 16, 1988, update, and agency annual reports to the Congress for fiscal years 1988 and 1989.

NOTE: Some of these facilities may have no known contamination, while others may have serious hazardous waste contamination.

a. Represents the defense installations included in the Department of Defense's *Annual Report to Congress for Fiscal Year 1989* for DoD's Defense Environmental Restoration Program. Also, these include 27 facilities of DoD's Defense Logistics Agency, as well as 1,552 Army, Navy, and Air Force facilities.

b. Includes individual hazardous waste sites on property under the Bureau of Land Management and separate facilities, such as national forests, national parks, fish and wildlife refuges, and facilities under the Bureau of Reclamation. Most of the sites are landfills, abandoned mines, and illegal dumping grounds.

c. Includes the Department of Energy, the Department of Agriculture, the Bureau of Mines within the Department of the Interior, the Tennessee Valley Authority, the Department of Commerce, the Environmental Protection Agency, and the National Aeronautics and Space Administration.

d. Includes the Veterans Administration, the Department of Defense, and the Department of Health and Human Services.

groundwater and thus the drinking water supplies of nearby properties. DOE is also currently managing five special remediation projects, which involve 29 former properties and other sites where radioactive contamination is being cleaned up.

The illegal dumping of hazardous wastes, their disposal in landfills, and their remains at mines have contaminated the nation's public lands. Currently, hazardous wastes contaminate at least 388 facilities and sites on public lands managed by the U.S. Department of Agriculture and the Department of the Interior, which include national forests and national parks. Problems at mining sites result from contaminants passing from discarded ore and other mining debris into the soil and groundwater. Most of these mines are now abandoned. Additional contaminated landfills and mines will probably be discovered as USDA and DOI continue to survey public lands for hazardous waste problems. Other federal facilities that generate hazardous wastes include research laboratories, test facilities and flight centers of the National Aeronautics and Space Administration, Coast Guard facilities, airports owned by the Department of Transportation, hospitals and medical centers, and federal office buildings.

Under provisions of the Comprehensive Environmental Response, Compensation and Liability Act, federal agencies also have responsibility for cleaning up contamination at formerly owned federal properties. The Department of Commerce (DOC) may be obligated to pay for cleanup at sites operated by the War Productions Board, a former DOC agency that monitored and operated industrial properties during World War II. DOC may be financially responsible for partial cleanup costs at the privately owned Avtex Fibers site in Virginia where the War Productions Board once operated. Similarly, the General Services Administration may be liable for cleaning up industrial properties that the War Assets Administration, a predecessor GSA agency, sold off after World War II.

The Department of Justice is responsible for confiscating illegal drug laboratories through criminal enforcement efforts. These laboratories often contain chemicals and contaminated glassware that are improperly handled. The Drug Enforcement Agency within DOJ is responsible for removing and disposing of contaminated materials at

these laboratories. The U.S. Marshals Service, also within DOJ, must clean up any drug laboratories that DEA seizes before they can resell these properties.

Federal credit programs may also lead to large federal liabilities for hazardous waste cleanup. Federal agencies that provide loans--such as the Small Business Administration, the Economic Development Administration (within DOC), the Farmers Home Administration, and the Resolution Trust Corporation, which is responsible for selling insolvent thrift institutions--often acquire private properties through foreclosure actions. CERCLA requires federal agencies to clean up any properties contaminated with hazardous wastes before reselling them to recover loan losses. The SBA and the EDA have noted that their cleanup liabilities under this provision, if held up in court, could be enormous. In some cases, the cleanup costs may be greater than the resale value of the properties.[1]

Another provision in the Superfund Amendments and Reauthorization Act places financial responsibility for cleaning up private hazardous waste sites on any party who provided a loan to the owner. EPA must determine, however, whether the loan allowed the operator to continue the activities that caused the contamination. Federal credit agencies provide loans to business and farmers who often engage in activities that generate or use hazardous materials and thus may require cleanup. Claims for the recovery of costs against federal credit agencies may succeed because these agencies, more so than private lenders, often provide technical advice to businesses and, therefore, may be more liable. At this time, whether EPA will name lenders as Potentially Responsible Parties at hazardous waste sites is uncertain. EPA will likely consider the lender's role as an advisor to the operators of the facility as a major cause for liability.[2]

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1. According to the Small Business Administration, federal lending agencies that obtain property through foreclosure should be exempt from cleanup obligations where they played no role in the contamination. The Department of Justice and the Environmental Protection Agency are evaluating this position. Their response will help clarify current and future federal liabilities at such properties.

2. The Environmental Protection Agency is currently investigating the extent of hazardous waste contamination at the Roebling Steel Plant in New Jersey, where the Economic Development Administration was the principal lender. As the agency in authority, the Department of Commerce may be partially liable for the cleanup costs, which are estimated to exceed $200 million.

EXTENT OF FEDERAL RESPONSIBILITIES FOR HAZARDOUS WASTES

The number of federal facilities that may require compliance or cleanup from hazardous waste activities is largely a function of how broadly liability for hazardous waste problems is ultimately defined. The primary source of data used in this study to develop an inventory of federal facilities with hazardous waste responsibilities was the Federal Agency Hazardous Waste Compliance Docket, established under SARA. Compiled by the EPA, this docket lists all federal facilities that have reported hazardous waste activities under three provisions of the Resource Conservation and Recovery Act and one of CERCLA. Such a listing includes most federal facilities that handle hazardous wastes or that have had hazardous waste spills or other types of contamination problems. Consequently, the docket identifies those facilities that may not fully comply with standards for hazardous waste management as well as those facilities that may have serious hazardous waste contamination. Table 2 lists the number of facilities on the docket by agency.

The docket update of November 16, 1988, contained 1,099 federal facilities. This listing, however, is not a complete accounting of federal hazardous waste activities and liabilities. The docket omits some facilities even where the federal government may incur costs for hazardous waste compliance or cleanup responsibilities. Facilities specifically omitted from the docket include formerly owned federal sites, private hazardous waste sites where the federal government contributed to the contamination, and federal facilities that generate small quantities of hazardous wastes. Also, the docket omits some federal facilities where agencies have not yet, or have only recently, reported hazardous waste activities to EPA.

Facilities Listed on the Federal Docket

RCRA and CERCLA require federal agencies to provide EPA with a history of their facilities that generate, transport, store, or dispose of

TABLE 2. NUMBER OF FACILITIES LISTED ON THE FEDERAL DOCKET, BY AGENCY

Agency	Facilities
Department of Agriculture	39
Army Corps of Engineers	17
Central Intelligence Agency	1
Department of Commerce	7
Department of Defense	572
Department of Energy	66
Environmental Protection Agency	14
General Services Administration	18
Health and Human Services	4
Department of the Interior	263
Department of Justice	2
National Aeronautics and Space Administration	12
Postal Service	5
Small Business Administration	1
Tennessee Valley Authority	17
Department of Transportation	48
Department of the Treasury	2
Veterans Administration	11
Total	1,099

SOURCE: Federal Agency Hazardous Waste Compliance Docket, November 16, 1988, update.

NOTES: The updated docket included 1,170 federal facilities; however, some are listed twice, some are not owned by the agency listed, and some did not meet the reporting requirements for inclusion. This table represents each agency's account of the number of facilities correctly attributed to that agency. Differences from the docket counts are explained in the *Federal Agency Summaries* printed separately as a supplement to this study.

The docket count represents the number of federal facilities with potential hazardous waste requirements at a given time and, thus, changes as the docket is updated.

hazardous materials or that have had some type of hazardous waste release or spill. From this data, EPA compiles the federal docket, updating it periodically. Regulatory authorities can use the docket data to track the progress of investigations and actual cleanup at those facilities. The categories for listing a facility on the federal docket provide a limited basis for assessing hazardous waste contamination. The four reporting categories are:

- RCRA Section 3005: facilities for which agencies have applied for an EPA permit for hazardous waste treatment, storage, or disposal activities;

- RCRA Section 3010: facilities where hazardous materials are generated, transported, treated, stored, or disposed;

- RCRA Section 3016: facilities with hazardous waste activities that federal agencies have reported in their inventories; and

- CERCLA Section 103: facilities for which agencies have reported any releases or spills of a hazardous substance.

Of 1,099 docket facilities listed, 434 reported hazardous waste releases or contamination only under CERCLA Section 103 or under RCRA Section 3016, as shown in Table 3. A facility that has reported some hazardous waste activity under RCRA Section 3016, but does not currently generate, transport, store, or dispose of hazardous materials, is assumed to have some type of hazardous waste contamination existing at the property. Reporting under RCRA Section 3005, 379 docket facilities or about 35 percent have applied for a RCRA permit to treat, store, or dispose of hazardous wastes. These facilities typically handle large quantities of hazardous wastes and thus, according to EPA, may have a greater potential for violations or spills. Of these facilities, 304 belong to DoD, and 33 belong to DOE. Of the total docket facilities listed, 130 facilities or about 12 percent are solely generators or transporters of hazardous waste. Such facilities have others treat, store, or dispose of their hazardous wastes and, thus, may have a lesser potential for violations or spills.

The docket provides a snapshot of the number of federal facilities with potential hazardous waste requirements at a given time. The actual docket count as of the November 16, 1988, update is 1,170 facilities, but the correct count is only 1,099. The docket lists some federal

TABLE 3. NUMBER OF FACILITIES REPORTED UNDER THE CATEGORIES OF THE FEDERAL DOCKET, BY AGENCY

Agency	Number of Facilities	RCRA, Section 3005	RCRA, Section 3010 Only	RCRA, Section 3016 or CERCLA Section 103 Only[a]
Department of Agriculture	39	2	2	28
Department of Defense	572	304	50	120
Department of Energy	66	33	2	22
Department of the Interior	263	7	14	231
Department of Transportation	48	4	23	11
Other Agencies	111	29	39	22
Total	1,099	379	130	434

SOURCE: Federal Agency Hazardous Waste Compliance Docket, November 16, 1988, update.

NOTES: Resource Conservation and Recovery Act of 1976, Section 3005: facilities that have applied for a permit from the Environmental Protection Agency for hazardous waste treatment, storage, or disposal.

Resource Conservation and Recovery Act of 1976, Section 3010: facilities that generate, transport, treat, store, or dispose more than 1,000 kilograms of hazardous materials in any month (those that generate less or are solely transporters were deleted in the November 1988 docket update).

Resource Conservation and Recovery Act of 1976, Section 3016: facilities that must be reported in agency inventories of any sites with hazardous waste activities.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Section 103: facilities that have reported any releases or spills of hazardous substances.

a. A facility not currently generating, transporting, treating, storing, or disposing of hazardous materials but assumed to have contamination on site because some hazardous waste activity was reported under RCRA Section 3016.

TABLE 4. NUMBER OF FEDERAL FACILITIES LISTED ON THE FEDERAL DOCKET, BY LOCATION

Location	Department of Agriculture	Army Corps of Engineers	Central Intelligence Agency	Department of Commerce	Department of Defense	Department of Energy	Environmental Protection Agency	General Services Administration	Health and Human Services
Alabama	--	--	--	1	6	--	--	--	--
Alaska	--	--	--	--	43	--	--	--	--
Arizona	--	--	--	--	9	--	--	--	--
Arkansas	1	--	--	--	4	--	1	--	--
California	3	--	--	--	80	6	--	2	--
Colorado	--	--	--	--	9	5	1	--	--
Connecticut	--	--	--	--	3	1	--	--	--
Delaware	--	1	--	--	2	--	--	--	--
D.C.	--	--	--	--	8	--	--	2	1
Florida	2	--	--	--	22	1	1	--	--
Georgia	--	--	--	--	11	--	--	--	--
Hawaii	--	--	--	--	23	1	--	--	--
Idaho	2	--	--	--	1	2	--	--	--
Illinois	--	--	--	1	9	2	1	--	--
Indiana	--	--	--	1	7	--	--	1	--
Iowa	1	1	--	--	1	2	--	--	--
Kansas	--	--	--	--	5	--	1	--	--
Kentucky	--	--	--	--	4	1	--	--	--
Louisiana	2	--	--	--	5	1	--	--	--
Maine	--	--	--	--	7	--	--	--	--
Maryland	1	--	--	1	26	--	1	1	2
Massachusetts	--	--	--	--	9	--	--	--	--
Michigan	1	--	--	--	6	--	--	--	--
Minnesota	--	--	--	--	4	--	--	--	--
Mississippi	--	1	--	--	6	--	--	--	--
Missouri	--	--	--	--	10	2	1	2	--
Montana	1	--	--	--	1	1	--	--	--
Nebraska	2	--	--	--	4	--	--	--	--
Nevada	--	--	--	--	1	--	--	--	--
New Hampshire	--	--	--	--	3	--	--	--	--
New Jersey	--	--	--	1	11	5	1	3	--
New Mexico	3	--	--	--	5	2	--	--	--
New York	1	--	--	--	23	5	--	5	--
North Carolina	1	--	--	1	25	--	--	--	1
North Dakota	2	1	--	--	3	1	--	--	--
Ohio	1	1	--	--	11	3	3	--	--
Oklahoma	2	2	--	--	6	--	--	--	--
Oregon	--	3	--	--	3	2	--	--	--
Pennsylvania	1	--	--	1	15	2	--	--	--
Puerto Rico	--	--	--	--	6	1	--	--	--
Rhode Island	--	--	--	--	7	--	1	1	--
South Carolina	--	--	--	--	10	1	--	--	--
South Dakota	--	--	--	--	2	1	--	--	--
Tennessee	--	--	--	--	7	3	--	--	--
Texas	4	3	--	--	34	2	--	1	--
Utah	1	--	--	--	6	2	--	--	--
Vermont	2	--	--	--	--	--	--	--	--
Virginia	--	1	1	--	36	--	1	--	--
Washington	3	2	--	--	12	9	1	--	--
West Virginia	3	--	--	--	2	--	--	--	--
Wisconsin	3	1	--	--	4	--	--	--	--
Wyoming	--	--	--	--	1	--	--	--	--
Guam	--	--	--	--	--	--	--	--	--
Trust Territory	--	--	--	--	--	--	--	--	--
Total	39	17	1	7	572	66	14	18	4

SOURCE: Federal Agency Hazardous Waste Compliance Docket, November 16, 1988, update.

(Continued)

TABLE 4. (Continued)

Department of the Interior	Department of Justice	National Aeronautics Space Administration	Postal Service	Small Business Administration	Tennessee Valley Authority	Department of Transportation	Department of the Treasury	Veterans Administration	Total
--	--	--	--	--	8	--	--	--	15
20	--	--	--	--	--	8	--	--	71
20	--	--	--	--	--	--	--	--	29
1	--	--	--	--	--	--	--	--	7
20	1	3	--	--	--	5	--	--	120
15	--	--	1	--	--	2	--	--	33
--	--	--	--	--	--	2	--	--	6
1	--	--	--	--	--	--	--	--	4
--	--	--	--	--	--	--	1	--	12
2	--	1	--	--	--	4	--	--	33
--	--	--	--	--	--	--	--	1	12
2	--	--	--	--	--	--	--	--	26
44	--	--	--	--	--	--	--	--	49
1	--	--	--	--	--	--	--	--	14
--	--	--	--	--	--	--	--	--	9
---	--	--	--	--	--	--	--	--	5
--	--	--	--	--	--	--	--	--	6
--	--	--	--	--	--	--	--	--	5
3	--	1	--	--	--	1	--	1	14
--	--	--	--	--	--	1	--	--	8
1	--	1	--	--	--	2	--	--	36
2	--	--	3	--	--	2	--	1	17
--	--	--	--	--	--	2	--	--	9
--	--	--	1	--	--	1	--	--	6
	--	--	--	--	--	--	--	--	7
1	--	--	--	--	--	--	--	--	16
8	--	--	--	--	--	--	--	--	12
1	--	--	--	--	--	--	--	--	7
50	--	--	--	--	--	--	--	--	54
--	--	--	--	--	--	--	--	--	3
3	--	--	--	--	--	3	--	3	29
30	--	1	--	1	--	--	--	1	43
5	--	--	--	--	--	2	--	1	42
--	--	--	--	--	--	2	--	--	30
--	--	--	--	--	--	--	--	--	7
1	--	2	--	--	--	--	--	--	22
2	--	--	--	--	--	2	--	--	14
7	1	--	--	--	--	3	--	--	19
3	--	--	--	--	--	--	--	--	22
--	--	--	--	--	--	1	--	--	8
2	--	--	--	--	--	--	--	1	12
--	--	--	--	--	--	--	--	--	11
--	--	--	--	--	1	--	--	--	4
--	--	--	--	--	8	--	--	--	18
2	--	1	--	--	--	2	--	--	49
8	--	--	--	--	--	--	--	--	17
--	--	--	--	--	--	--	--	--	2
2	--	2	--	--	--	1	--	--	44
6	--	--	--	--	--	2	1	--	36
--	--	--	--	--	--	--	--	--	3
--	--	--	--	--	--	1	--	1	10
--	--	--	--	--	--	--	--	1	2
--	--	--	--	--	--	--	--	--	8
--	--	--	--	--	--	--	--	--	2
263	2	12	5	1	17	48	2	11	1,099

NOTE: Dashes indicate no facilities.

facilities twice; some as federal that are not; and some that did not meet the reporting requirements for inclusion. The original docket (published on February 12, 1988) listed 1,245 federal facilities. The November 1988 update contained numerous removals, additions, and corrections, resulting in a net decrease of 75 facilities. EPA recently updated the docket again. This December 1989 update contains 1,268 federal facilities, although how many of these may be improperly listed is unclear. This CBO study uses the November 1988 docket update in order to assess the progress that agencies have made at these facilities.

DoD has the greatest number of facilities on the November 1988 docket. In fact, more than one-half of the 1,099 docket facilities belong to DoD. Of these, 169 are Army installations; 182, Navy; 193, Air Force; and the rest are part of DoD's Defense Logistics Agency. DOE has 66 facilities on the docket reporting hazardous waste management or cleanup requirements; 18 of these facilities form the defense weapons complex where the nation's nuclear weapons are developed, produced, and tested. The Bureau of Land Management is responsible for 199 of the 263 docket facilities listed for DOI. Another 15 federal agencies have reported facilities with hazardous waste activities.

Geographical Distribution of Docket Facilities. The docket lists federal facilities in all 50 states as well as in Washington, D.C., Puerto Rico, Guam, and the Trust Territories of the Pacific Islands. Table 4 on page 10 shows the distribution of these facilities by location. Of the 1,099 federal docket facilities, 12 states contain over 30 facilities each, accounting for more than one-half of the total. Of these 606 docket entries, DoD owns 297, and DOI manages 195. About 30 percent of these DOI entries are landfills and abandoned mines on public lands managed by BLM. Generally found in remote western areas, these sites represent more of a threat to the environment than to human health.

Federal Facilities on the National Priorities List. Under the authority of CERCLA, the EPA established the Hazard Ranking System (HRS) to evaluate and rank hazardous waste sites, both federal and private, based on their threat to human health and the environment. Sites or facilities that pose the greatest risks (that is, the highest rankings) are included on EPA's National Priorities List. These high-priority sites must meet the cleanup standards and requirements of CERCLA.

Thus, the NPL provides one indicator of which facilities have serious hazardous waste problems that may take considerable federal spending over many years to clean up.

Currently, 1,219 facilities are on or proposed for the NPL as of November 1989. About 10 percent (or 114 facilities: 78 on the NPL and 36 proposed) are federal facilities, as shown in Table 5. As federally owned properties, they are also listed on the federal docket. These 114 facilities on the NPL are distributed among 39 states and Puerto Rico. Two states, California and Washington, have more than 10 of these federal facilities each. DoD is responsible for 19 of the 21 federal NPL

TABLE 5. NUMBER OF FEDERAL FACILITIES ON OR PROPOSED FOR THE NATIONAL PRIORITIES LIST, BY AGENCY

	National Priorities List	Proposed	Total
Department of Agriculture	1	0	1
Department of Defense[a]	59	33	92
Department of Energy[b]	16	1	17
Department of the Interior	1	1	2
Small Business Administration	1	0	1
Department of Transportation	0	1	1
Total	78	36	114

SOURCES: The National Priorities List, November 1989 update, and Congressional Budget Office based on conversations with federal agency officials.

a. Of the 59 Department of Defense facilities on the NPL, 2 list 2 different sites; 1 of the 33 proposed NPL installations lists 2 proposed sites.

b. The Department of Energy's Hanford Facility in Washington has 4 separate sites listed on the NPL; 3 of the 16 NPL facilities are listed as different sites at 1 facility--the Oak Ridge Reservation in Tennessee; the 1 proposed DOE facility is a separate site of a facility currently on the NPL--the Lawrence Livermore Laboratory in California.

facilities in California and for 8 of the 11 NPL facilities in Washington. Like the federal docket, the NPL also changes its count when facilities ranked as high-priority are cleaned up, delisted, or added. Six federal agencies own the 114 federal facilities that are currently on or proposed for the NPL.

- o USDA's Agriculture Research Service in Washington has a laboratory with hazardous waste problems less serious than initially assumed and may be delisted shortly.

- o DoD owns 92 NPL facilities, which include the Army's Rocky Mountain Arsenal, numerous other Army ammunition plants and forts, Air Force and Navy bases, as well as other military installations.

- o DOE has 16 NPL facilities, 9 of which are nuclear weapons facilities. (One of these facilities has a separate site that is proposed for the NPL.)

- o DOI has one NPL facility--the Crab Orchard National Wildlife Refuge in Illinois, owned by DOI's Fish and Wildlife Service. Most of the liability for the many hazardous waste sites located at this wildlife refuge belongs to the Sangamo Corporation, a defense contractor that operated a manufacturing plant at this refuge. BLM has an additional DOI facility proposed for the NPL--the Lee Acres Landfill in New Mexico.

- o SBA owns one NPL site--the Cal West Metals Site in New Mexico, which was acquired through foreclosure on a loan provided to the site's former owners, who have paid for all the cleanup so far.

- o DOT has one facility proposed for the NPL--a Technical Center in New Jersey owned by the Federal Aviation Administration.

Limitations of the Docket Data. While the federal docket provides the most complete inventory of federal facilities with hazardous waste activities, several factors limit its usefulness. The docket lists facilities

with widely ranging hazardous waste activities and problems but gives no indication of the type or extent of contamination that may exist. Many of the facilities listed may not require any corrective action or cleanup beyond preliminary assessment and ongoing compliance. Other facilities may have very serious radioactive or hazardous waste problems. Thus, a comparison of the financial liabilities for hazardous wastes faced by each federal agency is not possible from the data available on the docket.

The docket lists only currently owned federal facilities and, thus, does not reflect the federal responsibilities at the 7,147 previously owned federal facilities that are being investigated for contamination. Under SARA, the liability for any cleanup may fall to the former federal owner. Federal agencies may also face large cleanup liabilities because of joint responsibility for contamination at private hazardous waste sites that are not included on the federal docket.

The docket omits sole transporters of hazardous waste and small generators of hazardous wastes (less than 1,000 kilograms in any month), even though these facilities face compliance with handling requirements for hazardous materials. The docket omits facilities whose federal agencies have only recently or not yet reported them to EPA. For example, a report on the hazardous waste compliance program at DOC claimed that three properties, which had not been reported to EPA, should be included on the docket.[3] Also, the USDA identified hazardous waste problems at 43 national forests that had not yet been included on the docket.

ADDITIONAL FEDERAL LIABILITIES FOR HAZARDOUS WASTES

To extend the data for this study beyond the federal docket, the Congressional Budget Office asked officials at each agency to identify additional facilities that might require financial resources to investigate or clean up hazardous waste problems. As the docket excludes some fed-

3. Argonne National Laboratory, *Assessment of Department of Commerce Hazardous Waste Compliance Programs* (March 15, 1989).

eral facilities that may incur considerable hazardous waste costs, this agencywide inventory provides a more complete picture of federal liabilities stemming from hazardous waste activities. Estimates of the number of these nondocket facilities for which each agency is responsible are presented in Table 6. Federal agencies identified roughly 8,400 facilities that are not on the docket but that require investigation for hazardous waste problems.

TABLE 6. NUMBER OF FEDERAL FACILITIES WITH POTENTIAL CONTAMINATION NOT LISTED ON THE FEDERAL DOCKET, BY AGENCY

Agency	Formerly Owned Sites	Agency-Owned Facilities	Total
Department of Agriculture	1	51	52
Department of Defense	7,118	1,007[a]	8,125
Department of Energy	25[b]	17[c]	42
Department of the Interior	1	73	74
Department of Transportation	1	52	53
Other Agencies	1	10	11
Total	7,147	1,210	8,357

SOURCE: Congressional Budget Office based on conversations and written information from federal agency officials.

NOTE: The number of facilities is based on agency estimates.

a. Represents the 1,579 installations included in the Department of Defense's *Annual Report to Congress for Fiscal Year 1989* for DoD's Defense Environmental Restoration Program, excluding the 572 DoD installations listed on the November 1988 docket.

b. The Department of Energy's Formerly Utilized Sites Remedial Action Project includes 29 sites, but 4 of these sites are listed on the docket (and on Table 2) because DOE now has title to some part of the facility.

c. Several DOE facilities not on the docket have no contamination problems but were included in DOE environmental surveys because of other environmental compliance activities.

Formerly Owned Federal Facilities

Many formerly owned facilities may have no contamination problems or require only minor cleanup, while some facilities are so contaminated that they are on the NPL. The Army Corp of Engineers is responsible for investigating 7,118 of these properties that were formerly owned by DoD. There is some double-counting, however, among the former DoD properties and the docket listings of other federal agencies.[4] The Army Corps of Engineers has found contamination at about 20 percent of the 1,732 former DoD properties investigated so far.

The one hazardous waste facility formerly owned by the USDA is a grain storage silo in Nebraska. Once operated by the Commodity Credit Corporation (CCC), the site is currently listed on the NPL. Various fumigants that had been applied to the stored grain caused groundwater contamination. The USDA was liable for all costs of cleanup and water treatment and has already spent several million dollars. More than 2,000 such grain silos exist, and the number that may have caused soil or groundwater contamination is unknown.

DOE established a specific program to investigate, monitor, and clean up any radioactive contamination from nuclear activities at former properties. This program has 29 former sites of which the federal docket lists 4 because DOE currently maintains title to some property at those sites. Also covered by this DOE program are some privately owned sites that the Congress specifically asked DOE to evaluate and clean up.

The Robinson Brick Company Site in Colorado, formerly owned by DOI, is also listed on the NPL. Contamination was caused at this site from large quantities of radioactive waste. The Bureau of Mines within DOI is financially responsible for any cleanup required because of its past efforts to produce radium there.

The one formerly owned DOT facility is the Standard Steel and Metal Salvage Yard, located in Anchorage, Alaska. The Federal Rail-

4. The Fish and Wildlife Service in the Department of the Interior stated that 14 of the 26 wildlife refuges listed on the docket as DOI facilities are actually former properties of the Department of Defense for which DoD is responsible.

road Administration once leased the land for this commercial property, whose owners have since declared bankruptcy. The Alaska Railroad now owns the site, which EPA has proposed for the NPL.

Currently Owned Federal Facilities

The bulk of the 1,210 facilities currently owned by federal agencies are DoD facilities. These facilities represent the remainder of the 1,579 installations included in the DoD Defense Environmental Restoration Program, minus the 572 DoD facilities in the November 1988 docket. The 17 DOE facilities listed in Table 6 represent those identified in the DOE *Needs Report* that were not listed on the docket. While most of these 17 facilities may require some hazardous waste cleanup, several facilities are under construction and have no contamination problems.[5] The *Needs Report* listed them either because of safety and health requirements or future environmental compliance.

Other agencies identified currently owned facilities for CBO's inventory because of problems of hazardous waste contamination that were suspected but not yet fully investigated. Most of the facilities identified by the USDA and the DOI are national forests and national parks that may contain contaminated landfills and abandoned mines. The 52 nondocket sites owned by DOT are Alaskan airstrips managed by the FAA. DOT has indicated that the contaminated sites at these facilities may be quite expensive to investigate and clean up because of local weather.

Privately Owned Sites With Potential Federal Liabilities

Federal agencies may be liable for part or all of the cleanup costs for hazardous wastes at some private sites, depending on the agency's involvement at the site. These sites are on the NPL but are not on the federal docket, which only includes facilities currently owned by a federal agency. At these Superfund sites, EPA may name a federal

5. These facilities currently being built include the Waste Isolation Pilot Plant in New Mexico and the Continuous Electron Beam Accelerator Facility in Virginia.

agency as a Potentially Responsible Party for cleanup liabilities because the agency either contributed to the contamination at the site or once owned the site. As of July 1989, EPA had identified 80 privately owned sites on the NPL where one or more federal agencies may be liable for cleanup costs. Table 7 shows the number of facilities at which federal agencies have been named Potentially Responsible Parties. The bulk of these privately owned sites are former DoD properties that are now on the NPL because of contamination from former DoD activities.

The extent of federal liability at hazardous waste sites that are privately owned is unclear. Most of these sites have not been cleaned up, nor has EPA allocated cleanup costs among the parties involved.

TABLE 7. NUMBER OF PRIVATELY OWNED SITES ON THE NATIONAL PRIORITIES LIST WHERE FEDERAL AGENCIES ARE A POTENTIALLY RESPONSIBLE PARTY, BY AGENCY

Agency	Facilities
Department of Agriculture	8
Department of Defense	61
Department of the Interior	8
Postal Service	7
Department of Transportation[a]	11
Veterans Administration	7
Other Agencies	36
Total	138[b]

SOURCE: Congressional Budget Office based on information provided by the Environmental Protection Agency in July 1989.

a. One site, currently proposed for the National Priorities List, has recently been sold to its operator, but the Department of Transportation may be financially liable as a former owner.

b. EPA has named federal agencies as Potentially Responsible Parties at 80 sites; at numerous sites, more than 1 agency has been named.

The level of federal responsibility in cleaning up these private Superfund sites will depend on the amount of contamination contributed by federal agencies and on the ability of other contributors or private owners to pay for any cleanup. Several federal agencies have indicated that their liabilities at some of these sites may be minimal because either the agency's contribution was minor or the agency was a former owner and not a contributor. Federal agencies are still potentially liable for full cleanup costs at these sites under the joint and several liability provisions of CERCLA.[6]

Limitations of the Inventory of Nondocket Facilities

The federal government will undoubtedly incur additional liabilities from hazardous waste compliance or cleanup requirements. As most federal agencies are still identifying hazardous waste problems at their properties, more contaminated facilities will surely be found. USDA and DOI, for example, have not comprehensively surveyed their landholdings for contamination because of the vast acreage and largely unsupervised nature of the public lands. Federal agencies may also be financially responsible for cleanup activities at additional privately owned sites, either as former owners or contributors to the contamination.

The facilities included in the federal docket and in CBO's inventory also excluded the numerous commercial properties with potential contamination problems on which the SBA and the EDA have foreclosed. At this time, these agencies are not able to estimate the number of such properties with potentially large liabilities. Furthermore, federal agencies are already incurring indirect costs by forfeiting ownership of properties that may be contaminated. To foreclose that option, the SBA and the EDA have adopted policies whereby properties must be evaluated for potential contamination before foreclosure. This provision could also change the lending practices of federal credit agencies, which might refuse loans to businesses that generate or handle hazardous wastes.

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6. These provisions allow the Environmental Protection Agency to hold any one Potentially Responsible Party liable for the full cleanup costs at an NPL site, even if EPA has identified other parties that have contributed to the contamination.

CHAPTER II

POTENTIAL FEDERAL LIABILITIES AND BUDGETARY IMPLICATIONS

The budgetary resources needed to meet hazardous waste requirements at federal facilities include the costs of operational compliance, corrective action, investigation, and cleanup. Almost all federal agencies perform some daily or ongoing operations to comply with federal and state standards for hazardous waste management. While costs of operational compliance may be small compared with cleanup costs, they may be significant among all federal agencies though not readily available. Such funds usually come from an agency's operating budget, targeted for specific facilities. In addition, many federal facilities do not fully comply with the waste management requirements under the Resource Conservation and Recovery Act. Consequently, some agencies may incur large costs for corrective actions to improve improper waste-handling practices, while others may incur only minor costs. The greatest costs will occur in future years as federal agencies begin to undertake the more extensive cleanup projects.

Agency efforts to reduce the amount of waste generated by federal activities and to develop more efficient cleanup technologies are another budgetary cost of hazardous wastes. These research and development (R&D) activities should reduce future disposal and cleanup costs. Research laboratories of the Department of Energy have the most extensive federal R&D efforts under way. Current hazardous waste statutes encourage waste reduction efforts, and some agencies have targeted reduction as an important part of hazardous waste requirements.

The greatest uncertainties and the largest liabilities for hazardous wastes stem from the investigation and cleanup costs at federal facilities. To determine the extent and timing of these potential costs, the Congressional Budget Office compiled a status report on each federal agency's progress in investigating and addressing problems of hazardous waste contamination (see *Federal Agency Summaries* as a

supplement to this study). For the most part, these status reports reflect information the agencies provided to CBO during the first half of 1989.

STATUS OF HAZARDOUS WASTE INVESTIGATIONS BY FEDERAL AGENCIES

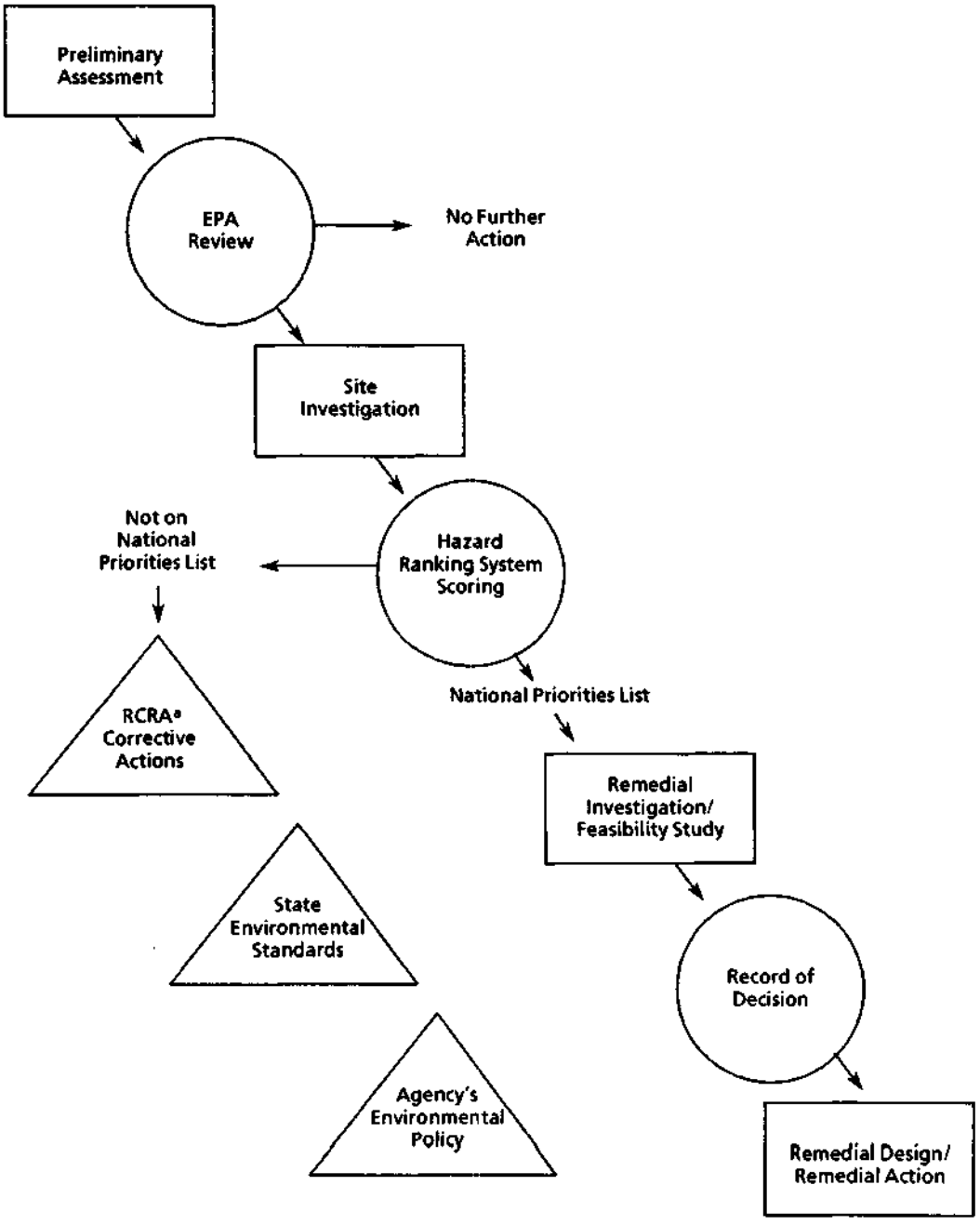
Agencies have completed few detailed investigations of hazardous waste contamination at their facilities. Over the next few years, most federal agencies will expand their efforts. These investigations will place agencies in a better position to estimate funding needs and to undertake the cleanup required for compliance with regulations. For the most part, agencies have conducted preliminary assessments at facilities listed on the November 1988 update of the federal docket. Many facilities with known hazardous waste problems need additional investigations, some of which are under way. Efforts to investigate hazardous waste problems at most facilities that are not on the docket have proceeded more slowly.

The Superfund Amendments and Reauthorization Act requires each federal agency to submit an annual report to the Congress describing the hazardous waste efforts under way at its docket facilities. Thus, problems at sites not on the federal docket may have to wait until after the legal requirements at docket sites have been met. Agencies receive less pressure to address the problems at nondocket facilities because of the lack of public awareness about many of these sites. Also, agencies with limited budgets for compliance and cleanup of hazardous wastes generally target facilities with the most serious problems--that is, facilities whose contamination problems are ranked high enough by the Environmental Protection Agency to be included on the National Priorities List.

Investigations at Facilities on the Federal Docket

SARA provisions established a specific schedule that federal agencies must follow in investigating docket facilities to determine whether hazardous waste problems exist. Figure 1 illustrates the stages for evaluation and cleanup required at a docket facility. For each facility,

Figure 1.
Stages of Investigation and Cleanup Required by Federal Facilities Listed on the Docket



NOTE: Circles denote actions by the Environmental Protection Agency; boxes denote agency steps required under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, if necessary; and triangles denote other options (non-CERCLA) for cleanup if not ranked on the National Priorities List.

a. Resource Conservation and Recovery Act of 1976.

the responsible federal agency must conduct a *preliminary assessment* of any contamination resulting from hazardous waste activities. An *EPA review* of this assessment determines whether further investigation is warranted. If so, the agency must conduct a *site investigation* at the facility. Based on those results, EPA ranks the facility according to the *Hazard Ranking System (HRS).* EPA developed the HRS under the Comprehensive Environmental Response, Compensation, and Liability Act as a means to identify which hazardous waste sites are the greatest risks to human health and the environment.[1] If ranked high enough, the facility is put on the *National Priorities List.* This listing requires more detailed investigation before cleaning up the facility according to CERCLA standards. This *remedial investigation and feasibility study (RI/FS)* characterizes the extent of contamination and its threat to human health and the environment and then identifies appropriate cleanup technologies and costs. Once completed, the agency and EPA sign a *record of decision* for the facility. This decision specifies the cleanup projects that the agency will undertake at the facility to achieve the standards required under CERCLA. The final stage is the *remedial design and remedial action (RD/RA),* which engineers the chosen cleanup program and then carries out the actual cleanup.

SARA required all facilities on the original docket, published on February 12, 1988, to submit preliminary assessments to EPA by April 1988. SARA further required facilities that are added to the docket in subsequent updates to complete these evaluations within 18 months of being listed on the docket. Agencies have completed preliminary assessments for about 70 percent of the 1,099 facilities on the November 1988 update of the docket. Over 40 percent of these facilities have completed site investigations, as shown in Table 8. Most of the facilities for which agencies have not yet completed preliminary assessments have until May 1990 to submit them to EPA. EPA added these facilities to the docket update of November 16, 1988.

1. The Environmental Protection Agency recently revised the Hazard Ranking System, putting more emphasis on the threat that hazardous wastes pose to the environment. Many facilities with hazardous waste sites located in remote areas, particularly national forests and landholdings within the Department of the Interior, may score high enough now to be added to the National Priorities List.

Several agencies have not completed the preliminary assessments on schedule as required for facilities listed on the original docket. The Department of Commerce has submitted the assessments for only 2 of its 12 docket facilities originally listed. The Department of the Interior has not completed assessments for some of its original docket listings. The Department of Transportation is currently conducting 12 of the required assessments for its facilities on the original docket.

TABLE 8. STATUS OF AGENCY INVESTIGATIONS AT FACILITIES LISTED ON THE FEDERAL DOCKET

Agency	Total Docket Facilities	No Further Action Needed[a]	Preliminary Assessment Complete	Site Investigation Complete	Remedial Investigation/ Feasibility Study Planned or Under Way	Remedial Investigation/ Feasibility Study Complete
Department of Agriculture	39	12	18	2	1	0
Department of Defense	572	111[b]	369[c]	369[c]	291	25
Department of Energy	66	6	50	43	27	0
Department of the Interior	263	151	211	27	3	2
Department of Transportation	48	24	36	5	2	2
Other Agencies	111	71	93	15	2	0
Total	1,099	375	777	461	326	29

SOURCES: Congressional Budget Office based on conversations and written information from federal agency officials, and agency annual reports to the Congress on hazardous waste activities for fiscal year 1988.

NOTE: At six of the facilities, a Facility Assessment or a Facility Investigation under the Resource Conservation and Recovery Act of 1976 substitutes for either an SI or RI/FS.

a. As indicated by the agency; the Environmental Protection Agency has not yet determined whether further investigations or cleanup activities will be necessary at most facilities.

b. The Department of Defense provided no information on the number of its docket facilities where no further action was expected to be needed. The Department of Defense's *Annual Report to Congress for Fiscal Year 1989* for DoD's Defense Environmental Restoration Program stated that about 70 percent of DoD sites that were investigated so far required further investigation or cleanup activity. This estimate of 111 facilities represents 30 percent of the 369 DoD docket facilities with completed initial assessments.

c. DoD does not break out the PA and SI stages; at the end of fiscal year 1988, PAs and SIs had been completed on all sites at 369 DoD docket installations.

Based primarily on the 777 preliminary assessments completed, agencies expect that 375 docket facilities will require no further investigation or cleanup. The exact number of docket facilities belonging to the Department of Defense that require no further action is unknown. DoD indicated, however, that roughly 70 percent of DoD sites investigated so far will need further investigation or cleanup. Most of the facilities requiring no further action either generate, transport, treat, or dispose of hazardous materials where investigations have found no contamination problems. Several other facilities in this category are already cleaned up. At most of the remaining 402 federal docket facilities with completed preliminary assessments, the agencies indicate that further investigation is necessary as a result of suspected contamination problems. In addition, 322 docket facilities have not yet completed preliminary assessments.

Agencies have completed site investigations at 461 docket facilities and have 355 RI/FSs completed or under way. These investigations include RI/FSs for most of the 114 federal facilities on or proposed for the NPL. Agencies, particularly DoD and DOE, often undertake RI/FSs for facilities not on the NPL where they expect significant cleanup operations. (SARA only requires an RI/FS at NPL facilities.) Of these 355 facilities with serious contamination problems, agencies have completed only 29 detailed RI/FSs so far. Therefore, federal agencies are far from knowing the full extent of the contamination problems and associated liabilities at their facilities.

Negotiated Agreements for Federal Facilities on the National Priorities List. Under SARA, the relevant state together with the responsible federal agency and the EPA must negotiate an interagency agreement for any federal facility listed on the NPL. The three parties must initiate this Federal Facility Agreement within six months of EPA's review of the completed RI/FS. The interagency agreement allows the parties to review alternative cleanup options. The agreement also sets schedules to design and carry out the cleanup.

Through 1989, 74 such agreements had been signed or were being negotiated: 59 for DoD installations, and the remaining 15 for DOE facilities, 9 of which were nuclear weapons facilities. These agreements do not specify cost estimates for the required cleanup; they do

require, however, that the responsible federal agency request sufficient funding in its budget appropriations to complete the cleanup on schedule. Thus, these agreements will help determine the extent and timing of federal liabilities at the most contaminated federal hazardous waste facilities.

Regardless of these legally enforceable agreements, the Congress will ultimately decide when and to what degree some federal facilities are cleaned up through the annual budget appropriation process. For example, the recent interagency agreement for the Hanford Reservation in Washington state commits DOE to undertake numerous cleanup activities through the year 2018. If the Congress does not appropriate the billions of dollars needed to complete the cleanup, the legal actions and enforcement authority that the state environmental agency or private citizens could take against DOE are unclear.

The overlapping statutory requirements of RCRA and CERCLA tend to complicate the negotiations for cleaning up federal facilities. In general, CERCLA standards require cleanup at inactive hazardous waste sites, while RCRA provisions require cleanup of hazardous wastes at currently operating facilities. Many active facilities include inactive hazardous waste sites and, thus, are subject to the requirements of both statutes. States primarily have authority to enforce cleanup activities under RCRA, while EPA has authority to enforce CERCLA. This split leads to problems over primary enforcement authority during negotiations on interagency agreements. For example, at DOE's Hanford Reservation, enforcement authority for cleaning up specific sites under RCRA was given to the state, while enforcement authority for cleaning up other sites on the same facility under CERCLA was given to EPA. At DoD's Rocky Mountain Arsenal, a Federal Facility Agreement has been signed by DoD, EPA, and several other parties. This interagency agreement designates certain cleanup schedules, but the state of Colorado has refused to sign the agreement so far. The state is unwilling to relinquish its authority to enforce RCRA standards for cleaning up some of the hazardous waste sites at the facility.

Investigations at Docket Facilities Not Subject to CERCLA. Docket facilities with contamination problems not serious enough to warrant

inclusion on the NPL may be cleaned up under other hazardous waste statutes. For example, the docket includes many facilities whose hazardous waste activities are subject to certain RCRA provisions. If EPA notifies a federal agency that a facility is out of compliance with requirements under RCRA, the agency must take corrective measures to comply. These corrective measures, similar to requirements under CERCLA, may involve:

- A *RCRA facility assessment* (RFA) to determine whether corrective actions are warranted;
- A *RCRA facility investigation* (RFI) to evaluate the extent of the hazardous waste contamination; and
- A *corrective measures study* (CMS) to identify and evaluate alternatives for cleanup or compliance requirements (corrective actions) at the site.

Many federal facilities may need to take corrective actions under RCRA. For example, the Tennessee Valley Authority has completed an RFA for its National Fertilizer Development Center and a power storage area, both in Alabama. These facilities must carry out corrective actions under RCRA to receive and maintain RCRA permits for handling hazardous wastes.

Many states have also established their own hazardous waste programs. Cleanup standards and requirements for hazardous wastes under state law may be stricter than those under federal law. Thus, states may require facilities to clean up contamination problems that do not rank high enough to be regulated under the CERCLA statute.

Investigations At Facilities Not on the Federal Docket

Federal agencies are evaluating 8,357 of their currently or formerly owned facilities not on the docket for potential hazardous waste problems. The agencies have completed about 2,900 initial investigations at these facilities, as shown in Table 9. Most of these investigations are comparable to preliminary assessments. The bulk of these

nondocket facilities are the 7,118 formerly used defense sites, many of which are not suspected of having hazardous waste problems. In fact, less than 20 percent of the 1,732 preliminary assessments completed so far at these properties have indicated any required cleanup. An official of the Army Corps of Engineers, which is responsible for investigating and cleaning up formerly used defense sites, indicated that this percentage is expected to remain steady for the assessments at the other 5,386 formerly used DoD sites. If so, roughly 1,400 of these 7,118 properties will require cleanup.

TABLE 9. STATUS OF AGENCY INVESTIGATIONS AT FACILITIES NOT LISTED ON THE FEDERAL DOCKET

Agency	Nondocket Facilities	Initial Assessments Complete
Department of Agriculture	52	48
Department of Defense[a]	8,125	2,709
Department of Energy	42	26
Department of the Interior	74	74
Department of Transportation	53	53
Other Agencies	11	10
Total	8,357	2,920

SOURCE: Congressional Budget Office based on conversations and written information from federal agency officials.

NOTE: Table includes 1,210 currently owned federal facilities with potential contamination problems, as well as the 7,147 formerly owned federal facilities that are represented in Table 6.

a. Of the Department of Defense sites, 7,118 are formerly owned properties. In addition to 1,732 completed assessments, preliminary assessments are under way at 1,826 sites. At the 1,007 currently owned DoD facilities, 97 percent were assumed to have preliminary assessments completed--the same number of docket and nondocket DoD sites (not facilities) with initial assessments completed as of September 30, 1989.

This category of formerly owned federal facilities includes 29 other facilities, most of which have hazardous waste contamination problems.[2] The remaining nondocket facilities represent the 1,210 currently owned facilities, many of which federal agencies may report to EPA for future inclusion on the docket. These facilities must then undergo the formal SARA evaluation process.

STATUS OF CLEANUP EFFORTS AT FEDERAL FACILITIES

To date, federal agencies have planned or conducted only limited cleanup activities at their facilities. Most cleanup efforts now under way or planned for the near term are only temporary measures, primarily intended to prevent the spread of contamination that may pose an immediate and direct threat to human health and safety. For example, in 1988, DoD constructed alternative systems for water supply and treatment at three DoD installations where drinking water was contaminated by hazardous wastes. Agencies have not yet initiated many of the permanent cleanup solutions at facilities, such as the DOE weapons plants that are contaminated with highly radioactive wastes.

Cleanup at Facilities on the Federal Docket

Federal agencies have undertaken or completed cleanup efforts under RCRA or CERCLA, to some degree, at 116 facilities on the federal docket. About one-half of these facilities are DoD installations, as shown in Table 10. Of the 30 facilities that agencies indicated had been cleaned up, 15 are individual sites on public lands managed by DOI. Additional discoveries of hazardous waste contamination or changes in regulatory standards may require further cleanup at these facilities, such as happened at some privately owned hazardous waste sites cleaned up under the Superfund program.

2. The exceptions are two Department of Energy facilities currently under construction. DOE identified these in its list of federal hazardous waste facilities because of future activities there for which hazardous waste compliance is expected.

TABLE 10. STATUS OF AGENCY CLEANUP EFFORTS AT FACILITIES LISTED ON THE FEDERAL DOCKET

Agency	Total Docket Facilities	No Further Action Needed[a]	Cleanup Under Way[b]	Cleanup Complete
Department of Agriculture	39	12	1	1
Department of Defense	572	111[c]	51	3
Department of Energy	66	6	20	3
Department of the Interior	263	151	2	15
Department of Transportation	48	24	3	0
Other Agencies	111	71	9	8
Total	1,099	375	86	30

SOURCES: Congressional Budget Office based on conversations and written information from federal agency officials, and agency annual reports to the Congress on hazardous waste activities for fiscal year 1988.

a. As indicated by the agency; the Environmental Protection Agency has not yet determined whether further investigations or cleanup activities will be necessary at most facilities.

b. Includes interim cleanup activities, corrective actions taken under requirements of the Resource Conservation and Recovery Act of 1976, and remedial activities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

c. The Department of Defense provided no information on the number of its docket facilities where no further action was expected to be needed. The Department of Defense's *Annual Report to Congress for Fiscal Year 1989* for DoD's Defense Environmental Restoration Program stated that about 70 percent of DoD sites that were investigated so far required further investigation or cleanup activity. This estimate of 111 facilities represents 30 percent of the 369 DoD docket facilities with completed initial assessments.

Cleanup requirements under CERCLA or RCRA may not cover certain types of hazardous waste problems at some docket facilities. For instance, RCRA does not regulate some hazardous wastes found at inactive landfills and mining sites on public lands managed by the Department of Agriculture and DOI. Most of these sites are unlikely candidates for the NPL. Thus, further action at these and other facilities will depend on state hazardous waste laws, other federal environmental laws, and the agencies themselves--depending on available funds.[3] An EPA official commented that, if agencies such as DOI were

3. Some of the problems at the Department of Energy's Naval Oil Shale Reserves are being addressed under the Clean Air Act, the Wyoming Department of Environmental Quality Air Quality Regulations, and the Toxic Substances Control Act.

appropriated funds for environmental restoration at these facilities, those agencies must follow the cleanup process under CERCLA.

Federal Facilities on the National Priorities List. Few facilities on the NPL are currently at the actual cleanup stage; yet, many of these federal facilities that EPA lists as high priority have had some preliminary RD/RA. DOE has initiated limited removal of hazardous waste or related cleanup at 9 of its 16 NPL facilities. USDA indicated that much of the cleanup needed at its Agriculture Research Service laboratory in Washington state is already under way. Cleanup at the Small Business Administration's Cal West Metals Site is also under way. DOI is planning the RD/RA stage at its Crab Orchard National Wildlife Refuge in Illinois and the cleanup stage at its Lee Acres landfill in New Mexico, a DOI site proposed for the NPL.

Most of the cleanup projects initiated or completed at DoD installations on the NPL involve excavating buried waste, tanks, and contaminated soil. Other DoD cleanup activities include removing explosive materials from Army ammunition plants, treating contaminated soil and groundwater, and providing alternative water supplies to affected communities. In many cases, the stricter SARA provisions will require permanent cleanup and treatment, rather than the containment measures that have often been used at DoD sites.

Cleanup at Facilities Not on the Federal Docket

Federal agencies have initiated few cleanup actions for hazardous wastes at their facilities not on the federal docket. About 150 defense facilities have cleanup operations under way or completed, as shown in Table 11. Of these, about one-half represent cleanup actions that have been funded at formerly owned DoD properties, some of which have more than one project under way. Some removal of hazardous wastes and other cleanup actions are under way or finished at 22 non-DoD facilities, primarily DOE facilities. According to estimates, roughly 6,000 of the nondocket facilities will not require actual cleanup.

DOE has completed cleanup at 10 sites in its Formerly Utilized Sites Remedial Action Program. Most of these sites were once used in

nuclear activities of the Atomic Energy Commission or in private operations involving radioactive contamination. The Congress assigned these latter sites to DOE for cleanup. DOE has also completed remedial actions for radioactive contamination at five facilities in its Surplus Facilities Management Program. This group of facilities contains sites no longer in use but in need of some radioactive waste management, primarily the decommissioning of facilities contaminated from radioactive activities. Cleanup of radioactive contamination is also an ongoing operation under two other DOE programs that have sites not on the docket. The Residual Nuclear Explosive Sites program includes 10 sites in the Unites States and in the mid-Pacific

TABLE 11. STATUS OF AGENCY CLEANUP EFFORTS AT FACILITIES NOT LISTED ON THE FEDERAL DOCKET

Agency	Nondocket Facilities	Cleanup Under Way	Cleanup Complete
Department of Agriculture	52	4	0
Department of Defense	8,125	105[a]	52[a]
Department of Energy[b]	42	2	15
Department of the Interior	74	1	0
Department of Transportation	53	0	0
Other Agencies	11	0	0
Total	8,357	112	67

SOURCE: Congressional Budget Office based on conversations and written information from federal agency officials.

NOTE: Table includes some facilities currently owned by the agency as well as those formerly owned.

a. Includes 20 currently owned facilities that have been cleaned up and 63 currently owned facilities at which cleanup actions are under way. Also represents 74 specific cleanup efforts in progress or completed at formerly owned properties of the Department of Defense. Some of these properties involve numerous ongoing cleanup projects.

b. No cleanup actions will be required at 2 facilities of the Department of Energy, in addition to the 15 sites where remedial actions have been completed.

where nuclear weapons were tested between 1946 and 1973; the Uranium Mill Tailings Remedial Action Project, legislated by the Congress in 1978, authorized remedial actions by DOE at certain inactive uranium processing sites and nearby properties contaminated with by-products of uranium mining and other radioactive materials.

Estimated Cleanup Schedules at Federal Facilities

At this time, most agencies have not scheduled the major cleanup projects at their hazardous waste sites because they have not completed adequate investigations at their facilities. The actual pace and timing of cleanup activities at federal facilities will depend, to a major degree, on the agency's available budget. Currently, each agency includes funding for environmental compliance and cleanup activities in its annual budget requests. Other options for financing the cleanup of hazardous wastes at federal facilities have been discussed, including the creation of a trust fund for the environmental restoration of DOE nuclear weapons facilities. This mechanism would remove annual funding for environmental cleanup from the budget appropriation process. The availability of the fund's resources, however, would still constrain the timing and scope of cleanup efforts.

While some agencies have planned specific compliance or cleanup activities over the next five years, only DOE has published preliminary estimates of the timeframe necessary on a facility-by-facility basis. These timeframes currently range from one year for some facilities to more than three decades at the most contaminated sites.[4] These estimates do not take into account the constraints on funding, which may delay the proposed cleanup process. In general, DOE has indicated that cleanup activities will take roughly 15 to 30 or more years at most of its NPL facilities. Some DOE facilities may never be completely cleaned up because of the extent of the contamination, the lack of effective technologies, and the location of the facility. In some cases, the costs of total cleanup may be economically unjustified, given trade-

4. Department of Energy, *Environment, Safety, and Health Needs of the U.S. Department of Energy*, vol. 2: Site Summaries (December 1988).

BOX 3
CLEANUP PROGRESS AT THE ROCKY MOUNTAIN ARSENAL

In 1975, the Department of the Army developed a plan for cleaning up its Rocky Mountain Arsenal (RMA) in Colorado, which was contaminated with hazardous wastes. The three cleanup phases would take 17 years and be completed by 1991.[1] In 1983, the Army published a new plan and revised its schedule to take 30 years because of additional contamination problems and changes in the cleanup plan. By 1984, the Army had again changed its plans, outlining a new strategy to clean up the site by the year 2000. Pressure from Members of the Congress as well as from state and local officials accelerated the schedule to clean up RMA, one of the first federal facilities nominated for the National Priorities List in 1984.

Finally, an amendment in the 1986 Military Construction Authorization Act required the Army to complete all cleanup activities at RMA by September 1993. The Army subsequently prepared four cleanup plans, assuming different cleanup methods, durations, and cost estimates. Only one of these plans would complete the cleanup by the Congressionally mandated deadline.[2] The accelerated cleanup plan for RMA cited numerous issues that could delay the cleanup:

- Uncertainties with the technology for incinerating hazardous wastes and the development of new technologies for removing metal contaminants in soils;
- Unrealistic assumptions in costs and time schedules, including favorable weather conditions, minimal equipment failures, and labor availability;
- State permits, environmental statutes, and litigation;
- Insufficient capacity for disposing of hazardous wastes at commercial landfill sites; and
- Insufficient funds appropriated by the Congress.

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1. Developments at the Rocky Mountain Arsenal are provided in *Environment*, "The Case of the Rocky Mountain Arsenal," by Karen B. Wiley and Steven L. Rhodes, vol. 29, no. 3, April 1987.

2. Environmental Science and Engineering, Inc., "Report on an Accelerated Cleanup Plan for the Contamination at RMA," Draft Final Report (Commerce City, Colorado: Rocky Mountain Arsenal, Program Manager's Office, June 1986).

offs between spending requests for other contaminated facilities and the health risks they pose. The response of the Congress to requests by DOE for large budget appropriations to comply with current hazardous waste requirements may ultimately determine the degree of cleanup.

DoD has not published a schedule of required activities for compliance and cleanup at its numerous installations. A report, prepared in 1988 by The Mitre Corporation on DoD's Installation Restoration Program (the major element of DoD's Defense Environmental Restoration Program), assumed that DoD could complete the required remedial actions at most DoD facilities within 5 to 10 years.[5] Major cleanup projects, such as constructing groundwater treatment systems, could take longer than 20 years. The actual pace of cleanup, again, will depend on the funds the Congress provides to DoD for its Defense Environmental Restoration Program. DoD's progress in cleaning up the Rocky Mountain Arsenal facility is an example of the obstacles that federal facilities face (see Box 3 on page 35).

APPROPRIATIONS AND PROJECTED COSTS FOR FEDERAL HAZARDOUS WASTE ACTIVITIES

The lack of detailed site information and sufficient cleanup experience makes any estimates of future federal spending on hazardous waste activities uncertain. In fact, estimates are certain to change. In fiscal year 1990, the Congress appropriated about $4.2 billion to federal agencies for compliance and cleanup of hazardous wastes. This amount is an increase of almost 30 percent over appropriations for 1989. In addition, the costs of routine operational compliance with hazardous waste laws are included in the operating expense accounts of individual federal facilities and, therefore, not generally reflected in an agency's environmental budget request (see Box 4).

Most agencies expect that their spending requirements for hazardous waste activities will increase in the future. Only limited budget information, however, is available over the next five years. DOE

5. The Mitre Corporation, *Estimate of the Cost to Complete the Installation Restoration Program*, for the Department of Defense, Office of the Deputy Assistant Secretary of Defense for the Environment (October 1988).

BOX 4
BUDGET DATA ON AGENCY COMPLIANCE WITH FEDERAL ENVIRONMENTAL LAWS

Executive Order 12088, "Federal Compliance with Pollution Control Standards," requires the administrator of each federal agency to ensure that "sufficient funds for environmental compliance are requested in the agency budget." As part of this process, each agency must submit an annual budget to the Office of Management and Budget (OMB). As defined by OMB Circular A-106 (December 31, 1974), this budget data indicates the funding needed for specific pollution control projects to bring each agency facility into compliance with all federal environmental laws. Agency requests for funding are categorized by expenditures on air, water, solid waste, hazardous waste, toxic substances and pesticides, radiation, drinking water, and noise pollution. For fiscal year 1990, federal agencies requested $1.75 billion for roughly 1,500 specific environmental projects at federal facilities.

The Environmental Protection Agency is supposed to review and rank these submissions from the agencies in each fiscal year for inclusion in the President's annual budget. Projects are ranked by the data submitted on the facility's compliance with relevant environmental regulation and on the pollutant's threat to human health and the environment. The data is limited and inconsistent, however, and does not provide a detailed or complete accounting of federal expenditures for compliance with environmental statutes. Generally, the A-106 budget data represents the capital costs required for environmental compliance projects and often does not include funding needed for site assessments, investigations, and remedial design studies.[1] The A-106 projects planned by federal agencies under the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 totaled only $1.14 billion for fiscal year 1990. This amount reflects less than 30 percent of the $4.20 billion appropriated for hazardous waste activities. The A-106 process is also not well coordinated with the overall budget appropriations requested annually by each federal agency and submitted to the Congress.

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1. The Department of Energy's A-106 budget figures for fiscal year 1990, revised in April 1989, include spending for site investigations of hazardous wastes, design efforts for remedial action, and some program requirements for underground storage tanks.

has projected that its environmental compliance, cleanup, and waste management costs over the next five years will average more than $4.2 billion per year, compared with the $2.6 billion the Congress appropriated in 1990. Together, DOE and DoD have indicated that they may need roughly $80 billion to $130 billion over the next 30 years to complete their environmental compliance and cleanup programs. DoD did not include estimates of future costs for compliance with RCRA requirements, which totaled $801 million in fiscal year 1990. The uncertainty of these figures, based on incomplete investigations and limited actual cleanup, ensures that these estimates of future budgetary needs are conservative.

Budget Appropriations for Fiscal Year 1990

The budget appropriations to federal agencies for compliance and cleanup of hazardous wastes were $4.2 billion in fiscal year 1990, compared with about $3.3 billion in fiscal year 1989. Only the DOE budget reflects costs for all environmental activities, including waste management and operational compliance. Other agency budgets reflect primarily hazardous waste investigation and cleanup costs, in addition to compliance costs under RCRA for underground storage tanks (see Box 5). Environmental activities at DOE facilities make up 60 percent of the 1990 budget appropriations of $4.2 billion, as shown in Table 12. The funds appropriated for DOE include all environmental spending, but the bulk reflects DOE spending for hazardous waste activities specifically required under RCRA and CERCLA.

The weapons facilities of DOE require over 80 percent of the $2.6 billion budgeted for DOE's environmental activities in fiscal year 1990. About $400 million is for routine operational compliance; $2.2 billion is for environmental investigation and cleanup, waste management, and corrective actions--primarily to address noncompliance problems under RCRA. The $2.2 billion is actually $200 million less than DOE projected for 1990 in its report, *Environmental Restoration and Waste Management Five-Year Plan.* This same report indicated that the Savannah River Plant in South Carolina will require

BOX 5
THE UNDERGROUND STORAGE TANK PROGRAM

Petroleum and hazardous chemicals in large volumes are kept in underground storage tanks (USTs). Federal agencies own or operate approximately 60,000 USTs. The total number is probably much larger, since several agencies did not report their UST inventories, particularly the Department of Energy. Environmental problems can result from leaks and spills in USTs, which then contaminate the soil and groundwater. The Environmental Protection Agency (EPA) estimates that between 10 percent and 30 percent of the nearly 2 million USTs, both federally and privately owned, are expected to leak. Thus, the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act of 1976 required EPA to develop a regulatory program for USTs to prevent, detect, and correct leaks and spills and to establish deadlines for complying with these requirements.

Using EPA's rough estimates, potential costs of federal compliance with the requirements of the UST program could reach $2.5 billion over the next three decades. EPA estimates that the total program cost for UST upgrades, investigations, and corrective actions would be roughly $69 billion, with an average cost of almost $41,000 per tank. This average assumes that 1.7 million USTs would be regulated and that the compliance and cleanup actions would take 30 years.[1]

The federal funding needed to meet the requirements of the UST program varies considerably, according to agency estimates of costs on an average-per-tank basis. The Federal Aviation Administration and the Coast Guard estimate costs of roughly $60,000 per UST; the Postal Service projects UST program costs averaging about $71,000 per UST; and the U.S. Department of Agriculture indicates costs of about $13,000 per UST. Given this wide range of cost estimates, the potential federal liabilities of meeting the requirements of the UST program are hard to project accurately.

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1. Reported in 40 CFR Parts 280 and 281, *Federal Register*, September 23, 1988.

TABLE 12. BUDGET APPROPRIATIONS FOR HAZARDOUS WASTE CLEANUP AND COMPLIANCE FOR FISCAL YEARS 1989 AND 1990, BY AGENCY (In millions of dollars)

Agency	1989	1990
Department of Agriculture	5	20
Department of Defense[a]	1,155	1,402
Department of Energy[b]	1,985	2,618
Environmental Protection Agency	1	1
Department of the Interior	16	24
Department of Justice	11	28
National Aeronautics and Space Administration	26	30
Postal Service	39	40
Tennessee Valley Authority	0	2
Department of Transportation	52	19
Veterans Administration	5	12
Total	3,295	4,196

SOURCE: Congressional Budget Office based on conversations and written information from federal agency officials.

NOTE: Only figures of the Department of Defense and the Department of Energy include hazardous waste compliance costs required under the Resource Conservation and Recovery Act of 1976; most of the funds appropriated to the other agencies cover mainly investigation and cleanup costs for hazardous waste contamination.

a. Includes $500 million and $601 million for hazardous waste investigations and cleanup in DoD's budget for fiscal years 1989 and 1990, respectively, and $655 million and $801 million for other environmental compliance activities in these years.

b. Includes hazardous waste corrective actions, remedial activities, and waste management costs of $1,657 million in 1989 and $2,218 million in 1990, plus the costs of routine operational compliance of $328 million in 1989 and an estimated $400 million in 1990.

about $550 million in 1990, and the Hanford Reservation will require almost $450 million, not including operational compliance. Environmental projects at two other facilities within this complex may cost more than $100 million each.

Of the $1.4 billion the Congress appropriated to DoD in 1990 for environmental activities, investigations and cleanup projects at DoD installations will cost $601 million, including formerly owned DoD properties. The Congress increased this amount from the $512 million that DoD actually requested for its Defense Environmental Restoration Program. In 1989, DoD officials indicated that expected funding for this program would remain steady at the 1989 level of $500 million over the next five years. For 1991, however, DoD has requested a budget of $817 million. The difference between the total environmental appropriations for DoD and the amount targeted for cleanup within the Defense Environmental Restoration Program primarily reflects other compliance projects, such as conforming DoD installations to RCRA requirements.

The USDA's budget for investigating and cleaning up hazardous wastes has increased significantly, from $5 million in fiscal year 1989 to $20 million in 1990. Initially, USDA had requested about $26 million for 1990; $5.4 million to investigate and clean up mining sites in national forests; $8 million to investigate and clean up other CERCLA sites; $9 million to check and replace or repair underground storage tanks; and $3.2 million for hazardous waste investigations and corrective actions to comply with RCRA.

Of the $24 million that the Congress appropriated to DOI for fiscal year 1990, about $15 million will reimburse EPA for cleaning up two DOI facilities--the Robinson Brick Company site, and the Krejci dump site in the Cuyahoga National Recreation Area. The remaining funds are slated for CERCLA investigations and cleanup projects, primarily on public lands managed by the Bureau of Land Management and at facilities of the Fish and Wildlife Service. DOI does not generate or handle significant quantities of hazardous wastes; therefore, its expenditures for actions under RCRA should be small, excluding the costs incurred at almost 4,000 underground storage tanks. The budgets of individual DOI facilities or regional offices include these costs, as well

as some additional costs for investigations and removal of small quantities of hazardous wastes.

Officials at the National Aeronautics and Space Administration say that NASA's 1990 budget appropriations of $30 million for environmental compliance was scaled down from its initial budget request of $54 million. The revised request was primarily the result of federal budget constraints. The $30 million was the minimum able to meet the agency's most pressing environmental needs and to remain in compliance with environmental statutes. NASA has targeted about $12 million specifically for investigations and cleanup of hazardous waste sites at NASA facilities; most of the remainder is needed to meet RCRA requirements.

All of the $40 million budgeted for the Postal Service in 1990 is needed for the agency's underground storage tank program. The Postal Service has established a 10-year program to investigate and, if necessary, replace its more than 5,000 underground storage tanks.

Funding Requests for Fiscal Years 1991 Through 1995

Except for DOE, federal agencies have not yet prepared detailed budgets for hazardous waste activities over the next five years. Nine other agencies have planned limited investigation and cleanup projects over this period. Estimates of federal spending for hazardous waste compliance and cleanup activities between 1991 and 1995 are shown in Table 13. These figures represent only a partial accounting of the total resources that will be needed. Details of these spending estimates for the five-year period follow:

- DoD has not projected funding requirements for hazardous waste activities beyond fiscal year 1991. The figure of $9 billion in Table 13 reflects two components of DoD costs for hazardous waste activities: environmental investigation and cleanup, and other environmental compliance. DoD increased its budget requests for environmental cleanup projects from $500 million to $817 million between 1989 and

TABLE 13. PARTIAL OR FULL FUNDING REQUIREMENTS FOR HAZARDOUS WASTE ACTIVITIES FOR FISCAL YEARS 1991 THROUGH 1995, BY AGENCY (In millions of dollars)

Agency	Fiscal Years 1991-1995
Department of Agriculture[a]	80
Department of Defense[b]	9,000
Department of Energy[c]	21,163
General Services Administration[d]	5
Department of the Interior	302
Department of Justice	27
National Aeronautics and Space Administration	175
Postal Service	200
Tennessee Valley Authority	40
Department of Transportation	260
Total	31,252

SOURCES: The Department of Energy report, *Environmental Restoration and Waste Management Five-Year Plan*, September 1989, and Congressional Budget Office based on conversations and written information from federal agency officials.

a. Reflects remedial actions only where Preliminary Assessment/Site Investigations were completed or under way. Since additional sites of the U.S. Department of Agriculture need to be assessed and are likely to be identified, costs probably will exceed these projections.

b. The Department of Defense has not projected its hazardous waste costs beyond fiscal year 1991. Spending for environmental compliance and cleanup activities from 1991 to 1995 may total roughly $9 billion, based on DoD budget appropriations in recent years.

c. Includes costs for environmental compliance and cleanup, waste management, and waste treatment and minimization research. Also includes the Department of Energy's projections of routine operational compliance costs of about $400 million per year, or $2 billion over the five-year period.

d. Officials of the General Services Administration indicated that the agency will spend roughly $4 million to $6 million over the next five years on its underground storage tank program.

1991. These costs are estimated at $5 billion over the 1991-1995 period. DoD will use these funds to complete preliminary assessments and site investigations at all DoD docket facilities and additional formerly owned sites. DoD will also initiate and continue remedial investigation and feasibility studies at its installations on the NPL, as well as undertake more cleanup projects. DoD increased its budget for other environmental compliance activities from about $650 million in 1989 to $801 million in 1990. These costs are estimated to total $4 billion over the next five years. The costs of DoD's operational compliance are not available.

- DOE has projected spending of about $19.2 billion for environmental activities between 1991 through 1995.[6] This amount includes $0.7 billion for corrective actions under RCRA at active DOE facilities; $6.8 billion for cleanup activities under CERCLA at inactive hazardous waste sites; and $11.7 billion for hazardous and radioactive waste management (treatment, storage, and disposal, as well as waste minimization research and development). In addition, DOE projected average spending of $400 million per year for operational compliance at its facilities.[7] Over the next few years, DOE spending on hazardous waste contamination will focus on investigations; more actual cleanup should be under way by the mid-1990s.

- USDA has projected $80 million for remedial actions from 1991 to 1995 at sites where initial assessments are completed or under way. Many additional hazardous waste sites, primarily in the national forests, may require funding for investigations and cleanup. USDA is just beginning to examine its 110 active landfills in national forests where both solid and hazardous wastes have been found.

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6. Department of Energy, *Environmental Restoration and Waste Management Five-Year Plan* (September 1989).

7. Department of Energy, *Environment, Safety, and Health Needs of the U.S. Department of Energy*, vol. 1 (December 1988).

- DOI has targeted $302 million for completing cleanup at the Robinson Brick Company site and for reimbursing EPA's emergency removal actions at the Krejci dump site.[8] DOI will also need these funds to continue remedial investigations at the Lee Acres Landfill, which has been proposed for the NPL, and to complete site investigations at 80 hazardous waste sites located in the national parks. These funds may be used to clean up eight privately owned Superfund sites where DOI has been named a Potentially Responsible Party.

- The Department of Justice's Bureau of Prisons has estimated about $16 million to investigate and clean up seven federal prisons. The Drug Enforcement Agency within DOJ has requested about $8 million for hazardous waste activities in fiscal year 1991 from the Asset Forfeiture Fund to finance its cleanup activities at illegal drug laboratories.

- NASA has projected funding needs of $30 million to $35 million per year between 1991 and 1995. NASA will undertake cleanup programs at 10 of its 12 facilities listed on the docket but does not expect to begin remedial actions at most of these facilities until the mid-1990s. Consequently, most of these funds are for continuing investigations and small cleanup efforts and not for major cleanup projects. Thus, NASA budgets for environmental activities may increase significantly beyond 1995, if not before.

- The Postal Service has projected $200 million for hazardous waste activities over the next five years. These funds reflect only the repair and possible replacement costs of its underground storage tanks. Agency officials expect no other spending needs for environmental activities.

- The Tennessee Valley Authority has estimated that it will require about $40 million between 1991 and 1995 for environmental activities at its National Fertilizer Develop-

8. The Robinson Brick Company site is an example of how cleanup costs may increase over time. In 1987, costs were estimated at about $3 million, compared with current estimates of about $25 million for total cleanup.

ment Center in Alabama. About $30 million is targeted for actual cleanup projects beginning in 1993.

- The Department of Transportation has indicated needing about $260 million beyond fiscal year 1990. About $160 million of this is targeted for compliance activities on the underground storage tanks owned by the Federal Aviation Administration. About $90 million is needed for specific remedial action projects at FAA facilities over the next five years. The Coast Guard has requested about $10 million for environmental activities in fiscal year 1991.

Long-Term Hazardous Waste Costs for the Departments of Defense and Energy

Preliminary estimates indicate that DoD may spend up to $17 billion to complete its Defense Environmental Restoration Program. These long-term estimates are summarized in Table 14. The Mitre Corporation published a report on the costs DoD would need to complete the investigation and cleanup for the Installation Restoration Program within DoD's Defense Environmental Restoration Program.[9] To determine program costs, the report summarized its assumptions in the face of limited information and major uncertainties. Although the report focused on DoD, these assumptions apply to the problems of measuring the budgetary implications of federal hazardous waste efforts in general (see Box 6).

DOE may face potential costs of $71 billion to $111 billion for environmental compliance activities. These estimates cover costs for all environmental compliance, investigation, remedial cleanup, waste management, and research. The estimates include $400 million per year (about $9 billion over the 1989-2010 period) for operational com-

9. The Mitre Corporation, *Estimate of the Cost to Complete the Installation Restoration Program*, for the Department of Defense, Office of the Deputy Assistant Secretary of Defense for the Environment (October 1988).

TABLE 14. PROJECTED COSTS OF ENVIRONMENTAL ACTIVITIES FOR THE DEPARTMENT OF DEFENSE AND THE DEPARTMENT OF ENERGY (In billions of dollars)

Agency	Total Baseline Costs	Total High Costs
Department of Defense	10.4	16.8
Installation Restoration Program[a]	9.7	15.1
Rocky Mountain Arsenal	0.7	1.7
Department of Energy[b]	71.3	110.8
Defense Weapons Complex	62.5	100.6
Other	8.8	10.2

SOURCE: Projections from the Department of Defense's Installation Restoration Program as reported in the *Annual Report to Congress for Fiscal Year 1989*, February 1990, for DoD's Defense Environmental Restoration Program; projections for DoD's share of the Rocky Mountain Arsenal cleanup by DoD officials in a telephone conversation on October 17, 1989; cost estimates of the Department of Energy in *Environment, Safety, and Health Needs of the U.S. Department of Energy*, Volumes 1 and 2, December 1988.

a. Reflects only the costs of hazardous waste investigation and cleanup at currently owned and formerly owned DoD installations, not costs of environmental compliance at active facilities. Reflects costs in fiscal year 1989 dollars, inflated from the fiscal year 1987 estimates of $9 billion to $14 billion provided in the DoD annual report. The high estimates are an attempt to quantify some of the uncertainties inherent in the baseline estimates.

b. Includes compliance costs for all DOE facilities with environmental laws and investigation and cleanup costs at all hazardous waste sites; also reflects costs for DOE waste management operations, including research and operational activities, consistent with the DOE Five-Year plan. Excludes costs for safety and health compliance. The high estimates reflect projections based on stricter cleanup standards than might be imposed under existing environmental requirements.

pliance but exclude costs for safety and health activities, which were included in the DOE *Needs Report*.[10]

The potential costs of $35 billion to $63 billion to clean up the contaminated DOE weapons facilities dwarf the expected federal cleanup liabilities that other agencies may incur. The uncertainties behind the DoD cost estimates for environmental requirements also apply to DOE's cost estimates. Furthermore, the extensive radioactive contamination that exists at DOE facilities makes cleanup costs even more difficult to project than at most other federal facilities. Certain

10. For consistency, safety and health-related costs of the Department of Energy were not included in this Congressional Budget Office study because such costs are not available from other federal agencies.

BOX 6
UNCERTAINTIES IN COST ESTIMATES

The number of hazardous waste sites belonging to each federal agency will determine, in part, future federal expenditures for cleaning up hazardous wastes. The Department of Defense presumably has located from 70 percent to 90 percent of its hazardous waste sites; other agencies, particularly the Departments of Agriculture and the Interior, continue to inventory public lands for potential hazardous waste problems. Cost estimates for cleanup, however, are the more crucial and unknown factor.

Only limited cost information and cleanup experience exists on which to base estimates. Contingencies are likely to arise during the construction phase of cleanup projects. Negotiations over the standards for cleanup required under the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 will also delay cleanup projects and increase costs. This effect is particularly true at federal sites on the National Priorities List, where state and local environmental agencies negotiate the timing and scope of cleanup with the federal agencies and the Environmental Protection Agency.

States increasingly assume more active roles in planning, monitoring, and enforcing federal cleanup of hazardous waste sites. This oversight may ultimately increase cleanup costs through delays, disputes, and litigation. Several officials of state environmental agencies have argued that the standards for treatment and cleanup required under state laws are not significantly stricter than the federal CERCLA and RCRA statutes. A state's interpretation of the standards required under federal laws, however, may differ from EPA's. If state agencies are able to enforce stricter interpretations, cleanup costs could increase. The budgetary impacts, however, are difficult to measure.

aspects of future cleanup at weapons plants are unclear, including: the standard of cleanup that will be required; the standard of cleanup that will be funded; and the cleanup technologies that will be needed, many of which have not yet been developed. DOE has also noted that the discovery of more extensive contamination than is already suspected will be a primary reason for increased federal liabilities at hazardous waste sites.[11]

11. The Secretary of Energy has stated that, because research efforts are under way at the Department of Energy and the Environmental Protection Agency to develop more cost-effective technologies for hazardous waste treatment and to minimize the quantity of wastes generated in the future, the current cost estimates may actually overstate potential federal liabilities.

CONCLUSION

Federal agencies face increasing, yet uncertain, liabilities in complying with all federal and state hazardous waste laws. Over the next few years, agencies will complete more investigations at their hazardous waste sites. The cleanup standards required at federal facilities under the RCRA and CERCLA provisions should be more clearly defined. As a result, agencies should develop a much clearer picture of their actual hazardous waste needs and costs.

The budgetary impact of federal hazardous waste activities could be enormous. Given the billions of dollars in future costs for compliance and cleanup of hazardous wastes at federal facilities, the Congress may not provide federal agencies with enough funding to meet current federal and state requirements. Further, the potential for increasingly strict standards for environmental regulations, particularly under the evolving state environmental programs, is quite large.

The Congress will face two critical issues in its efforts to address federal hazardous waste problems. First, comparative assessments of the hazardous waste problems at different federal facilities are difficult for the Congress to make. Yet, the Congress must determine how to allocate scarce federal dollars efficiently so as to provide the greatest benefit to the public welfare. For these responsibilities, the Congress will need more information on which hazardous waste problems at which federal facilities may cause the most severe damage to human health and the environment. DOE and DoD have developed models to identify and rank the severity of the problems at each of their facilities. Still, no efforts are under way to compare the human health risks at a contaminated federal prison, for example, with the risks at an abandoned mining site within a national forest or at an illegal drug laboratory seized by DEA. Before the severity of the different problems of hazardous waste contamination can be ranked, more research is needed to understand and measure the actual health risks attributed to various sources of contamination. This research data would enable the Congress to evaluate the relative benefits of addressing specific hazardous waste compliance and cleanup problems.

Second, the Congress must establish environmental priorities across the various media (soil, air, water) that are affected by contamination. For example, EPA has claimed that the health risks from hazardous waste sites may be minor compared with other environmental pollution, such as indoor air pollution from radon or pesticide residues on food. Again, the demand for increased federal spending to study and address these and other issues will present the Congress with some very difficult choices. The complexity and controversy of these risks to human health and the environment increase the need for a better system to evaluate potential costs and benefits of federal hazardous waste programs.