CBO TESTIMONY

Statement of
Jan Paul Acton
Assistant Director
Natural Resources and Commerce Division
Congressional Budget Office

before the
Subcommittee on Oversight
Committee on Ways and Means
U.S. House of Representatives

June 11, 1992

NOTICE

This statement is not available for public release until it is delivered at 10:00 a.m. (EDT), Thursday, June 11, 1992.

CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515

Mr. Chairman and Members of the Subcommittee, thank you for inviting me to participate in your review of the Superfund cleanup program and its associated trust fund, the Hazardous Substance Superfund. The Congressional Budget Office (CBO) is pleased to contribute to this timely effort to promote a productive dialogue about the hazardous waste cleanup effort, before the next Superfund reauthorization.

CBO's analysis leads me to the following observations:

- Although the Superfund program is more than 11 years old, in many ways it is still in its early stages. Barring major changes in policy, both the trust fund and the cleanup effort will grow and remain sizable for several decades.

- The trust fund collected $10.2 billion in its first 11 years. At the end of fiscal year 1991, the fund had a total balance of $4.0 billion and an unobligated balance of $0.6 billion. Dedicated taxes account for two-thirds of cumulative receipts, including $1.4 billion in 1991.

- Federal expenditures under Superfund started slowly and have escalated since the 1986 reauthorization. Obligations totaled $1.35 billion and outlays were $0.88 billion during the first five years of the program. By contrast, in fiscal year 1991 *annual* obligations amounted to $1.6 billion and outlays reached $1.4 billion. Cumulative obligations and outlays over the first 11 years totaled $8.8 billion and $6.2 billion, respectively.

- Many sites have entered the Superfund remedial process, but few have finished it. More than 1,200 sites have been placed on the National Priorities List, but the broadest definition of completions used by the Environmental Protection Agency (EPA) includes only 80 sites. The majority are in the earlier stages of remedial investigation or design.

- Under the "enforcement-first" policy instituted by EPA in 1989, the share of remedial activities undertaken by private parties has grown sharply. Consequently, the trust fund has diminished in importance as a source of cleanup resources.

Increased private resources have helped the number of remedial actions to grow almost 50 percent between 1989 and 1991.

- Although these changes have increased the number of sites at later stages of the process, individual sites are not getting cleaned up faster. In the first two and a half years under "enforcement first," the projected time to complete key stages in the process has grown by 18 to 24 months.

- Although EPA has increased its enforcement efforts, it has made only modest use of some settlement tools that the Congress provided in the 1986 reauthorization. Only 58 *de minimis* settlements, 14 mixed-funding agreements, and one nonbinding allocation of responsibility were reached or provided in the succeeding five years.

HISTORY AND MECHANICS OF THE TRUST FUND

The Congress created the Hazardous Substance Superfund (originally the Hazardous Substance Response Trust Fund) in December 1980, when it

passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The law took a two-pronged approach to the problem of abandoned hazardous wastes: it made four groups--waste generators and transporters, and site owners and operators--liable for cleaning up such wastes, and it established the trust fund for use in cases in which these parties are unable or unwilling to take action.

The Congress initially authorized the fund to receive up to $1.6 billion in "external" money by the end of fiscal year 1985: $1.38 billion could be collected from excise taxes on petroleum and certain chemicals, and $0.22 billion could be appropriated from general revenues. Interest paid on trust fund balances invested in Treasury securities, CERCLA penalties and punitive damages, and expenditures recovered from liable parties could be used to increase the fund.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) renewed and expanded the fund's taxing authority, allowing $6.65 billion in collections over the 1987-1991 fiscal period. (When this authority lapsed between October 1985 and January 1987, the fund received two advances from general revenues, totaling $0.2 billion.) As part of this expansion, the Congress added a corporate environmental tax

equal to 0.12 percent.[1] Also, the tax rates on crude oil and petroleum products were increased more than tenfold: from 0.79 cents to 8.2 cents a barrel for domestic crude oil, and from 0.79 cents to 11.7 cents a barrel for imported petroleum products (including crude oil). Most of the rates on taxed chemicals remained unchanged, and taxes were established (and ultimately put into effect in 1990) on imported derivatives of those chemicals. SARA also increased the authorized rate of transfers from general revenues to $1.25 billion over the five-year period.[2]

More recently, the tax rates on domestic and imported petroleum were equalized at 9.7 cents per barrel, as of December 12, 1989, and the Omnibus Budget Reconciliation Act of 1990 (OBRA) renewed the Superfund tax and transfer authorities, at unchanged rates, through December 31, 1995 (in section 11231), while extending EPA's spending authorities only through the end of fiscal 1994 (section 6301).

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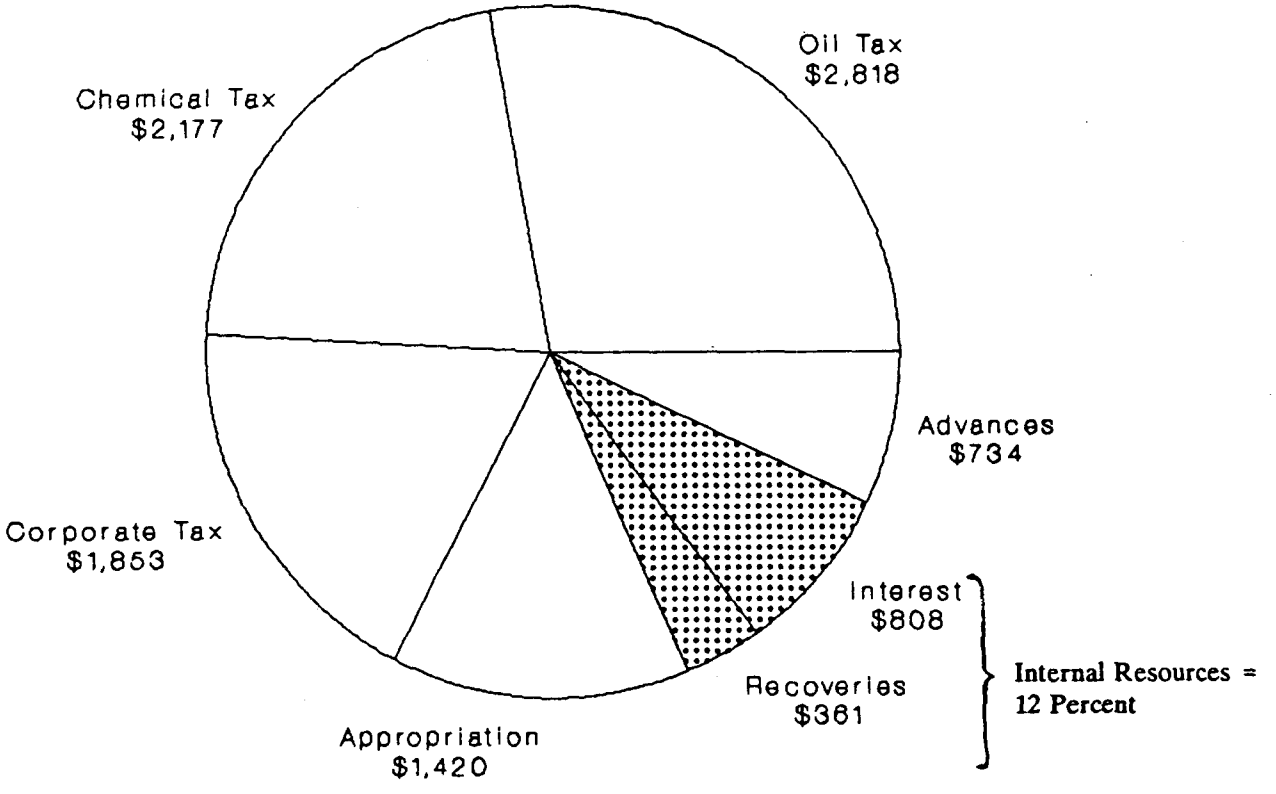
1. The tax applies to alternative minimum taxable income of more than $2 million.

2. SARA has often been described as an $8.5 billion reauthorization, based on section 111's five-year ceiling on appropriations from the trust fund. This ceiling never entered into force, however. By virtue of section 531, the only provisions in the act effective in creating trust funds, imposing taxes, or authorizing amounts of trust fund expenditures were those in Title V. Since Superfund received $0.862 billion in interest payments and cost recoveries over the five years, the Congress could have appropriated $8.762 billion under SARA if tax collections and general-fund transfers had reached their maximum authorized levels.

In its first 11 years, the trust fund collected $10.2 billion. As Figure 1 shows, external sources (taxes, advances, and general-fund appropriations) account for 88 percent of the total, with internal sources (interest, cost recoveries, fines, and penalties) making up the remaining 12 percent. Total tax revenues are $6.85 billion (67 percent of all revenues), compared with the total CERCLA and SARA authorization of $8.03 billion.

Since SARA, revenues from the tax on oil and petroleum products have been twice as large as those from the taxes on chemicals, reversing the pre-SARA relationship (see Figure 2). Two "firsts" took place in fiscal year 1991: for the first time, the corporate tax was the single largest source of tax revenues; also, total tax collections reached $1.40 billion, exceeding the annual prorated share of the $11.97 billion authorized under SARA and OBRA. The Treasury Department is required to terminate the Superfund taxes early if necessary to keep post-1986 collections from exceeding the SARA/OBRA limit. CBO projects that annual receipts will not again exceed the prorated figure until 1994, and hence that total collections will remain well below the limit through the expiration of EPA's spending authority in September 1994. However, the

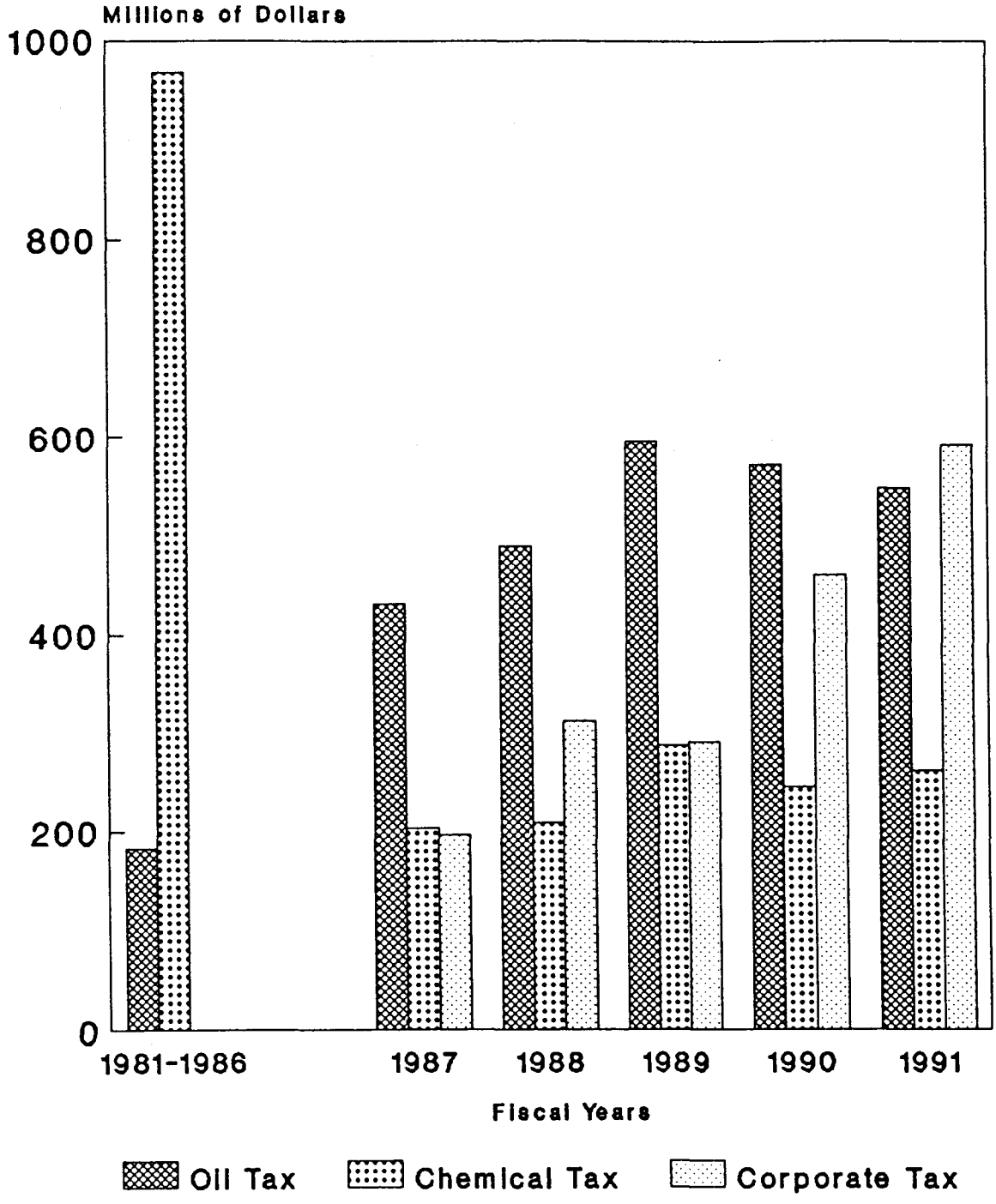
Figure 1.
Cumulative Trust Fund Resources
(Fiscal years 1981-1991; in millions of dollars)



Total Receipts: $ 10,171

SOURCE: Congressional Budget Office based on Treasury Department data.

Figure 2. Superfund Tax Revenues



SOURCE: Congressional Budget Office based on Treasury Department data.

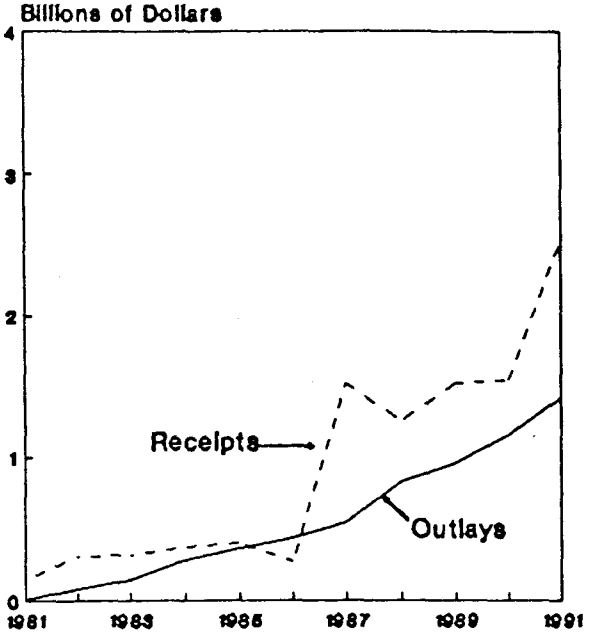
tax rates or ceiling on collections may have to be adjusted if early cutoffs are to be avoided in a future reauthorization.

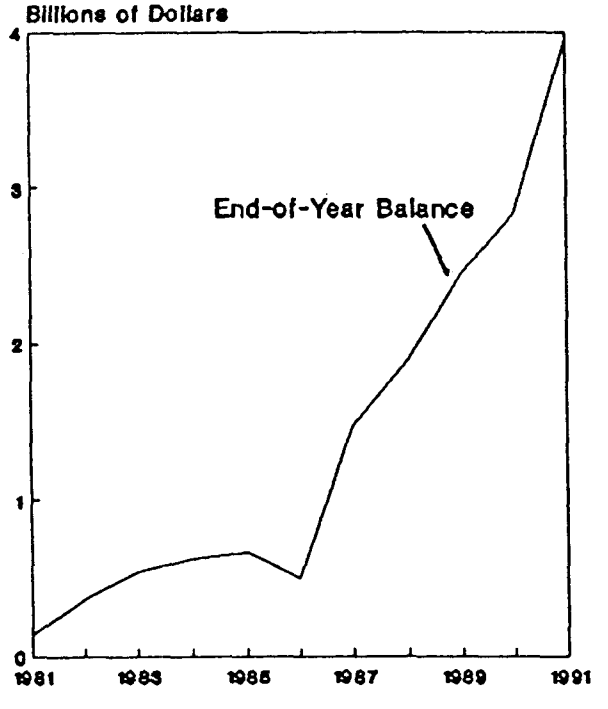
As previously noted, the interest credited to the trust fund ($0.8 billion through fiscal year 1991) comes from its investments in U.S. government securities. The Treasury Department makes investments on behalf of the fund twice a month, based on estimates of revenues being collected from the Superfund taxes, and on daily reports from EPA concerning the monies it has recovered from liable private parties. General-fund revenues appropriated to the trust fund are not invested but are the first to be drawn down in monthly transfers to EPA and the other program agencies. In turn, the agencies draw down these individual accounts as they receive bills for previously obligated external expenses, and to meet their payrolls.[3]

The trust fund started fiscal year 1992 with a balance of $4 billion. This figure includes $71 million in monies transferred to EPA and other cooperating agencies but not yet spent, and repayable advances from the general fund of $0.7 billion. Figure 3 shows that the balance has grown

3. The other agencies that receive transfers directly from Superfund are the Agency for Toxic Substances and Disease Registry, Army Corps of Engineers, Federal Emergency Management Agency, and Commerce, Interior, and Labor Departments. The Coast Guard, National Institute of Environmental Health Sciences, and Justice Department also make expenditures on behalf of the program, but these flow through EPA's account.

Figure 3. Trust Fund History
(By Fiscal Years)





SOURCE: Treasury Department.

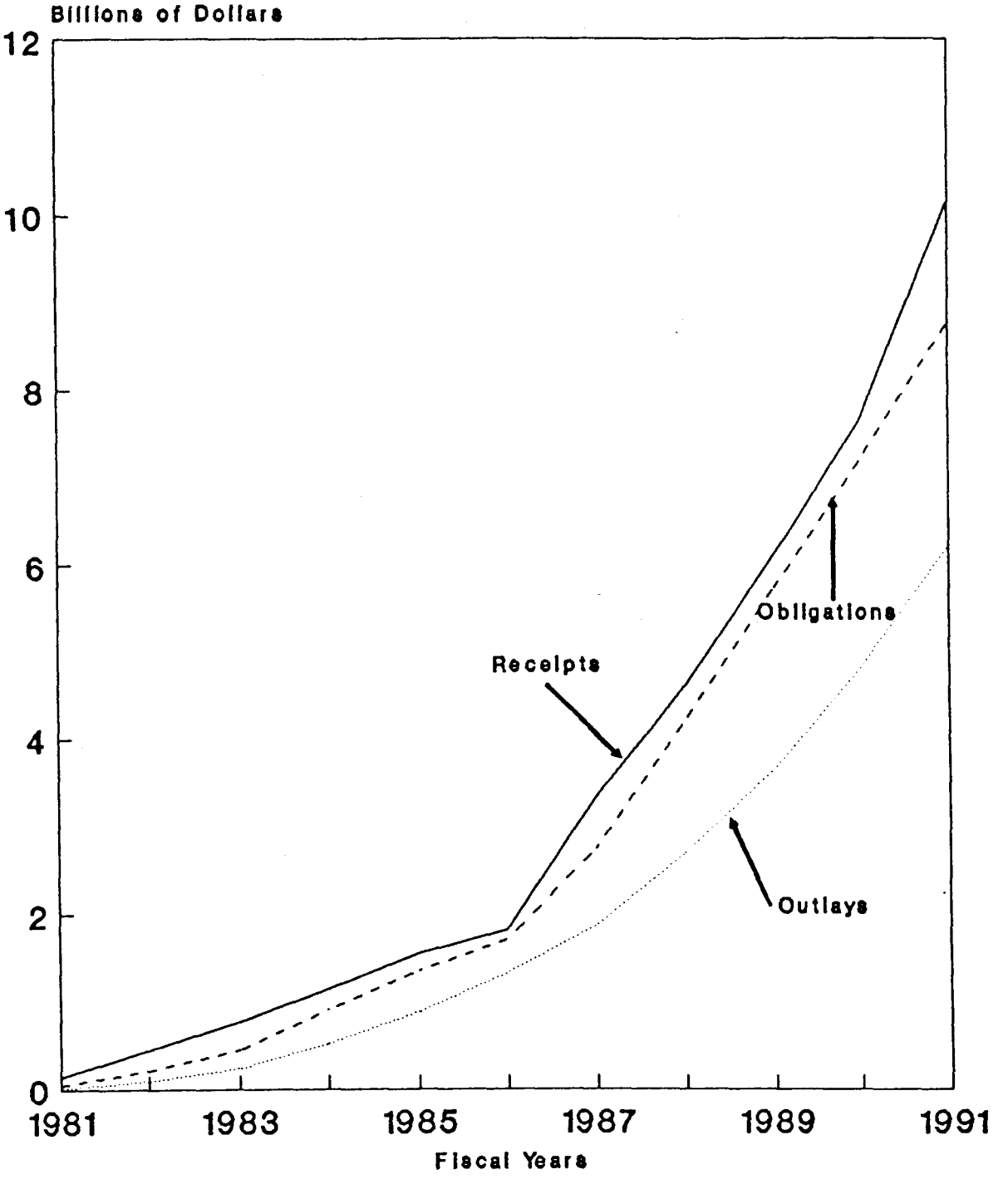
steadily in every year except 1986, when the program's taxation authority lapsed. Most of the initial 1992 balance is already spoken for, as shown in Figure 4; EPA and the other relevant agencies have obligated $2.6 billion they have not yet spent. Only $0.6 billion, or 16 percent of the balance, is not accounted for by these remaining obligations or the repayable advance from the general fund.[4]

USES OF THE TRUST FUND

The Superfund effort includes two categories of responses to waste hazards: "removal actions" and "remedial actions." Removals include emergency responses to immediate threats such as spills or leaking barrels, and limited, interim steps toward full cleanup, such as draining a surface lagoon. By law, removals financed by the trust fund are limited to one year and $2 million, unless EPA finds that continued action is immediately necessary, or appropriate and consistent with its plans for subsequent remediation. Unlike remedial actions, removals are not restricted to sites on the National Priorities List (NPL); indeed, fewer than one-third of the removals conducted to date have been at NPL sites.

4. The Treasury Department is required to suspend the Superfund taxes in calendar year 1994 or 1995 if the unobligated balance exceeds $3.5 billion at the start of the year and is expected, even in the absence of tax collections, to remain above that level at the end of the year.

Figure 4.
Cumulative Trust Fund History

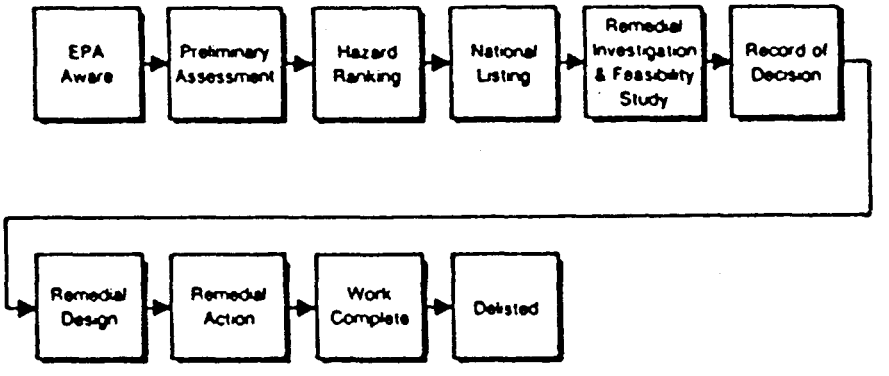


SOURCE: Congressional Budget Office based on Treasury Department and Environmental Protection Agency data.

Superfund is best known for its remedial cleanups, which attempt to resolve permanently all threats to health and the environment posed by the nation's worst abandoned waste hazards. Before listing a site on the NPL for remedial response, EPA undertakes a three-stage screening process involving a preliminary assessment, a site investigation, and ultimately a scoring under the Hazard Ranking System. The NPL itself can be thought of as a multistage pipeline, the major steps of which are the remedial investigation and feasibility study (RI/FS), record of decision (ROD), remedial design (RD), and remedial action (RA). The RI/FS maps out more precisely the nature and extent of the waste hazards at a site (or subsite) and evaluates alternative response options; the ROD documents EPA's selection of a particular option; the RD phase develops the detailed engineering plan for carrying out the selected remedy; and the RA constitutes the actual construction of the remedy. The pipeline is illustrated in Figure 5.

This simplified description of the NPL pipeline omits two important features. First, EPA frequently divides sites into multiple "operable units" if the sources of contamination are physically separated or if different media require different kinds of treatment. (For example,

FIGURE 5. PRINCIPAL STEPS IN THE SUPERFUND PROCESS



SOURCE: Jan Paul Acton, Understanding Superfund: A Progress Report (Santa Monica, Cal.: RAND Corporation, 1989), p. 12.

groundwater contamination is often handled as a separate unit.) Since operable units do not generally proceed through the pipeline in tandem, progress for a multiunit site can be precisely described only by referring to its individual units (or to some subset, such as its most advanced unit). Second, RI/FSs, RDs, and RAs can be subdivided into "fund-lead" and "enforcement-" or "PRP-lead," according to whether EPA finances the work through the trust fund or uses its enforcement authorities to induce the site's "potentially responsible parties" (PRPs) to undertake the work themselves. (By contrast, all RODs are done by EPA.)

This structure would be modified under EPA's recently proposed "Superfund Accelerated Cleanup Model" (SACM), also called the new paradigm. Under this model, EPA would seek to take (or induce PRPs to take) "early actions" to eliminate all immediate threats to public health and safety within three years, or at most five years, from the time a site is identified. Early actions would include the present removals, but also relatively simple and straightforward remedial projects, such as the capping of landfills and incineration on a modest scale. Environmental restoration, including groundwater cleanup and other long-term remediation, would be managed on a second track, similar to the present NPL. This proposal, presently undergoing pilot testing, hinges on the

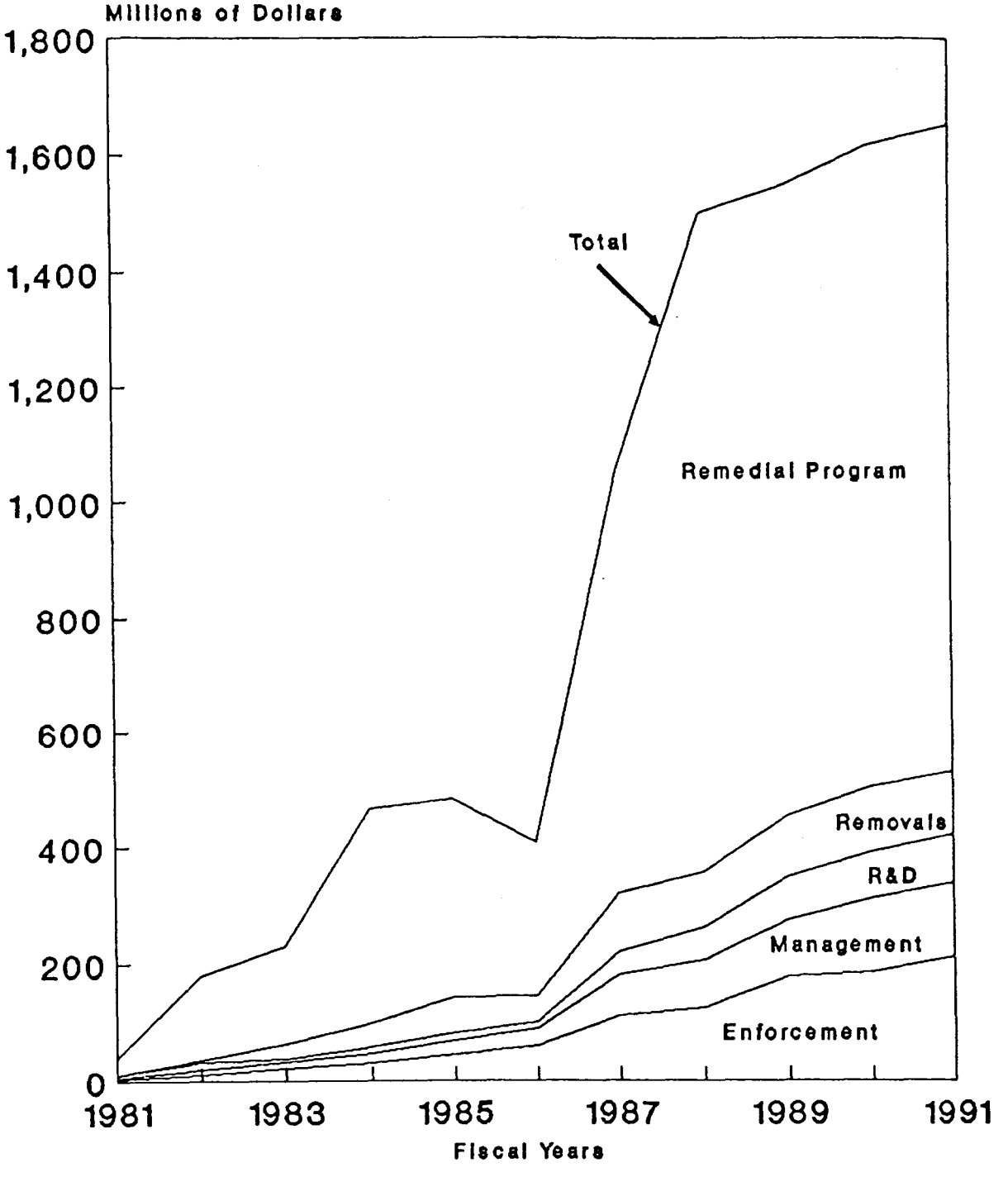
feasibility of sufficiently compressing the present multistage screening and investigation process to make adequate technical (and enforcement) data available to meet the timetable for early action in eliminating all immediate risks.

EPA figures show that remedial activities account for about 70 percent of Superfund obligations, averaging more than $1 billion in recent years (see Figure 6). The remaining activities, such as enforcement, removals, and management, cost less than $0.2 billion each. In this classification scheme, similar to that used in EPA's annual budget justification, "remedial program" includes extramural contracts for site assessment, fund-lead RI/FSs, RDs, and RAs, and oversight of private-lead RDs and RAs; community relations efforts and technical assistance grants; and the salaries of EPA's site-level cleanup personnel, and support staff for budgeting, training, guidance, and evaluation. Obligations in all categories increased severalfold in the first two years after SARA, growing more moderately since then to $1.6 billion in fiscal years 1990 and 1991.[5] Outlays have increased more gradually, as shown in Figure 7, reaching $1.1 billion in 1990 and $1.4 billion in 1991.[6] Note that if EPA applies

5. This chart, unlike Figure 4 above, shows gross obligations, uncorrected for subsequent recoveries of funds that were deobligated.

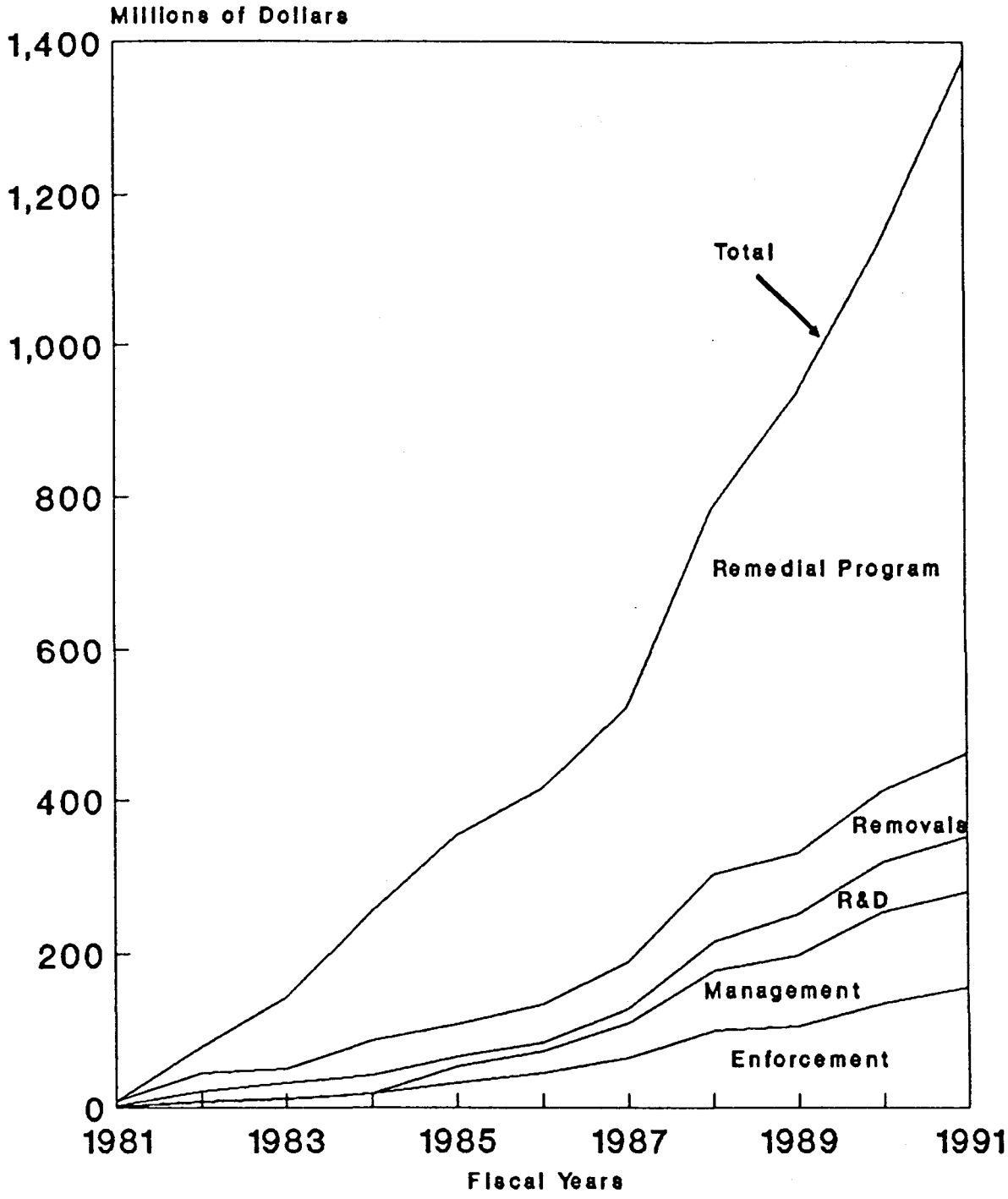
6. The outlays in Figure 7 do not precisely match those in Figure 3 because of differences between EPA and Treasury Department data.

Figure 6.
Distribution of Trust Fund Obligations



SOURCE: Congressional Budget Office based on Environmental Protection Agency data.

Figure 7.
Distribution of Trust Fund Outlays



SOURCE: Congressional Budget Office based on Environmental Protection Agency and Treasury Department data.

the new paradigm, budgetary distinctions between the removal and remedial programs are likely to be replaced by a new breakdown between early and long-term actions.

Beginning with fiscal year 1991, the Office of Management and Budget (OMB) adopted a different classification scheme in its apportionment of the Superfund appropriation from the Congress. This three-way scheme categorizes all expenditures as cleanup, enforcement, or support, with cleanup restricted to extramural dollars for removals, remedial work, and PRP oversight. Using these categories, OMB has set minimum floors on obligations for cleanup and enforcement, and hence a ceiling on spending for support; this ceiling is in addition to the limit imposed by the Congress on administrative expenses. Currently, 40 percent of the $1.23 billion that EPA plans to obligate for its remedial and removal programs in fiscal year 1992 counts as support under the OMB definitions, including approximately $0.2 billion (13 percent) for site assessment and salaries of cleanup and assessment personnel. The Congress may wish to review OMB's apportionment levels to see if they are in accord with legislative intentions and priorities.

LEVERAGING AND RECOVERY OF TRUST FUND DOLLARS

Superfund is a system based on liability. Potentially responsible parties are asked to finance the investigation and remediation of sites on the National Priorities List. Trust fund resources can be replenished through costs recovered from the parties liable for a waste hazard, or they can be leveraged through agreements and orders that lead such parties to do some or all of the cleanup work themselves. Under the "enforcement-first" policy adopted by EPA in 1989, the share of remedial actions at nonfederal facilities to be done by responsible parties has risen from 32 percent in fiscal year 1988 to 63 percent in fiscal year 1991. EPA estimates the cumulative value of commitments from liable parties for RAs and other cleanup responses at $5.1 billion, with $1.4 billion coming in 1991 alone. Cumulative recoveries and fines through 1991 total an additional $0.4 billion.

CERCLA makes four groups of potentially responsible parties liable for cleanup costs, damages to natural resources, and the costs of studies of health effects at a hazardous waste site. The four groups are the site's present owners and operators, its previous owners and operators during periods when it received hazardous substances, the generators of such substances, and any waste transporters responsible for choosing the

disposal site. The primary exceptions and defenses to liability apply to governmental entities that acquire property through eminent domain or involuntary transfer; secured creditors who merely hold indicia of ownership to protect their security interest, without participating in the site's management; and "innocent landowners" who obtain property by bequest or inheritance, or had no reason to know of a hazard when they acquired it.

Liability under CERCLA is strict, joint and several, and retroactive. Strict liability implies responsibility without regard to care or negligence, or observance of existing regulations. Joint-and-several liability means that any PRP can be assessed the total costs for a contaminated site. Joint-and-several liability does not apply to contributions that can be shown to have produced a separate, divisible result. Retroactive means that liability applies to actions that took place before CERCLA's passage in 1980.

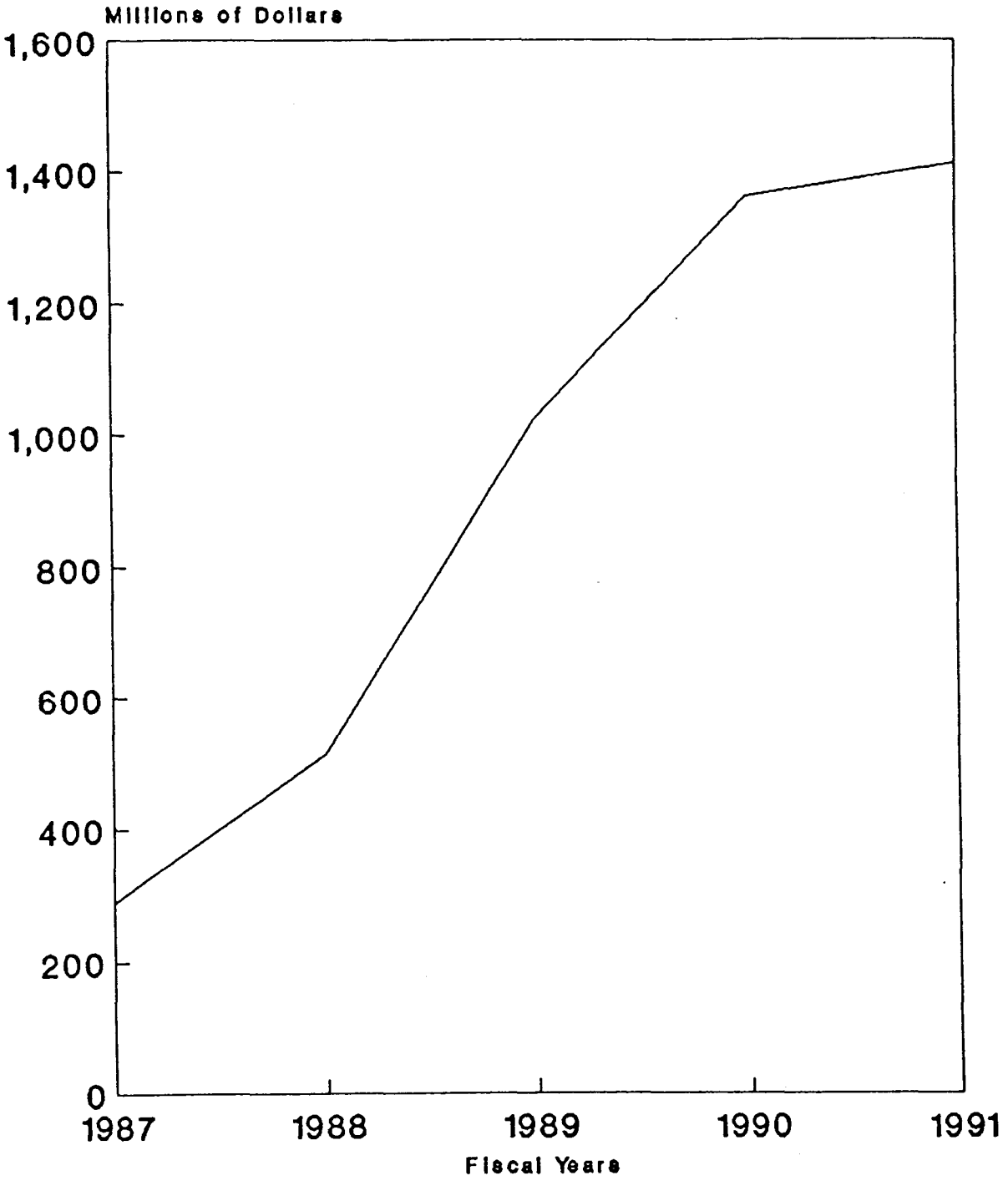
EPA can choose among three broad approaches to enforcing Superfund liability: it can pay for cleanup out of the trust fund and seek to recover its costs later; in cases of "imminent and substantial endangerment to the public health or welfare or the environment," it can

use administrative and judicial mechanisms to insist that PRPs perform the work; or it can negotiate a settlement with the PRPs. In all cases, responsible parties that EPA chooses to pursue may initiate "contribution suits" for reimbursement from their fellow PRPs.

The value of new PRP work commitments, as measured by the EPA estimates reproduced in Figure 8, grew sharply starting in 1989. (Comprehensive data on actual PRP expenditures do not exist; efficiencies attributable to the private sector and ROD underestimates of the extent of contamination may make EPA's figures too high or too low.) The single largest cause of the increase is probably the enforcement-first policy, under which EPA regularly issues a unilateral administrative order (UAO) to compel cleanup when a negotiated settlement is not reached within the allotted time. The number of UAOs issued for remedial design and remedial action rose from 13 in fiscal year 1988 to 28 in 1989, 44 in 1990, and 48 in 1991. Other factors likely to have played a role in the increase in PRP work commitments include the accumulation of legal precedents and the maturation of the pipeline.

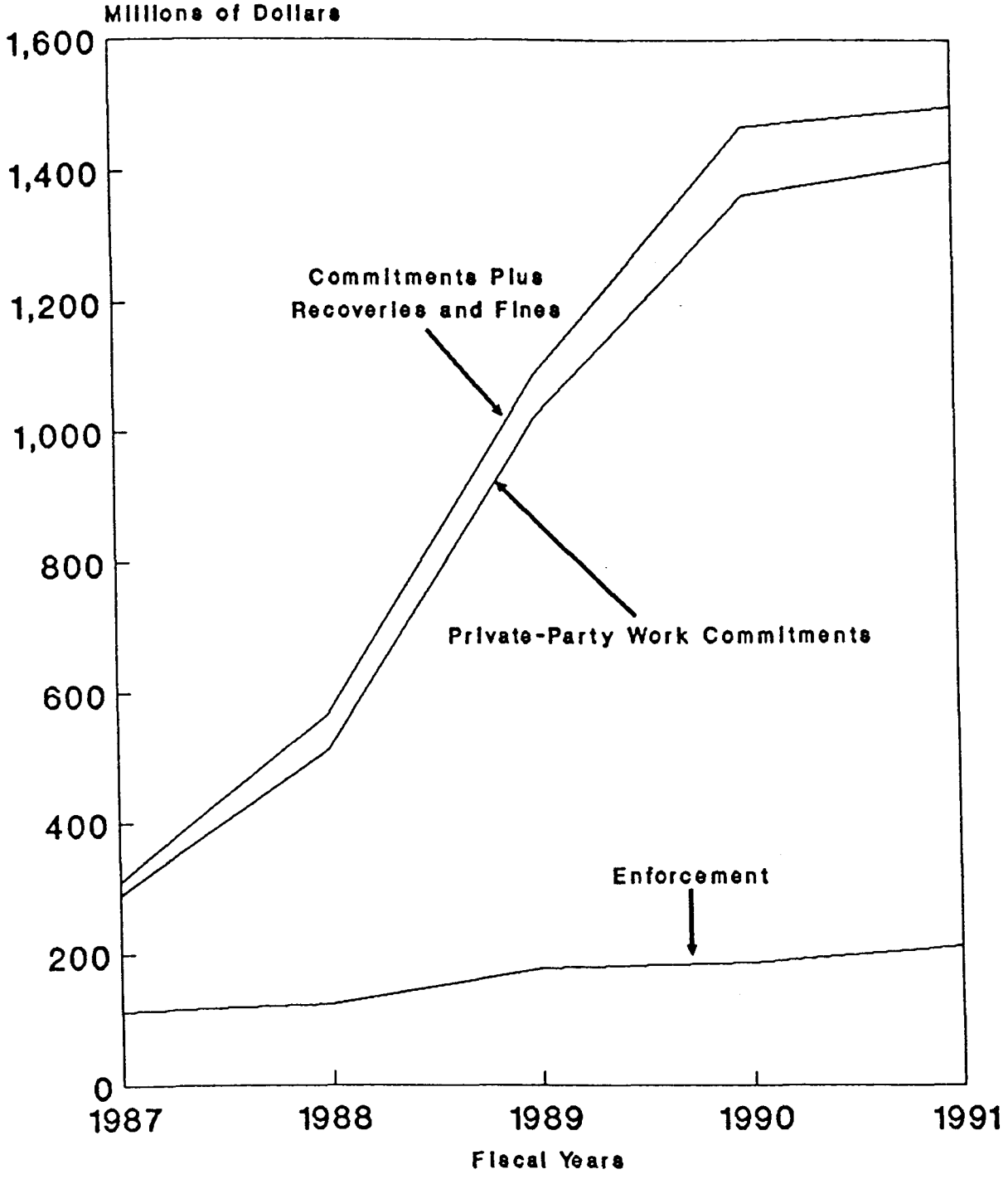
Figure 9 combines the estimated work commitments with the dollars collected from PRPs in penalties, fines, and cost recoveries, and

Figure 8.
Annual Private-Party Work Commitments



SOURCE: Environmental Protection Agency.

Figure 9.
Returns to Enforcement



SOURCE: Congressional Budget Office based on Environmental Protection Agency data.

compares the total with the dollars obligated by EPA and the Department of Justice for enforcement. At this point, private-sector commitments average roughly $7.10 for each dollar of federal enforcement expense, up from about $4.60 in 1988.

The trust fund is also leveraged through state contributions and voluntary cleanups of sites not on the NPL. CERCLA requires the states to provide 10 percent of the cost of any remedial action financed by the fund (except at sites operated by a state or local government, where the required share is at least 50 percent), and all maintenance costs. So far, states have contributed $63.4 million in matching costs at federal-lead sites; this figure does not include maintenance costs and matching contributions at a few sites where states have taken primary oversight responsibility. No data exist on the number or dollar cost of voluntary cleanups motivated solely or primarily by the desire to avoid involvement with the Superfund program.

PERFORMANCE OF THE CLEANUP PROGRAM

Different observers judge the success of the Superfund program according to varying interpretations of the overall goal of "protecting human health

and the environment." At least five key objectives can be identified in the legislation and public dialogue: cleanups that are permanent, fast, and low-cost; incentives for the prevention of future waste hazards; and fairness.[7]

Even on the level of these individual criteria, judging Superfund's results is not a straightforward task, in part because the program's many legislative and administrative changes present analysts with a moving target. Nonetheless, the 11-year track record does provide evidence on its performance to date and clues regarding its prospects in meeting the five objectives.

Permanence

SARA section 121(a) established a preference for remedial actions that "permanently and significantly [reduce] the volume, mobility or toxicity of the hazardous substances," and required EPA to select "permanent

7. In principle, economic analysis could reduce this list to the two goals of efficiency and equity. "Efficiency" refers to the maximization of net benefits to society as a whole, and thus encompasses the list's first four objectives; "equity," a synonym for fairness, is concerned with allocating the aggregate benefits and costs in accord with what individuals deserve. CBO is unable to weigh Superfund's overall efficiency, however, because EPA does not collect comprehensive statistics on the benefits to health and the environment resulting from site cleanups (let alone those from the incentive effects) and because such benefits are not readily monetized for comparison with the program's costs.

solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable."

Despite some apparent overstatement in published EPA statistics, Superfund does show significant movement after SARA's application toward permanent treatment and away from containment methods in the case of remedies dealing with soil and surface-water contamination (called "source-control remedies"). CBO calculates that 71 percent and 70 percent of source-control decisions in fiscal years 1989 and 1990, respectively, involved at least some treatment. By contrast, earlier EPA figures show just 16 percent treatment in source-control remedies from 1982 to 1984, and 23 percent in 1985.[8]

This trend toward treatment technologies has its practical limits, as well as its costs. A study by the Office of Technology Assessment (OTA) said that, "Some cleanup problems have no good treatment solutions (e.g., very large municipal landfills)" given the present state of remedial

8. Environmental Protection Agency, *Progress Toward Implementing Superfund: Fiscal Year 1990*, p. 11. This report says that 76 percent and 79 percent of the source-control records of decision (RODs) in 1989 and 1990 involved treatment. These figures are based on an apples-and-oranges comparison, however: they contrast the total number of principal treatment *remedies* (from all single-treatment, multiple-treatment, and treatment-plus-containment RODs) with the number of *RODs* involving containment alone. The lower CBO estimates use RODs as a consistent unit of analysis.

technology.[9] (Municipal landfills of all sizes constituted 23 percent of the NPL as of February 1991.) When treatment is feasible, it is generally more expensive; in its base-case projections with the Outyear Liability Model, EPA assumes $17.3 million for the average remedy for source-control treatment, versus $9.4 million for containment. This comparison probably understates the cost differential for a given problem, since the sites on which the containment figure is based are generally larger or more complex.

The feasibility and cost of permanent cleanup are even more questionable in the case of contaminants in groundwater. Such contaminants may lie in isolated pockets above or below the groundwater itself, or may be found in aquifer material. Based on its review of the technical literature, OTA concluded that, "Both duration and potential to achieve cleanup objectives are highly uncertain with the prevalent pump-and-treat method," and that, "More strategic thinking and economic analysis should go into two other primary options," namely point-of-use treatment and research and development (R&D) for new technologies.[10] Some observers believe that under present policies and technologies,

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9. Office of Technology Assessment, *Coming Clean: Superfund Problems Can Be Solved...* (October 1989), p. 139.

10. Office of Technology Assessment, *Coming Clean*, pp. 155-157.

pump-and-treat remedies may require 100 years or more. The trust fund implications of such lengthy operations may be relatively minor, since PRPs and the states bear the statutory responsibility for long-term operation and maintenance (O&M).

Pace of the Cleanup Effort

The speed with which the nation's hazardous waste problem is resolved has two elements: the number of sites where work is begun in a given time period, and the length of time needed to complete work on any one site. The number of sites where some remedial design or action is under way has increased substantially in recent years, thanks in part to the maturation of the NPL pipeline and the private resources brought to bear through EPA's enforcement-first strategy, but there is no evidence that the average site is moving through the process more quickly.

EPA has made significant recent progress in pushing sites through the preremedial stages of the Superfund pipeline. As of May 8, 1992, screening for placement on the NPL remained incomplete for 34.5 percent of sites in the CERCLIS inventory, down 2 percentage points in

10 months.[11] Also, 84 out of 1,245 proposed or final NPL sites awaited the start of their first remedial investigation/feasibility study at the end of December 1991; this number is down one-third from the previous year and 69 percent from September 30, 1989. Sites that are divided into multiple units may require more than one RI/FS; nonetheless, a rough estimate based on the EPA average of 1.8 operable units per site suggests that 85 percent of those studies necessary for the present NPL sites may have started by now.

This is not to say that the Superfund pipeline will empty out in the next few years. First, sites will continue to be added to CERCLIS and the NPL for at least a decade. EPA has projected that the NPL will reach 2,100 sites sometime around the turn of the century, and has estimated that CERCLIS might treble in size, ultimately including 90,000 sites and presumably ensuring a continued flow of new NPL additions at least into the next decade.[12]

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11. Statement of Jan Paul Acton, Congressional Budget Office, before the Subcommittee on Investigations and Oversight, Committee on Public Works and Transportation, U.S. House of Representatives, October 29, 1991, p. 14. Using EPA data, CBO testified last fall that screening was incomplete at roughly 44 percent of CERCLIS sites, through June 1991. This figure is nine percentage points higher than the one we report today. Of the nine points, two reflect changes in actual program accomplishments, and seven represent improvements in the accuracy of the data used in EPA's internal Superfund management reports.

12. Researchers at the University of Tennessee recently chose 3,000 sites as the best point estimate of the ultimate size of the NPL (excluding federal facilities), and 6,000 as a plausible upper-end figure. See Milton Russell, E. William Colglazier, and Mary R. English, *Hazardous Waste Remediation: The Task Ahead* (Knoxville, Tenn.: University of Tennessee, Waste Management Research and Education Institute, 1991), p. 17.

Second, the remedial pipeline itself is a slow one. One measure of this is the low percentage of NPL sites that have been cleaned up. EPA reported in April 1992 that cleanup construction has been completed at 80 sites;[13] 40 of these are "delisted," meaning that EPA has certified that the remediation goals were achieved, while 40 await administrative review or are undergoing operation and maintenance of the remedy. As noted earlier, some remedies (such as groundwater treatments) can require decades of O&M to reach cleanup goals.

Slowness in the pipeline is also indicated by the length of time individual sites take to reach the "construction complete" stage. CBO reported last fall that, for projects completed between October 1989 and March 1991, the combined time required for an average RI/FS, RD, and RA was almost seven years--two years more than for projects completed before October 1989.[14] New EPA data through December 1991 suggest that the average duration of RI/FSs has suddenly fallen six months, but this statistic is difficult to evaluate in the absence of data on the other pipeline stages. The most comprehensive duration figure for which

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13. Statement of William K. Reilly, Administrator, U.S. Environmental Protection Agency, before the Subcommittee on Superfund, Ocean and Water Protection, Committee on Environment and Public Works, U.S. Senate, April 8, 1992.

14. Statement of Jan Paul Acton before the Committee on Public Works and Transportation, October 29, 1991, p. 23. The precise figure was 82.4 months.

December 1991 data is available involves all projects completed or ongoing at a given point, with planned completion dates used for ongoing work. As of September 1989, the average of actual and planned durations summed over the three stages of remedial response was 82.7 months, just under seven years; by March 1991, it had risen to eight years. The December 1991 figures show that it increased another two months; moreover, a new duration category--the average time lapse between the end of an RI/FS and the start of the subsequent RD--adds another 10 months to a full remedial sequence, making a total of nine years. Even this estimate understates the time required for complete site cleanup, by neglecting the post-RA operations phase and the prevalence of multiple operable units.

The length and cost of the later stages of remedial response suggest the possibility of a bottleneck as the pipeline matures; so far, the increased leveraging of PRP resources has helped avoid such a stricture. The number of remedial designs in progress grew from 158 at the end of fiscal year 1988 to 375 at the end of fiscal 1991, an increase of 137 percent; when federal facilities and PRP-lead sites are subtracted, however, the comparable growth rate is just 28 percent. Total remedial actions in progress rose from 132 to 312 over the same period, a very

similar 136 percent growth; again, most of the increase is attributable to federal facilities and PRP leads, with fund-lead projects showing an increase of 53 percent.

The pace and lead distribution of the removal program have been quite steady over the last four fiscal years, with the annual number of activities started varying only between 342 and 358, and the share of responsible-party leads fluctuating between 28 percent and 35 percent. Overall, 2,781 removals at 2,225 sites have been started since 1981, with 2,276 (or 82 percent) completed as of January 1, 1992.

Cost

The remediation cost for an average Superfund site is currently projected by EPA to be almost $30 million. Using data from existing records of decision and an educated guess of 25 percent subsequent cost growth, EPA derives an estimate of $13.6 million per remedial action (at nonfederal facilities); this implies a total of roughly $27 million or $28 million per site, given an average 1.8 RAs per site and a few million for removals, RI/FSs, and RDs. In a recent study from the University of

Tennessee, analysts calculated a similar average of $32.9 million per site, using 1.6 RAs per site and 77 percent cost growth.[15]

This rough average of $30 million per site provides the basis for a rule of thumb on the total nationwide costs of Superfund cleanups. For example, an ultimate NPL of 3,000 nonfederal sites would imply total remediation costs of $90 billion. More detailed estimates of total costs are available from EPA and the University of Tennessee study, but these figures must be interpreted carefully. EPA's latest Superfund report to the Congress cites a total estimate of $27.2 billion, including the program's central administrative expenses, but excluding PRP-lead cleanups and the costs of sites not yet on the NPL.[16] The Tennessee base-case estimate of $151 billion neglects EPA's central administrative costs but includes PRP expenditures (as does the rule of thumb), and assumes 3,000 nonfederal NPL sites. It also includes operation and maintenance costs on an undiscounted, "as-built" basis; discounting O&M costs back to the start of the associated RA reduces the estimate to $99 billion.

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15. Russell and others, *Hazardous Waste Remediation*, pp. A-3.14 - A.3.18.

16. Environmental Protection Agency, *Progress Toward Implementing Superfund: Fiscal Year 1990*, Chapter 3.

Private-sector "transaction costs"--that is, costs incurred for legal battles over the extent and allocation of liability, rather than for necessary studies and cleanup itself--are omitted in each of the above estimates. (Governmental transaction costs are included in the EPA figure.) The RAND Corporation recently published an analysis, which I cowrote before coming to CBO, of the Superfund experiences of five very large industrial firms and four insurance companies. This analysis showed that the share of transaction costs in total expenditures at NPL sites was 19 percent for the large industrial PRPs and 89 percent for the insurance companies.[17] If these cost shares were valid for firms not included in the RAND data set and remained steady over time, a rough calculation suggests that private transaction costs could add 17 percent to the nation's Superfund bill.[18]

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17. Jan Paul Acton and Lloyd S. Dixon, *Superfund and Transaction Costs* (Santa Monica, Cal.: RAND Corp., 1992).

18. Assume that the insurance industry spends $190 million per year on National Priorities List sites (based on the RAND data), and that private and EPA expenditures are both $1.5 billion per year. Then private transaction costs are .19(1500) + .89(190) = $0.45 billion, adding 17 percent to the other $2.7 billion in public and private costs.

Incentives for Hazard Prevention

Superfund's supporters and critics both generally agree that the program served as a wakeup call to generators, transporters, and acceptors of hazardous wastes, and that the nation's future waste problems have been reduced as a result. The Resource Conservation and Recovery Act (RCRA) had begun regulating the disposal of hazardous wastes in 1976, four years before CERCLA, but covered fewer substances and imposed only record-keeping requirements on generators and transporters. The prospect of multimillion dollar cleanup liabilities created incentives for careful waste handling beyond RCRA requirements, and for source reductions beyond those encouraged by the increased disposal costs.

Some observers believe that Superfund's prevention effects are substantial enough to justify its transaction costs and any perceived unfairness of joint-and-several liability. Others argue that the incremental impacts are now small, after subtracting the independent effects of RCRA, general tort liability, public disclosure laws, and increased environmental awareness among potential polluters. There are no data available to resolve this issue. In any event, the prevention argument is weak, if not ineffectual, as a justification for liability for actions taken

before CERCLA. The best arguments for maintaining retroactive liability probably hinge on the difficulty of carrying out a nonretroactive alternative simply (so as to allow significant savings in transaction costs) and fairly.[19]

Note that the effects of Superfund's incentives for "prevention" may include some that are undesirable--costly, environmentally harmful, or both--because joint-and-several liability encourages decisionmakers to focus not just on the environmental risks of their own actions, but also on the costs they might incur through legal responsibility for the actions of others. Unnecessary financial costs could arise, for example, through the use of individual treatment and disposal facilities on site by companies reluctant to send their wastes to a common facility that could operate on a more efficient scale. Industrial sprawl, one form of environmental harm, could result if manufacturers build new plants on undeveloped property, rather than risk liability by buying existing, contaminated facilities whose owners are too poor to clean them up for sale.

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19. The impacts on fairness would depend in part on how the new policy dealt with PRPs who have already paid for cleanups for which they would no longer be liable, and with the question of joint-and-several liability among post-CERCLA PRPs for the costs of their own or others' pre-CERCLA contributions.

Fairness

Unlike the previous four objectives, fairness is concerned with the distribution of the total social benefits and costs of the Superfund program. Distributive equity provides part of the rationale for the "polluter pays" approach in CERCLA and several of the SARA settlement tools. By contrast, the use of joint-and-several liability, which leaves solvent and identifiable PRPs legally responsible for a waste hazard's "orphan cost shares," suggests that the Congress has been willing to trade some loss of fairness for gains in cleanup speed and other total benefits. In any event, much of the controversy surrounding Superfund continues to center on equity issues.

The most familiar equity questions have dealt with the definition of the set of PRPs and the allocation of costs among them. This category includes such questions as whether households can be held liable by virtue of the hazardous components in their trash, how volume and toxicity should be weighed in allocating cost shares to industrial and municipal waste in landfills containing both, and the boundaries of the exemption for secured creditors who do not participate in the management of a contaminated site. Other equity issues involve non-PRP funding: for

example, the fair distribution of burdens among contributors to the trust fund, the proper uses of the fund in supplementing or supplanting PRP financing, and the appropriate levels of contribution from the states.

Two SARA settlement tools of particular interest from the standpoint of fairness are *de minimis* buyouts (intended to allow quick resolution of the liability of minor contributors to a waste hazard) and mixed-funding agreements, in which the trust fund and PRPs share the costs of a cleanup. The record to date shows that EPA has issued 58 *de minimis* settlements, corresponding to 18 percent of the 318 cleanup settlements reached between fiscal years 1987 and 1991. Of the 58, 13 were issued in 1991.[20] EPA is working on an initiative to increase the use of *de minimis* agreements--which will reportedly emphasize early collection of PRP contribution data, so as to allow quicker settlements with appropriate parties--and on guidance for the use of similar "cash-out" settlements with PRPs whose contributions exceed the *de minimis* level.

20. Based on previous information from EPA, CBO had reported earlier that no *de minimis* settlements were reached in 1991.

EPA has made less use of the mixed-funding tool, issuing just 14 such agreements between 1987 and 1991.[21] This figure may not tell the whole story. EPA acceptance of less than full reimbursement of its past costs may sometimes amount to an unofficial type of mixed funding (one that does not involve fund-financed cleanup and hence does not trigger the requirement that states contribute 10 percent). Nonetheless, the use of this option has clearly been constrained by policy; EPA avoids making mixed-funding contributions that are not expected to be recoverable from other, nonsettling PRPs, partly on the basis of its statutory injunction to "make all reasonable efforts to recover" such expenditures. In particular, the agency does not generally use its mixed-funding authority to relieve solvent PRPs of a site's orphan shares.

EPA has recently issued guidelines clarifying the actions lenders may take without incurring liability as owners or operators of contaminated sites; it is also preparing guidance on the allocation of costs

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21. The mixed-funding total includes 11 "preauthorization" agreements, in which EPA agrees in advance to reimburse PRPs for certain cleanup costs, and three "mixed-work" settlements, in which the cleanup tasks themselves are divided between EPA and the PRPs. A 12th preauthorization had not yet been submitted for court approval as of the end of fiscal year 1991. The total does not include cash-out settlements, some of which may also represent mixed-funding compromises by EPA (as opposed to bankruptcy settlements or cash contributions to other PRPs accepting full cleanup responsibility).

    Another SARA settlement authority little used by EPA is the nonbinding allocation of responsibility (NBAR), a tool intended to hasten cleanup and cut transaction costs by providing PRPs with a starting point for their internal discussions on cost allocations. The agency cites low PRP interest as the primary reason that it issued only one NBAR through fiscal year 1991.

at sites involving both municipal and industrial waste. CBO is not yet able to comment on the impacts of these steps.

CONCLUDING OBSERVATIONS ON THE NEW PARADIGM

As I noted earlier, EPA has recently proposed a new paradigm, also known as the Superfund Accelerated Cleanup Model. The SACM involves changes in the public presentation of Superfund's current activities, as well as in the activities themselves. EPA believes that the program's removal actions have received insufficient acknowledgment; by eliminating the distinction between removal sites and remedial sites, the agency hopes to change the yardstick by which Superfund is measured, shifting the emphasis from NPL completions to risk reductions. Although the proposed emphasis seems consistent with Congressional intent, CBO notes that EPA has not developed and does not collect consistent data on how much its responses reduce risk. Such data would be valuable for EPA management and Congressional oversight of the program; however, a 1991 report by the National Research Council suggested that reliable

measures may not be possible under the present state of toxicological knowledge.[22]

The proposed substantive changes emphasize improving the pace of the cleanup effort, as the word "accelerated" suggests. EPA would pursue this goal by eliminating the downtime between stages of the present process of site assessment; applying a more streamlined, removal-like approach to relatively simple and standardized remedial actions would help speed things up. Again, EPA expects that adequate information could be collected quickly enough to allow all immediate threats to public health and safety to be eliminated within three to five years of the time a site is identified.

EPA has not yet worked out all the details of this early-action approach, particularly those involving interaction with its "enforcement-first" policy. Attempts to meet the new timetable may lead to tensions with other objectives. If EPA maintains its present negotiation policies, the time and effort required for gathering evidence and reaching settlements may strain its budgetary and staffing limits. If the agency attempts to avoid negotiation delays through greater use of unilateral

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22. National Research Council, Committee on Environmental Epidemiology, *Environmental Epidemiology, Vol 1: Public Health and Hazardous Wastes* (Washington, D.C.: National Academy Press, 1991).

orders to PRPs, public and private litigation costs may rise. Alternatively, EPA could try to speed settlements through greater use of mixed funding and other incentives; this would involve a shift in its interpretation of the "polluter pays" objective and somewhat greater demands on the trust fund. Finally, EPA could place more emphasis on fund-lead cleanups and subsequent cost recovery, which would significantly increase demands on the external components of the fund, at least temporarily. As evidence of these possible trade-offs emerges from EPA's pilot tests of the new paradigm, the Congress may wish to refine its legislative instructions to the agency concerning where the balances should be struck.