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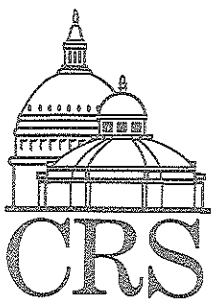
CRS Report for Congress

Superfund Fact Book

Environment and Natural Resources Policy Division

May 26, 1994



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SUPERFUND FACT BOOK

SUMMARY

Designed to bring about the decontamination and remediation of the Nation's inactive hazardous waste dumps, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted in 1980, amended and reauthorized in 1986 by the Superfund Amendments and Reauthorization Act (SARA), and extended in 1990.

CERCLA creates a trust fund, administered by the U.S. Environmental Protection Agency (EPA), to clean up hazardous waste sites that have been listed by EPA on the National Priorities List (NPL). Superfund also establishes liabilities for responsible parties involved in the release of hazardous substances and outlines a claims procedure for parties who have cleaned up sites.

This fact book is a compendium of data and other pertinent information about the law and the program, followed by a Superfund-related glossary. The topics covered are appropriations, disposal sites, remedies, costs, liabilities, settlements, State superfund programs, treatment technologies, assessments of natural resource damages, land use, and international comparisons.

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BACKGROUND

Legislative History

- On December 11, 1980 President Jimmy Carter signed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or "Superfund" into law.[2] On October 17, 1986, CERCLA was amended and reauthorized by the Superfund Amendments and Reauthorization Act (SARA).[3] On November 5, 1990, CERCLA was reauthorized without amendments until September 30, 1994; the taxing authority was extended through December 31, 1995.[4]

Purposes

- CERCLA's impetus was the emerging realization, as most directly evidenced by the Love Canal problem, that inactive hazardous waste sites presented great risk to public health and the environment and that existing law did not address these abandoned disposal sites. CERCLA was designed to respond to situations involving the past disposal of hazardous substances.[5]

- CERCLA's purpose is to authorize the Federal Government to swiftly respond to hazardous substance emergencies, and to protect public health and the environment by cleaning up the Nation's worst hazardous waste sites. The law seeks to make those responsible for the improper disposal of hazardous waste bear the costs and accept responsibility for their actions; it creates a trust fund to finance

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[1] This report originally was prepared at the request of the Senate Committee on Environment and Public Works.

[2] P.L. 96-510, 94 Stat. 2767 (1980).

[3] P.L. 99-499, 100 Stat. 1613 (1986).

[4] P.L. 101-508, § 6301, 104 Stat. 1388, 1388-319 (1990).

[5] Lee, Robert T. "Comprehensive Environmental Response, and Liability Act," Environmental Law Handbook. Twelfth Edition. Rockville, Maryland: Government Institutes, Inc., 1993. p. 267.

response actions where a liable party cannot be found or is incapable of paying cleanup costs.

The Superfund

- The Hazardous Substance Superfund is a trust fund maintained by taxes imposed upon the petroleum and chemical industries as well as by an environmental tax on corporations. In addition, general tax revenue is contributed to the Superfund.[6]

- Total authorization for the Superfund through 1994 was $15.2 billion. In 1980, $1.6 billion was authorized for the FY 1981 to FY 1985 period, and when the program was reauthorized in 1986, $8.5 billion was added to the fund for the next 5 years. In 1991, Congress added another $5.1 billion when it reauthorized Superfund through 1994.[7]

- The Hazardous Substance Superfund is supported by:

  a tax on domestically produced and imported oil (about $570 million in 1992);

  a tax on feedstock chemicals (about $245 million in 1992);

  a corporate environmental tax (about $460 million in 1992);

  general revenues (authorized at $250 million per year); and

  other sources, including interest on the Trust Fund.[8]

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[6] Ibid, p. 268.

[7] U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER). Superfund Progress. Spring 1992.

[8] U.S. Environmental Protection Agency, Comptroller's Office, 1992, as referenced in Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

- The Superfund corporate environmental tax generates $460 million each year, or about one-third of the annual Trust Fund monies. Major industrial sectors contributed the following percentages of the tax in 1988:

Manufacturing	52.4%
Finance, insurance and real estate	17.4%
Transportation and public utilities	16.3%
Retail trade	5.0%
Wholesale trade	3.2%
Services	2.8%
Mining	2.0%
Construction	0.7%
Agriculture, forestry and fishing	0.2%[9]

- Environmental restoration, of which Superfund spending is a part, is an expanding portion of the Federal environmental budget, having increased from $7 billion in 1991 to $10.5 billion in 1994. In addition to Superfund, there are Federal facility cleanup and restoration programs at the Departments of Energy and Defense.

APPROPRIATIONS

Annually as part of the DVA-HUD-Independent Agencies appropriations bill, Congress appropriates funds from the Department of Treasury maintained Superfund to the EPA. This annual appropriation funds EPA's Superfund-related research and development, enforcement, management and support as well as response actions. It also funds, through the EPA, the Superfund-related activities of the Agency for Toxic Substances and Disease Registry, the Coast Guard, National Oceanic and Atmospheric Administration, Federal Emergency Management Agency, the Occupational Safety and Health Administration, and the Departments of Justice and Interior.

- Superfund was first funded in FY 1981 at a level of $40.3 million; $1.497 billion was appropriated in FY 1994. Total enacted budget authority for Superfund was $13.385 billion for FY 1981 to FY 1994. (See table 1 and figure 1.)

- Using the FY 1994 enacted level of $1.497 billion as an example, roughly 65% of the appropriation is allocated for response actions, 4% for research, 12% for enforcement, 9% for interagency, 7% for management, and less than 1% for support at the regional level. (See figure 2.)

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[9] U.S. Department of Treasury, 1989, as referenced in Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

Table 1. The Budget Authority for the Superfund from FY 1981 to FY 1995 (enacted budget authority in real dollars)

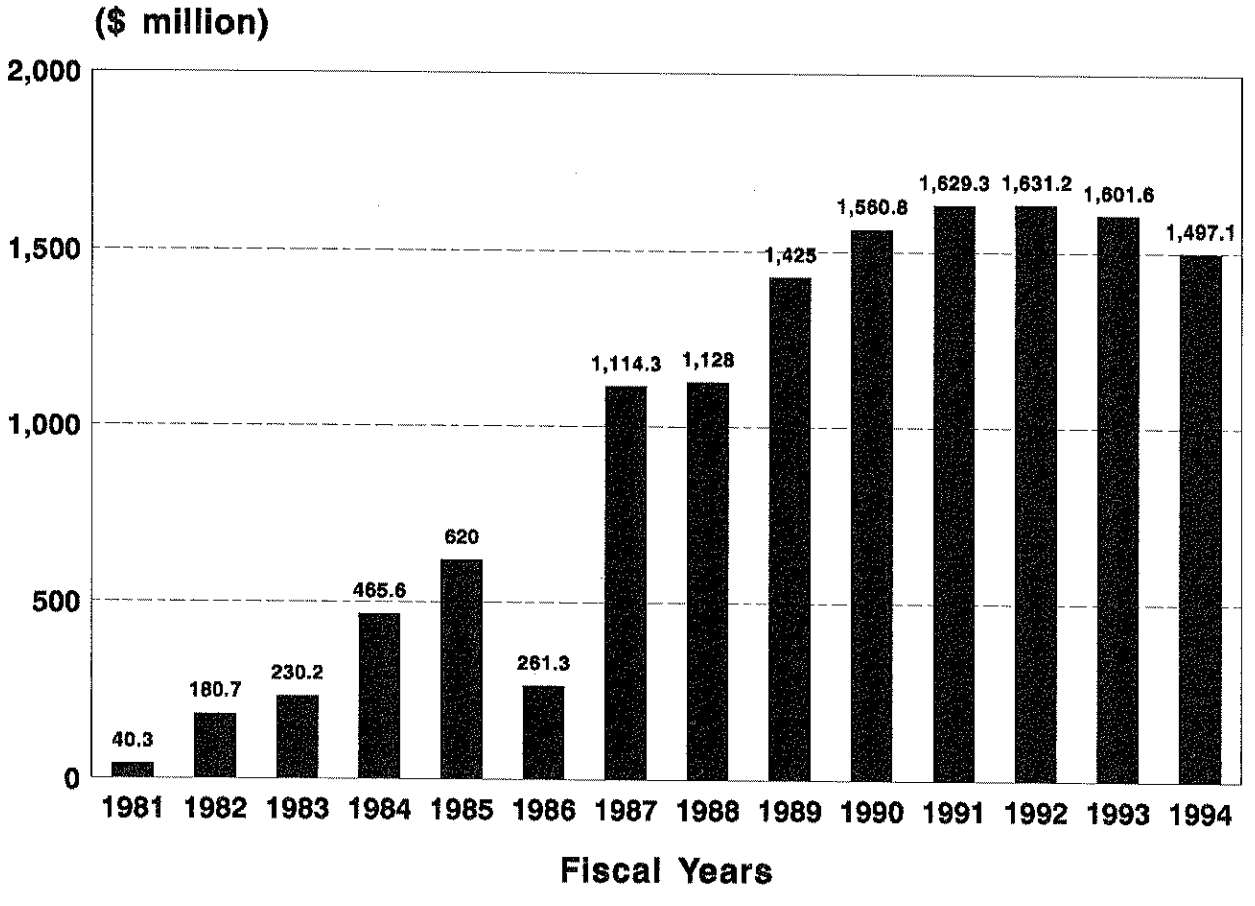
FY 1981 to FY 1988

	1981	1982	1983	1984	1985	1986	1987	1988
Research and Development	4.7	13.8	6.8	10.2	12.6	10.5	38.7	58.2
Enforcement	2.5	8.4	17.7	26.7	48.7	52.1	97.6	122.9
Management and Support	2.3	9.5	11.4	17.2	25.2	30.8	78.2	95.1
Response Actions	24.0	149.0	184.6	411.2	513.4	312.9	1,180.8	851.6
EPA	24.0	149.0	166.2	366.4	510.5	292.7	1,113.1	763.4
Support	0.0	0.0	0.0	0.0	0.0	0.0	4.2	4.1
Interagency	0.0	0.0	18.4	44.8	3.0	20.2	63.5	84.1
TOTAL Budget Authority	40.3	180.7	230.2	465.6	620.0	261.3	1,114.3	1,128.0
Amount Requested	250.0	200.0	230.0	310.0	640.0	900.0	1,050.0	1,200.0

FY 1989 to FY 1995

	1989	1990	1991	1992	1993	1994	1995 Request
Research and Development	68.1	64.2	72.9	64.7	68.2	62.6	59.9
Enforcement	132.6	121.9	174.9	182.0	175.3	180.3	188.0
Management and Support	98.7	107.5	126.7	117.4	124.4	110.3	140.3
Response Actions	1,125.7	1,267.2	1,254.8	1,267.0	1,233.3	1,144.0	1,111.7
EPA	1,027.2	1,149.6	1,116.8	1,114.0	1,072.9	976.9	972.3
Support	4.0	5.0	4.5	6.9	8.4	8.0	3.3
Interagency	94.5	112.6	133.5	148.7	152.0	159.1	136.1
Total Budget Authority	1,425.0	1,560.8	1,629.3	1,631.2	1,601.6	1,497.1	*
Amount Requested	1,600.0	1,750.0	1,753.1	1,765.0	1,766.4	1,614.7	1,499.7

Superfund Budget Authority

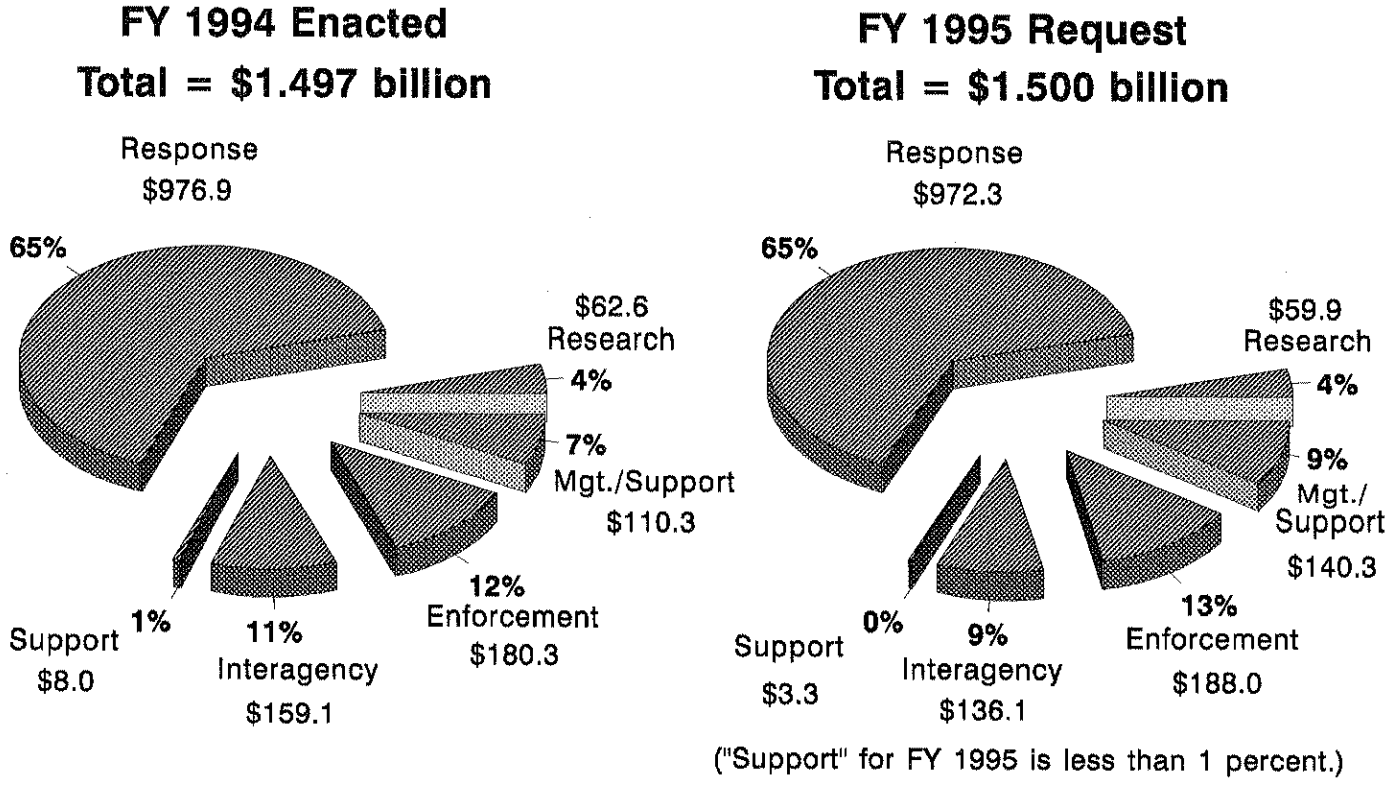


Source: Congressional Research Service, based on EPA budget justification documents.

Figure 1

Superfund Appropriations

(amounts in $million)



("Support" for FY 1995 is less than 1 percent.)

Source: Prepared by the Congressional Research Service using data from the Environmental Protection Agency.

Figure 2

SITES

- The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) tracks every hazardous disposal site considered for remediation. The total number of sites in CERCLIS as of December 8, 1993 was 38,952.[10] There is no screening process for CERCLIS listing. Even when a CERCLIS site is determined to be free of risk, it remains on CERCLIS.

- The National Priorities List (NPL) contains sites that have been determined to be the most hazardous in the United States.

- As the most recent listing, on February 23, 1994, there are 1,191 sites on the NPL, of which 123 are Federal facilities.[11]

- An additional 96 sites are proposed for listing on the NPL, of which 30 are Federal facilities.[12]

- Final and proposed NPL sites total 1,287, including 153 Federal facilities.[13]

- The first listing in the *Federal Register* occurred on September 8, 1983, and placed 406 sites on the NPL.[14]

- By the end of 1999, EPA expects to add 340-370 sites to the NPL, providing a total of 1,627-1,657.[15]

- Almost one-third of the NPL sites, or 403 Superfund sites, involve local governments, either as site owners, or as operators or transporters of waste to the site. Of the 403 sites, 216 are categorized as landfills.[16]

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[10] U.S. Environmental Protection Agency. Superfund Hotline, April 1, 1994.

[11] U.S. EPA. *Federal Register*, Feb. 23, 1994, p. 8724-8725.

[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] This and other information is from a January 28, 1994 OSWER Directive responding to 21 questions submitted to the Environmental Protection Agency by Representatives Al Swift and John Dingell on July 19, 1993. It became popularly known, and is hereinafter cited as the "Swift-Dingell Response."

[16] Clean Sites, Inc. *Main Street Meets Superfund: Local Government Involvement at Superfund Hazardous Waste Sites,* January 1992, p. 16.

Distribution of Sites

- States with over 50 NPL Superfund sites as of February 23, 1994 were:

  California
  Florida
  Michigan
  New Jersey
  New York
  Pennsylvania

- States with 21-50 NPL Superfund sites as of February 23, 1994 were:

  Illinois
  Indiana
  Massachusetts
  Minnesota
  Missouri
  North Carolina
  Ohio
  South Carolina
  Texas
  Virginia
  Washington
  Wisconsin

- As of 1991, 18.5% of sites were urban (central city areas); 39.0% of sites were classified as suburban (bordering urban areas); and 42.5% were classified as rural (outside suburban), as defined by the setting or character of the site, and the population density near the site.[17]

Construction Completions

- Construction completion at sites refers to the point in the cleanup process at which physical construction is complete for all remedial and removal work anticipated at the entire site.

- By the end of the year 2000, over one-half of the 1,249 sites listed as final and deleted on the National Priorities List (NPL) are projected to have construction completed. This number could go as high as two-thirds of all sites.[18] (See figure 3.)

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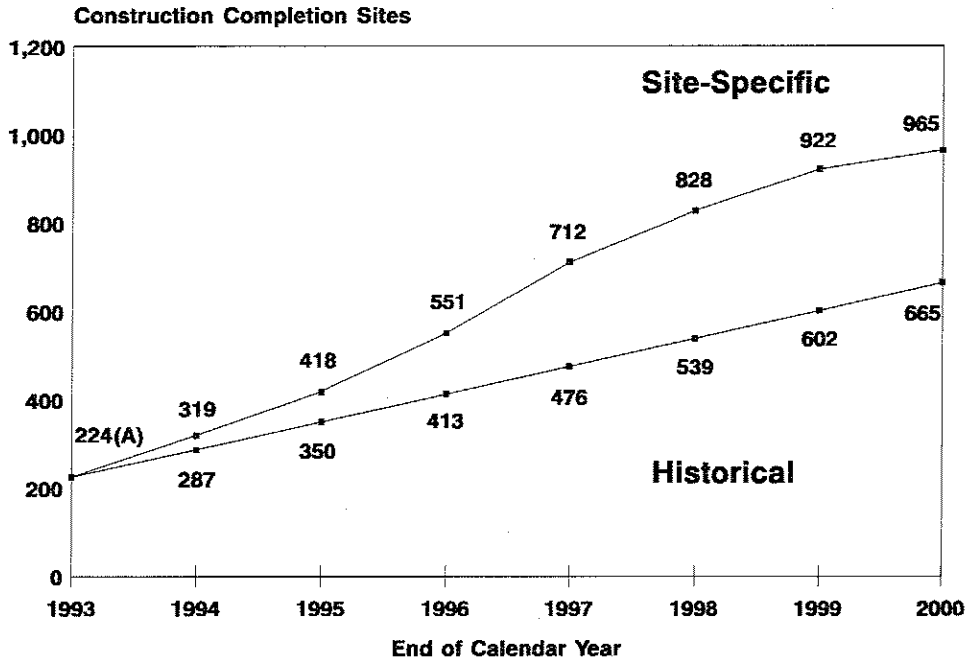
[17] U.S. EPA, OSWER. *Superfund Progress--Aficionado's Version*, 1992. p. 6.

[18] "Swift-Dingell Response."

Figure 3

Construction Completion Estimates for Sites on the NPL



(A) = Actual Construction Completion Data

Sources:

1. August 1993 RPM Data Collection (questions E10 and E13).

2. The full universe of sites addressed by the question: The 1,249 final and deleted sites listed on the NPL as of July 1993.

3. The subset of the universe for which data are provided: The 1,249 final and deleted sites listed on the NPL as of July 1993.

Note: Looking at historical trends to determine future rates of construction completions, EPA estimates construction completion at 63 sites per year, bringing the projected total of sites with construction completion to 665 sites by the end of the calendar year 2000. Site-specific answers from site managers, which may not account for real world delays that are difficult to predict, project 965 construction completions by the end of calendar year 2000.

REMEDIES

ARARs

- CERCLA does not contain any cleanup standards but instead applies standards from other sources. Application of these standards to CERCLA response actions is done by ARARs, that is, "applicable or relevant and appropriate" substantive and promulgated requirements of Federal or State environmental laws and regulations.[19]

- **Applicable requirements** are "cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site."[20]

- **Relevant and appropriate requirements** are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.[21]

- As with applicable requirements, State requirements are relevant and appropriate only if they are identified in a timely manner by a State and are more stringent than Federal requirements.

Emergency Removal Actions

- The emergency removal program responds to short-term emergencies at hazardous disposal sites requiring immediate action. By law, an emergency action can take no more than 1 year to complete and cost no more than $2 million. There were 2,984 emergency removal projects completed from FY 1980 through FY 1993, and there were approximately 340 emergency removals completed in FY 1993.

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[19] Fogelman, Valerie. *Hazardous Waste Cleanup, Liability, and Litigation.* Westport, Connecticut: Quorum Books [1992]. p. 45.

[20] Ibid.

[21] Ibid.

Length of Time to Remediation

- Using the best available data, the Congressional Budget Office estimates in March 1994 that the average time of cleanup for the first 1,249 NPL sites will be at least 12 years. Because of data limitations, the true average is more likely to be between 13 and 15 years.[22]

- A preliminary assessment study, on average, takes 95-145 hours to complete; a remedial investigation/feasibility study 18-30 months; and a remedial design 12-18 months to complete.[23]

- On average, a period of more than 8 years lapses from the time a site is discovered to the time definitive remediation work begins. During this time the remedial investigation are completed. In addition delays are caused by negotiations and litigation among EPA, State agencies, Potentially Responsible Parties (PRPs), insurers, and municipalities deciding who should bear the remediation costs.[24]

Remedy Selection

- "**Treatment**" in this usage means a process that significantly reduces the volume, toxicity, or mobility of hazardous substances. "**Containment**" is a remediation method that seals off all possible exposure pathways between a hazardous disposal site and the environment. "**Removal**" refers to a cleanup of released hazardous substances including the assessment of the site, the disposal of removed material, and any other actions to protect the public health and environment.

- EPA selected treatment as the remedy for 78% of sites with ground water contamination, and 65% with surface water contamination. When soil contamination occurred, EPA selected treatment at 50% of sites. EPA tends to select containment remedies for large volumes of waste at sites (for example, greater than one million cubic yards), and treatment remedies for small volumes of waste (less than 1,000 cubic yards).[25]

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[22] U.S. Congressional Budget Office. *Analyzing the Duration of Cleanup at Sites on Superfund's National Priorities List.* March 1994. p. 2.

[23] Guerrero, Peter. *Superfund: Current Progress and Issues Needing Further Attention.* GAO Testimony. June 1992, p. 8.

[24] Action, Jan Paul. *Understanding Superfund.* RAND Institute for Social Justice. 1989.

[25] U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (OERR). 1991.

Stages of Remediation

The status of the 1,320 National Priorities List sites (including proposed sites, and sites deleted from the list) as of the end of FY 1993 was:

- 45 proposed sites with evaluation for immediate threat completed, but action not begun.
- 32 final sites with evaluation for immediate threat completed, but action not begun.
- 13 sites with removal-only actions.
- 309 sites where studies are underway.
- 85 sites where remedies have been selected.
- 225 sites where designs are underway.
- 393 sites where construction is underway.
- 166 sites where construction is completed.
- 51 sites deleted from the NPL (includes 1 site deleted by referral to another authority).[26]

COSTS

- In its most recent annual report to the Congress on Superfund for 1990, EPA projected funding requirements of $16.4 billion in fiscal years 1993 and beyond and a cumulative total since 1981 of $27.2 billion. EPA estimates are based on the current NPL of 1,268 sites as of the end of FY 1993.

- In December 1991 a group of researchers at the University of Tennessee released reports that contained a "best-guess estimate" of $151 billion for cumulative costs to clean up 3,000 nonfederal NPL sites.[27]

- The University of Tennessee's figures cover a different set of costs than does the smaller EPA estimate: they include State and private remediation costs for NPL sites as well as Federal costs, but they omit expenditures on non-NPL removal sites and EPA's enforcement and management activities.

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[26] U.S. Environmental Protection Agency. *4th Quarter FY 1993 Superfund Management Report.* December 1993. p. I-3. Categories are cumulative. Sites with construction underway already have completed the requirements of study, remedy selection, and design.

[27] M. Russell, E.W. Colglazier, and M.R. English, *Hazardous Waste Remediation: The Task Ahead*; and E.W. Colglazier, T. Cox, and K. Davis, *Estimating Resource Requirements for NPL Sites* (Knoxville, Tenn.: University of Tennessee, Waste Management Research and Education Institute, 1991).

- A Congressional Budget Office study released in January 1994 estimates it could take $75 billion to clean up a total of 4,500 sites now in need of work.[28]

Capital Costs

- The average capital cost at a non-Federal facility site is $21.8 million. Site assessment, studies, and design comprise approximately 11% of total site costs, resulting in an average cost of approximately $25 million.[29]

- A relatively small number of very expensive sites raise the average cost significantly. Over 60% of all capital cleanup costs are accounted for by only 16% of the operable units (OUs). An operable unit is a division of a site cleanup project; on average, there are 1.8 OUs for a non-Federal facility site.[30]

- 69% of NPL sites have capital costs of less than $10 million.[31]

- 38% have capital costs of less than $3 million.[32]

- Site managers expect capital costs to exceed $20 million at 296 sites (232 non-Federal facility sites and 64 Federal facilities). The most common factors contributing to these estimates are large volumes of contaminated media, site complexities and high treatment costs.[33]

Contractor Costs

- According to GAO, the potential exists for serious contract management problems in the Superfund program. EPA extensively uses cost-reimbursable contracts to clean up hazardous waste sites. These contracts require special agency oversight because they reimburse the contractor for all allowable costs and therefore give the

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[28] U.S. Congress. Congressional Budget Office. *The Total Costs of Cleaning Up Nonfederal Superfund Sites*. Washington, U.S. GPO, 1994.

[29] "Swift-Dingell Response."

[30] Ibid.

[31] Ibid.

[32] Ibid.

[33] Ibid.

contractor little incentive to control costs.[34] EPA has been striving to control costs and to ensure a high quality of performance. For example, during the period from 1990 to 1992, program management costs dropped by nearly $6 million (from $30.2 million to $24.7 million) while remedial work almost doubled in the same period (from $75.5 million to $141.4 million).

- In fiscal year 1991, when EPA's total obligation for the Superfund program was approximately $1.7 billion, remedial action contractors were paid approximately $600 million to study sites and design and perform remedies.[35]

EPA Enforcement/Costs to Potentially Responsible Parties (PRPs)

- The Superfund program enforcement budget for FY 1993 was $209 million, or approximately 13% of Superfund resources.

- Responsible parties are paying increasing amounts of the cost of cleanup.

- According to EPA, liable party share of remediation costs in Fiscal Year 1987 was 37%, and trust fund share was 63%. In Fiscal Year 1993, liable party share increased to 79%, and the trust fund decreased to 21%.[36]

- According to a RAND study of five PRPs with an average of 144 sites each, annual outlays for site remediation nearly tripled between 1984 and 1989, increasing from $2.6 million to $6.1 million. Transaction costs (legal fees and other non-remediation costs) averaged 21% of the total outlays of each firm.[37]

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[34] U.S. Senate. Committee on Environment and Public Works. Subcommittee on Superfund, Recycling, and Solid Waste Management. *Superfund Reauthorization*. Hearings, 103rd Congress, 1st Session. Statement of Richard L. Hembra, Director Environmental Protection Issues, General Accounting Office.

[35] General Accounting Office (GAO). *Superfund Program Management*. December 1992. p. 30.

[36] U.S. Environmental Protection Agency. OSWER. *Superfund Enforcement Program Highlights*, CERCLIS. 1993.

[37] Acton, Jan Paul, and Lloyd S. Dixon. *Superfund and Transaction Costs*. Santa Monica, Calif.: RAND Institute for Social Justice, 1992. p. xii.

- The cumulative value of private party commitments since the beginning of the Superfund program exceeds $8 billion. Nearly three-quarters of that amount has been pledged since 1989.[38]

- Privately funded remediations in fiscal year 1992 accounted for $1.5 billion, a seven-fold increase from $207.5 million in fiscal year 1987.[39]

Operations and Maintenance Costs (O&M)

- Most Superfund sites require Operations and Maintenance (O&M) after remediation is complete. Examples of O&M include maintaining a cap or repairing fences at previous sites, or continuing to pump and treat groundwater for a certain period of time.[40]

- According to the current National Contingency Plan, States are responsible for 100% of O&M costs, which can be considerable. If continuous pumping of groundwater is part of the remediation plan, EPA pays for the first ten years of pumping, after which it becomes the State's responsibility.[41]

- States have spent approximately $110 million to date on Operations and Maintenance, costs which will increase as more site remediations are completed.[42]

LIABILITY

- A Potentially Responsible Party (PRP) is any individual or company that may have contributed to contamination at a Superfund site. Examples of PRPs include waste generators, waste transporters, current or former landowners, and site operators. Courts have

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[38] U.S. Environmental Protection Agency. OSWER. *Superfund Enforcement Program Highlights*, CERCLIS. 1993.

[39] GAO, *Superfund Program Management,* p. 22.

[40] Excerpted from Luftig, Steve (U.S. EPA) and Claudia Kerbawy (MIDNR). *The State's Role in Operations and Maintenance.* Presentation at Clean Sites, Inc., Superfund Reauthorization Project Meeting, March 24, 1993, as referenced in Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

[41] Ibid.

[42] Ibid.

interpreted PRP liability for Superfund remediations to be strict, joint and several, and retroactive (defined below).[43]

- **Strict liability** means the government needs to prove only involvement at a waste site, not negligence.[44]

- **Joint and several liability** indicates that any involved party may have responsibility for the entire site, regardless of its degree of involvement.[45]

- **Retroactive liability** means that parties can be held liable for past actions that may have been legal at the time.[46]

Contributors to Waste

- Waste comes from a variety of sources. The following distribution shows the breakdown of waste contributors:

Manufacturing operations	38.9%
Municipal landfills	16.5%
Recyclers	8.5%
Industrial landfills	6.5%
Department of Energy and Department of Defense	5.0%
Mining	2.0%
Other sources	22.5%[47]

(See figure 4.)

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[43] Acton, Jan Paul, and Lloyd S. Dixon. *Superfund and Transaction Costs.* Santa Monica, Calif.: RAND Institute for Social Justice. 1992. p. ix.

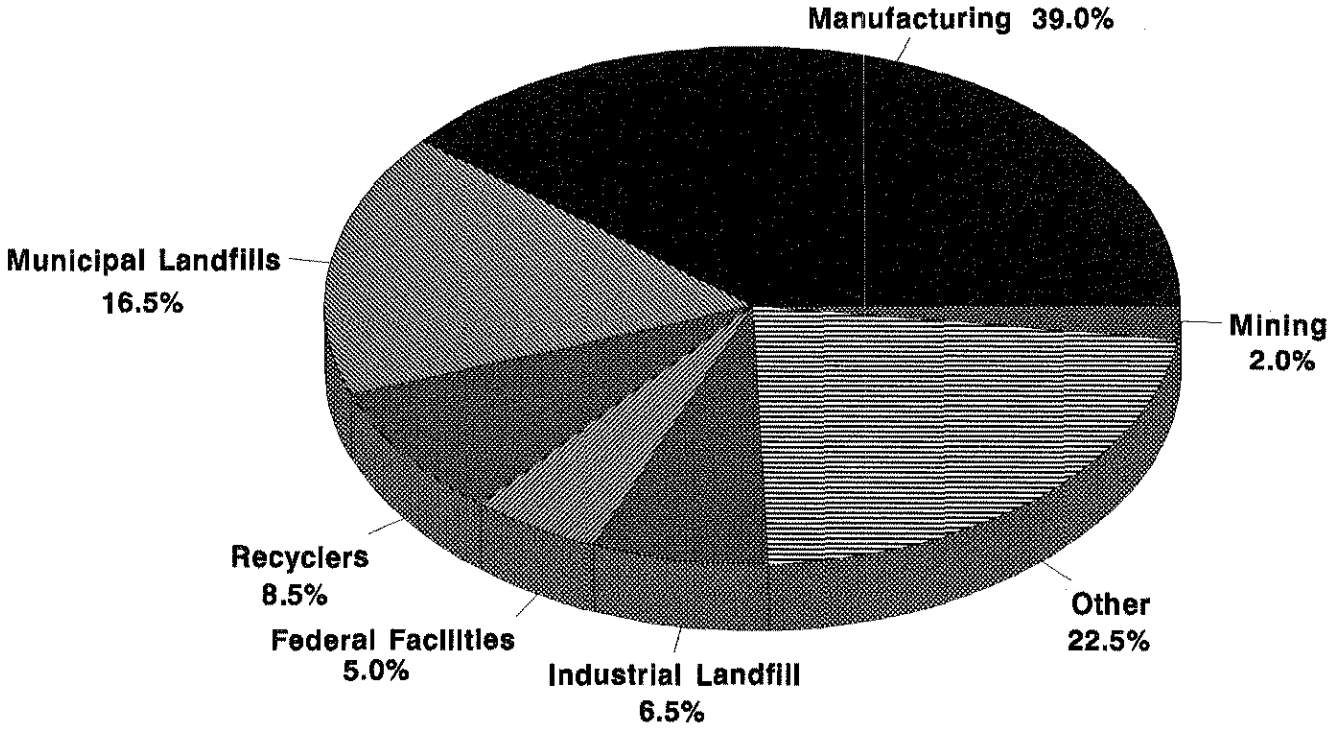
[44] Ibid.

[45] Ibid.

[46] Ibid.

[47] U.S. EPA, OSWER. *Superfund: Focusing on the Nation at Large*. 1992, p. 8.

Contributors of Waste at NPL Sites



Source: U.S. EPA, OSWER. Superfund: Focusing on the Nation at Large. 1992.

Figure 4

Waste

- Superfund hazardous substances include liquid waste (found at 92.4% of NPL sites), solid waste (found at 58.3% of NPL sites), and sludge (found at 49.2% of NPL sites).[48]

- The classes of contaminants most prevalent at NPL sites are:

Organic chemicals	71.4%
Metals	64.3%
Oily wastes	35.1%
Inorganic chemicals	30.9%
Municipal waste	27.3%
Acids/bases	24.5%
PCBs (Polychlorinated biphenyls)	20.3%
Pesticides/herbicides	18.4%
Paints/pigments	17.7%
Solvents	6.3%[49]

(See figure 5.)

Record of Decision (ROD)

- The ROD is a formal document by which an EPA administrator (usually the regional administrator) chooses the remedy to be applied to at a Superfund site.[50]

- Contaminated soil is present at 80% of the NPL sites with RODs yet to be implemented.[51]

- Groundwater contamination is present at nearly 79% of NPL sites with RODs.[52]

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[48] U.S. Environmental Protection Agency, OSWER. Physical State of Waste. *Superfund: NPL Site Characterization Project Report*, 1991. p. 53.

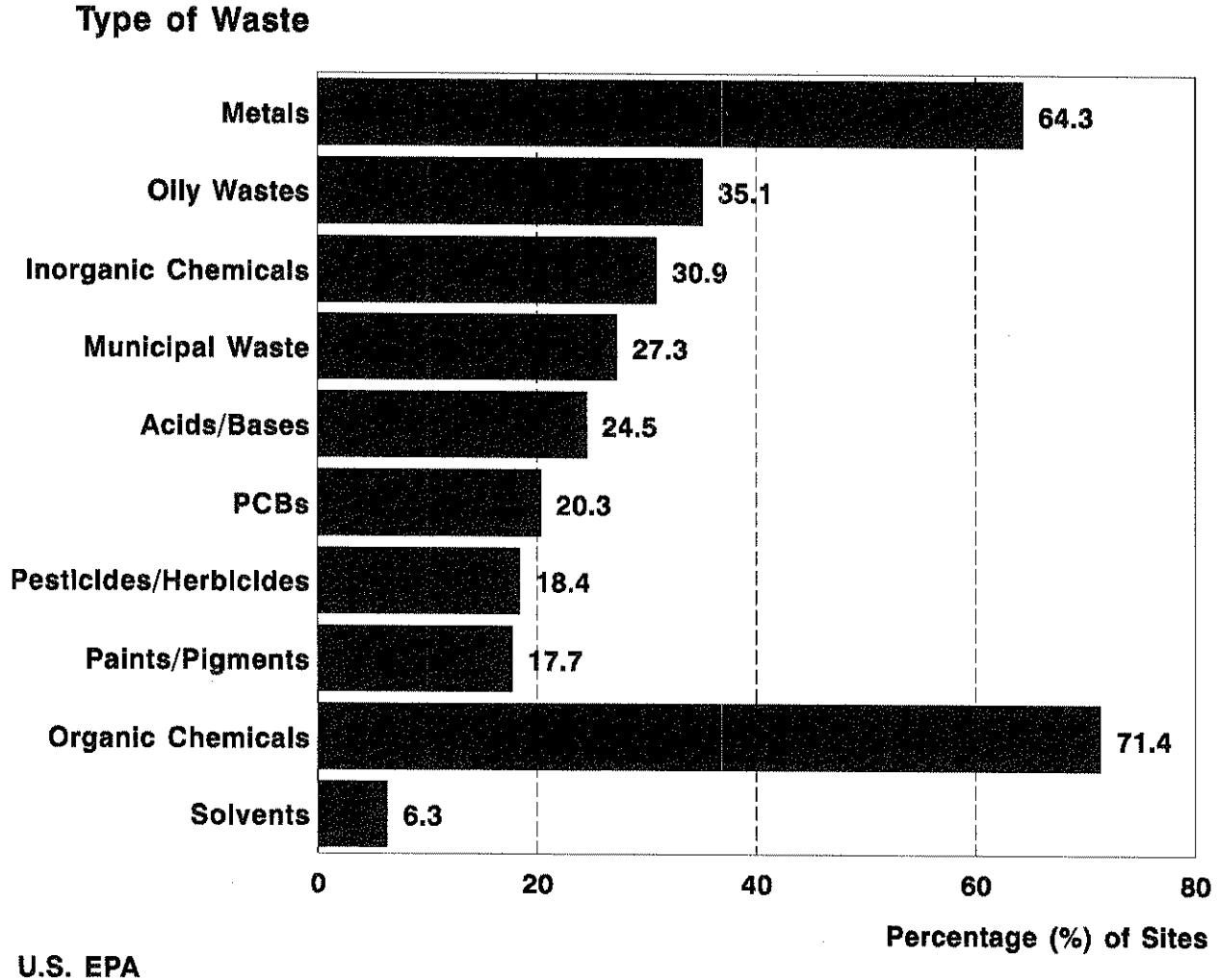
[49] U.S. Environmental Protection Agency. OSWER. *National Priorities List Characterization Project Report.* 1991. p. 54.

[50] Church, Thomas W. and Robert T. Nakamura. *Cleaning Up the Mess: Implementation Strategies in Superfund.* Washington, D.C.: The Brookings Institution [1993]. p. 175.

[51] U.S. Environmental Protection Agency, Technology Innovation Office, 1992, as referenced in Business Roundtable, *101 Terms & Facts on Superfund,* November 1993.

[52] Kovalick, Walter, Jr. U.S. EPA, OSWER. Testimony before the U.S. House Committee on Science, Space and Technology, April 1993.

Predominant Waste at NPL Sites: Rate of Occurrence (%)



Source: U.S. EPA

Figure 5

- The most frequently occurring soil contaminants at NPL sites with RODs were:

Lead	130 sites
Trichloroethylene (TCE)	112 sites
Arsenic	100 sites
Chromium	91 sites
Perchlorethylene (PCE) or Tetrachloroethylene	91 sites
Toluene	91 sites
Cadmium	82 sites
Benzene	76 sites
Zinc	65 sites
Ethylbenzene	63 sites
Polychlorinated biphenyls (PCBs)	61 sites
Copper	57 sites.[53]

(See figure 6.)

- Major soil contaminant groups at NPL sites with RODs are organics and metals (67%); organics only (23%); and metals only (10%).[54]

Insurers

- Insurers and those who are insured spend approximately $500 million each year on Superfund litigation involving insurance coverage.[55]

- Insurance companies are experiencing substantial increases in their payments for PRP Superfund claims. A Government Accounting Office (GAO) study of the Nation's largest property/casualty insurers found that, before 1987, 10 of 13 studied companies made a total of approximately $11 million in payments to their policy holders. From 1987 to 1991, however, the 13 companies paid approximately $144 million in claims.[56]

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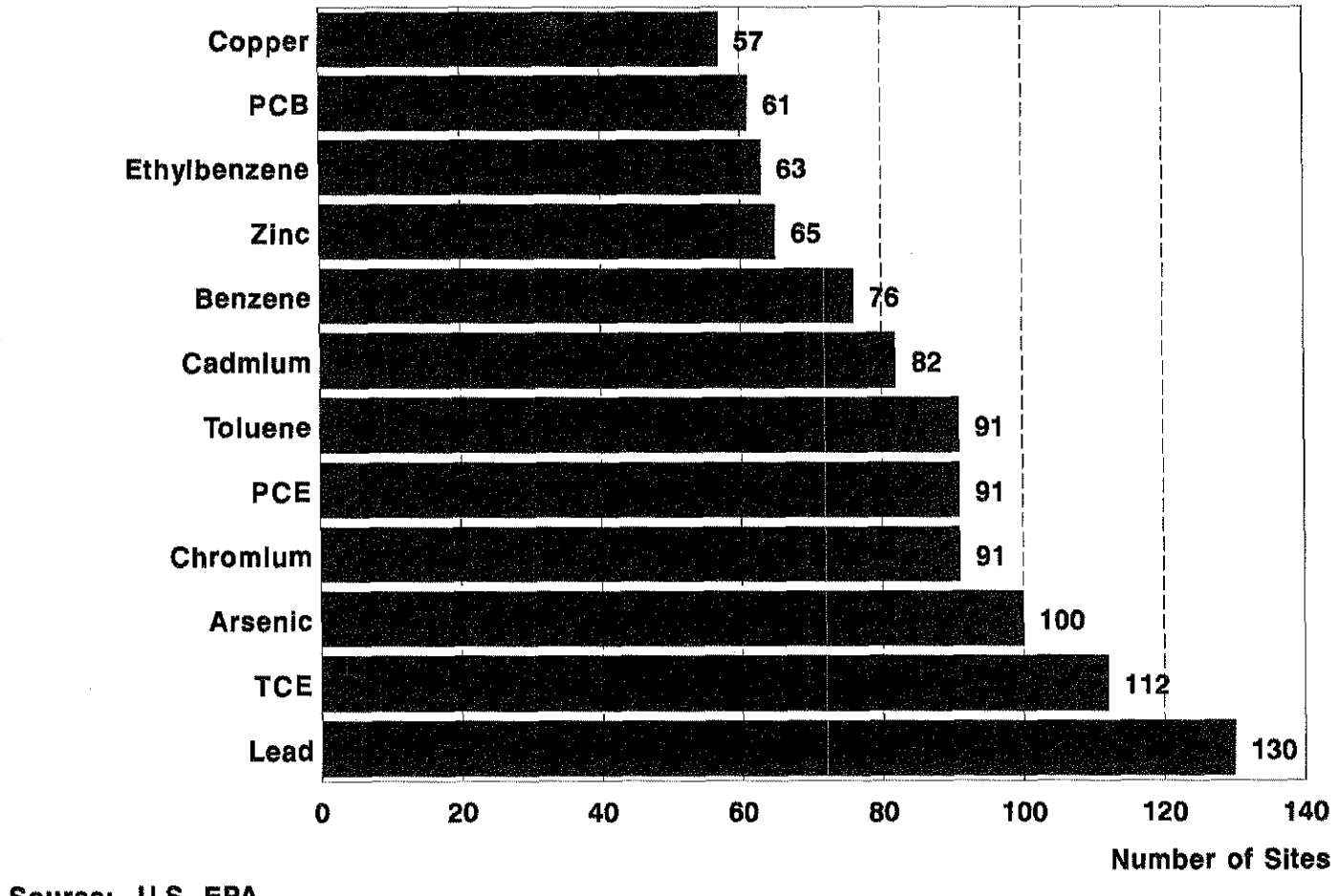
[53] U.S. Environmental Protection Agency, Technology Innovation Office, 1992, as referenced in Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

[54] Ibid.

[55] House Committee on Banking, Finance and Urban Affairs, 1990, as referenced in Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

[56] Hembra, Richard. *Superfund Pollution Claims.* Government Accounting Office (GAO). 1992.

Frequency of Soil Contaminants Found at NPL Sites with RODs



Source: U.S. EPA

Figure 6

- According to a RAND study of four national insurance carriers involving over 13,000 claims, 88% of total expenditures by insurance companies to PRP policyholders covered transaction costs such as corporate legal fees; 12% of payments were for corporate remediation activities. RAND calculated that if its sample was representative of the whole insurance industry, insurers spent $470 million on claims involving inactive hazardous waste sites in 1989.[57]

SETTLEMENTS

De Minimis Settlements

- *De minimis* parties are PRPs who have contributed very small amounts of waste to a site compared to others. In a sample of 32 settlements 99.28% of the 1,674 *de minimis* settlors each contributed less than 1% of the waste.[58] (See figure 7.)

- 73% of the *de minimis* parties contributed one-tenth of 1% of the waste, or less.[59] (See figure 7.)

- *De minimis* settlements were first authorized in SARA of 1986 under Section 122(g)(1)(B) of CERCLA. Since then, through FY 1993, 6,144 *de minimis* parties have resolved their liability in 125 settlements.[60] (See figure 8.)

- When practicable and in the public interest, Section 122 (g) authorizes EPA to reach final settlements with PRPs if the settlement involves a minor portion of the response costs, and the waste sent to the site by the PRP is minimal in comparison to the other hazardous substances at the facility in terms of volume and toxicity (*de minimis*).[61] It encourages EPA to reach a final settlement with such parties "as promptly as possible."

- *De minimis* settlements are also appropriate in situations where a party is the owner of the property where the facility is located but did

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[57]Acton, Jan Paul, and Lloyd S. Dixon, p. x-xi.

[58] U.S. Environmental Protection Agency. Office of Solid Waste Management and Emergency Response (OSWER) and Office of Waste Program Enforcement (OWPE). *The First 125 De Minimis Settlements.* October 1993. p. 3.

[59] Ibid.

[60] Ibid., p. 3.

[61] Wagner, Travis P. *The Complete Guide to the Hazardous Waste Regulations.* 2d ed. New York, Van Nostrand Reinhold [1991]. p. 327.

not conduct or permit the generation, handling or disposal of hazardous substances at the facility; contribute to the release or threatened release from the facility; or acquire the facility with knowledge that it had been used to store, handle or dispose of hazardous substances.[62]

- There are 220 sites where sufficient volumetric data exist to establish whether there are PRPs who contributed "minimal" amounts of hazardous substances to facilities and *could be* considered *de minimis*.[63]

- Although EPA has sufficient information to assess whether *de minimis* parties *may* exist at each of these 220 sites, this analysis has not been conducted at all of these sites. At 160 sites, however, EPA regional officials have indicated that there may be *de minimis* parties. While the precise number of potentially *de minimis* parties at each of these 160 sites is not known, the *median* range of potential *de minimis* parties at each site is between 11 and 50 parties.[64]

- In response to criticism that EPA took too long to reach *de minimis* settlements, the Agency issued new guidance in July 1993, which requires that the Agency only needs to estimate the PRPs' contribution, compared to the total volume of waste at the site.[65] Previous guidance required more detailed volumetric data.

- In the fiscal year ending September 30, 1993, EPA entered into 38 *de minimis* settlements at 25 sites, which is roughly 2.5 times the previous annual average. This demonstrated a shift toward increased use of *de minimis* settlements.[66]

- As of October 1993, the mean (arithmetic average) individual payment by *de minimis* parties was $27,419.[67] (See figure 9.)

- The median payment was $6,750. (Median means one-half the settlors paid more, and one-half paid less).[68] (See figure 9.)

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[62] 42 U.S.C. Sec. 9622(g)(1).

[63] "Swift-Dingell Response."

[64] Ibid.

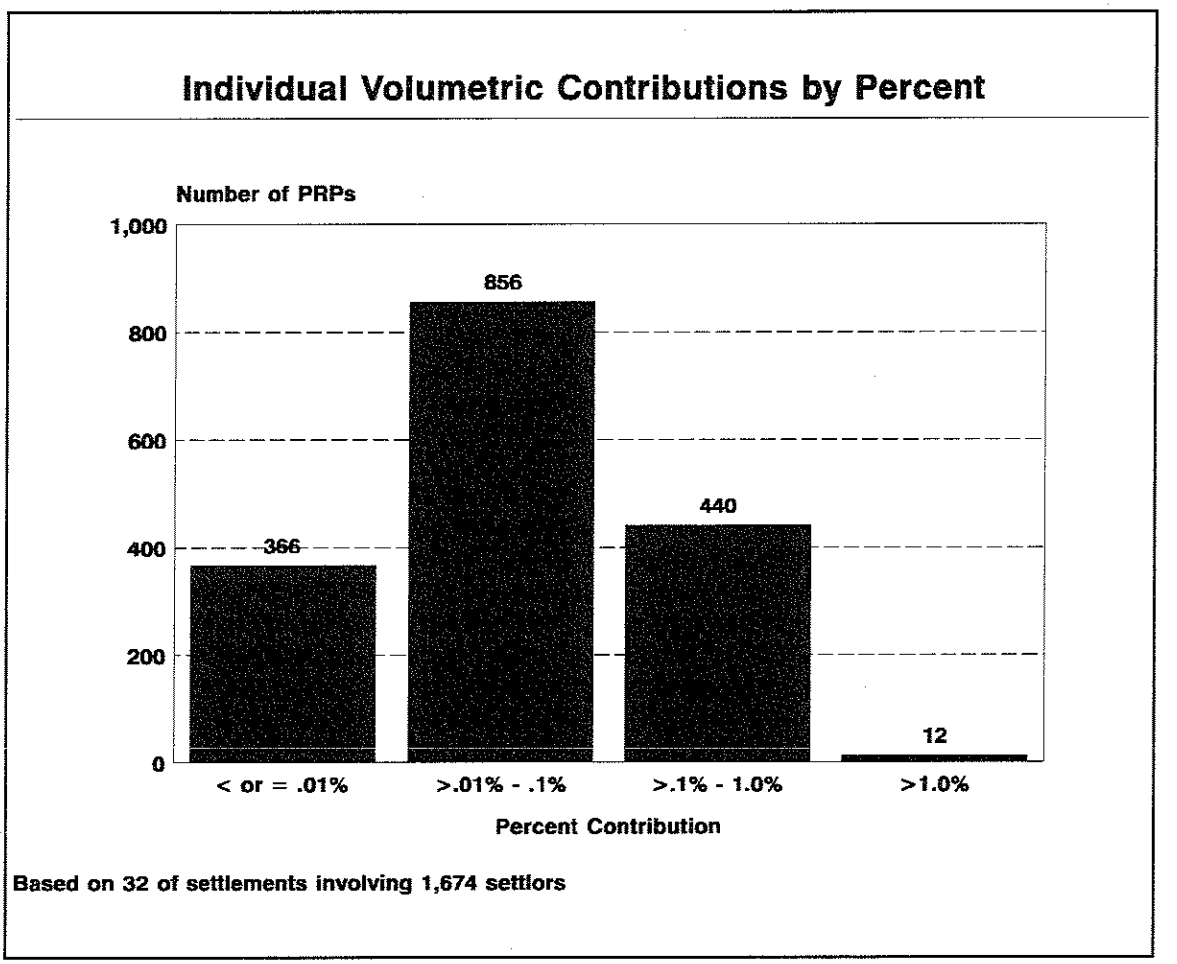
[65] Ibid.

[66] Jones, Stephen C. Early Settlements Finally May Catch On. *The National Law Journal*, v. 16, November 22, 1993: p. 18

[67] Ibid., p. 11.

[68] Ibid., p. 11.

Figure 7



Source: U.S. EPA, Office of Waste Programs Enforcement, *The First 125 De Minimis Settlements*, October 1993.

Notes: Although the volumetric cut-off for *de minimis* eligibility has frequently been set at 1 percent, most of the *de minimis* settlors contributed an amount significantly less than 1 percent.

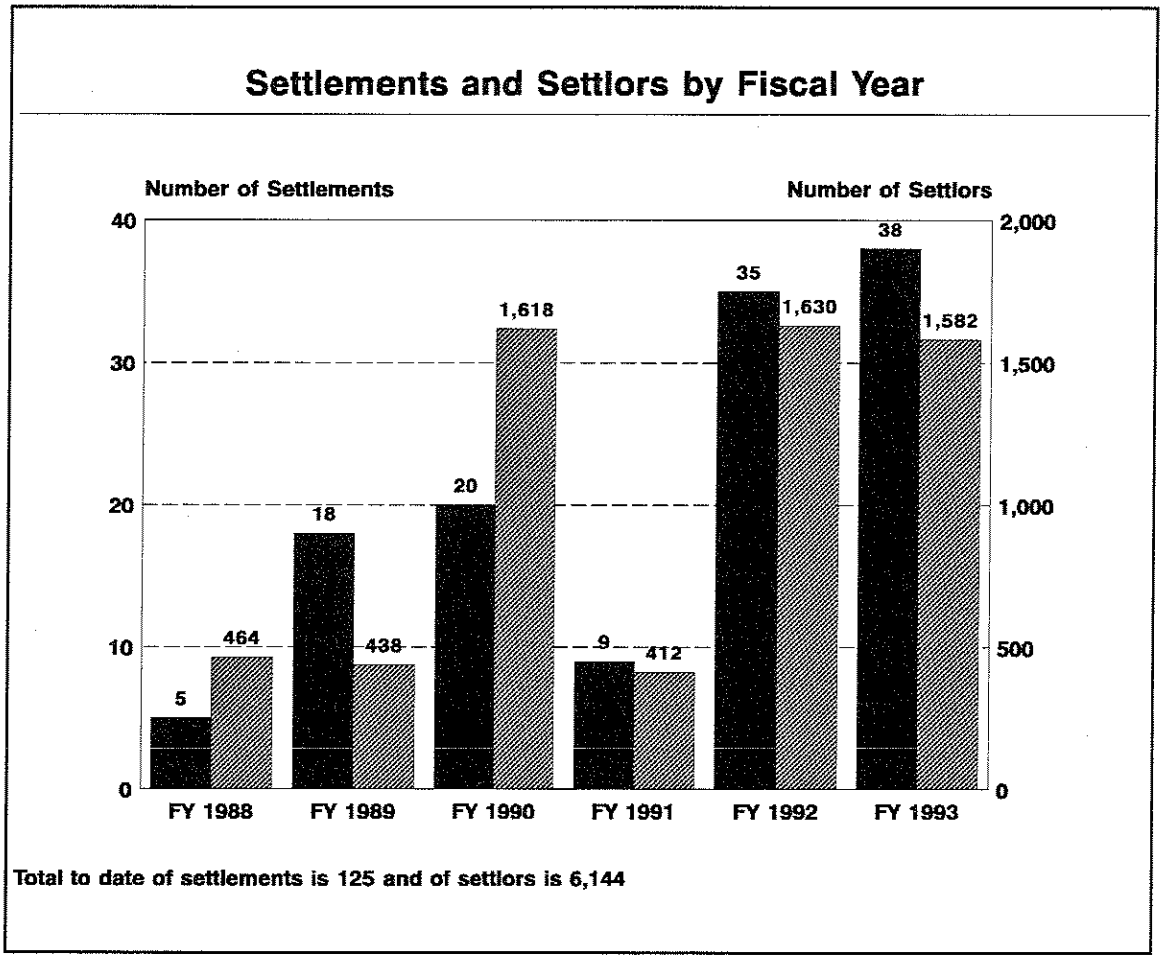
Seventy-three percent of the *de minimis* parties individually contributed .1 percent of the waste or less.

Less than 1 percent of the settlors individually contributed more than 1 percent of the waste to a given site.

Waste contributions are not always expressed as a percentage share of total waste at the site; individual contributions are occasionally recorded only in gallons, pounds, number of batteries, etc.

For individual contributions, the mean is .11 percent, the median is .04%, and the range of percentages is from .0001 to 1.47.

Figure 8

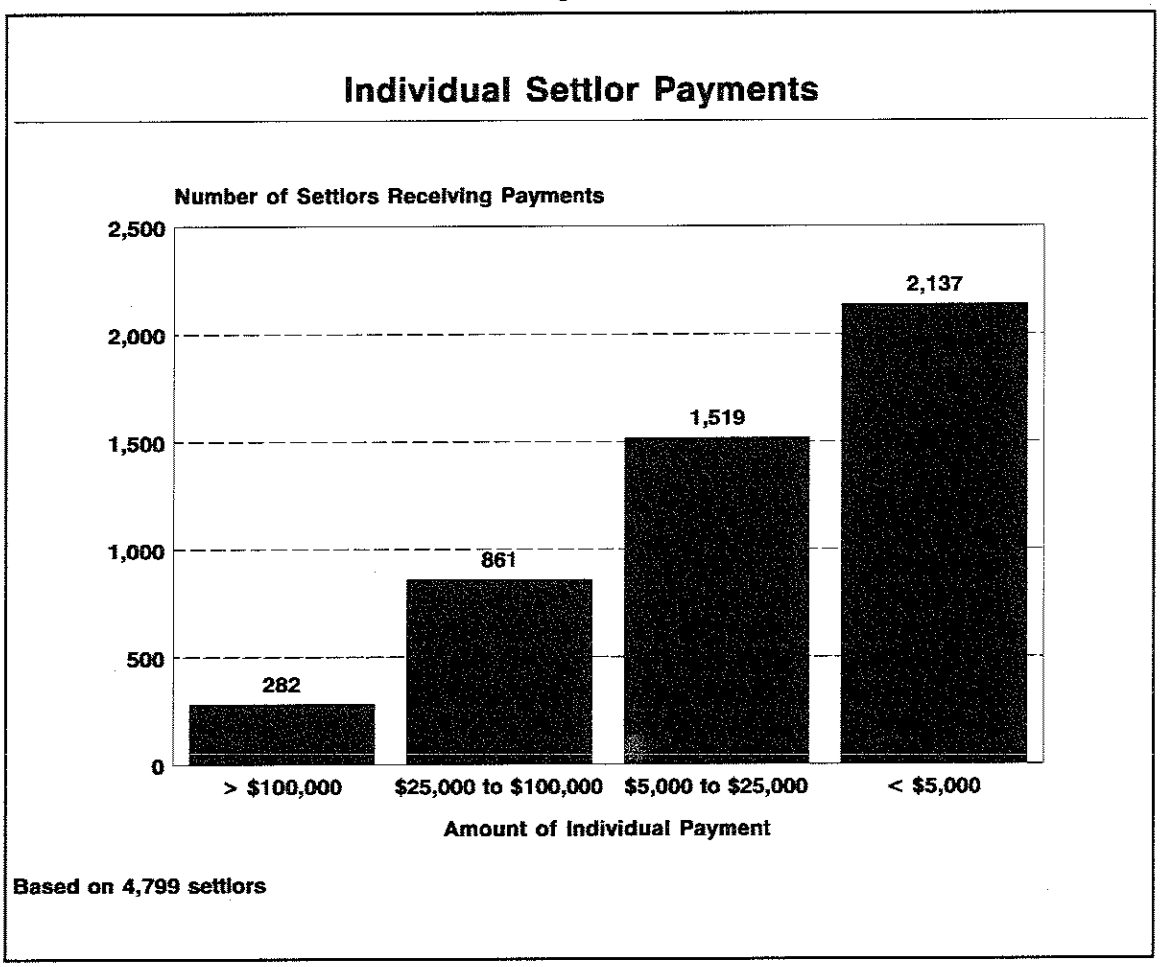


Source: U.S. EPA, Office of Waste Programs Enforcement, *The First 125 De Minimis Settlements*, October 1993.

Note: These final settlement numbers may not accurately reflect EPA's *de minimis* enforcement activity in a given fiscal year, as the settlements are counted in this graph as final when an Administrative Order on Consent was signed by the Regional Administrator or a Consent Decree was entered by the Court. For example, although there were only 9 final *de minimis* settlements in FY 1991, many of the 35 settlements finalized in FY 1992 were actually developed in FY 1991.

There are 125 total settlements and 6,144 total settlors to date.

Figure 9



Source: U.S. EPA, Office of Waste Programs Enforcement, *The First 125 De Minimis Settlements*, October 1993.

Notes: Individual payments usually include a premium, which is an additional percentage of each settlor's allocated share of the cleanup costs. Premiums frequently address potential cost overruns or orphan shares.

Premiums for *de minimis* settlors have ranged from 10 percent to 327 percent of individual payments. On average, settlors have paid a premium of 108 percent. The premium most frequently addressed in *de minimis* settlements to date is 100 percent.

In addition to paying an allocated share and a premium, some settlors have also paid additional amounts if they were previously offered *de minimis* settlement, but declined to participate. There are 12 settlements in which this occurred, and the amounts assessed averaged 23 percent of a settlor's individual payment.

The amount of individual payments ranged from $6 to $1,450,000. The mean individual payments was $27,419, and the median individual payment was $6,750.

- The range of individual *de minimis* payments has been from $6 to $1,450,000.[69] (See figure 9.)

- On average, *de minimis* settlements have contributed 8% of the total cleanup costs at the sites.[70] (See figure 10.)

Mixed Funding Settlements

- At every multiparty CERCLA site there are parties that wish to settle with EPA and those that cannot or do not. At the same time, there may be a vast quantity of wastes at the site which came from defunct or bankrupt companies. Wastes from these defunct or bankrupt companies are referred to as a site's "orphan share."[71]

- If EPA paid for the entire orphan share for Remedial design/remedial action (RD/RA) at every enforcement-lead site (where potentially responsible parties perform the remedy) with an orphan share, the Office of Waste Programs Enforcement (OWPE) estimates that the annual cost to the Trust Fund would range from approximately $150.0 million to $420.0 million dollars per fiscal year. Comparatively, the Superfund appropriation for FY 1993 was approximately $1.57 billion dollars.[72]

- The Mixed Funding provision of CERCLA allows EPA and PRPs to share either the work or funding responsibilities of a remediation. There are three authorized mechanisms for Mixed Funding settlements. These are:

  Cash-outs. PRPs pay the Agency for all or part of the remediation costs in lieu of performing the remediation.

  Mixed Work. PRPs agree to conduct/pay for discrete portions of the remediation work.

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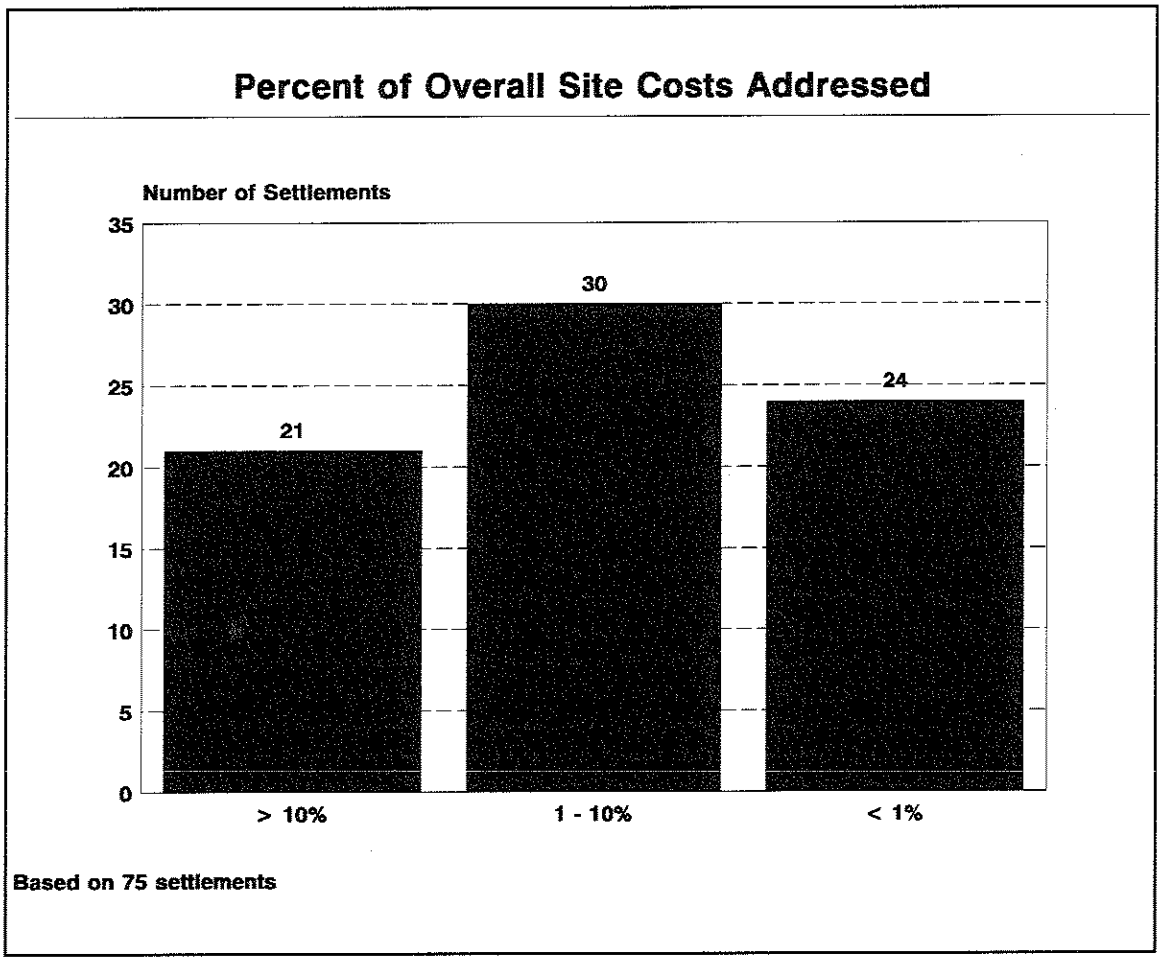
[69] Ibid., p. 11.

[70] Ibid., p. 14.

[71] Lee, p. 341.

[72] U.S. Environmental Protection Agency. OSWER. *Mixed Funding Evaluation Report: The Potential Costs of Orphan Shares*. September 1993.

Figure 10



Source: U.S. EPA, Office of Waste Programs Enforcement, The First 125 *De Minimis* Settlements, October 1993.

Note: On average, *de minimis* settlements have addressed 8 percent of the total cleanup costs at the site. Overall, this portion of total site costs addressed by *de minimis* settlements has ranged from .003 percent to 45 percent.

Pre-authorization Settlement. PRPs agree to conduct the remediation, and the government agrees to pay a portion of the costs, with proper documentation.[73]

- While designed to streamline the Superfund process, EPA has approved only twelve preauthorization Mixed Funding Settlements since the SARA amendments of 1986. These settlements would require response actions with an estimated value of $192.6 million, of which the Superfund has agreed to reimburse $43.9 million, or an average of 23%.[74]

STATES

State Superfund Programs

- State responsibilities under the Superfund program range from cost sharing to leading NPL site remediations.[75]

- Most States have separate programs for enforcing and funding remediations at non-NPL sites. As of 1991, thirty-four States have an inventory/registry or a priority list of hazardous disposal sites. Each State establishes its own criteria for placing sites on an inventory/registry, priority list, or list of sites needing attention.[76]

- An EPA study found that 31 States have a removal program and six States are developing a removal program. In general, most States seek out PRPs for PRP-lead removal actions before beginning a project. If the PRP cannot be identified, then the States will begin the removal.[77]

- State sources of program funding for non-NPL sites include State appropriations (26.6%), State fees (21.9%), taxes (14.1%), bonds

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[73] Ross, William. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, 1993, as referenced in Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

[74] Ibid.

[75] U.S. Environmental Protection Agency. Office of Emergency and Remedial Response (OERR). *An Analysis of State Superfund Programs: 50-State Study, 1991 Update.* Publication 9375.6-08B. December 1991.

[76] Ibid.

[77] Ibid.

(12.5%), EPA core grants (10.9%), cost recovery (6.3%), fines (4.7%), and Federal funding (3.0%).[78]

- Funding for State Superfund programs has decreased 16% since 1990, but is still higher than in 1989. In 1991, fifteen States had State trust fund balances in excess of $10 million. Thirty States had reported staff increases since 1990, and 10 States had over 100 staff members devoted to hazardous waste issues.[79]

TREATMENT TECHNOLOGIES

Bioremediation

- In-situ bioremediation (also known as bioreclamation) is one form of biological treatment that has been used at CERCLA sites. In-situ bioremediation is the process of altering and controlling environmental conditions in order to enhance the metabolic activity of microorganisms that degrade organic contaminants.

- Bioremediation is an innovative treatment technology. Between 1982 and 1989, 37% of all technologies used for source control at Superfund sites were innovative technologies. Bioremediation was selected or used at 22.5% of those sites.[80] The advantages and disadvantages of biological treatment are listed in table 2.

Chemical Treatment

- The objectives in using chemicals and chemical reactions are to either immobilize, mobilize for extraction, or detoxify the contaminants.

- The chemical processes may be combined or used individually as treatment alternatives. Table 3 summarizes some of the advantages and disadvantages of each chemical treatment process.

Thermal Treatment

- One class of treatment technologies that presents a potentially permanent solution to the problem of many hazardous wastes is

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[78] Ibid.

[79] Ibid.

[80] U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response, Technology Innovation Office. *Innovative Treatment Technologies: Semi-Annual Status Report.* EPA/540/2-91/001. January, 1991.

thermal treatment. Table 4 compares some of the apparent advantages and disadvantages of each thermal technology.

Physical Treatment

- The basic objective of physical treatment is the manipulation of the physical properties of the wastes in order to immobilize them, detoxify them, or render them less harmful.

- The chemical characteristics of the hazardous waste remain constant during physical treatment. Physical treatment often produces residues that require further treatment prior to disposal.

- Chemical or thermal technologies may be applied to these residues in order to dispose of them in an environmentally safe manner. Table 5 outlines some of the advantages and disadvantages of physical treatment technologies.

Table 2. Bioremediation Summary

Technology	Advantages	Disadvantages
In-situ Bioremediation	Cost effective technology.	Complex waters can inhibit biological activity.
	Fairly broad applicability for organic wastes.	Applicability limited by site conditions.
	Large volumes of soil may be treated.	Difficult process to monitor for cleanup efficiency.
	Likely to be supported by the public since it is viewed as a natural process.	Better understanding and optimization of the science required.

Table 3. Chemical Technology Comparison

Technology	Advantages	Disadvantages
Soil Flushing	Costs are relatively low.	Effectiveness limited to soils with few hazardous materials.
	Great success on soils with few contaminants.	Limited application if soil characteristics are unfavorable.
Soil Washing	Effective on gravel and treats a wide variety of wastes.	Ineffective on soils containing silt and clay.
	Removes 90 to 99 percent of organics, in closed-treatment unit.	Limited by complex waste materials.
	Cost effective and favorably viewed by the public.	Additives may be hazardous and difficult to remove.
Solvent Extraction BEST	Separation efficiencies are greater than 98 percent.	Uses flammable solvent, requiring safety measures.
	Produces dry solids, and reduces waste volume.	Requires adjustment of the pH level.
	Waste does not require heating.	
CF System	90 percent removal efficiency on PCB contaminated soils.	Treatment limited to halogenated organics.
Dehalogenation	Toxicity reduction of target contaminants.	By-products may require further treatment.
	Short treatment time, and relatively low operational and maintenance costs.	

Table 4. Thermal Treatment Comparison

Technology	Advantages	Disadvantages
General Thermal Treatments	Effective in treating a variety of waste. Reduces volume. Destroys organic waste with efficiency of 99.9 percent.	Relatively expensive technology. Public resistance is high. Volatile metals can cause stack emission problems.
Infrared Incineration	Applicable to a wide variety of solids.	Not appropriate for liquid or slurry wastes. Volatile metals can cause stack emission problems.
Rotary Kiln Incineration	Least preprocessing requirements and can accept debris up to 12 inches. Well developed and proven, but extensive operating experience is required.	The process has long setup time and requires large gas volume. Susceptible to thermal shock, requiring careful maintenance. Volatile metals can cause stack emission problems.
Fluidized Bed Incineration	Operates at lower temperature, reducing fuel costs. Simple design and long life of incinerator. Minimal NO_x formation reducing emission control costs.	Difficulty in removing residual from the bed. Relatively slow throughout capacity (3 tons per hour). Volatile metals can cause stack emission problems.
Wet-Air Oxidization	Potentially cost-effective if applicable to waste.	Limited to liquid or sludge waste (organics and oxidizable inorganics). Volatile metals can cause stack emission problems.
Low-Temperature Thermal Stripping	Tests show that 97.9 percent PCB removal efficiency. No combustion byproducts.	Not applicable to waste with high moisture and organics. Not applicable to heavy metals.
In-situ Radio Frequency	Potentially 2 to 4 times less expensive than excavation and incineration.	More research is required to verify effectiveness in-situ. Volatile metals can cause stack emission problems.

Table 5. Physical Treatment Comparison

Technology	Advantages	Disadvantages
In-Situ Vacuum and Steam Extraction	Demonstrated effectiveness in removing VOCs. Relatively simple and reliable technology. Treatment costs are low.	Process limited to volatile compounds. Uneven treatment may occur due to non-homogeneous soil.
Stabilization/Solidification (Cement-Based)	Relatively low cost technology. Use of readily available material.	Final product is not acceptable for disposal without secondary containment. Weight and volume of final products are twice the original, increasing costs.
Stabilization/Solidification (Silicate-Based)	Can stabilize a wider range of materials compared to cement-based.	Final product is not acceptable for disposal without secondary containment. Oil and grease, in addition to materials such as calcium sulfate, can interfere with the bonding process.
Thermoplastic	Lower leaching rate and less volume compared to cement-based techniques. Little affected by water or microbial attacks.	Certain wastes are incompatible with this technique, limiting its application. High equipment and energy costs.
Micro-Encapsulation	Waste material is completely isolated from leaching solution. Material for encapsulation is very tough, nonbiodegradable, chemically stable and flexible.	Energy intensive and a costly process. Binding resins are expensive.
In-Situ Vitrification	Potentially the greatest degree of containment compared to all other technologies Successfully tested for treatment of radioactive hazardous waste. Potential to destroy all contaminant groups.	High energy demands and very costly. Requires off-gas collection and treatment.
Air Stripping	Is very effective in removing contaminants from groundwater, when combined with activated carbon.	Alone, only partially effective; must be followed by other treatment technology. High energy costs.

ASSESSING NATURAL RESOURCE DAMAGES (NRD)

- The United States, States, Indian tribes, and foreign governments are entitled to recover from a responsible party for damages, injury to, destruction, loss of, and loss of use of natural resources. Natural resource damages also include the reasonable cost of assessing those damages.[81]

- Before the enactment of SARA (1986), Section 111 of Superfund authorized claims from the fund for the costs of the assessment of damages to natural resources and/or the cost of replacement, restoration, rehabilitation, or acquisition of equivalent natural resources as a result of injury due to a release.

LAND USE

- Less than one-half (44%) of National Priorities List (NPL) sites have a single on-site land use. The most common current land uses are industrial, none (e.g., abandoned) and commercial. In addition, 15% of the sites currently have residents living on site.[82] (See figures 11 and 12.)

- More than three-quarters (76%) of sites have a mixed land use surrounding the site. Seventy-nine percent (79%) of sites have residential land use surrounding them. About 72.8 million people live within 4 miles of a site.[83] (See figure 13.)

- In the future (i.e. after remediation), one-half of the sites are expected to have a single land use. Land uses at sites are expected to be industrial, residential and commercial. In the future, land uses adjacent to sites are expected to be primarily residential.[84] (See figure 14.)

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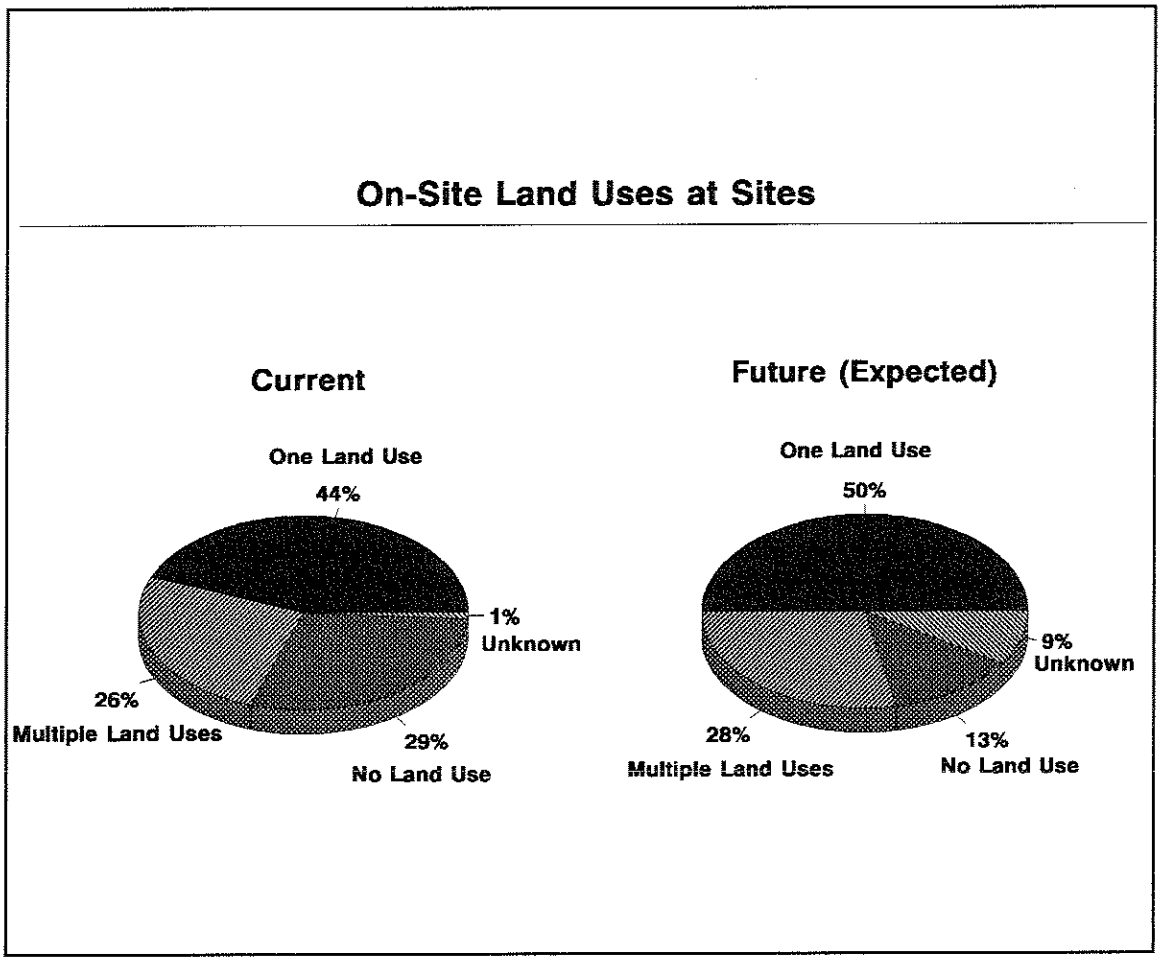
[81] Olney, Austin P. "Oil Pollution Act of 1990," Environmental Law Handbook. Twelfth Edition. Rockville, Maryland: Government Institutes, Inc., 1993. p. 226.

[82] "Swift-Dingell Response."

[83] Ibid.

[84] Ibid.

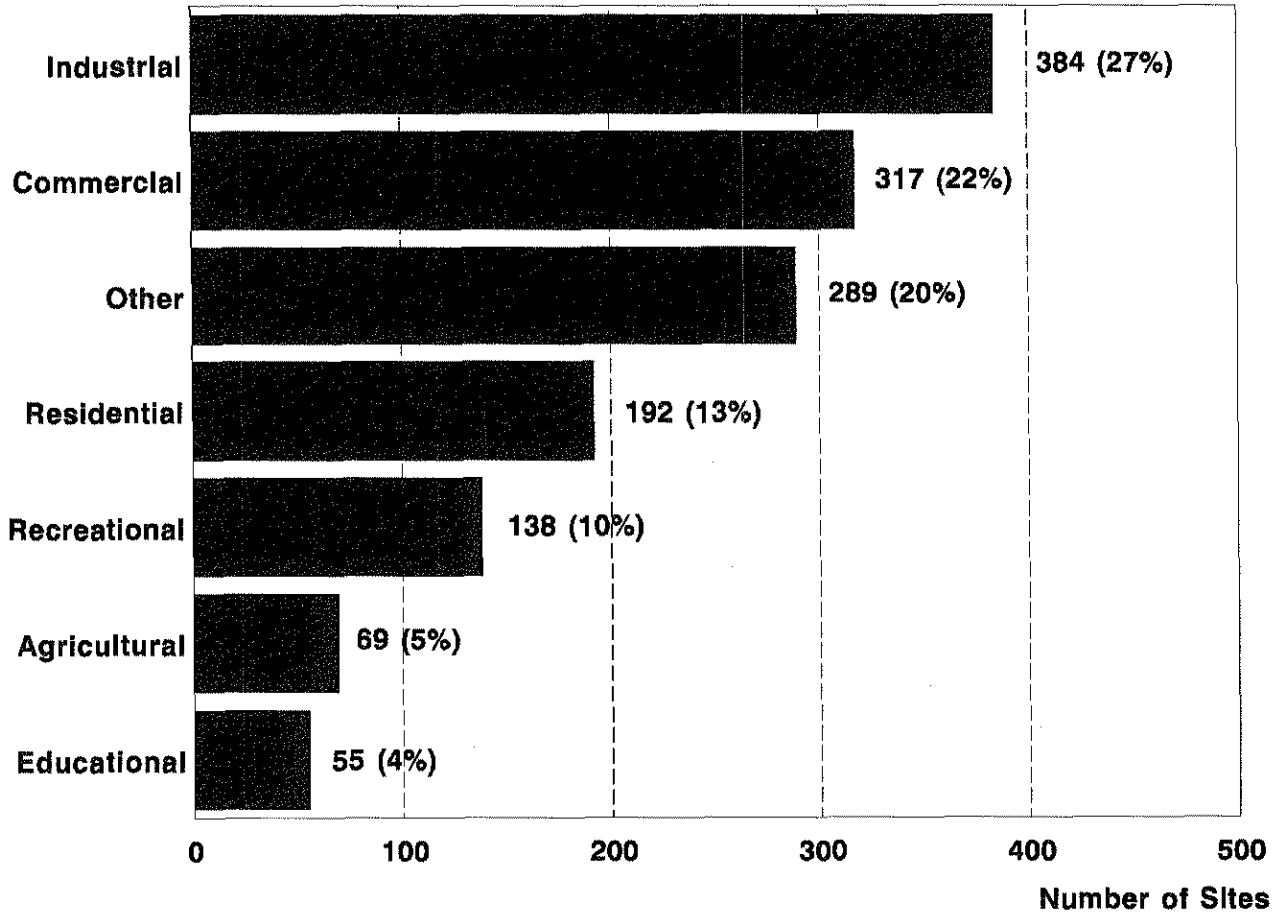
Figure 11



Types of Land Use	Current			Future Expected		
	Single	Multiple	Total Uses	Single	Multiple	Total Uses
Industrial	170	214	384	159	145	304
Commercial	117	200	317	69	162	231
Other	208	81	289	62	152	214
Residential	19	173	192	98	32	130
Recreational	23	115	138	42	87	129
Agricultural	13	56	69	15	47	62
Educational	1	54	55	1	28	29

Note: Current on-site land uses represent data from 1,247 sites responding while future expected on-site land uses represent data from 889 sites responding. These land-use numbers add up to more than the total number of sites reporting because there may be more than one current or expected land use at a given site.

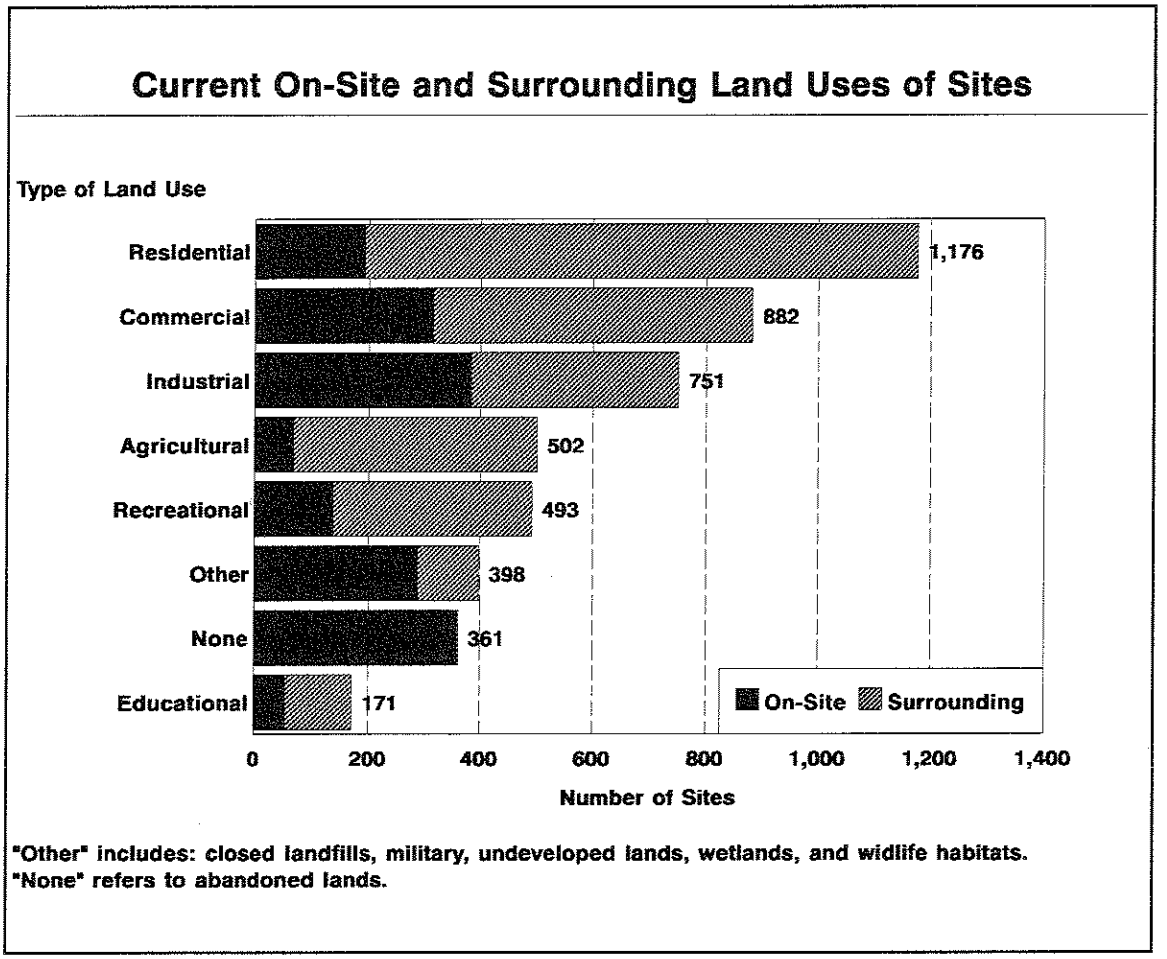
Current Land Use in Vicinity of Site



Source: U.S. EPA, Swift-Dingell, Question 10.

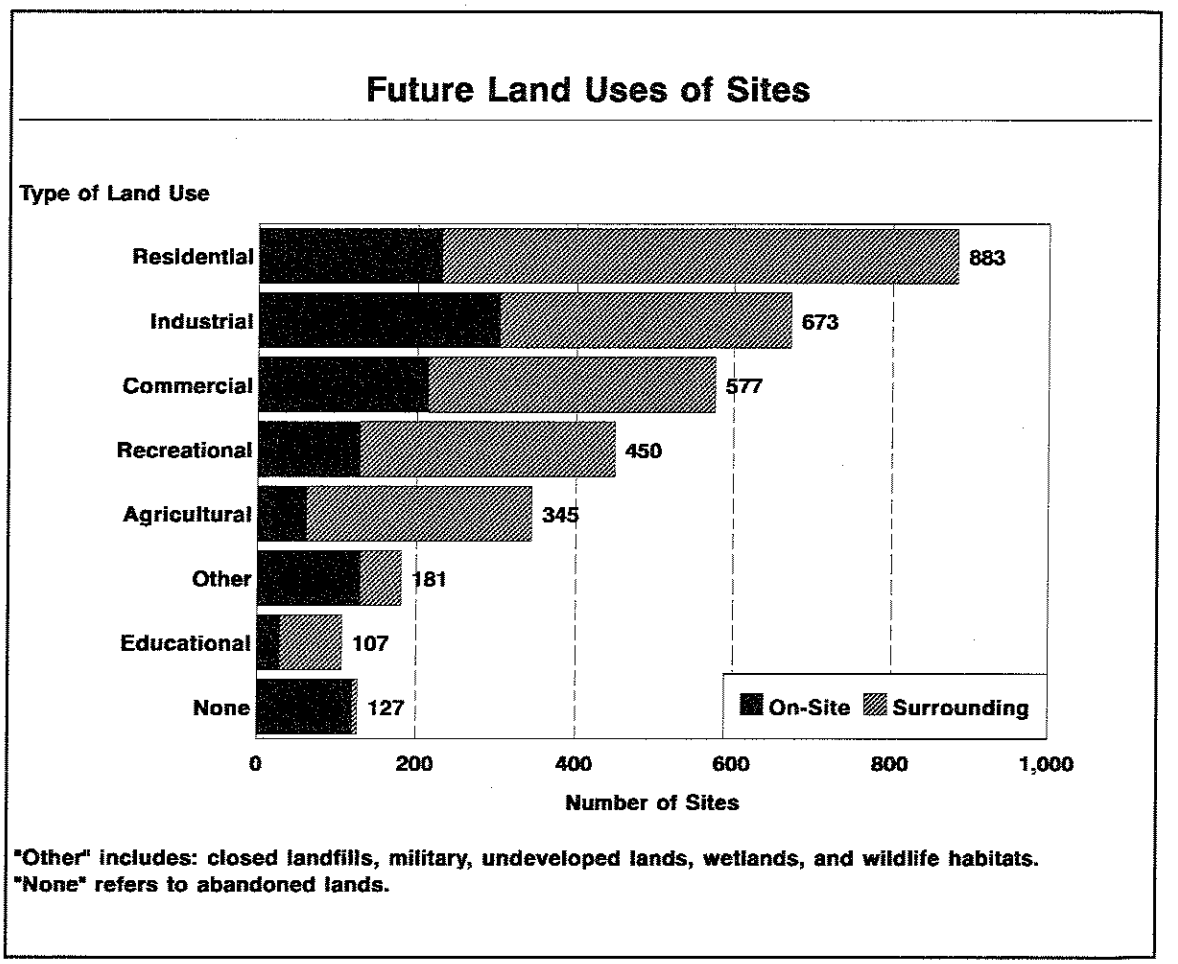
Figure 12

Figure 13



Note: Of the 1,249 final and deleted NPL sites (123 Federal facilities and 1,126 non-Federal facility sites), on-site land uses reflect data from 1,247 sites reporting while surrounding land uses reflect data from 1,245 sites reporting. These current land-use numbers add up to more than the total number of sites reporting because there may be more than one land use at or surrounding a given site.

Figure 14



Note: Of the 1,249 final and deleted NPL sites (123 Federal facilities and 1,126 non-Federal facility sites), on-site land uses reflect data from 889 sites reporting while surrounding future land uses reflect data from 881 reporting sites. These expected land-use numbers add up to more than the total number of reporting sites because there may be more than one expected land use at or surrounding a given site.

INTERNATIONAL COMPARISON

- In a study of eight countries, the European Community and the Council of Europe found that no other country uses industry specific taxes to fund hazardous disposal site remediation. The U.S. system of strict, joint and several, and retroactive liability is the most stringent, with no other country imposing liability for past actions at abandoned sites that were legal at the time. Most countries assign liability to the actual releaser.[85]

- In all countries but the United States, the liability of the generator ceases with transfer to an authorized waste disposal facility.[86]

- The Business Roundtable characterizes European remediation standards as more flexible and pragmatic, taking into consideration past and future land uses when assigning remediation levels. This is in contrast to the U.S. system, where remediation standards assume future residential land use, and are based on standards developed for other purposes such as safe drinking water.[87] Others have stated that environmental protective measures in the United States are often more rigorous than those of European countries.

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[85] The Business Roundtable. *Comparison of Superfund with Programs in Other Countries.* Washington, D.C. September 1993.

[86] Ibid.

[87] Ibid.

GLOSSARY OF SUPERFUND RELATED TERMS[88]

Act of God. Means an unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight [CERCLA §101(1)].

Administrative Order on Consent. A legal agreement between EPA and PRPs whereby PRPs agree to perform or pay the cost of a site remediation. The agreement describes actions to be taken at a site and may be subject to a public comment period. Unlike a consent decree, an administrative order on consent does not have to be approved by a judge.

Administrative Record. A file that is maintained, and contains all information used by the lead agency to make its decision on the selection of a response action under CERCLA. This file is to be available for public review with a copy established at or near the site, usually at one of the information repositories. A duplicate file is held in a central location, such as an EPA Regional Office.

Administrator. Unless otherwise stated, the Administrator of the United States Environmental Protection Agency [CERCLA §101(34)].

Agency for Toxic Substances and Disease Registry (ATSDR). This organization established under section 104(i) of CERCLA provides technical support and assistance to protect human health and worker safety, determines the toxicological and human health impacts associated with hazardous substances, develops a priority-order list of hazardous substances most frequently found at sites on the CERCLA National Priorities List, and produces toxicological profiles of chemicals.

Air Stripping. A treatment system that removes, or "strips," volatile organic compounds from contaminated ground water or surface water by forcing an airstream through the water and causing the compounds to evaporate.

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[88] The definitions are taken from several sources, including:

Church, Thomas W. and Robert T. Nakamura. *Cleaning Up the Mess: Implementation Strategies in Superfund.* Washington, D.C.: The Brookings Institution [1993].

Wagner, Travis P. *The Complete Guide to the Hazardous Waste Regulations.* New York: Van Nostrand Reinhold [1992].

Business Roundtable, *101 Terms & Facts on Superfund*, November 1993.

Alternate Concentration Limit (ACL). An alternate remediation target to the concentration limit set by EPA or a State for a particular hazardous substance or waste.

Alternative Remedial Contract System (ARCS). A strategy in which responsibility for remedial contract management is relegated to the EPA regions. An ARCS contract is a form of cost-reimbursable contract called a "cost-plus-award-fee contract," under which EPA reimburses the contractor for all allowable costs incurred.

Alternative Water Supplies. Includes, but is not limited to, drinking water and household water supplies [CERCLA §101(34)].

Applicable Requirements. Means those Federal requirements that would be legally applicable, whether directly, or as incorporated by a federally authorized State program, if the response actions were not undertaken pursuant to CERCLA section 104 or 106 [40 CFR 300.6].

Aquifer. An underground permeable rock formation composed of materials such as sand, soil, or gravel that can store and supply ground water to wells and springs.

ARAR. Applicable or relevant and appropriate regulation. An environmental health, or other standard that must be met in a Superfund cleanup. These standards typically concern air, water, or soil quality, and may be set by localities, States, branches of the EPA, or other components of the Federal Government (such as the Fish and Wildlife Service, or the Coast Guard).

Barrel. Means forty-two United States gallons at sixty degrees Fahrenheit [CERCLA §101(3)].

Bioremediation. A treatment method that utilizes micro-organisms to absorb hazardous wastes and convert them into non-hazardous constituents.

Brownfields. Property historically used for industrial purposes that has a high likelihood of being contaminated.

Cap. An impermeable layer that seals a hazardous waste site. A cap is designed to seal off all exposure pathways of the hazardous waste contained within.

Carbon Adsorption. A treatment system where contaminants are removed from ground water or surface water when the water is forced through tanks containing activated carbon, a treated material to which the contaminants adhere.

Carcinogen. Any substance that can cause or contribute to the production of cancer.

Carveout. A term used to designate an exemption from CERCLA law or regulations. Generally pertains to liability for site remediations.

CERCLA. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (P.L. 96-510).

CERCLIS or CERCLA Information System. A database maintained by EPA and the States that lists sites where releases may have occurred, need to be addressed or have been addressed. CERCLIS consists of three inventories: CERCLIS Removal Inventory, CERCLIS Remedial Inventory, and CERCLIS Enforcement Inventory.

Claim. Means a demand in writing for a sum certain [CERCLA §101(4)].

Claimant. Means any person who presents a claim for compensation under this Act [CERCLA §101(5)].

Coastal Waters. For the purposes of classifying the size of discharges, means the waters of the coastal zone except for the Great Lakes and specified ports and harbors on inland rivers [40 CFR 300.6].

Comment Period. A time period provided for the public to review and comment on proposed EPA actions or rulemakings following publication in the Federal Register.

Community Relations. EPA's program to inform and involve the public in the Superfund process and respond to community concerns.

Community Relations Plan (CRP). Formal plan for EPA community relations activities at Superfund sites. The CRP is designed to ensure citizen opportunities for public involvement at the sites, determine activities that will provide for such involvement, and allow citizens the opportunity to learn more about the site.

Consent Decree. A legal document approved and issued by a judge that formalizes an agreement reached between EPA and PRPs where PRPs will perform all or part of a Superfund site remediation, and identifies other enforcement action to be taken by the Agency. The consent decree describes actions that PRPs are required to perform and is subject to a public comment period.

Construction Completion. Construction completion at sites refers to the point in the cleanup process at which physical construction is complete for all remedial and removal work required at the entire site. Construction is officially complete when a document has been signed by EPA stating that all necessary remediation has been finished. While no further construction is anticipated at the site, there may still be a need for long-term, on-site activity before specified clean-up levels are met (e.g., restoration of groundwater and surface water). Although physical construction may not

be necessary at some sites, these sites are also included in this category to fully portray EPA's progress.

Containment. A remediation method that seals off all possible exposure pathways between a hazardous disposal site and the environment. Generally includes capping and institutional controls.

Contract Lab. Laboratories under contract to EPA that analyze soil, water, and wastes samples taken from areas at or near Superfund sites.

Contribution. A legal doctrine that enables parties sued under joint and several liability to obtain compensation from other parties who may have been legally liable, but who were not proceeded against in the original court action.

Cost-effective Alternative. An alternative control or corrective method identified as the best available in terms of reliability, permanence, and economic considerations.

Cost Recovery. A legal proceeding, authorized under CERCLA, that allows the government to proceed against PRPs for recovery of both administrative and actual cleanup costs expended in either emergency removal or remedial activities at hazardous waste sites.

Covenant not-to-sue. CERCLA authorizes EPA to release responsible parties from liability to the United States under CERCLA, including future liability resulting from releases or threatened releases addressed by a remedial action.

Damages. Means damages for injury or loss of natural resources as set forth in Section 107(a) or 111(b) of this Act [CERCLA §101(6)].

Debris. Materials that are primarily non-geologic in origin, such as grass, trees, stumps, and manmade materials such as concrete, clothing, partially buried whole or empty drums, capacitors, and other synthetic manufactured materials, such as liners.

Delisting. The process by which a Superfund site is removed from the National Priorities List (NPL) after it has been completely cleaned up.

***De minimis* buyout.** A practice, authorized in SARA, which allows the government to accept a fixed monetary sum from a PRP in exchange for a complete end to that party's liability at a Superfund site. This provision is available only to smaller contributors of waste to a site.

Dense Non-Aqueous Phase Liquids (DNAPLs). Generally organic compounds (or mixtures of such compounds) that are immiscible (do not mix) with water.

Drinking Water Supply. Means any raw or finished water source that is or may be used by a public water system (as defined in the Safe Drinking Water Act) or as drinking water by one or more individuals [CERCLA §101(7)].

Emergency. Those releases or threats of releases requiring initiation of on-site activity within hours of the lead agency's determination that a removal action is appropriate.

Enforcement. EPA's efforts, generally through legal action or the threat thereof, to force PRPs to perform or pay for a Superfund site remediation. Also includes EPA, State or local legal actions to obtain compliance with environmental laws, rules, regulations, or agreements and/or obtain penalties or criminal sanctions for violations.

Environment. Means (A) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (B) any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States [CERCLA §101(8)].

Environmental Income Tax. Tax levied on industry sectors. The revenues from this tax are added to the Superfund.

Environmental Response Team (ERT). EPA hazardous waste experts who provide 24-hour technical assistance to EPA Regional Offices and States during all types of emergencies involving releases at hazardous disposal sites and spills of hazardous substances.

Explanation of Differences. Subsequent to adoption of a final remedial action plan, if any remedial action is taken, any enforcement under §106 is taken, or any settlement or consent decree under §106 or §122 is entered into, and if such action, settlement, or decree differs in any significant respects from the final remedial action plan, the lead agency is required to publish an explanation of significant differences and reasons the changes were made.

Facility. 1) Any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft; or 2) any site or area where a hazardous substance has been deposited, stored disposed of or placed, or has otherwise come to be located. Does not include any consumer product in consumer use or any vessel [CERCLA §101(9)].

Facility Notification. Notice to EPA under CERCLA §103(c) of certain facilities where hazardous substances are or have been stored, treated, or disposed of.

Fate and Transport Modeling. A mathematical process for simulating the behavior of contaminants in various environments to predict contaminant concentration and mobility.

Feedstock Tax. This tax is levied on petroleum and chemical feedstocks. The revenues generated are added to the Superfund.

Fiscal Year (FY). Any yearly accounting period, regardless of its relationship to a calendar year. The fiscal year for the Federal Government begins on October 1 of each year and ends on September 30 of the next year. It is designated by the calendar year in which it ends.

Fund or Trust Fund. Means the Hazardous Substance Superfund.

Greenfields. Property which has no history of industrial use. Generally viewed as attractive to industry for development because there is little or no fear of CERCLA liability.

Groundwater. Means water in a saturated zone or stratum beneath the surface of land or water [CERCLA §101(11)].

Guarantor. Means any person, other than the owner or operator, who provides evidence of financial responsibility for an owner or operator under this Act [CERCLA §101(13)].

Hazard Ranking System (HRS). A scoring system used to evaluate potential relative risks to public health and the environment from releases or threatened releases of hazardous substances. EPA and States use the HRS to calculate a site score (0-100) based on the actual or potential release of hazardous substances from a site through air, surface water or ground water. A score of 28.5 places the site on the National Priorities List.

Hazardous Substance. Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive. Further, any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or otherwise emitted to the environment.

Hazardous Substance Superfund or Trust Fund. The fund set up under CERCLA to help pay for remediation of hazardous disposal sites and to take legal action to force those responsible for the sites to perform remediation.

Hazardous Wastes. Technically, those wastes that are regulated under Resource Conservation and Recovery Act (RCRA) 40 CFR, Part 261 either because they are "listed" or because they are ignitable, corrosive, chemically reactive, or toxic.

Incineration. A treatment technology involving the burning of certain types of solid, liquid, or gaseous materials under controlled conditions to destroy hazardous waste.

Indian Tribe. Means any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village but not including any Alaska Native regional or village corporation, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians [CERCLA §101(36)].

Information Repository. A file containing current information, technical reports, reference documents, and technical assistance grants application information on a Superfund site. The information repository is usually located in a public building that is convenient for local residents.

Leachate. A contaminated liquid resulting when water percolates, or trickles, through waste materials and collects components of those waters.

Lead Agency. Means the Federal agency (or State agency operating pursuant to a contract or cooperative agreement executed pursuant to section 104(d)(1) of CERCLA) that has primary responsibility for coordinating response actions under this Plan. A Federal lead agency is the agency that provides the On-Scene Coordinator (OSC) or Remedial Project Manager (RPM) as specified elsewhere in this Plan. In the case of a State as lead agency, the State shall carry out the same responsibilities delineated for OSCs/RPMs in the National Contingency Plan (except coordinating and directing Federal agency response actions) [40 CFR 300.6].

Liability (Joint and Several). A legal standard where liability is imposed on a PRP for the entire site, regardless of the percentage of contribution or toxicity of materials at a site. This legal theory may result in assigning the entire liability to one or a few members of a liable group. The remaining members of the group are also liable for the entire site. Usually members sue each other for contribution where liability has been assigned to one or a few members.

Liability (Strict). A legal standard where liability is imposed without regard to fault, (as in negligence), or intent, (as in a willful violation of existing laws). The actor, based upon performance of the act, is considered to be liable due to mere performance of the act.

Management of Migration. Means actions that are taken to minimize and mitigate the migration of hazardous substances or pollutants or contaminants and the effects of such migration. Management of migration

actions may be appropriate where the hazardous substances or pollutants or contaminants are no longer at or near the area where they were originally located or situations where a source cannot be adequately identified or characterized. Measures may include, but are not limited to, provision of alternative water supplies, management of a plume of contamination, or treatment of a drinking water aquifer [40 CFR 300.6].

Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water delivered to any user of a public water system.

Maximum Contaminant Level Goal (MCLG). The maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on human health would occur, and which includes an adequate margin of safety.

Mixed Funding. The practice, authorized in SARA, by which the government can assume some proportion of cleanup expenses, with other parties assuming the rest.

Monitoring Wells. Special wells drilled at specific locations on or off a hazardous disposal site where ground water can be sampled at selected depths and studied to determine the direction of ground water flow and the types and amounts of contaminants present.

National Contingency Plan, or **National Oil and Hazardous Substances Pollution Contingency Plan (NCP).** The basic policy directive for Federal response actions under CERCLA. It sets forth the Hazard Ranking System, and the procedures and standards for responding to releases of hazardous substances, pollutants, and contaminants.

National Response Center (NRC). The Federal operations center that receives notification of all releases of oil and hazardous substances into the environment.

National Response Team (NRT). Representatives of 13 Federal agencies who as a team coordinate Federal responses to nationally significant incidents of pollution and provide advice and technical assistance to the responding agency(ies) before and during a response action.

Natural Resources. Land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the fishery conservation zone established by the Fishery Conservation and Management Act of 1976), any State or local government, or any foreign government [CERCLA §101(16)].

Natural Resource Damage Assessment (NRDA). A provision in CERCLA under which parties can be sued to restore/replace any flora/fauna that has been damaged during an incident which flows from an existing Superfund

site or the remediation of such a site. Legal action is taken separately from the settlement provisions for remediation.

Navigable Waters or Navigable Waters of the United States. Means the waters of the United States, including the territorial seas [CERCLA §101(15)].

NBAR. Nonbinding allocation of responsibility. A device, established in SARA, that allows the EPA to make a nonbinding estimate of the proportional share that each of the various responsible parties at a Superfund site should pay toward the costs of cleanup.

Notice Letter. EPA's formal notice by letter to PRPs, also called a Section 104(e) letter, that CERCLA-related action is to be undertaken at a site with those PRPs being considered responsible.

NPL. National Priorities List. The list of (currently, approximately 1,200)hazardous waste sites that have been determined (through a hazardous ranking score) to pose a serious threat to human health and the environment in the United States.

O&M. Operating and maintenance costs. The expenses of maintaining an ongoing engineering remedy at a Superfund site. Depending on the remedy chosen, these costs can range from very low to extremely expensive. They can continue to be generated for decades.

Offshore Facility. Means any facility of any kind located in, on, or under any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel [CERCLA §101(17)].

On-Scene Coordinator (OSC). Means the Federal official predesignated by the EPA or USCG to coordinate and direct Federal responses under Subpart E and removals under Subpart F of this Plan; or the DOD official designated to coordinate and direct the removal actions from releases of hazardous substances, pollutants, or contaminants from DOD vessels and facilities [40 CFR 300.6].

Onshore Facility. Means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under, any land or nonnavigable waters within the United States [CERCLA §101(18)].

Operable Unit. A discrete part of the entire response action that decreases a release, threat of release, or pathway of exposure [40 CFR 300.6].

ORC. Office of Regional Counsel. The EPA's legal office in the regions. Typically, an ORC attorney is assigned to each Superfund case.

Orphan Share. The term used to describe the share of waste at a site that cannot be collected from a PRP, because the PRP is either unidentifiable or insolvent.

Owner or Operator. Means (A)(i) in the case of a vessel, any person owning, operating, or chartering by demise, such vessel, (ii) in the case of an onshore facility or an offshore facility, any person owning or operating such facility, and (iii) in the case of any facility, title, or control of which was conveyed due to bankruptcy, foreclosure, tax delinquency, abandonment, or similar means to a unit of State or local government, any person who owned, operated, or otherwise controlled activities at such facility immediately beforehand.

Person. Means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, United States Government, State, municipality, commission, political subdivision of a State, or any interstate body [CERCLA §101(21)].

Petroleum Exclusion Clause. A clause in CERCLA that exempts some petroleum wastes and their generators from the Superfund cleanup scheme.

Plan. Means the National Oil and Hazardous Substances Pollution Contingency Plan published under Section 311(c) of the CWA and revised pursuant to Section 105 of CERCLA [40 CFR 300.6].

PRP. Potentially responsible party. Either an individual, a business, or a government unit that has been identified as a party that is potentially liable for site cleanup under the provisions of CERCLA.

Preliminary Assessment/Site Inspection (PA/SI). The process of collecting and reviewing available information about a known or suspected hazardous disposal site or release. EPA or States use this information to determine if the site requires further study. If further study is needed, a site inspection is undertaken. A site inspection is the technical phase that follows the preliminary assessment. It is designed to collect more extensive information on a hazardous disposal site. The information is used to score the site using the hazard ranking system to determine whether response action is needed.

Proposed Plan. A public participation requirement of CERCLA in which EPA summarizes for the public the preferred remediation strategy, rationale for the preference, alternatives presented in the detailed analysis of the Remedial Investigation/Feasibility Study, and waivers to remediation standards of §121(d)(4) that may be proposed.

Pump-and-treat. This treatment process involves removal of contaminated groundwater through pumping or other processes, followed by treatment of the water and either re-injection of the water into the ground or discharge of the water to a stream or lake.

Quality Assurance/Quality Control. A system of procedures, checks, audits, and corrective actions to ensure that all EPA research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

RCRA. Resource Conservation and Recovery Act of 1976 (P.L. 94-580). The act, administered by the EPA, that regulates the definition, transportation, and disposal of hazardous wastes. This act is distinct from the Superfund statutes in that it regulates current and future waste disposal practices, while Superfund was established to clean up inactive hazardous waste sites.

RD/RA. Remedial design/remedial action. The final stage of a site cleanup, when the remedy is designed and put into effect.

Regional Response Team. Representatives of Federal, State, and local agencies who may assist in coordination of activities at the request of the On-Scene Coordinator or Remedial Project Manager before and during response actions.

Release. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. Includes abandonment or discarding of barrels, containers and other closed receptacles containing any hazardous substance, pollutant, or contaminant.

Relevant and Appropriate Requirements. Those Federal requirements that, while not "applicable," are designed to apply to problems sufficiently similar to those encountered at CERCLA sites that their application is appropriate. Requirements may be relevant and appropriate if they would be "applicable" but for jurisdictional restrictions associated with the requirement [40 CFR 300.6].

Remedial Action, Remedy. The actual construction or implementation phase that follows the remedial design of the selected remediation alternative at a site on the National Priorities List.

Remedial Action Plan (RAP). This plan details the technical approach for implementing remedial response. It includes the methods to be followed during the entire remediation process -- from developing the remedial design to implementing the selected remedy through construction.

Remedial Design. An engineering phase that follows the record of decision when technical drawings and specifications are developed for the subsequent remedial action at a site on the National Priorities List.

Remedial Project Manager (RPM). Means the Federal official designated by EPA (or the USCG for vessels) to coordinate, monitor, or direct remedial or other response activities under Subpart F of the National Contingency Plan; or the Federal official the Department of Defense (DOD) designates

to coordinate and direct Federal remedial or other response actions resulting from releases of hazardous substances, pollutants, or contaminates from DOD facilities or vessels [40 CFR 300.6].

Remedial Response. A long-term action that stops or substantially reduces a release of a hazardous substance that could affect public health or the environment. The term remediation, or cleanup, is sometimes used interchangeably with the terms remedial action, removal action, response action, remedy, or corrective action.

Remediation. Site cleanup.

Removal, or **Emergency Removal**. An action taken by the EPA under the emergency removal provisions of CERCLA, that enables the agency to take preliminary steps to clean up a site or reduce its danger when there is an imminent and substantial threat to public health or the environment. A removal cannot exceed $2 million or 1 year for any one action at any one site.

Reopener. A clause, usually included in Superfund consent decrees at government insistence, which allows the government to reopen a case and proceed legally against a responsible party who has already settled with the government if certain contingencies of site cleanup (such as discovery of additional, unexpected waste, or failure of a remedy) occur.

Reportable Quantity (RQ). Quantity of a hazardous substance considered reportable under CERCLA in the event of a release.

Respond or Response. Means remove, removal, remedy, and remedial action. All such terms (including the term "removal" and "remedial action") include enforcement activities related thereto [CERCLA §101(25)].

RI/FS. Remedial investigation/feasibility study. The *remedial investigation* is an engineering study that assesses the geographical, geological, and hydrological properties of a site, and the nature and extent of the hazardous waste contained therein. It is usually combined with the *feasibility study,* which identifies the various cleanup alternatives and specifies their costs and benefits.

Risk Assessment. A qualitative and quantitative evaluation performed to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific pollutants.

ROD. **Record of Decision**. The formal document by which an EPA administrator (usually the regional administrator) chooses the remedy to be applied at a Superfund site.

RPM. Remedial Project Manager. The EPA official who has charge of the remediation at a particular Superfund site.

SACM (Superfund Accelerated Cleanup Model). A model developed by EPA to accelerate remediations so that most contamination is removed early in the process.

SARA. Superfund Amendments and Reauthorization Act of 1986 (P.L. 99-499). The law reauthorizing the Superfund program and adding a number of additional provisions, such as several incentives to encourage voluntary settlements, as well as the requirement that Superfund cleanups meet applicable or relevant and appropriate regulations (see *ARAR*).

Section 106 Order. A unilateral administrative order, authorized by statute, that allows the EPA to order PRPs to perform certain remedial actions at a Superfund site, subject to treble damages and daily fines if the order is not obeyed.

Selected Alternative. The remediation alternative selected for a site based on technical feasibility, permanence, reliability, and cost. The selected alternative need not be the least expensive alternative. If there are several remediation alternatives available that deal effectively with the problems at the site, EPA must choose the remedy on the basis of permanence, reliability, and cost.

Settlement. A legal agreement reached between EPA and parties at a Superfund site. The settlement outlines the payments of each party, the time frame of remediation and the remedy selected.

SITE (Superfund Innovative Technology Evaluation). This program supports development of technologies for assessing and treating waste at Superfund sites. EPA evaluates the technology and provides an assessment of its potential for future use in Superfund remediation actions. The program consists of four related components: the Demonstration Program, the Emerging Technologies Program, the Monitoring and Measurement Technologies Program, and Technology Transfer activities.

Site Inspection. A technical phase that follows a preliminary assessment designed to collect more extensive information on a hazardous disposal site. The information is used to score the site using the Hazard Ranking System to determine whether response action is needed.

Soil. Materials that are primarily of geologic origin such as sand, silt, loam, or clay, that are indigenous to the natural geologic environmental at or near the Superfund site.

Source Control Action. The construction or installation and start-up of those actions necessary to prevent the continued release of hazardous substances or pollutants or contaminants (primarily from a source on top of or within the ground, or in buildings or other structures) into the environment [40 CFR 300.5].

Source Control Maintenance Measures. Those measures intended to maintain the effectiveness of source control actions once such actions are operating and functioning properly, such as the maintenance of landfill caps and leachate collection systems [40 CFR 300.5].

Special Notice Procedures. The government may use these procedures under SARA's settlement provision (Section 122) to reach agreement with PRPs to conduct Remedial Investigation/Feasibility Study and other remedial actions.

Strict Liability. The legal doctrine that allows a defendant in certain tort cases to be held liable for injuries, regardless of whether or not that party was negligent.

Surface Water. Bodies of water that are above ground, such as rivers, lakes and streams.

Technical Assistance Grant (TAG) Program. A grant program that provides funds for qualified citizens' groups to hire independent technical advisors to help understand and comment on technical decisions relating to Superfund remediation actions.

Third-party suits. In the context of Superfund, third-party suits are those brought by PRPs at a site who are sued by the government, and against other PRPs who were not sued, in order to obtain compensation for their costs and expenses. See *contribution.*

Title III, SARA. Emergency Response and Community Right-to-Know Act. This Act outlines the responsibilities of parties under emergency responses and provides guidelines for storing information for public access.

United States and **State**. Includes the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction [CERCLA §101(27)].

Vessel. Means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water [CERCLA §101(28)].

Viable PRP. A PRP who can be expected to pay his, her or its share of cleanup costs.