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

FEB 3 1994

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: Response to Congressmen Dingell and Swift

FROM: Henry L. Longest II, Director
Office of Emergency and Remedial Response

Bruce M. Diamond, Director
Office of Waste Programs Enforcement

TO: Director, Waste Management Division
Regions I, IV, V, VII
Director, Emergency and Remedial Response Division
Region II
Director, Hazardous Waste Management Division
Regions III, VI, VIII, IX
Director, Hazardous Waste Division
Region X
Director, Environmental Services Division
Regions I, VI, VII, X

PURPOSE

To distribute OSWER's response to the 21 questions submitted by Congressmen Dingell and Swift.

BACKGROUND

Last summer we undertook a challenging project to gather detailed site specific data on all 1249 sites on the National Priorities List. This effort required substantial work by many of your staff; especially the Regional Project Managers (RPMs). Our headquarters staff visited each Region and interviewed over 450 RPMs on issues relating to NPL sites. The RPMs provided us with information such as current and future site land use; standard industrial classification (SIC) codes for site activites; media addressed in RODS; groundwater data; number of PRPS; capital costs; and site durations. Your regional management teams, including the Regional Information Management

Coordinators, were very supportive in assisting our headquarters teams in obtaining over 700 site documents that were reviewed in headquarters. Without the enthusiastic support of the Regions, this effort would not have been as successful as we believe it has been.

IMPLEMENTATION

We invite your review of the information provided in the attached national summary information provided to Congressmen Dingell and Swift. We anticipate that as the reauthorization debate continues, there will be additional queries from Congress, our outside constituents, advisory groups, as well as our own EPA staff.

We would again like to thank you and your staffs for your support in this most important endeavor. Please let us know if you have any questions or comments. For specific information on the project, we ask that your staff contact Michael Cullen (703) 603-8730 or Suzanne Wells (703) 603-8710.

Attachment

cc: Elliott P. Laws
Jerry Clifford
Timothy Fields, Jr.
Superfund Branch Chiefs, Regions I-X
Information Management Coordinators, Regions I-X

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

JAN 28 1994

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Honorable John D. Dingell
Chairman
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515-6115

OSWER DIRECTIVE 9200.2-21

Dear Mr. Chairman:

I am pleased to forward to you the responses to the 21 questions on the Superfund program you submitted in your July 19, 1993, letter to Administrator Browner.

As you know, over the past several months we visited our ten EPA Regions and obtained information on the 1,249 current and deleted sites on the National Priorities List. We discussed site specific issues with over 450 Regional Remedial Project Managers as well as other staff. We believe the information we have gathered will assist Congress in its evaluation and oversight of the Superfund program.

During the process of gathering and analyzing data, we had periodic meetings with your staff and the suggested outside policy analysts to review our progress. We now look forward to working with you and your staffs as you review the information.

Sincerely,

Elliott P. Laws
Assistant Administrator

Enclosures

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

JAN 28 1994

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Honorable Al Swift
Chairman
Subcommittee on Transportation
and Hazardous Materials
U.S. House of Representatives
Washington, D.C. 20515-6115

Dear Mr. Chairman:

I am pleased to forward to you the responses to the 21 questions on the Superfund program you submitted in your July 19, 1993, letter to Administrator Browner.

As you know, over the past several months we visited our ten EPA Regions and obtained information on the 1,249 current and deleted sites on the National Priorities List. We discussed site specific issues with over 450 Regional Remedial Project Managers as well as other staff. We believe the information we have gathered will assist Congress in its evaluation and oversight of the Superfund program.

During the process of gathering and analyzing data, we had periodic meetings with your staff and the suggested outside policy analysts to review our progress. We now look forward to working with you and your staffs as you review the information.

Sincerely,

Elliott P. Laws
Assistant Administrator

Enclosures

(2)

EXECUTIVE SUMMARY

INTRODUCTION

Over the past year, as the debate over the latest reauthorization of Superfund got underway, EPA faced increasing requests for data about the Superfund program from Congress, independent researchers and advocacy groups. These requests coincided with a major Agency effort to make Superfund data more comprehensible, comprehensive and accessible to a broader audience. Also, in July 1993, Congressmen Swift and Dingell wrote to Administrator Browner requesting detailed information on NPL sites in preparation for upcoming reauthorization hearings. To address these requests, EPA interviewed Regional site managers and collected information from site documents about every National Priorities List (NPL) site.

EPA compiled the results of months of data gathering and analysis in the form of responses to the Congressmen's twenty-one specific questions. These data have the advantage of reflecting the experiences of the Regional site managers on a site-by-site basis rather than relying on anecdotal information. Considered as a whole, they represent an important step forward in using real-world data to analyze vital areas of the Superfund program and help set the stage for reauthorization.

THE QUESTIONS

Congressmen Swift and Dingell asked twenty-one questions on topics ranging from capital costs to identifying the past and potential future uses of NPL sites. The Congressmen's original letter appears as Attachment A to this report. The questions appear in this report in the order asked, and each response is labelled with the corresponding question number. The responses begin with a summary statement, followed by more detailed information as requested by the Congressmen. The data sources for each answer are provided, along with any necessary background information.

Some of the answers confirm what past analyses had shown, while others offer new insights into the program. For example, the average cost to clean up a non-Federal facility site is about $25 million. Many sites however, cost significantly less than the average would indicate. Only a small percentage of sites fall into the high cost category (more than $100 million). Large volumes of contaminated media was the most common factor contributing to capital costs exceeding $20 million.

Despite a common perception of sites having large numbers of potentially responsible parties (PRPs), our data show that more than half of NPL sites have fewer than ten responsible parties, and about one fifth have only a single PRP. On the other hand, about one third of sites have at least one non-viable responsible party, and about one half of sites have potential *de minimis* parties.

As expected, an overwhelming number of sites have groundwater and/or soil contamination as the primary contamination problems, and drinking water supplies are affected at most sites with groundwater problems.

The most common current on-site land uses are industrial, abandoned and commercial, although 15% of sites currently have residents living on-site. The most common current land use surrounding sites is residential. About 73 million people live within 4 miles of an NPL site (based on 1990 Census data). The most common expected future site uses were industrial, residential and commercial, while land use adjacent to the site is expected to be residential. Future human consumption of groundwater is assumed at more than half of the sites.

EPA expects about 75 to 95 sites to be added to the NPL in 1994. From 1995 through the end of 1999, between 340 and 370 sites will be added. By the end of the year 2000, we expect to complete construction at between one half and two thirds of current NPL sites.

CONCLUSION

EPA is committed to protecting public health and the environment through the Superfund program. The Agency recognizes that there are areas of the program that can and should be made more effective and efficient. The data presented in this report and the new information EPA has collected ensure there will be reliable data that reflect actual field experience at Superfund sites to support the reauthorization debate.

JUL 2 1 1993

A

U.S. House of Representatives
Committee on Energy and Commerce
Room 2125, Rayburn House Office Building
Washington, DC 20515-6115

July 19, 1993

The Honorable Carol M. Browner
Administrator
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Administrator Browner:

As we undertake reauthorization of the Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended, in the Committee on Energy and Commerce, we are interested in obtaining certain basic information to assist Congress in its evaluation and oversight of the Superfund program.

This letter seeks certain specific data about each facility on the Superfund National Priorities List. The data requested has been identified with the assistance of a number of outside policy analysts and we believe is essential to a better understanding of this complex and regionally delegated program.

We request this information pursuant to Rules X and XI of the Rules of the House of Representatives, and ask that it be provided to the Committee no later than September 15, 1993.

Sincerely,

John D. Dingell, Chairman
Committee on Energy
and Commerce

Al Swift, Chairman
Subcommittee on Transportation
and Hazardous Materials

cc: The Honorable Carlos J. Moorhead, Ranking Minority Member
Committee on Energy and Commerce

The Honorable Michael G. Oxley, Ranking Minority Member
Subcommittee on Transportation and Hazardous Materials

Attachment
to Letter of Chairmen Dingell and Swift
July 19, 1993

Please provide the following data, on a facility-by-facility basis, for each facility on the National Priorities List, separated into two categories: 1) non-federal and 2) federal.

1. What is the current expected total capital cost for cleanup? What is the expected average annual operations and maintenance (O&M) cost for each facility, and the number of years that O&M will be required? If the facility has been added to the NPL so recently that reliable cost estimates can not be made, please so indicate, and indicate the date of listing.

2. Please indicate if the facility is expected to cost over $20 million in capital costs. If so, what factors are responsible (please respond in terms of the factors listed on the attached, "Checklist of Factors for Analysis of Expensive Facilities")?

3. How many RODs have been signed? What media (groundwater, surface water, sediment, surface waste, or soil) have been addressed by each ROD signed to date? How many additional RODs are expected, and what media remain to be addressed in the future RODs?

4. When is construction completion expected?

5. For each facility for which an RI/FS was initiated after October 17, 1986 and for which a risk assessment has been performed, please indicate: the date of risk assessment completion; media addressed (groundwater, surface water, sediment, surface waste, or soil); and whether additional risk assessments are anticipated for the facility. On the basis of these risk assessments, please quantify:

   a. the baseline risk posed by the facility;
   b. the future risk projected to be posed by the facility if unremediated;
   c. the future risk projected by the facility when remediated.

6. Where a remedy has been selected for contaminated soil, please indicate the remedy that was selected and the principal contaminants addressed.

7. For each facility at which a ROD addressed groundwater, please provide the following:

   a. current use of groundwater adjacent to the facility (e.g., drinking, irrigation, industrial);
   b. current groundwater classification adjacent to the facility (e.g., sole source, potential source, etc.);

c. assumption for future groundwater use;
d. whether risk assessment assumed future consumption of plume *per se* or future downgradient consumption of groundwater; and
e. if the remedy relied upon natural attenuation for cleanup of plume.

8. For each facility where a remedy has been selected for groundwater, please indicate the remedy that was selected and whether DNAPL contamination is highly likely. For each groundwater remedy where DNAPL contamination is highly likely, please provide the following information:

a. Was the ROD(s) involving groundwater signed before or after EPA's May 1992 guidance on DNAPL sites?
b. Did the selected remedy seek to return groundwater to drinking water standards?
c. Did the selected remedy have containment pumping as its goal?
d. Did EPA invoke a technology feasibility waiver to avoid applying ARARs to the DNAPL cleanup?

9. Please provide the complete set of cleanup standards (contaminant by contaminant, for each media) used at the facility. Indicate whether the standard was based on risk assessment, MCL, state standard, or other (indicate what other). Where a cleanup standard has been established for soil based on a risk assessment initiated after October 17, 1986, please indicate the date of completion of the risk assessment and each of the exposure assumptions used for each cleanup standard as follows:

a. whether the driving factor establishing the standard was soil ingestion, leaching to groundwater or other route of exposure, (please indicate what other, e.g., dermal, inhalation);
b. number of total years and number of days per year of exposure to the facility, broken down by age of exposed individual where appropriate;
c. amount of soil ingested, contacted, or inhaled per day of exposure, broken down by age of exposed individual where appropriate;
d. whether exposure to contaminated soil is assumed to occur to maximum concentrations found at the facility, average concentrations, or other (indicate what other);
e. whether any of the contaminants used to calculate risk are assumed to degrade in soil over time (thereby decreasing exposure).

10. Please provide the following information:

a. current land use of facility *per se*;
b. current adjacent land use;
c. if current adjacent land use includes residential use, number of people within 1/4 mile of the facility, 1 mile of the facility;

d. assumption for future land use of facility *per se* (industrial, residential, etc.); and
e. assumption for future adjacent land use (industrial, residential, etc.).

11. Please identify whether ATSDR has indicated that a more in-depth study under section 104(i) is needed after the health assessment is completed. Indicate for each such facility whether such a study is planned, underway or completed, and identify the type of study.

12. For non-federal sites only, please identify what kind of operation/activity was present at the facility, from the list of possible operations/activities listed below. Only one category should apply to each facility.

A. Industrial

Chemical manufacturing
Wood preserving
Petroleum refinery
Tannery
Printing
Paper mill
Asbestos manufacturing
Foundries
Textile mill
Rubber and plastics
Primary metals
Fabricated metals products
Electronic and electrical equipment
Electric power production and distribution
Mining -- please specify one of the following categories:
  a) metals
  b) coal
  c) oil and gas
  d) non-metallic mineral
Coal gasification plant
Oil and gas pipelines
Dry cleaners
Pesticides formulators
Other: _____

B. Waste Management

(Facilities would be placed in a "waste management" category only if the primary operations at the facility are/were waste management activities, e.g., a chemical plant that has an on-site landfill should be categorized as a chemical plant; a public landfill, commercial landfill that takes waste on a fee-for-service basis or an off-site private landfill would all fall under the category of waste management.)

1. Recycling
   a) drum reconditioning
   b) used oil recycling
   c) battery recycling
   d) solvents recycling
   e) other recycling: _____

2. Landfills

   (Should be used for sites where the only or primary waste management activity is a landfill/ landfills. Facilities with a variety of waste management activities are categorized more broadly under "other waste management.")

   a) municipal landfill: publicly owned, fee-for-service (or for municipally generated trash only), only municipal-type waste.
   b) municipal co-disposal landfill: publicly owned, fee-for-service, both municipal-type and industrial wastes.
   c) Commercial landfill: privately owned, fee-for-service, municipal or industrial waste, but not both.
   d) Commercial co-disposal landfill: privately owned, fee-for-service, municipal-type and industrial waste.
   e) Captive industrial landfill: privately owned, not fee-for-service, (i.e., landfill is for the use of one company/organization), only industrial waste.
   f) Captive co-disposal landfill: as above, but mixed industrial and office/municipal-type waste.

3. Other waste management

   (These sites could include a landfill, but also have other waste management operations, such as incinerators, surface impoundments, waste piles, etc.)

   a) Municipal waste management -- has waste management activities other than or in addition to a landfill: publicly owned, municipal-type and industrial wastes managed.
   b) Commercial industrial waste management -- includes a variety of waste management activities/ operations, e.g., incinerators: privately owned, fee-for-service, industrial waste managed.
   c) Captive industrial waste management: same as above, except that facilities are only for the use of one company/organization (i.e., not commercially available on a fee-for-service basis).

C. "Miscellaneous" facilities

(Some Superfund facilities do not have either industrial or waste management operations on-site. The facilities are often contaminated by off-site operations or activities or as a result of spills.) Specific categories include:

Retail/office/industrial areas: industrial area/park/complex/development/property/operations
Wells/water areas: municipal/private/residential/commercial wells, groundwater contamination, tidal estuaries/waterways/creeks/rivers, hydroelectric dams
Railroads: railroad yard/property, electric train repair operations, railroad loading and storage areas
Airports: airports, airfields
Trucking operations: trucking operations, truck leasing operations, vacuum truck terminals
Farms/other pesticide application areas: farms, farmers' cooperatives, horse stables, cropland, pig farms, dairy farms, orchards
Universities: universities, research laboratories, agricultural research centers, schools
Illegal disposal areas: illegal dumping/disposal areas
Storage areas: warehouses, storage facilities
Residential areas: apartment complexes, residential areas/developments/property, city contamination
Repair operations: aircraft and electrical appliance repair operations (NOT recycling operations)
Cleaning operations

D. Other

Multiple operations: sites with multiple operations currently on-site

Other: (describe)_____

13. Please identify whether the best estimate of the total number of PRPs associated with the facility that could potentially by held liable under section 107 (irrespective of whether EPA decides to pursue all of them) is: (1), (2-10), (11-50), (51-100), (101-300), (301-1000), (1001+).

14. For each facility where there is only one potentially responsible party, please indicate whether that PRP is an owner/operator.

15. Please indicate where the only potentially responsible parties are owner/operators (i.e., no hazardous substances were contributed to the facility by offsite generator/transporters).

16. Please indicate whether sufficient volumetric data exists to establish whether there are PRPs who contributed small amounts of hazardous substances to the facility and could be considered de

minimis parties. For each such facility, indicate the number of potential de minimis parties. For each such facility, please identify where a waste-in list has been or could be prepared based on the data available to EPA.

17. Please indicate where there are orphan parties (i.e., parties who are not financially viable or can not be located) and where sufficient volumetric data exists, please provide the best estimate of the percentage, by volume, of waste contributed to the site by generator/transporter orphan parties. For each of those same facilities, indicate whether all the owner/operators are orphan parties.

18. Please indicate whether the government believes that there are no financially viable parties, or no parties that can be found, and that the Trust Fund will have to pick up 100% of site study and cleanup costs?

19. Please indicate whether the facility is fund-lead or expected to be fund-lead.

20. Please indicate where EPA has expended funds that are recoverable under section 107, indicate the amount of those recoverable expenditures, indicate whether a cost recovery action has been filed to recover those funds, whether funds have been recovered and the amount that has been recovered, and indicate whether or not the statute of limitations is expected to be a bar to cost recovery of any amount.

21. Please obtain from regional officials in each region their best informed judgment with respect to the number of facilities in their region that will be added to the NPL in the period from October 1, 1993 to October 1, 1994, and in the five year period from October 1, 1994 to October 1, 1999. To the extent possible, please obtain information concerning the types of facilities that will be added to the NPL during the periods referenced above. In addition, please obtain the opinion of regional officials with respect to the number of facilities currently on CERCLIS, other than those for which a determination has been made not to list, which are likely ultimately to be added to the NPL.

CHECKLIST OF FACTORS FOR ANALYSIS OF EXPENSIVE FACILITIES
(Mark primary factors with a "1"; check all other major factors.)

Facility characteristics:
- large volume of contaminated soil/sediment
- large volume of contaminated groundwater
- facility hazards pose danger to cleanup workers
- other _____

Remedy characteristics:
- high-unit-cost treatment of soil/sediment
- high-unit-cost treatment of groundwater
- high-unit-cost treatment of surface water
- second remedy required after first failed
- other _____

Question #1

Capital Costs for National Priorities List (NPL) Sites:

Site cleanup activities are typically divided into multiple projects, called operable units (OUs). On average, there are 1.8 OUs per non-Federal Facility site. The average capital cost to conduct an OU remedial action project is $12.1 million for a non-Federal Facility site. This translates to an average *site* capital cost of $21.8 million for the typical non-Federal Facility site. Site assessment, studies and design comprise approximately 11% of total site costs, resulting in an average cost estimate of approximately $25 million for non-Federal Facility sites.

In addition, most sites have annual operation and maintenance (O&M) costs of $50,000 or more for each OU extending for approximately 21 years.

NOTE: The cost estimates were collected from site manager surveys which reported costs in ranges for each OU. The average OU capital costs were calculated by averaging the midpoint of the estimated cost ranges.

What is the current expected total capital cost for cleanup?

The average cost to clean up non-Federal Facility sites listed as final or deleted on the NPL is expected to be approximately $25 million. This average is impacted by the relatively small number of sites with very high cleanup costs; 16% of the OUs account for over 60% of all capital cleanup costs incurred at NPL sites. The majority of projects (69%) have capital costs of less than $10 million and 38% have capital costs of less than $3 million. Approximately 89% of the total site cleanup cost is for capital costs; the remaining 11% includes site assessment, study and design activities.

The approach used to calculate the reported capital costs was to average the midpoint of the remedial action OU cost range estimates provided by site managers (i.e., $12.1 million for non-Federal Facility sites and $11.3 million for Federal Facilities) and take into account the 11% of total site costs commonly spent on site assessment, study and design activities. This calculation resulted in an average OU cost of $13.6 million for non-Federal Facility sites and $12.7 million for Federal Facilities. The average site cost of close to $25 million for non-Federal Facility sites was extrapolated by multiplying the average OU cost by the average number of OUs (1.8 at non-Federal Facility sites). The estimate for non-Federal Facility site cleanup cost is in line with the previously reported estimate of $25 million derived from an analysis of non-Federal Facility RODs. *(No corresponding exhibit).*

What is the expected average annual O&M cost for each facility?

For all OUs (Fund-lead, PRP-lead and Federal Facilities), most O&M costs were more than $50,000 annually. *(No corresponding exhibit).*

What is the expected number of years that O&M will be required?

For State-lead O&M OUs, the estimated average number of years for O&M is 19. On average, O&M is expected to last 21 years for PRP-lead OUs and 23 years for Federal Facility OUs. *(No corresponding exhibit).*

If the facility has been added to the NPL so recently that reliable cost estimates cannot be made, please so indicate and indicate the date of listing.

Reliable site cleanup cost estimates are not available for 316 sites. Of these 316 sites, 168 have PRP-lead cleanups for which cost data are proprietary and not readily available to EPA. Seventy (70) cleanups are at Federal Facilities for which the Federal agencies have not made their cost information available to EPA. Twelve (12) are sites where the State has taken responsibility for cleanup activities and no Fund dollars are involved. Sixty-six (66) are Fund-lead sites that are listed on the NPL, but reliable estimates for total capital cleanup costs are not available. These 66 sites were published as final NPL sites in the Federal Register as follows:

1983	26 sites listed
1984	5 sites listed
1986	7 sites listed
1987	2 sites listed
1989	14 sites listed
1990	7 sites listed
1992	5 sites listed

(No corresponding exhibit).

Data Source

1) *The source:* 1) August 1993 RPM Data Collection (questions E13, E32, E48, E51 and E52a), 2) CERCLIS and 3) EPA cost analysis of RODs.
2) *The full universe of sites addressed by the question:* The 1,249 final and deleted sites listed on the NPL as of August 1993.
3) *The subset of the universe for which data are provided:* The 1,161 final and deleted sites listed on the NPL responding to the questions.

Background Information

What is an Operable Unit (OU)?
An OU is the division of a project into meaningful work elements (events) that can be implemented on different schedules, resulting in acceleration of cleanups. OUs allow certain elements of a project to be started ahead of others to lessen the hazards present at the site and to complete some work elements ahead of more complex and hazardous work elements. Thus, each element can move at its own rate to completion. Examples of two separate OUs are source control and groundwater cleanup.

What is a median?
A median has a two-part definition: 1) the median is defined as the middle observation of an odd-numbered group of observations that are ordered from smallest to largest; or 2) the median is defined as the number halfway between the two middle observations of an even-numbered group of observations that are ordered from smallest to largest.

What is the definition of capital costs?
Capital costs include all remedial action costs, including construction, up to 10 years of operating a groundwater treatment system, any operational and functional period prior to acceptance of the project and can include any service contracts for operating costs (e.g., burning materials in an incinerator). Operation and maintenance and removal costs are not covered in capital cost estimates.

What is Operation and Maintenance (O&M)?
O&M encompasses those activities necessary to ensure the continued effectiveness of the remedy after the remedial action goals are met, or after the 10 year operational period that EPA can pay for groundwater treatment systems. The cost of O&M is borne by the PRP or a State government (except in a very limited number of circumstances). Therefore, there is no Fund-lead O&M.

Question #2

Factors Contributing to High Cleanup Costs:

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.

Please indicate if the facility is expected to cost over $20 million in capital costs. If so, what factors are responsible?

Overall, 64 of the 123 Federal Facilities reporting (52%) expect to have capital costs greater than $20 million, while only 232 of the 1,126 non-Federal Facility sites reporting (21%) expect to have capital costs greater than $20 million.

The most common factor for sites with capital costs expected to exceed $20 million is large volumes of contaminated media (e.g., soil, groundwater). This reason was cited in 205 (88%) of the 232 non-Federal Facility sites and 48 (75%) of the 64 Federal Facilities expecting capital costs greater than $20 million. Site complexities and high technology costs also were cited often as major factors driving high cost sites. *(See Exhibit 2-1).*

NOTE: Similar cost factors were grouped to facilitate data analysis. (See "Major Cost Factor Groups" in *Exhibit 2-1*). The factors, that make up each group, are individually described in the key above *Exhibit 2-1*. More than one factor may be cited for any given site, therefore, the number of sites providing individual cost factors in the table in *Exhibit 2-1 does not total to the cost* factor groups illustrated in the graphic.

Data Source

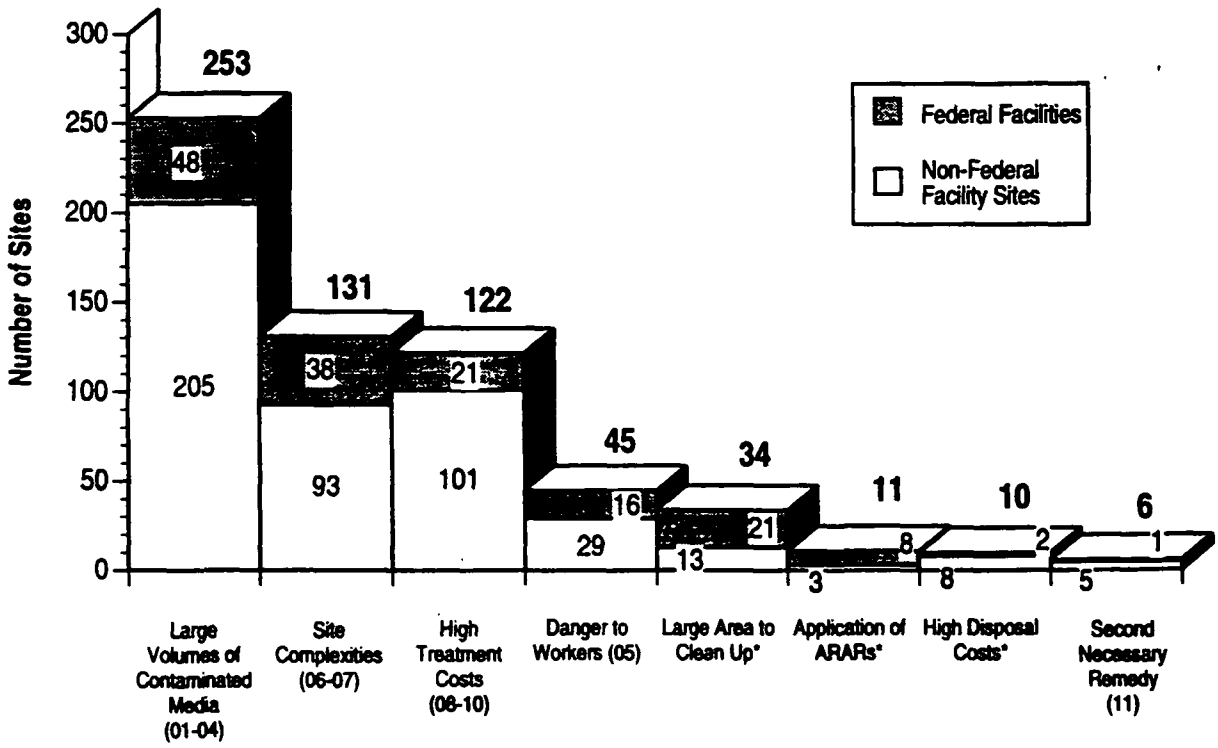
1) *The source:* August 1993 RPM Data Collection (questions E49 and E50).
2) *The full universe of sites addressed by the question:* The 1,249 final and deleted sites on the NPL as of July 1993.
3) *The subset of the universe for which data are provided:* Those 296 sites for which site managers expected capital costs to exceed $20 million (of 1,249 sites reporting).

Background Information

What is the definition of capital costs?
Capital costs encompass all remedial action costs including construction, up to 10 years of operating a groundwater treatment system, any operational and functional period prior to acceptance of the project and can include service contracts for operating costs (e.g., burning materials in an incinerator). Operation and maintenance, and removal costs are **not** covered in capital cost estimates.

Exhibit 2-1
Major Factors Contributing to Capital Cleanup Costs Expected to Exceed $20 Million

Descriptions of Individual Factors	% Non-Federal Facility Sites (of 232)	# Non-Federal Facility Sites	% Federal Facilities (of 64)	# Federal Facilities
01 = Large volume of highly contaminated soil/sludge/solid waste	59.1%	137	45.3%	29
02 = Large volume of soil overall	37.5%	87	48.4%	31
03 = Large volume of contaminated sediment	16.4%	38	23.4%	15
04 = Large volume of contaminated groundwater	46.6%	108	57.8%	37
05 = Site hazards pose dangers to cleanup workers	12.5%	29	26.6%	17
06 = Complex hydrogeology	26.3%	61	35.9%	23
07 = Complex mixture of contaminants	25.0%	58	37.5%	24
08 = High unit cost of treatment of soil/sludge/solid waste	33.2%	77	21.9%	14
09 = High unit cost of treatment of groundwater	20.7%	48	25.0%	16
10 = High unit cost of treatment of surface water	3.9%	9	6.3%	4
11 = Second remedy was required after first remedy failed	2.2%	5	1.6%	1
12 = Other (specified by site managers)	31.0%	72	64.1%	41
* = Large area to clean up (from 'Other' responses)	5.6%	13	32.8%	21
* = High disposal costs (from 'Other' responses)	3.4%	8	3.1%	2
* = Application of ARARs (from 'Other' responses)	3.4%	8	4.7%	3
99 = Unknown	0.9%	2	3.1%	2



More than one factor can be cited for any given site. Seventy-four (74) non-Federal Facility sites and 43 Federal Facilities reported 'Other' and/or 'Unknown' factors. These responses cited by site managers include such factors as difficulty of wetland remediation and presence of DNAPLs.

Question #3

Media Evaluated in Records of Decision (RODs):

A wide variety of media are affected by Superfund site contamination. Contamination of the groundwater and soil media are the most frequent problems identified at sites. Site managers report two-thirds of the signed RODs addressed groundwater and one-half addressed soils. More than one-half of the planned RODs are also expected to address contaminated groundwater and soil.

How many sites have signed RODs?

Site managers reported information on 789 National Priority List (NPL) sites with signed RODs. Site managers reported on 1,135 RODs at these 789 sites. (At the end of fiscal year 1993, 885 sites had signed RODs). The number of RODs signed is greater than the number of sites because more than one ROD may be signed at a site. *(No corresponding exhibit).*

How many media are addressed by each signed ROD?

A ROD may address more than one contaminated media. A wide variety of media are affected by Superfund sites *(See Exhibit 3-1).* The groundwater medium was addressed in two-thirds of the RODs. These RODs were signed at 622 sites. The soil medium was addressed in one-half of the RODs. These RODs were signed at 478 sites.

NOTE: Some sites may have RODs that address both groundwater or soil.

Background Information

What is a Record of Decision (ROD)?
Upon completion of site studies, EPA selects a remedy for site contamination. This remedy is detailed in the ROD. The ROD can either address the entire site cleanup (more than one medium), one phase of the site cleanup (for example, soil contamination), or determine that no further action is needed.

How many additional RODs are expected, and what media remains to be addressed in the future RODs?

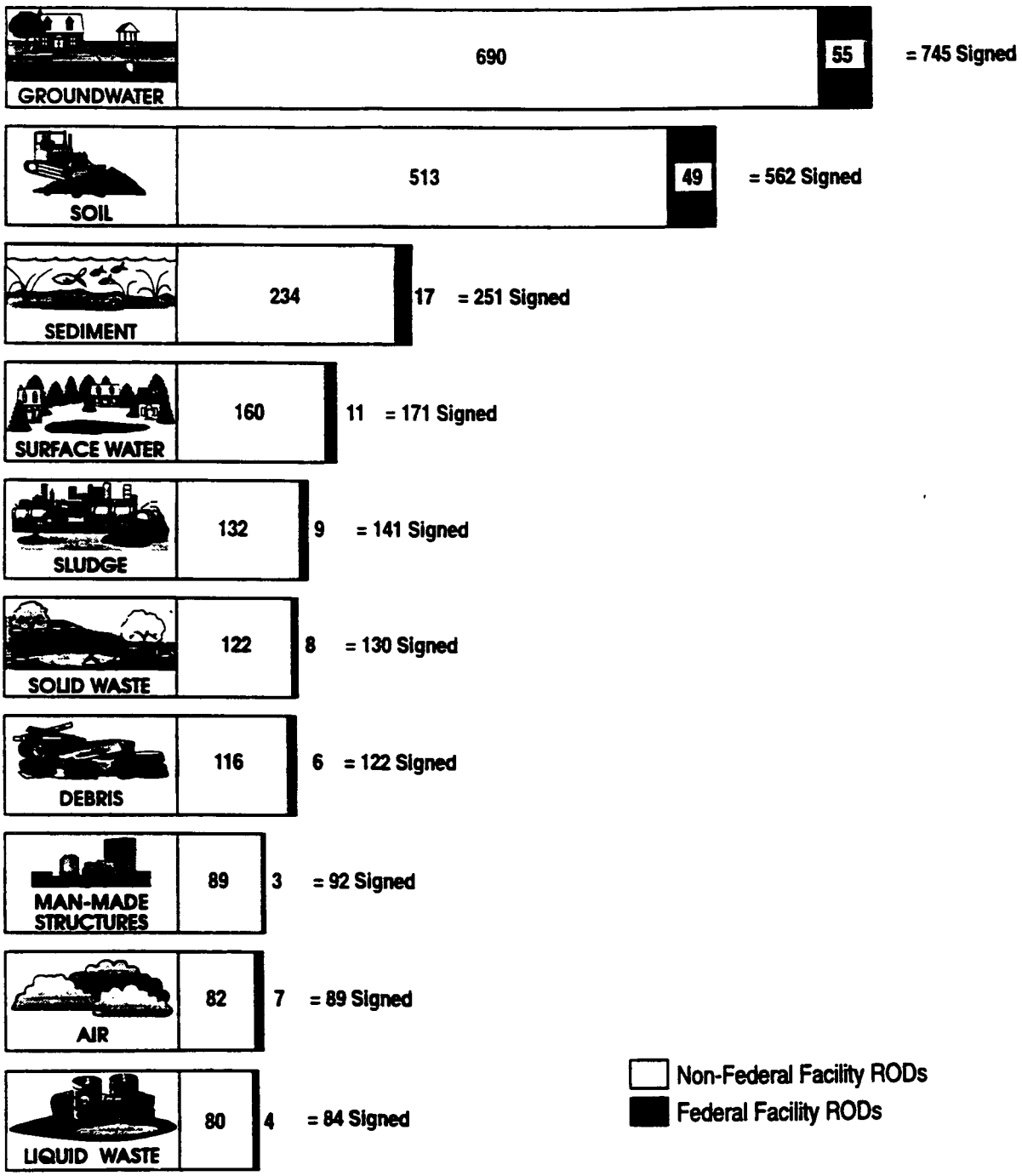
Site managers reported that 542 sites will need a ROD in the future. They expect 986 RODs at these 542 sites *(See Exhibit 3-2).* The groundwater medium is expected to be addressed in 625 RODs. These RODs are planned at 412 sites. The soil medium is expected to be addressed in 588 RODs. These RODs are planned at 348 sites.

The data provided here cannot answer the question of how much work remains to be done at NPL sites. The data provided do not consider the areal extent of problems at sites, the risk yet to be remediated, the complexity of site problems, nor do they exclude those media where no action is needed.

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E32, E34 and E36).
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 (1,126 non-Federal Facility sites and 123 Federal Facilities).
3) *The subset of the universe for which data are provided:* RPMs reported on 1,170 sites with signed or planned RODs. The number of sites is less than the total number of RODs because more than one ROD may be signed or planned at a site.

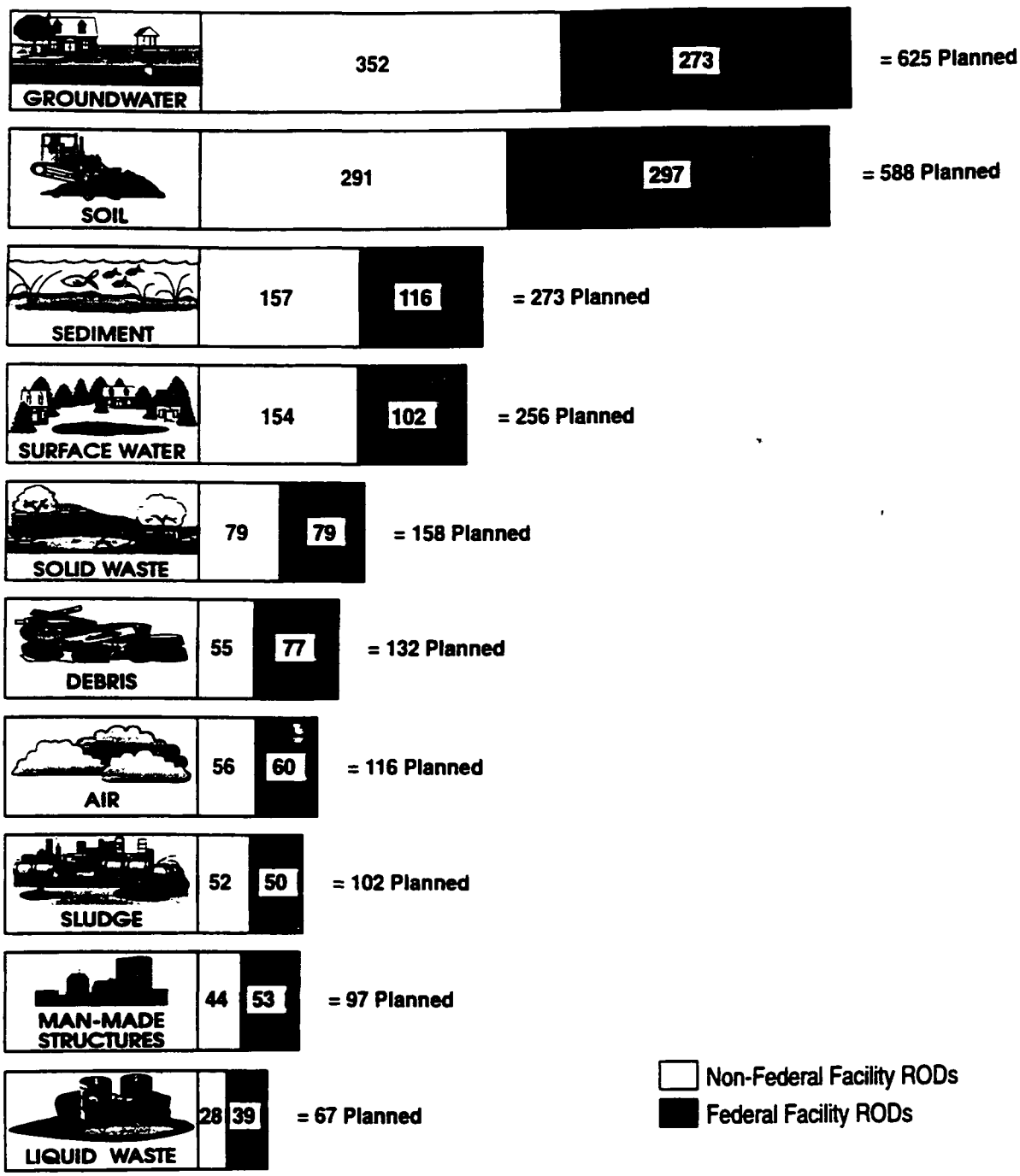
Exhibit 3-1
Signed Superfund Records of Decision (RODs) Address Contamination of Different Media



NOTE: Other media have been evaluated in 19 signed RODs. The signed numbers total more than the 1,135 signed RODs reported because a ROD may analyze more than one contaminated medium. In addition, the number of RODs signed is greater than the number of total sites with signed RODs because more than one ROD may be signed at a site.

Exhibit 3-2

Planned Superfund Records of Decision (RODs) Will Address Contamination of Different Media



NOTE: Other media will be evaluated in 128 planned RODs. Site managers answered 'Unknown' for the type of media that will be evaluated in 77 planned RODs. The planned numbers total more than the 986 planned RODs reported because a ROD may analyze more than one contaminated medium. In addition, the number of planned RODs is greater than the number of total sites with planned RODs, because more than one ROD may be planned at a site.

Question #4

Construction Completions:

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. Construction completions beyond the year 2000 are difficult to project and can be assessed later when more site-specific information is available.

When is construction completion expected?

To determine when construction will be completed for sites currently on the NPL, EPA looked to two sources of information: 1) historical data and trends, and 2) site-specific projections. The first approach is the more conservative of the two because it accounts for real world delays encountered during past cleanups.

EPA first looked at historical trends to determine future rates of construction completion. In fiscal year 1992 (FY 92), EPA completed construction at 86 sites, while in FY 93, EPA reported construction completion at 68 sites, for a total of 217 sites by the end of FY 93. Because the construction completion definition was established in 1992, the FY 92 accomplishments included "old" sites that would have met the criteria in previous years. In both FY 92 and FY 93, the construction completion accomplishments were most likely less complex than are expected in future years. Consequently, EPA estimates construction completion at 63 sites per year through the end of the century. This yearly rate combined with the 224 sites completed by December 31, 1993, brings the projected total to 665 sites with construction completion by the end of calendar year 2000. *(See Exhibit 4-1).*

Construction completions also were assessed using responses from site managers to a site-specific question that asked the year construction completion is expected. The site-specific answers may not account for real world delays that are difficult to predict. Examples of possible delays are Superfund resource limitations, unforeseen site conditions encountered after remedy selection and enforcement issues. Using the site-specific approach, the projection is 965 construction completions by the end of calendar year 2000. *(See Exhibit 4-1).*

How many of the sites for which construction is complete were single party sites?

Of the 217 sites where construction was completed by September 30, 1993, 49 sites (23%) are single-party sites. *(No corresponding exhibit).*

What is the mean and median number of PRPs at sites for which construction is complete?

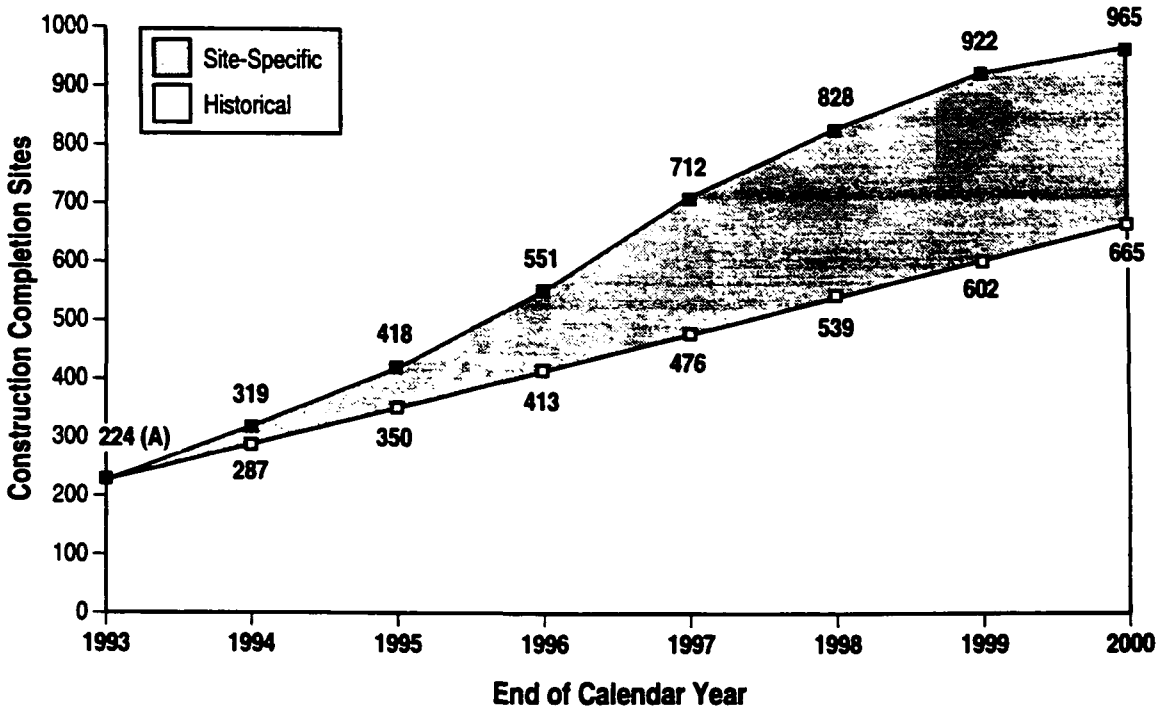
Since the data were reported in ranges, the mean and median cannot be calculated. The most frequently selected range – between 2 and 10 PRPs – was reported at 46% of the sites. *(No corresponding exhibit).*

Background Information

What is 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.

Exhibit 4-1

Construction Completion Estimates for Sites on the NPL



(A) - Actual Construction Completion Data

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.

Data Source

1) *The source:* 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.

Question #5

Risk Assessments:

This analysis evaluated site risk information from approximately one-half of the sites that have had risk assessments produced since the passage of the Superfund Amendments and Reauthorization Act (SARA) and that also have a signed Record of Decision (ROD). For the 216 sites evaluated, exposure to soil was addressed in 166 risk assessments, exposure to groundwater in 103, exposure to sediment in 28 and exposure to surface water in 21 site risk assessments. When comparing risk and hazard levels before and after remediation, both cancer risks and non-cancer hazards show a reduction following remediation. Individual cancer risks for current as well as future unremediated exposures between 10^{-5} and 10^{-3} were most common. Individual cancer risk estimates after remediation were most frequently reported to range between 10^{-6} and 10^{-5}. Non-cancer hazards for current exposures were most commonly reported to be between 0.1 and less than 100. The reported non-cancer hazard estimates for sites after remediation were less than 10. While these trends are consistent with expectations, the levels reported are based on limited analysis that should be refined before definitive conclusions are drawn.

Overview

Two factors were considered in the selection of risk assessments because it was not possible to collect and analyze all available risk assessments . First, a priority was placed on collecting risk assessments associated with sites that had a Remedial Investigation/Feasibility Study (RI/FS) that was started after October 17, 1986 (date of the passage of SARA) and a ROD signed after September 30, 1990. According to the Comprehensive Environmental Response, Compensation and Liability (Act) Information System (CERCLIS), 387 sites fit these criteria. Second, a priority was placed on the analysis of sites that were non-Federal Facility sites. Risk assessments for 216 sites were collected and analyzed, which corresponds to approximately one-half of the expected risk assessments. Moreover, the process of collecting and analyzing risk assessment information is an ongoing effort.

Risk information is developed to characterize a site and support site cleanup decisions. As outlined in the answer to Question 9, there are several ways that a ROD will specify that site risk should be addressed. More specifically, RODs recommend some or all of the following:

- clean up media to risk-based levels based on data from the baseline or other risk assessment;
- remove/treat contaminated soil;
- clean up groundwater to Maximum Contaminant Levels (MCLs) or other ARARs; and
- eliminate exposure using engineering or institutional controls.

The use of these other approaches to determining the need for site cleanups is one reason that risk/hazard estimates are not generated for all media. Another reason that risk/hazard estimates may not be reported is that either the site evaluation does not indicate the presence of contamination (no estimates were generated) or risk/hazard estimates were below the reporting thresholds for this analysis (cancer risk levels of 10^{-6} or greater or a hazard index of 0.1 or greater were targeted).

For each facility for which an RI/FS was initiated after October 17, 1986 and for which a risk assessment has been completed, please indicate:

- **the date of risk assessment completion and whether additional risk assessments are anticipated for the facility.**

  Exhibit 5-1 summarizes the dates that risk assessments examined in this exercise were completed. The reported number of completed risk assessments was under-reported because the timing for the data collection effort of this project did not allow for collection and analysis of many of the risk assessments. In addition, 7 sites have been omitted from this compilation because the date of the risk assessment needs to be verified before reporting. Another 7 sites were analyzed from fiscal year 1988 (FY 88) and FY 89. As of the time of data collection (September 1993), risk assessments were underway for 45 sites and anticipated for an additional 74 sites.

- **the media addressed (groundwater, surface water, sediment, surface waste or soil).**

  Of the 216 sites evaluated, 166 site risk assessments addressed exposure to soil, 103 site risk assessments addressed exposure to groundwater, 28 site risk assessments addressed exposure to sediments and 21 site risk assessments addressed exposure to surface water. *(No corresponding exhibit).*

On the basis of these risk assessments, please quantify:

a. **the baseline (current) risk posed by the facility;**
b. **the future risk projected to be posed by the facility if unremediated; and**
c. **the future risk projected by the facility when remediated (residual risk).**

  Total "facility cancer risk/non-cancer hazard" was generally not provided. However, total "facility cancer risk/non-cancer hazard" can be calculated by combining appropriate individual scenarios where it is known that the same person had the potential to be exposed via multiple scenarios. A total "facility risk/hazard" was not available for many sites because site specific cleanup decisions are typically based upon evaluation of specific media.

a. **the baseline (current) risk posed by the facility;**

  The reported cancer risks for current exposures at Superfund sites tend to range between 10^{-5} and 10^{-3}. Reported hazard index (HI) levels for current exposures tended to range between 0.1 and 100. In some instances, hazard levels exceeded these values. *(No corresponding exhibit).*

b. **the future risk projected to be posed by the facility if unremediated; and**

  Future uncontrolled risks are similar to current cancer risk and non-cancer hazard levels examined. *(No corresponding exhibit).*

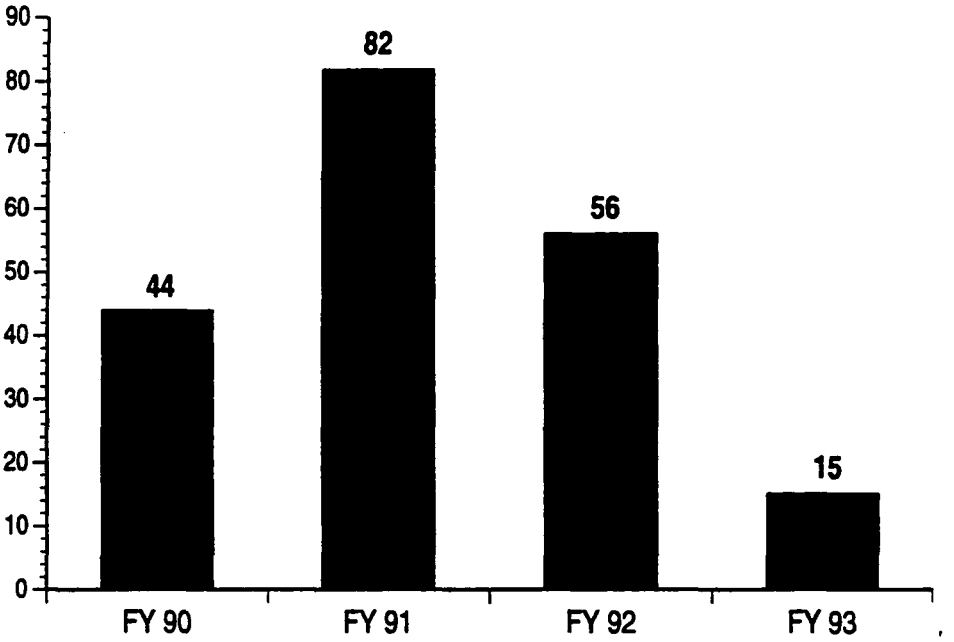
c. **the future risk projected by the facility when remediated (residual risk).**

  Although a systematic comparison of site specific risk reduction was not performed, there is a general tendency for post remediation risk levels for cancer risk and non-cancer hazard levels to be lower than current or future unremediated estimates. Individual future cancer risk estimates after remediation were most frequently reported to range between 10^{-6} and 10^{-5}. The reported non-cancer hazard estimates from sites after remediation were less than 10. Comparing these values with reported typical values for current and future unremediated risk estimates suggest reductions of around two orders of magnitude. Nevertheless, some sites were reported to have residual risks within the risk range (10^{-6} to 10^{-3}) following remediation.

  In general, these findings are consistent with overall expectations for changes in risks and hazards at Superfund sites. The overall risk/hazard levels are similar to those reported for other types of sites associated with hazardous waste.

Exhibit 5-1

Distribution by Fiscal Year (FY) of 216 Completed Risk Assessments



This exhibit presents a distribution by FY of the 216 sites for which risk information was taken to support this analysis. Risk information was also obtained from 7 sites where risk assessments were conducted in FY 88 and FY 89. Approximately twice as many risk assessments were expected to have been performed over the period shown (dates not available). As of the time of data collection (September 1993), risk assessments were underway for 45 sites and anticipated for an additional 74 sites.

Data Source

1) *The source:* CERCLIS and Risk Information Collection Forms.

Background Information

What is a baseline risk assessment and how are the results used?
A baseline risk assessment characterizes current and future cancer risks and non-cancer hazards posed by exposure to site contaminants. Cancer risks and non-cancer hazards are generally calculated by combining estimates of exposure to contaminants with toxicity levels.

Risk managers use the results of the baseline risk assessment or chemical specific standards (such as Maximum Containment Levels (MCLs) or other Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)) to establish the need to clean up a site. Generally cleanup is warranted where the baseline risk assessment for an individual, using Reasonable Maximum Exposure (RME) assumptions, indicates that the risk exceeds a greater than 10^{-4} lifetime excess cancer risk or the Hazard Index (HI) for non-cancer hazards exceeds one.

What is an exposure scenario?
An exposure scenario is comprised of six elements: a medium (e.g., groundwater, soil, sediment, or surface water), an exposure route (ingestion, inhalation or dermal contact), a time frame (current or future), a location (on-site or off-site), a land use (residential or industrial) and a receptor population (e.g., workers, children or trespassers). The average number of exposure scenarios for a specific medium is between 5 and 10. Generally, the scenario that presents the highest risk is used to define the risk posed by that specific medium. Specific exposure scenarios combine contaminant concentration with other parameters such as contact rate, exposure frequency and duration and body weight.

What is a cancer risk estimate?
Cancer risk estimates represent a statistical upper limit probability of excess cancer cases (above background level) that is associated with environmental contamination. For example, if the risk for a scenario was 1×10^{-4} this would present an upper limit risk of 1 excess cancer case (above background level) per 10,000 people. The table below indicates the various probability estimates used.

Cancer Risk Probability Estimate	Excess Cancer Cases in a Given Population
1×10^{-1}	1 in 10
1×10^{-2}	1 in 100
1×10^{-3}	1 in 1,000
1×10^{-4}	1 in 10,000
1×10^{-5}	1 in 100,000
1×10^{-6}	1 in 1,000,000

What is a Hazard Quotient (HQ)?
The HQ is the ratio of a contaminant's estimated exposure level to a reference dose for that contaminant. (The reference dose is the threshold level below which it is unlikely for a population to experience adverse non-cancer health effects). If the exposure level exceeds the reference dose, then there may be adverse non-cancer health effects.

What is the non-cancer Hazard Index (HI) estimate?
The HI is the level below which it is unlikely for a population to experience adverse non-cancer health effects (such as nerve damage, birth defects and liver damage) resulting from exposure to more than one chemical. The HI is the sum of individual HQs for each chemical (e.g., if an individual were exposed to four contaminants in soil, the sum of the four HQs for these contaminants would provided the HI estimate for the exposure scenario).

The greater the HI value for a group of contaminants in a medium is above 1, the greater the chance that adverse non-cancer health effects may result from exposure to that medium.

What is Reasonable Maximum Exposure (RME)?
RME is a measure used to estimate the likelihood of exposure to contaminants at sites. It is the maximum exposure that is reasonably expected to occur at a site, and is therefore a measure of "high-end" exposure, rather than "average" or "worst-case" exposure.

Question #6

Soil Remedies and Principal Contaminants:

As of August 1993, site managers reported 562 Records of Decision (RODs) were signed that address contaminated soil. These RODs have been signed at 478 sites. Treatment was a principal element of the selected remedy in 308 (67%) of the RODs. Almost three-quarters of the RODs where treatment was selected also included a containment technology. The principal contaminants found in the soil at these sites are lead, arsenic, trichloroethene, chromium, cadmium, toluene, tetrachloroethene and benzene.

Where a remedy has been selected for contaminated soil, please indicate the remedy that was selected.

As of August 1993, site managers reported that 562 RODs were signed that address contaminated soil. These RODs have been signed at 478 sites. *(No corresponding exhibit).*

NOTE: The number of RODs signed is greater than the number of total sites because more than one ROD that addresses soil may be signed at a site.

Of the 463 RODs where remedy information is available, site managers reported that 389 RODs that address contaminated soil were signed post-Superfund Amendments and Reauthorization Act (SARA) (between October 17, 1986 and August 1993). These RODs were signed at 347 sites. The remedy selected in 277 of these RODs (71%) included treatment as a principal element and containment was selected in 73 RODs (19%). Non-engineering controls (e.g., institutional controls, monitoring, no action) were selected in 39 RODs (10%). The majority of the RODs (73%) where treatment was a principal element of the selected remedy also included some form of containment.

Of the 463 RODs where remedy information is available, site managers reported that 74 RODs that address contaminated soil were signed pre-SARA (i.e., prior to October 17, 1986). These RODs were signed at 73 sites. The remedy selected in 31 of these RODs (43%) included treatment (e.g., solidification/stabilization, incineration, soil vapor extraction) as a principal element. Containment (e.g., off-site landfilling, surface capping) was selected in 37 RODs (49%). Non-engineering controls (e.g., institutional controls, monitoring, no action) were selected in 6 RODs (8%). The majority of the RODs (68%) where treatment was a principal element of the selected remedy also included some form of containment. *(See Exhibit 6-1).*

These data show a 28% increase in the number of treatment remedies selected after the passage of SARA in 1986. *(See Exhibit 6-1).*

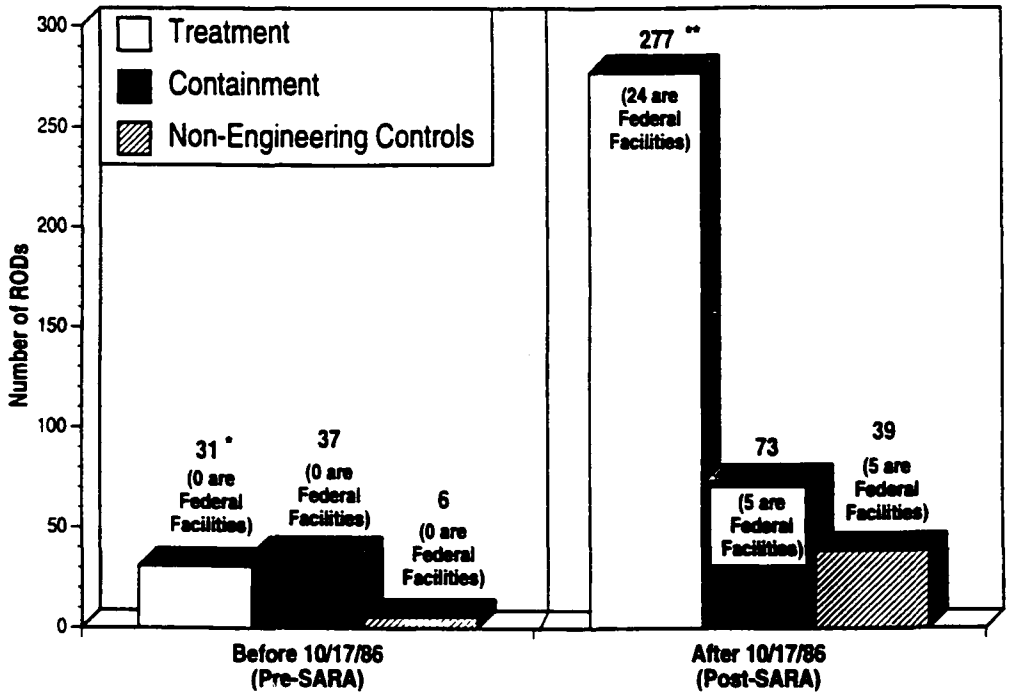
Where a remedy has been selected for contaminated soil, indicate the principal contaminants addressed.

Site managers reported that 562 RODs have been signed to address contaminated soil at 478 sites. At 263 of these sites, at least one of the chemicals on EPA's list of principal contaminants is found in the soil and is being addressed by the remedy selected. At the remaining sites, the RODs may have been signed recently (i.e., fiscal year 1993) and the data is not yet available or the chemicals found at the site are not on EPA's list of principal contaminants.

The contaminants found most frequently in the soil are lead (50%), arsenic (40%), chromium (35%), trichloroethene (35%), cadmium (33%), toluene (30%), tetrachloroethene (29%) and benzene (27%). *(See Exhibit 6-2).*

NOTE: The number of contaminants addressed by RODs is greater than the number of total RODs because more than one contaminant is generally found in the soil at a site.

Exhibit 6-1
Types of Remedies Chosen to Address Soil Contamination



NOTE: The number of RODs is greater than the number of total sites because more than one ROD is often signed at a site.

* Includes 21 RODs where containment was also a component of the remedy.

** Includes 202 RODs where containment was also a component of the remedy.

Background Information

What does the Superfund Amendments and Reauthorization Act (SARA) say about remedy selection?

Comprehensive Environmental Recovery, Compensation and Liability Act (CERCLA) was amended in 1986 by SARA. Section 121 of SARA required EPA to select remedies that "utilize permanent solutions and alternative *treatment* technologies . . . to the maximum extent practicable."

What are principal contaminants?

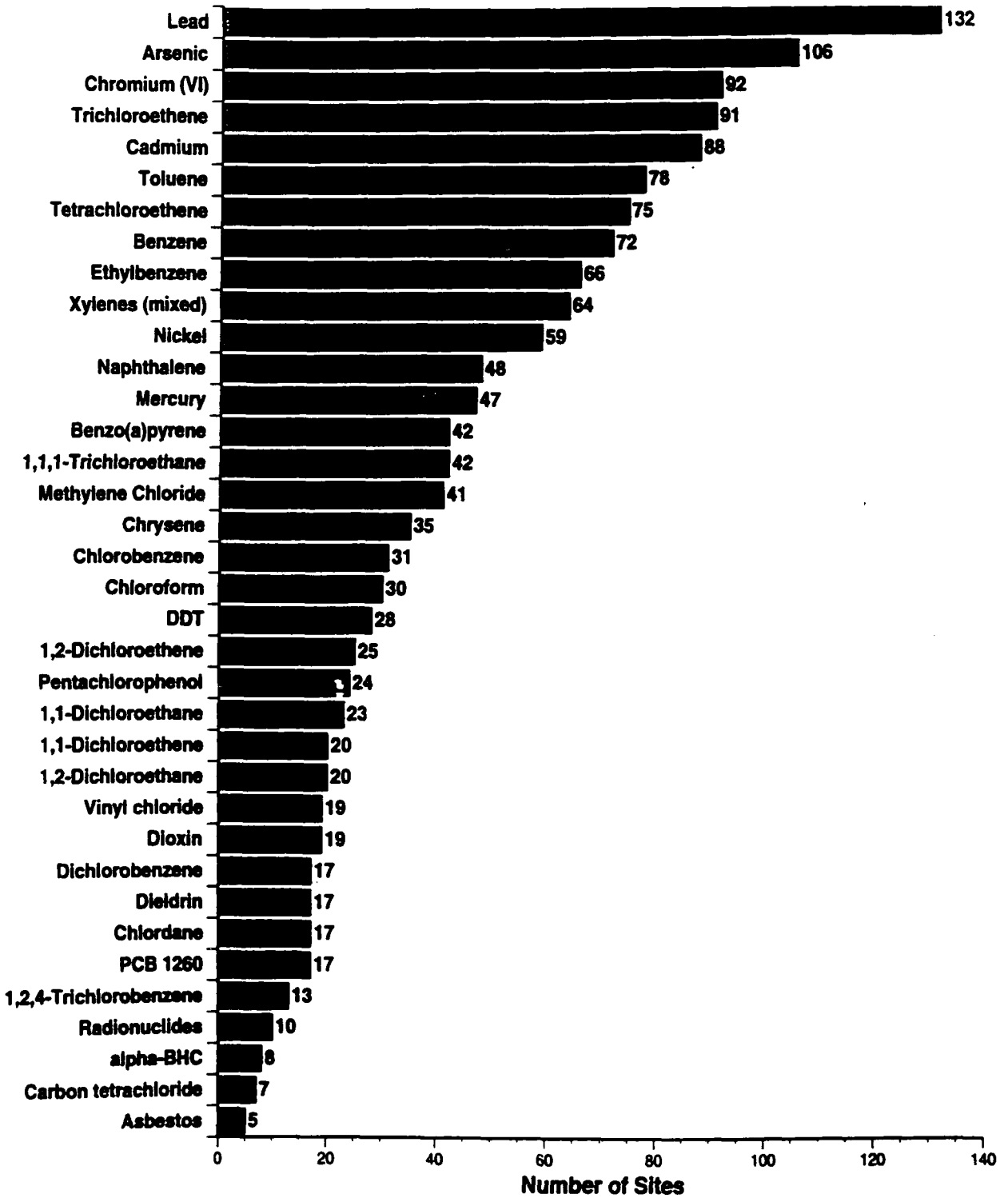
Principal contaminants are those chemicals that represent the most significant threat, in terms of prevalence or toxicity, at sites, or represent unique classes of chemicals (e.g., asbestos or radionuclides) that appear at sites.

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E32 and E36) with information integrated from the ROD Information Database System.
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 (123 Federal Facilities and 1,126 non-Federal Facility sites).
3) *The subset of the universe for which data are provided:* Those 463 RODs signed to address soil contamination with available remedy data.

Exhibit 6-2

Sites with Principal Contaminants in the Soil Addressed by Signed RODs



The contaminants found most frequently in the soil are lead (50%), arsenic (40%), chromium (35%), trichloroethene (35%), cadmium (33%), toluene (30%), tetrachloroethene (29%) and benzene (27%).

Question #7

Groundwater Adjacent to Superfund Sites:

Most groundwater at or in close proximity to Superfund sites is used as a current source of drinking water and the majority of groundwater aquifers are classified as potential drinking water supplies. Future human consumption of groundwater both on-site and downgradient of the plume was assumed at over one-half of the sites. Approximately 20% of sites with a Record of Decision (ROD) addressing groundwater contamination relied upon natural attenuation as the sole remedy or in conjunction with other technologies.

For each facility at which a ROD addressed groundwater, please provide the following:

a. **current use of groundwater adjacent to the facility (e.g., drinking, irrigation, industrial).**

Of the 582 non-Federal Facility sites reporting RODs signed to address groundwater contamination, site managers reported that groundwater was most commonly used as a source for private domestic wells at 251 sites (43%), while 143 sites (25%) cite groundwater use for the public water supply. Of the 40 Federal Facilities reporting RODs signed to address groundwater contamination, site managers reported that groundwater was mostly used for the public water supply at 20 sites (50%), while 17 sites (43%) cite primary groundwater use for agricultural purposes. Other uses of groundwater adjacent to National Priorities List (NPL) sites are provided in *Exhibit 7-1*.

NOTE: To ensure a response that would show all uses of the aquifer in close proximity to the site, EPA site managers were asked to identify uses of the groundwater **underneath and** adjacent to the site. This ensures that any uses within the site boundaries, but not directly affected by contamination, are represented.

b. **current groundwater classification adjacent to the facility (e.g., sole source, potential source, etc.).**

For those sites reporting that groundwater adjacent to either non-Federal Facility sites or Federal Facilities has been classified, the majority have groundwater that is usable or potentially usable as a drinking water source (i.e., Class II designation). In addition, 21% are special groundwaters designated as Class I. *(See Exhibit 7-2)*. Of the 388 sites where people are using groundwater for drinking, site managers reported that 67% were potentially threatened by a contaminated plume. *(No corresponding exhibit)*.

In addition, many aquifers exchange water with other important water sources. *(See Exhibit 7-3)*.

c/d. **assumption for future groundwater use and whether the risk assessment assumed future consumption of the plume *per se* or future downgradient consumption of groundwater.**

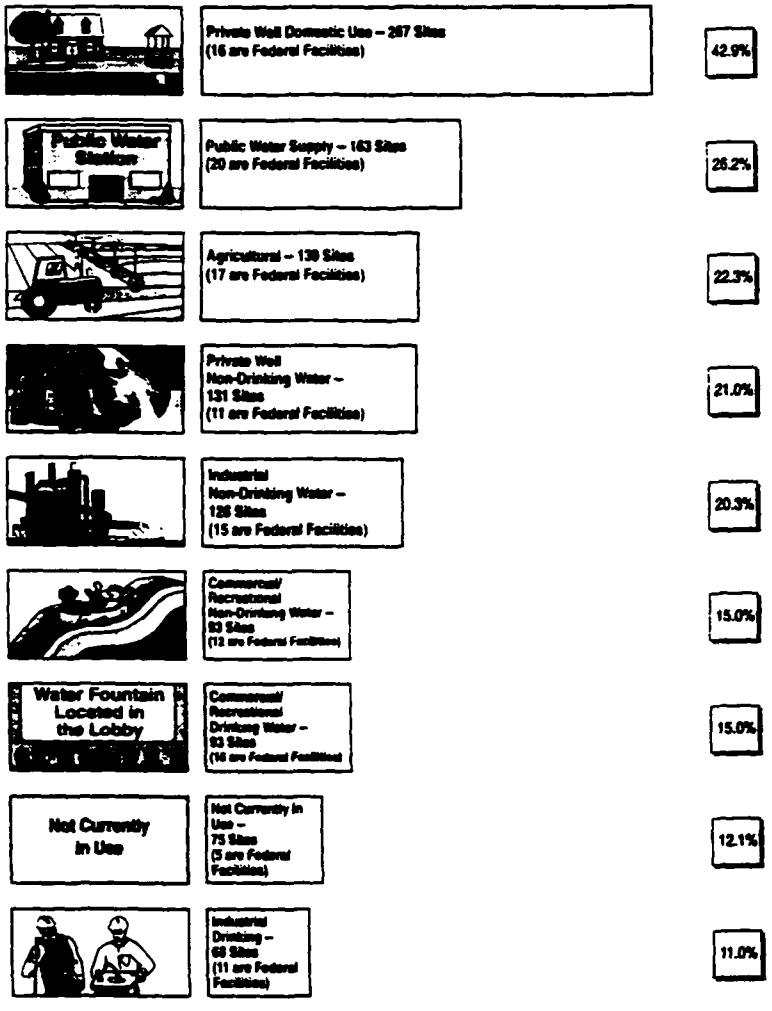
Of the 582 non-Federal Facility sites reporting RODs signed to address groundwater contamination, 328 sites (56%) assumed future human consumption of groundwater both on site and downgradient (i.e., beyond the extent) of the plume, while 65 sites (11%) assumed future consumption of groundwater only downgradient of the plume. Sixty-nine (69) sites (12%) assumed future consumption of groundwater only on site. Of the 40 Federal Facilities reporting RODs signed to address groundwater contamination, 24 sites (60%) assumed future consumption of groundwater both on site and downgradient of the plume, while 4 sites (10%) assumed future consumption of groundwater only downgradient of the plume. Three (3) sites (8%) assumed future consumption of groundwater only on site. *(See Exhibit 7-4)*.

e. **if the remedy relied upon natural attenuation for cleanup of plume.**

Of the 582 non-Federal Facility sites reporting RODs to address groundwater contamination, 127 sites (22%) relied upon natural attenuation of contamination as the sole remedy or in conjunction with other technologies (i.e., a component of the remedy). Of the 40 Federal Facilities reporting RODs to address groundwater contamination, 8 sites (20%) relied upon natural attenuation of contamination as a component of the remedy. *(No corresponding exhibit).*

NOTE: Preliminary investigations being conducted by EPA to develop groundwater presumptive remedies indicate that the survey estimates of reliance on natural attenuation may be high.

Exhibit 7-1
Uses of Groundwater Underneath and Adjacent to Superfund Sites

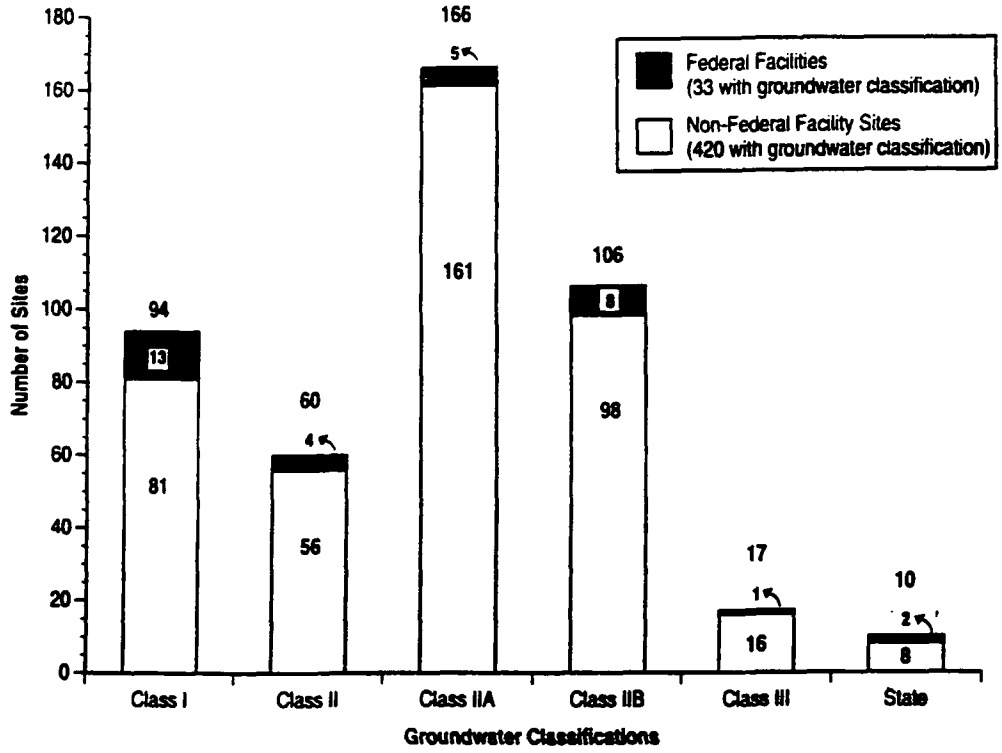


Groundwater in the vicinity of non-Federal Facility sites is most commonly used as a source for private domestic wells. Groundwater in the vicinity of Federal Facilities is most commonly used for the public water supply.

NOTE: 1) A single source of groundwater can be used for multiple purposes. For this reason, the percentages shown in the chart do not add up to 100%.

2) Site managers answered 'Unknown' for 10% of non-Federal Facility sites and 5% of Federal Facilities. Answers were not provided for 7.4% of non-Federal Facility sites and 2.5% of Federal Facilities.

Exhibit 7-2
Groundwater Classifications at Superfund Sites



EPA Description

Class	Description
I	Special groundwaters. Either irreplaceable sources of drinking water (e.g., sole source aquifers) or those supporting ecologically vital environments (e.g., habitat for endangered species).
II	Current and/or potential sources of drinking water. In this survey, the distinction between current and potential was not provided.
IIa	Current sources of drinking water.
IIb	Potential sources of drinking water, based on water quality and potential yield.
III	Not a potential source of drinking water and of limited beneficial use, based on water quality and potential yield.

Other Classifications

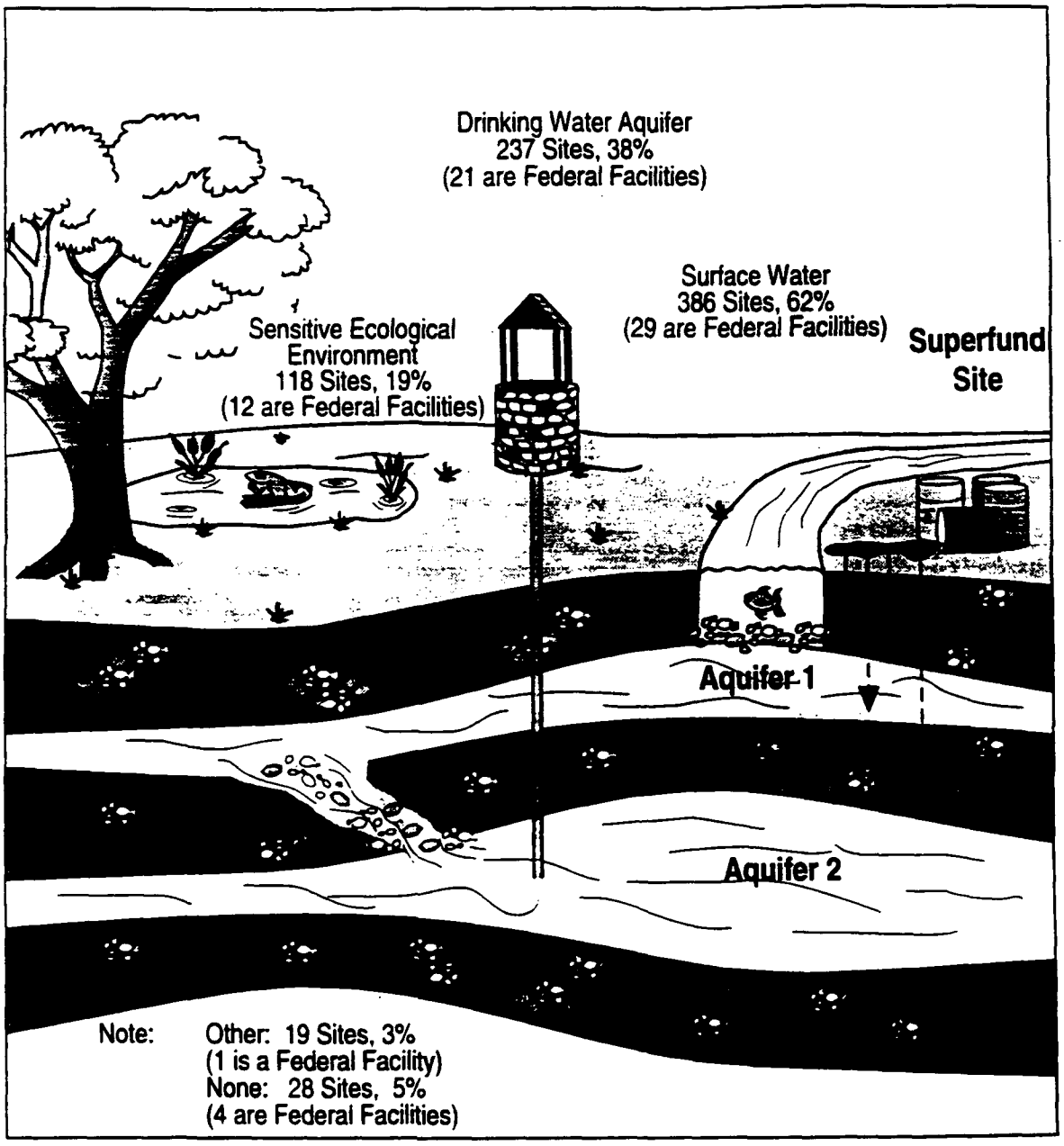
State	Classification is based on a State law or regulation. Such a classification is unique to the State in which it is located.

For those sites reporting that groundwater adjacent to either non-Federal Facility sites or Federal Facilities has been classified, the majority have groundwater that is usable or potentially usable as a drinking water source (i.e., Class II designation).

NOTE: Groundwater was either not classified or the classification was unknown at 169 sites. The Superfund program classifies groundwater when necessary to determine a remedial action. In some cases, the groundwater is not classified (e.g., when an alternate water supply is provided). Consequently the number of sites with a groundwater classification is less than the number of sites with a groundwater ROD.

Exhibit 7-3

Where Does the Affected Aquifer Discharge?

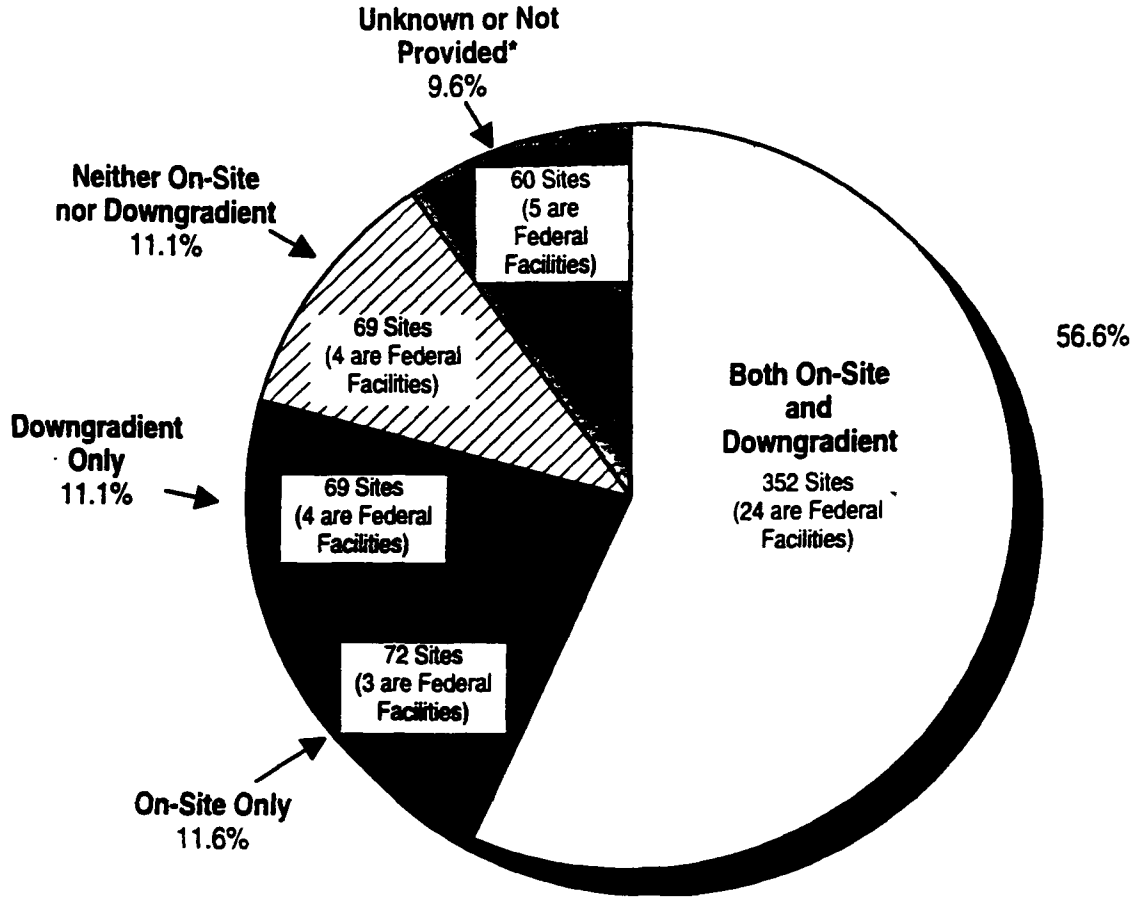


Aquifers underneath and adjacent to both non-Federal Facility sites and Federal Facilities most often discharge into surface water.

NOTE: The number of affected areas exceeds the number of Superfund sites because one aquifer may discharge into multiple environs. Site managers answered 'Unknown' for 72 sites and 'Not Applicable' for 9 sites. Answers were not provided for 24 sites.

Exhibit 7-4

Projected Human Consumption of Groundwater at NPL Sites



* Sites are only included in this category where site managers responded 'Unknown' or did not respond to assumptions for *both* on-site and downgradient human consumption.

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E37a, E37b, E37c, E38a, E38b, E39, E40, E42 and E43).
2) *The full universe of sites addressed by the question:* The 1,249 final and deleted NPL sites as of July 1993.
3) *The subset of the universe for which data are provided:* Those sites with groundwater RODs signed prior to July 1993: 622 sites and 745 RODs, which include 582 non-Federal Facility sites reporting 690 RODs and 40 Federal Facilities reporting 55 RODs.

Background Information

There have been 690 RODs signed to evaluate contamination of groundwater at 582 non-Federal Facility sites and 55 RODs signed to address groundwater contamination at 40 Federal Facilities with groundwater contamination.

How is groundwater classified?
Groundwater is generally classified according to its quality, quantity and intended use. The Federal classification scheme distinguishes between groundwaters that are currently used for drinking water purposes, those that are potentially usable for drinking water and those that, due to poor quality or insufficient quantity, are not suitable for drinking water purposes. States also may have their own, unique classification scheme.

What is natural attenuation?
Natural attenuation refers to the processes of biodegradation, dispersion, dilution and absorption of contaminants found in groundwater. In limited situations where the chemical and biological conditions of the contaminated aquifer are favorable, natural attenuation may be capable of reducing contaminant concentrations to acceptable heath-based levels over time. However, for natural attenuation to be effective, it must generally be preceded by source removal or control measures and other active forms of remediation.

When is a water supply considered to be a public water supply?
EPA considers water supplies to be public if the water system has at least 15 service connections or serves an average of at least 25 year-round residents. EPA regulations under the Safe Drinking Water Act apply to all public water supplies. Certain EPA drinking water standards also apply to water systems that regularly serve at least 25 of the same people for more than 6 months per year (e.g., rural schools).

Question #8

Groundwater Contamination:

As of August 1993, site managers reported 745 Records of Decision (RODs) were signed that address groundwater contamination. These RODs were signed at 622 sites. The primary objective of RODs at the vast majority of the sites (84%) is to restore the groundwater to beneficial use.

Based on the September 1993 Dense Non-Aqueous Phase Liquid (DNAPL) survey results, EPA estimates that there is a medium to high likelihood that DNAPLs will be present at almost 60% of all National Priorities List (NPL) sites.

For each facility where a remedy has been selected for groundwater, please indicate the remedy that was selected.

Site managers reported 745 RODs for 622 sites that address groundwater contamination have been signed as of August 1993. *(No corresponding exhibit).*

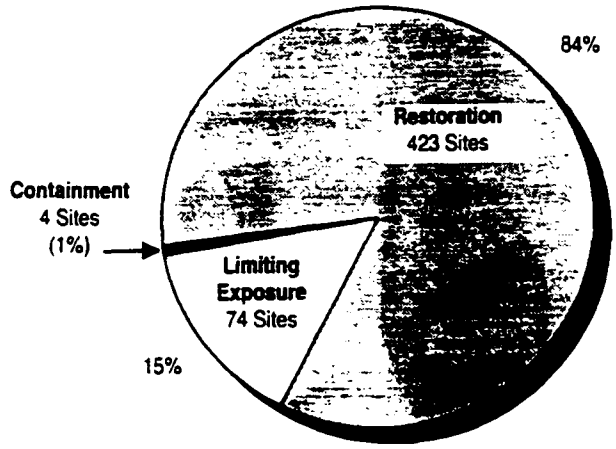
EPA selects remedies to address groundwater contamination that meets one or more of the following three objectives (in priority order): 1) restoration of the groundwater to beneficial use through the use of treatment technologies or natural attenuation: 2) containment of the contaminated groundwater through the use of subsurface barriers (e.g., slurry wall); or 3) controlling or limiting direct exposure to the contamination (e.g., providing an alternate water supply, closing wells).

Remedy data are available for 501 of the 622 sites with RODs that address groundwater. Of these 501 sites, the highest objective to be achieved at 423 sites (84%) is restoration of the groundwater to beneficial use. At least 25% of these 423 sites include the achievement of one additional objective, such as providing an alternate water supply or containing a portion of the contaminated groundwater aquifer. In addition, 4 sites (1%) have as their highest objective to contain the contaminated groundwater; and 74 sites (15%) have the sole objective to limit/control exposure. *(See Exhibit 8-1).*

At 80% of the sites, remedies were selected that include pumping and treating the contaminated groundwater.

NOTE: The number of RODs signed is greater than the number of total sites because more than one ROD that addresses groundwater may be signed at a site.

Exhibit 8-1
Objectives of Groundwater Remedies at Sites



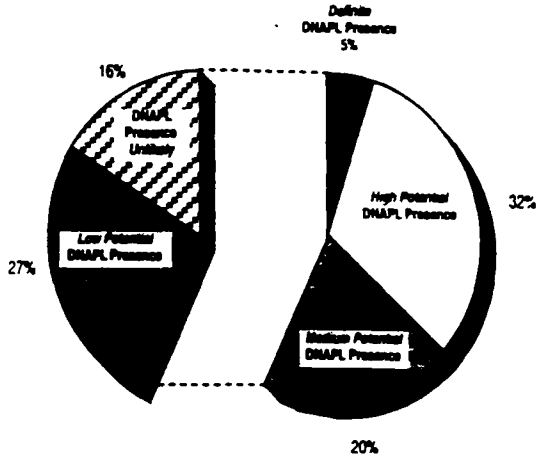
Of the 501 sites where remedy information is available, 84% have as their highest objective restoration of the groundwater to beneficial use.

NOTE: During implementation of a specific technology to restore the groundwater, EPA may also take action to limit exposure to the contamination.

For each facility where a remedy has been selected for groundwater, please indicate whether DNAPL contamination is highly likely.

The study released in September 1993, titled "An Evaluation of the Likelihood of DNAPL Presence at NPL Sites," surveys existing data for sites to retrospectively determine the potential for DNAPLs to be present in the groundwater. In the study, EPA estimates that approximately 5% of NPL sites will exhibit definite DNAPL presence via a visual observation and 52% of sites have a medium to high likelihood of DNAPL presence. Twenty-seven percent (27%) of sites have a *low potential;* and 16% of the sites are *unlikely* to have DNAPLs present. The study shows that certain factors, such as site use and site contaminants, correlate well with the presence of DNAPLs. *(See Exhibit 8-2).*

Exhibit 8-2
DNAPL Contamination in Groundwater



NOTE: This graphic reflects the entire NPL as extrapolated from a focused sample of sites in five of the ten EPA Regions.

For each groundwater remedy where DNAPL contamination is highly likely, please provide the following information:

a. Was the ROD(s) involving groundwater signed before or after EPA's May 1992 guidance on DNAPL sites?

The September 1993 DNAPL study focuses on 302 sites, 185 of which have signed RODs that address groundwater. The DNAPL study further indicates that at 97 of these sites, the presence of DNAPLs is *definite* or *highly likely*. Site managers reported that 135 RODs that address groundwater have been signed at these sites. Of these, only 19 RODs (14%) have been signed since EPA issued the new DNAPL guidance in May 1992. One (1) of these RODs was signed at a Federal Facility. The remaining 116 RODs were signed prior to May 1992. Two (2) of these RODs were at Federal Facilities. *(No corresponding exhibit).*

Data Source

1) *Sources:* 1) "An Evaluation of the Likelihood of DNAPL Presence at NPL Sites" (NTIS #PB93-963343, September 1993); 2) EPA Analysis of Technical Impracticability Waivers, (Internal Document, June 1993); and 3) RPM Data Collection (questions E32, E36, E46 and E47 with information integrated from the ROD Information Database System).
2) *The full universe of sites addressed by the question:* The 1,249 final and deleted sites on the NPL as of July 1993 (123 Federal Facilities and 1,126 non-Federal Facility sites).
3) *The subset of the universe for which data are provided:* The 501 sites listed on the NPL with RODs that address groundwater contamination and where remedy data are available.

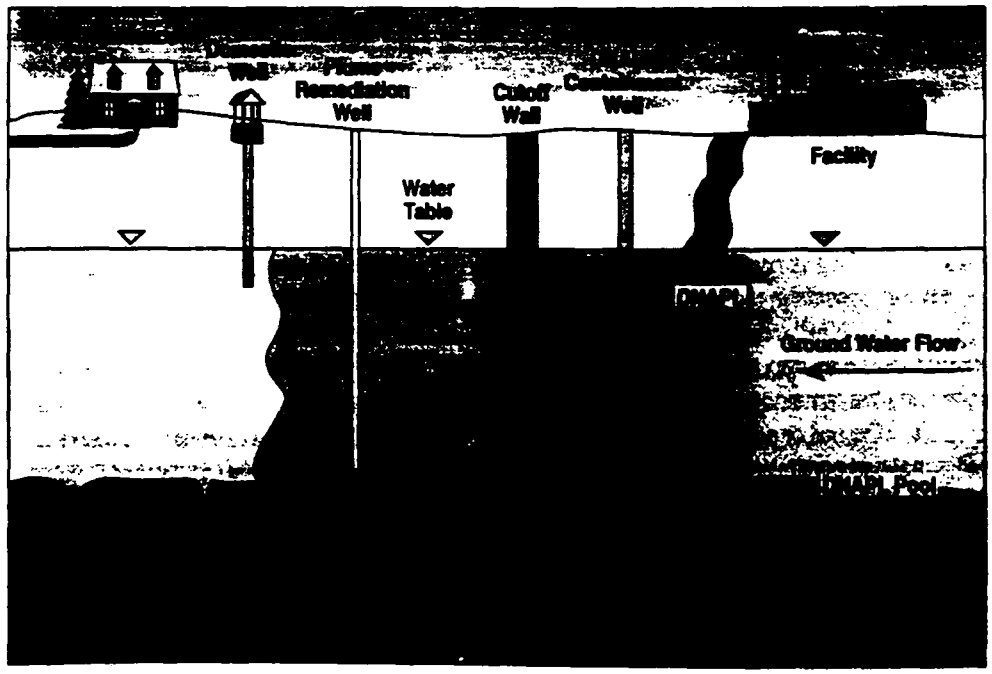
b/c. Did the selected remedy seek to return groundwater to drinking water standards and/or did the selected remedy have containment pumping as its goal?

EPA recently issued guidance on the limited exceptions to the Agency's primary objective of returning contaminated groundwater to beneficial use. This guidance states that "where it is technically practicable to contain the long-term sources of contamination, such as the DNAPL zone, EPA expects to restore the aqueous contaminant plume outside the DNAPL zone to required cleanup levels." In addition, the Agency expects to contain or remove the DNAPLs source at sites. Consequently, at some sites, more than one response may be appropriate to remediate groundwater contamination. Based on the conditions surrounding the source of the contamination and the nature of the dissolved plume, a remedy may include pump and treat, containment and/or natural attenuation. Particularly where free-phase DNAPLs are present, containment pumping facilitates restoration of the dissolved plume.

Of the 135 RODs that address groundwater at sites where DNAPL presence is *definite* or *highly likely*, 87 RODs (64%) have a goal of returning at least some portion of the contaminated groundwater to drinking water standards. Two (2) of these remedies are at Federal Facilities. In addition, site managers report 103 RODs (76%) selected containment pumping as a component of the remedy selected. Three (3) of these RODs were at Federal Facilities.

Of the 19 RODs signed since the issuance of the new DNAPL guidance in May 1992, 12 RODs (63%) have a goal of returning at least some portion of the contaminated groundwater to drinking water standards, and 16 of the RODs (84%) include containment pumping as a component of the remedy selected. *(See Exhibit 8-3).*

Exhibit 8-3
Sites With DNAPL Containment Remedy



Containment pumping is a common remedy selected to control groundwater contamination. Where free-phase DNAPLs are present, containment pumping facilitates restoration of the dissolved plume. Of 135 RODs reported to address DNAPL contamination in groundwater, 103 RODs (76%) selected containment pumping as a component of the remedy selected. Three (3) of these RODs were at Federal Facilities.

d. Did EPA invoke a technology feasibility waiver to avoid applying ARARs to the DNAPL cleanup?

From 1986 through 1992, EPA addressed technical impracticability at 39 NPL sites. EPA waived cleanup standards (ARARs) at the time of the ROD at 13 sites because achieving the standards was technically impracticable based on site conditions. Nine (9) of these waivers were for sites where the presence of DNAPLs may have precluded restoration of groundwater to the cleanup standards in all or part of the contaminated aquifer.

EPA also signed 23 RODs during this period that contained a contingency provision to waive groundwater ARARs due to technical impracticability. Such a contingency allows the Agency to invoke an ARARs waiver in the event that new information, obtained after implementation of the selected remedy, indicates that achieving cleanup standards is technically impracticable. At least 10 of these "contingency waivers" were related to DNAPLs.

In addition, EPA included language waiving ARARs due to technical impracticability in three ROD amendments. At least one of these waivers was related to DNAPLs. ROD amendments are issued by EPA to document a fundamental change in a remedy selected in a ROD based on information obtained after the ROD was approved. A ROD amendment may not be required if such a change was anticipated with contingency language in the original ROD. More than one-half of the 39 technical impracticability determinations were issued subsequent to EPA's May 1992 DNAPL guidance. *(No corresponding exhibit).*

Background Information

What are free-phase Dense Non-Aqueous Phase Liquids (DNAPLs)?

DNAPLs are contaminants that do not readily mix with and are more dense than water in their undiluted form. DNAPLs include a wide range of chemical types and mixtures, including chlorinated solvents, creosote, coal tars, PCBs (polychlorinated biphenyls) and some pesticides. Chlorinated solvents, the most prevalent DNAPLs, can sink to great depths and migrate over large distances from their release point. As a result, DNAPLs can be difficult to locate in the subsurface and are often undetected. As DNAPLs migrate through the subsurface, a portion becomes trapped in the soil pore spaces or fractures and the remainder can continue to migrate or form pools in the soil or aquifer matrix. The portion of DNAPLs that can continue to migrate is called **free-phase DNAPLs**. DNAPLs make groundwater cleanup more difficult because, even though they do not mix, they slowly release dissolved chemicals over a long time, forming a plume of contaminants in the groundwater adjacent to the DNAPLs.

What are Applicable or Relevant and Appropriate Requirements (ARARs)?

ARARs are State or Federal laws, regulations, standards, requirements, criteria, or limitations that are legally applicable or relevant and appropriate to the contaminant of concern or cleanup action being taken at the site. EPA is required to consider all ARARs when selecting a remedy for a site.

What is a Technical Impracticability ARAR Waiver (TI ARAR Waiver)?

Six types of ARAR waivers are identified in Section 121 of the CERCLA, as amended. One of these provisions allows ARARs to be waived if EPA finds that "compliance with such requirements is technically impracticable from an engineering perspective." A decision to waive a groundwater cleanup standard on the grounds of technical impracticability, or a TI ARAR waiver, is documented in a Record of Decision (ROD) along with an explanation of why the ARAR cannot be attained. (Part d of this question refers to technical impracticability ARAR waiver as a technical feasibility waiver; however, the correct terminology is technical impracticability ARAR waiver).

Question #9

Cleanup Standards and Soil Exposure Assumptions:

The most affected media at Superfund sites are soil, sediment and groundwater. For the sites where groundwater is contaminated, Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) are often the basis for cleanup for most of the principal contaminants. For most sites, soil cleanup levels are established to protect groundwater at the site. Risk assessments are driving cleanup levels in relatively few situations.

Please provide the complete set of cleanup standards (contaminant by contaminant, for each media) used at the facility. Indicate whether the standard was based on risk assessment, MCL, state standard, or other (indicate what other).

Exhibits 9-1 and *9-2* show the total number of sites where particular chemicals were found and the number of sites where the respective bases for cleanup standards were used to establish cleanup concentration levels for various chemicals. These exhibits present data for 42 specific chemicals and the category of radionuclides that represent the most significant threats at sites in either soil or groundwater. The 42 chemicals were chosen because of their prevalence and toxicity, or because they represent unique classes of chemicals that appear at sites (e.g., asbestos, radionuclides). These data are taken from a universe of 194 sites for which detailed risk and cleanup level data were taken from site characterization documents and Records of Decision (RODs) (from Question 5). Chemicals are listed only for media in which they have been found.

Not all chemicals are found at every site. Furthermore, cleanup standards are not necessarily developed for every contaminant at every site (e.g., a chemical may be present at a site below a level of concern; therefore, cleanup levels would not be developed for that chemical at that site). However, at some sites, chemical standards were listed for every chemical found at that site, not just those found to be posing a significant threat at that site. Also, a particular chemical may have a cleanup concentration level with more than one basis (e.g., a State ARAR and a Federal MCL) established at the same concentration level, and both serve as the basis of cleanup.

Where a cleanup standard has been established for soil based on a risk assessment initiated after October 17, 1986, please indicate the date of completion of the risk assessment and each of the exposure assumptions used for each cleanup standard.

At 33 of the 194 sites, soil cleanup standards were based on a risk assessment that was initiated after October 17, 1986 with a ROD signed after September 30, 1990. These 33 sites do not include sites where soil cleanup levels were based on modeling from groundwater MCLs, Maximum Contaminant Level Goals (MCLGs) or other standards applicable to soil concentration where soil contaminants leach to groundwater.

Risk-based soil cleanup standards for sites may be based on more than one exposure route. For example, ingestion and inhalation of dust-blown soil may be combined to form a composite soil exposure scenario that serves as the basis for setting risk-based cleanup levels. For answers to the remainder of this question, soil cleanup standards for sites may be based on more than one set of exposure assumptions.

NOTE: Because more than one set of exposure assumptions (i.e., exposure route, durations or frequencies) may be considered in developing a soil cleanup level, the number of times different exposure assumptions appear may be greater than the total universe of sites. *(No corresponding exhibit).*

a. **Was the driving factor establishing the standard soil ingestion, leaching to groundwater or other routes of exposure, (please indicate what other, e.g., dermal, inhalation)?**

The most common exposure routes of contaminants through the soil medium used to determine soil cleanup standards are ingestion, dermal exposure and soil inhalation.

Out of a total universe of 33 sites, the ingestion route was used in establishing cleanup levels at 28 sites; dermal contact was used in 19 sites; inhalation was used in 14 sites; ingestion of contaminated food was used in 3 sites; and another exposure route was used at 1 site. *(No corresponding exhibit).*

b. **What are the number of total years and number of days per year of exposure to the facility, broken down by age of exposed individual where appropriate?**

At 24 out of 33 sites, exposure to children (6 years or younger) was determined to be relevant. At 4 out of these 24 sites, exposure was assumed to occur over a period of 3 years or less for children. At 20 out of 24 sites, 4 to 6 years of exposure was assumed. (The frequency of exposure was assumed to be greater than 200 days/year at 15 of 24 sites, between 101 and 200 days/year at 5 sites, and less than 100 days/year at 4 sites.)

For adults, defined as older than 6 years, at all 33 of the sites, 17 or less years of exposure was assumed; at 27 of 33 sites between 18 and 30 years of exposure was assumed; and at 2 of 33 sites greater than 30 years of exposure was assumed. (The frequency of exposure was assumed to be less than 200 days/year at 32 of 33 sites, between 101 and 200 days/year at 17 of 33 sites and 100 or less days/year at 13 sites.)

NOTE: Because more than one duration of exposure was considered to be important at some sites, the sum of all durations of exposure for adults is greater than the universe of sites. *(No corresponding exhibit).*

c. **What is the amount of soil ingested per day of exposure, broken down by age of exposed individual where appropriate?**

At 23 of 24 sites where exposure to children was determined to be relevant, children were assumed to ingest 200 mg/day of contaminated soil. At 1 of 24 sites, 100 mg/day was the assumed ingestion rate. Adults were assumed to ingest less than 100 mg/day at 11 of 33 sites. At 30 of 33 sites, adults were assumed to ingest between 100 and 120 mg/day. At 7 of 33 sites, adults were assumed to ingest 200 or greater mg/day. *(No corresponding exhibit).*

d. **Was exposure to contaminated soil assumed to occur to maximum concentrations found at the facility, average concentration, or other (indicate what other).**

In assessing risks from soil contamination, the measure of concentration used in the baseline risk assessment was the reasonable maximum exposure (RME) at 23 of 33 sites, maximum concentration at 9 of 33 sites and another measure of concentration at one of 33 sites. (See Background Information for discussion of different measures of soil concentration). *(No corresponding exhibit).*

e. **Were any of the contaminants used to calculate risk assumed to degrade in soil over time (thereby decreasing exposure)?**

At only 1 of 33 sites, some contaminants are assumed to degrade over time. *(No corresponding exhibit).*

NOTE: Degradation of contaminants can be very uncertain and difficult to estimate. Many contaminants, such as metals and complex organic compounds, do not degrade at all or degrade extremely slowly.

Data Source

1) *The source:* August 1993 Human Health and Soil Ingestion Data Collection Forms.
2) *The full universe of sites addressed by the question:* 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 33 sites where an RI, FS or a combined RI/FS was started after October 17, 1986, a ROD addressing soil contamination was signed after September 30, 1990, a risk assessment has been completed and soil cleanup goals are based on a completed risk assessment.

Exhibit 9-1

Basis of Standards for Principal Contaminants in Groundwater at 103 Sites

Contaminant	Number of Sites per Basis of Cleanup Standard					
	MCL	MCLG	RCRA Land Disposal	Risk Assessment	State ARAR	Other
1,1 Dichloroethene	3	1		1	3	2
1,2 Dichloroethane					1	
1,2 Dichloroethene					5	
Arsenic	21	1	1		5	
Benzene	7					
Benzo (a) pyrene	2					
BHC, alpha						1
Cadmium	14		1		6	6
Carbon Tetrachloride	7					
Chlordane	2					
Chlorobenzene	7			1	6	3
Chloroform	12			2	6	3
Chromium	4					
DDT				2		1
Dichlorobenzene	1			1		
Dieldrin				2	1	2
Dioxin	1					1
Ethylbenzene	10	1		1	14	4
Lead	9		1		9	21
Mercury	9				6	1
Methylene Chloride	4			1	3	1
Naphthalene	1			4	3	4
Nickel	4					
Pentachlorophenol	4			1		
Radionuclides	1					2
Tetrachloroethene	6			1	3	4
Toluene	17	2			13	9
Trichloroethane		1		1	1	3
Trichloroethene	10			1	2	4
Vinyl Chloride	29	1		2	24	7
Xylenes	1				12	

MCL - Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal

RCRA - Resource Conservation and Recovery Act
ARAR - Applicable or Relevant and Appropriate Requirements

NOTE: A particular chemical may have a cleanup concentration level with more than 1 basis (e.g., a State ARAR and a Federal MCL) established at the same concentration level, and both serve as the basis for cleanup.

Exhibit 9-2
Basis of Standards for Principal Contaminants in Soil at 166 Sites

Contaminant	Number of Sites per Basis of Cleanup Standard							
	MCL	MCLG	RCRA	RCRA Land Disposal	Clean Water Act	Risk Assessment	State ARAR	Other
1,1 Dichloroethene	1							2
Arsenic	1	1	1	3	1	12	2	
Asbestos								1
Benzene			1					
BHC, alpha						2		
Cadmium				5		3	3	4
Chlordane						1		
Chlorobenzene						1		
Chloroform	1						1	
Chromium			1					
Chrysene			1			1	1	
DDT			1			2		1
Dieldrin						2		
Dioxin						2	1	1
Ethylbenzene			1			1	8	5
Lead				2	1	8	4	15
Mercury						5	2	1
Methylene Chloride						3	1	1
Naphthalene			1			1	1	4
Nickel			1					
Radionuclides						1		1
Tetrachloroethene	1							1
Toluene	1		1		1	2	3	4
Trichloroethene	1							2
Vinyl Chloride	1						2	1

MCL - Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal

RCRA - Resource Conservation and Recovery Act
ARAR - Applicable or Relevant and Appropriate Requirements

NOTE: A particular chemical may have a cleanup concentration level with more than 1 basis (e.g., a State ARAR and a Federal MCL) established at the same concentration level, and both serve as the basis for cleanup. Generally, the baseline risk assessment basis for the cleanup level applies to sites where direct contact (inhalation, dermal contact, or ingestion) are actual or potential threats. In some situations, it may include modeling of contaminants leaching from soil to groundwater. The MCL, MCLG, and "other" basis for cleanup standards reflect the threat posed by contaminants leaching from soil to groundwater. "Other" also includes partitioning of contaminants from sediment to surface water and application of ambient water quality criteria in surface water.

Background Information

What are cleanup standards?
Cleanup standards, developed by State or Federal agencies, are concentrations of contaminants that are considered acceptable (i.e., do not pose a threat to potential receptors). In the Superfund program, many cleanup standards are adopted from other Federal and State environmental laws. For example, Maximum Contaminant Levels (MCLs) and MCL Goals (MCLGs) from the Safe Drinking Water Act have been adopted as standards for Superfund. States can have their own standards which may be more stringent than Federal standards. Some States have also developed cleanup standards for soil. Other Applicable or Relevant and Appropriate Requirements (ARARs) also may provide cleanup levels.

What is a risk assessment?
A risk assessment characterizes risks, either actual or potential, posed to human health and the environment by site contaminants. Site managers use the results of the assessments to help determine whether a cleanup is warranted and the appropriate remedies for addressing the risks posed by the site.

How are populations categorized for risk assessment?
Risk assessment assumptions are often categorized into child and adult age groups. These groups account for significant differences in behavior, activities and body weight that would affect exposure to contaminants. Risk assessors take into consideration that these situations may change, for example, children growing into adults while living near a Superfund site.

What are different exposure concentrations?
EPA guidance states that an arithmetic average soil concentration should be used in all Superfund exposure/risk assessments. However, the number of samples collected at each site varies considerably, and over the years assessments have been submitted to the Agency with averages based on a limited number of samples. As a way to deal with the uncertainty involved in calculating the "true" average soil concentration at a site (especially with limited data sets), the 95 percent upper-confidence limit (UCL_{95}) on the arithmetic mean is preferred.

This term is referred to here as the reasonable maximum exposure (RME) concentration. In cases where the data are limited or there is extreme variability in the measured (or modeled) data, the UCL_{95} can be much higher than the highest concentration measured at the site. If additional samples cannot be collected, the highest measured (or modeled value) is often used as a default to represent the exposure point concentration. However, the true site mean may actually be *higher* than this maximum value, because the UCL_{95} indicates that a higher mean is possible.

Question #10

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 on sites are industrial, none (e.g., abandoned) and commercial. In addition, 15% of the sites currently have residents living on site.

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.

In the future, 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.

NOTE: Due to the nature of the land use questions, site managers may not have been able to answer all questions for each site. There are four types of land use portrayed (current site land use, current land use surrounding the site, expected future land use and expected future land use surrounding the site); the number of responses differs for each.

Please provide the following information:

a. current land use of the facility *per se*.

Forty-four percent (44%) of sites currently have a single land use; 29% have no active current land use; and 26% have two or more current land uses based on the 1,247 sites reporting (out of all 1,249 sites). Current site use is 'Unknown' at 1% of the NPL sites reporting.

Of the 551 sites reporting a single on-site land use, the most frequent uses are other (e.g., closed landfill, wetlands), industrial and commercial. Of the sites reporting multiple on-site land uses, the most frequent uses are industrial, commercial and residential. *(See Exhibit 10-1 for a comparison of current and future expected single and multiple on-site land uses).*

Combining *all* (single and multiple) current on-site land uses reported, the most frequent uses are industrial, none, (e.g.,abandoned) and commercial. *(See Exhibit 10-2 for a comparison of all current on-site and surrounding land uses).*

b. current adjacent land use.

Seventy-six percent (76%) of sites have mixed land use (two or more uses) surrounding the site, while 23% have a single land use. Of the 1,245 sites reporting, only one is surrounded by land that is not in use. *(No corresponding exhibit).*

Of the 1,245 sites reporting current land uses surrounding the site, the majority are residential, commercial and agricultural. *(See Exhibit 10-2 for a comparison of all current on-site and surrounding land uses).*

NOTE: In this survey, land use for areas *surrounding* sites was defined as any use in "close proximity" to sites. This term allows for more than simply abutting or adjacent land uses.

c. if current adjacent land use includes residential use, number of people living near the site.

A preliminary review of Census data suggests approximately 72.8 million people living within 4 miles from the center of 1,193 sites. The method employed by Superfund (see Background Information) does not provide an accurate and reliable estimate for very small geographic areas. *(No corresponding exhibit).*

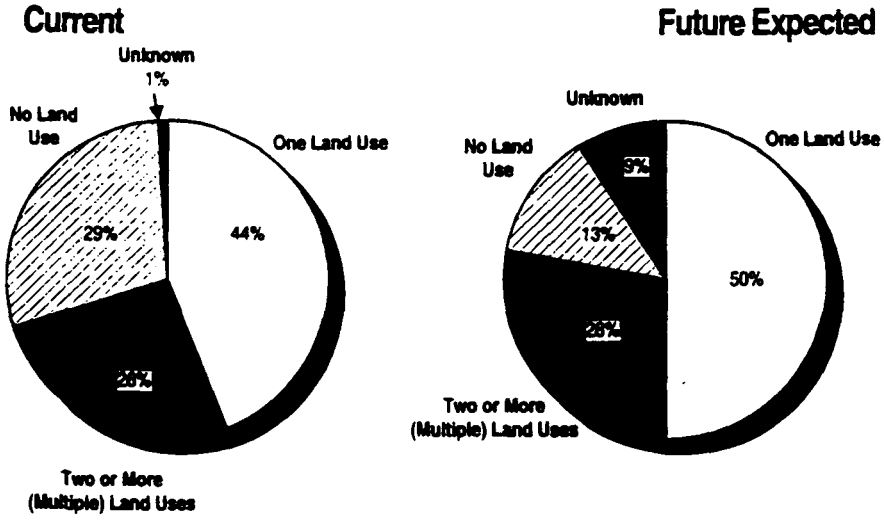
d. assumption for future land use of the facility *per se* (e.g., industrial, residential, etc.).

Fifty percent (50%) of the sites are expected to have a single use in the future; 28% are expected to have two or more uses and 13% are not expected to be in use based on the 889 sites reporting (out of all 1,249 sites). The future site use is 'Unknown' at 9% of sites.

Of the 446 sites reporting a single future land use on site, the most frequent uses are expected to be industrial, other (e.g., closed landfills, wetlands) and residential. Of the 245 sites reporting multiple future land uses on site, the most frequent uses are residential, commercial and industrial. *(See Exhibit 10-1 for a comparison of current and future expected single and multiple on-site land uses).*

Combining *all* (single and multiple) future on-site land uses reported, the most frequent uses are expected to be industrial, residential and commercial. *(See Exhibit 10-3 for a comparison of all future expected on-site and surrounding land uses).*

Exhibit 10-1
On-Site Land Uses at Sites



Current

	Single-Use Sites	Multiple-Use	Total Sites with Each Use
Industrial	170	214	384
Commercial	117	200	317
Other *	208	81	289
Residential	19	173	192
Recreational	23	115	138
Agricultural	13	56	69
Educational	1	54	55

Future Expected

	Single-Use Sites	Multiple-Use	Total Sites with Each Use
Industrial	159	145	304
Residential	69	162	231
Commercial	62	152	214
Other *	98	32	130
Recreational	42	87	129
Agricultural	15	47	62
Educational	1	28	29

* The 'Other' category includes: closed landfills, military, undeveloped lands, wetlands and wildlife habitats.

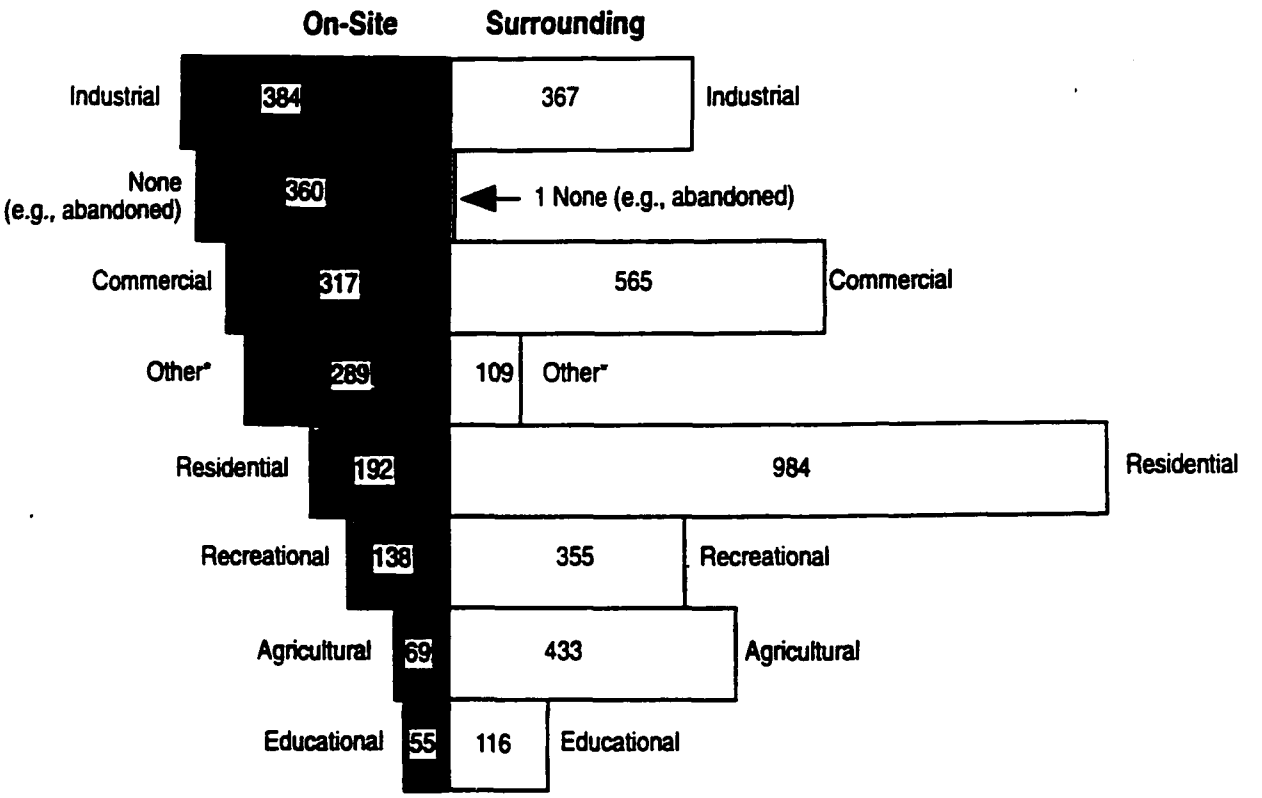
NOTE: Current on-site land uses represent data from 1,247 sites responding while future expected on-site land uses represent data from 889 sites responding. These land-use numbers add up to more than the total number of sites reporting because there may be more than one current or expected land use at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

e. assumption for future adjacent land use (industrial, residential, etc.).

Seventy-three percent (73%) of sites are expected to have mixed uses surrounding the sites, while 24% will have a single land use surrounding the site based on the 881 sites reporting (out of all 1,249 sites). Only 1% expect to have no land use surrounding the site. Future surrounding land use was reported as 'Unknown' at 2% of the sites. *(No corresponding exhibit).*

The expected future land uses for areas *surrounding* the majority of sites are residential, industrial and commercial. *(See Exhibit 10-3 for a comparison of all future expected on-site and surrounding land uses).*

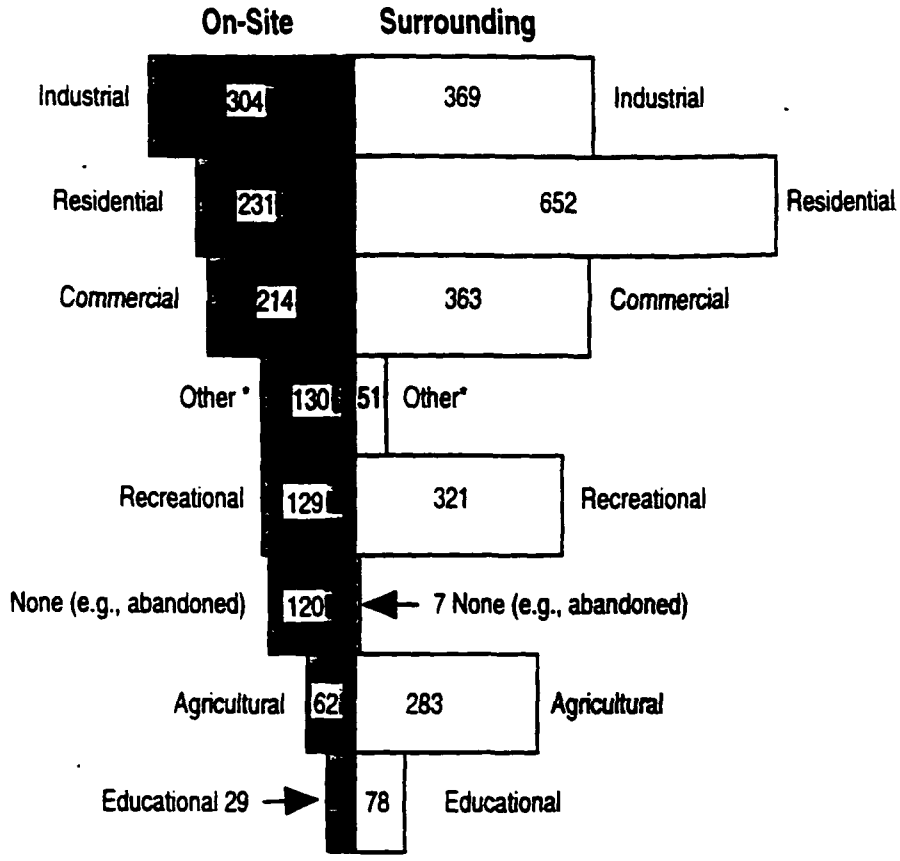
Exhibit 10-2
Current On-Site and Surrounding Land Uses of Sites



* The 'Other' category includes: closed landfills, military, undeveloped lands, wetlands and wildlife habitats.

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.

Exhibit 10-3
Future Land Use of Sites



* The 'Other' category includes: closed landfills, military, undeveloped lands, wetlands and wildlife habitats.

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

Supplemental Information

Currently, 35% of the sites are totally or partially abandoned. In the future, over one-quarter of these sites will continue to be abandoned, but an almost equal number will have residential (25%) or industrial (24%) site uses. *(No corresponding exhibit).*

Site managers reported the future land use at 252 of the sites where the current land use is industrial. The majority of these sites (72%) will continue to have an industrial land use in the future. Other frequently reported future land uses at these sites include commercial (73 sites) and residential (64 sites). *(No corresponding exhibit).*

Of the 231 sites that are expected to have a future residential land use, the most frequently reported current land uses are residential (135 sites), commercial (128 sites) and abandoned (115 sites). *(No corresponding exhibit).*

Background Information

Assumptions used to provide population information.

The population information is based on a preliminary review of U.S. Census Bureau data. U.S. Census Bureau data is based on units (called "blocks") that vary in configuration and areal extent, especially from urban to rural areas. Census Bureau data identify the centroid of each "block" (around which there is a uniform population count). EPA has utilized the data from the central point at the NPL site and eliminated the potential for double counting where NPL sites are in close proximity to each other. Due to the number of assumptions and the difficulty of comparing Census "blocks" with NPL site boundaries, accurate and reliable population data within 1/4 mile are unavailable at this time.

What is the Graphic Exposure Modeling System (GEMS)?

GEMS is an automated population estimation system which relates area population to a single point. It was developed by EPA's Office of Toxic Substances to estimate potential population exposure. The system can account for "double counting" of populations within a given proximity to more than one site. (In this question, the system was used to estimate the population within 4 miles of facilities).

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E9a, E9b and E35), CERCLIS and GEMS database.
2) *The full universe of sites addressed by the question:* The 1,249 final and deleted sites on the NPL as of July 1993 (123 Federal Facilities and 1,126 non-Federal Facility sites).
3) *The subsets of the universe for which data are provided:* 1,247 sites responded with current land uses; 1,245 sites responded with current land uses for surrounding areas; 889 sites responded with expected future land uses; 881 sites responded with expected future land uses for surrounding areas; and GEMS information correlated to the latitudes and longitudes at 1,193 sites.

Question #11

ATSDR Recommendations and Follow-Up:

ATSDR has initiated follow-up studies for 15% of the sites for which the need for follow-up health studies has been identified.

Please identify whether ATSDR has indicated that a more in-depth study under Section 104(i) is needed after the health assessment is completed. Indicate for each such facility whether such a study is planned, underway, or completed and identify the type of study.

SARA Section 104(i) requires ATSDR to complete a Public Health Assessment within one year of the date that a site is proposed to the National Priorities List (NPL). ATSDR has completed at least one Public Health Assessment for over 1,249 NPL sites.

Background Information

What is the Purpose of an ATSDR Public Health Assessment?

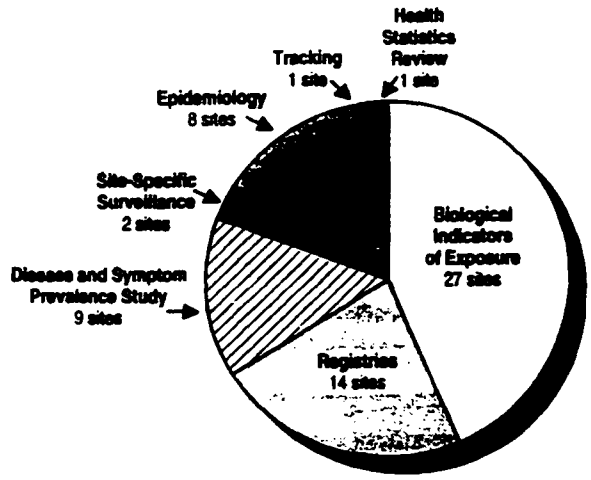
ATSDR Public Health Assessments assist in determining whether actions should be taken to reduce human exposure to hazardous substances from a site, whether additional information on human exposure is needed, and whether specific health follow-up studies should be undertaken for a site. Follow-up health studies may include epidemiological studies, establishing a registry of exposed individuals, establishing a health surveillance program or other public health related activities.

Data Source

1) ATSDR's HazDat database and Public Health Actions Tracking System.

Exhibit 1-1 shows the types of studies conducted (some sites have more than one study). *Exhibit 1-2* lists the 56 NPL sites (some sites are included in more than one study) at which ATSDR has initiated health studies. These studies include biological indicators of exposure studies, disease and symptom prevalence studies, registries (trichloroethylene, dioxin and benzene), epidemiological studies, and other studies. Twelve (12) studies are complete and 8 studies (at 5 sites) have completed the development of a protocol. In addition, since September 1990, ATSDR has reviewed over 500 NPL sites; these reviews have identified the need for approximately 200 health studies involving 140 sites.

Exhibit 11-1
Types of Health Studies Initiated



NOTE: The number of health studies is greater than the total number of sites because more than one study may be conducted at a site.

Exhibit 11-2
Health Studies Initiated by ATSDR

Site Name	CERCLIS No.	Study Type	Study Title	Started	Completed
Aberdeen Pesticides Dump	NCD980843346	Epidemiology	Env Expo and their Effects on the Immune System, NC	9/16/93	
ACME Solvent Reclaiming Inc	ILD053219259	Registries	Trichloroethylene	8/1/88	
Allied Corp Kalamazoo Plt	MID006007306	Biological Indicators of Exposure	Allied Paper/Portage Creek/Kalamazoo River, MI	9/30/93	
Anderson Development Co	MID002931228	Epidemiology	Analytic Epidemiologic Study of MBOCA, MI	9/25/91	
Baird & McGuire	MAD001041987	Biological Indicators of Exposure	Baird & McGuire Superfund Site, MA	*	
Beloit Corp	ILD021440375	Registries	Trichloroethylene	8/1/88	
Bofors Nobel Inc	MID006030373	Epidemiology	Analytic Epidemiologic Study of MBOCA, MI	9/25/91	
Brio Refinery Co., Inc.	TXD980625453	Biological Indicators of Exposure	Brio Refining Co./Dixie Oil Processors, TX	12/1/91	
Bunker Hill Mining & Metallurgical Cmplx	IDD048340921	Epidemiology Study	Case Control Study Blood Lead Levels Silver Val.ID	11/1/92	
Bunker Hill Mining & Metallurgical Cmplx	IDD048340921	Site Specific Surveillance	Lead Screen Study/Silver Valley (Bunker Hill) ID	9/30/89	
Byron Salvage Yard	ILD010236230	Registries	Trichloroethylene	8/1/88	
Carson River Mercury Site	NVD980813646	Biological Indicators of Exposure	Carson River Superfund Site, NV	*	
Central City-Clear Creek	COD980717557	Biological Indicators of Exposure	Clear Crk/Central City Mine Waste Exp Study, CO	9/30/89	
Cherokee County, Kansas	KSD980741862	Biological Indicators of Exposure	Kansas Multi-Site Lead Exposure Study, Galena, KS	7/1/90	
Commencement Bay-South, Takoma Channel	WAD980726301	Biological Indicators of Exposure	Commencement Bay Exposure Study, Tacoma WA	9/1/84	3/31/87
Commencement Bay-South, Takoma Channel	WAD980726301	Biological Indicators of Exposure	Puyallup Tribe Data Assessment of Mortality, WA	6/1/89	12/19/91
CONRAIL Railyard Elkhart	IND000715490	Registries	Trichloroethylene	8/1/88	
Cornhusker Army Ammunition Plant	NE2213820234	Disease and Symptom Prevalence	Cornhusker Army Ammunition Plant, Hall County, NB	8/5/93	
Crossley Farm/Hereford GW	PAD981740061	Registries	Trichloroethylene	8/1/88	
Crystal Chemical Co.	TXD990707010	Biological Indicators of Exposure	Crystal Chemical Co. Arsenic Expo. Study, TX	6/1/88	9/1/90
General Motors/Central Foundary Div.	NYD091972554	Biological Indicators of Exposure	St. Regis, PCB From Toxic Waste, NY	9/30/89	
Griffiss Air Force Base	NY4571924451	Disease and Symptom Prevalence	Griffiss Air Force Base, Rome, NY	7/16/93	
Hanford - 100-Area (DOE)**	WA3890090076	Disease and Symptom Prevalence	Hanford, WA	*	
Hanford 1100-Area (DOE)**	WA4890090075	Disease and Symptom Prevalence	Hanford, WA	*	
Hanford 200-Area (DOE)**	WA1890090078	Disease and Symptom Prevalence	Hanford, WA	*	
Hanford 300-Area (DOE)**	WA2890090077	Disease and Symptom Prevalence	Hanford, WA	*	
Industrial Excess Ldfl	OHD000377911	Biological Indicators of Exposure	Uniontown Vos Blood Testing Near Landfill, OH	10/1/87	6/30/88
Interstate Lead Co (ILCO)	ALD041906173	Biological Indicators of Exposure	Leeds, Child Lead Exposure Study, AL	9/15/88	9/1/91
LaSalle Electrical Utilities	ILD980794333	Biological Indicators of Exposure	LaSalle Electrical Utilities, IL	9/30/93	
Lipari Landfill	NJD980505416	Tracking System	Voluntary Resident Tracking Database, New Jersey	9/1/90	

* Study protocol has been approved; data collection has not started.

**Public Health Assessment under development.

Information based on records in ATSDR's HazDat database, November 1993.

Exhibit 11-2 (continued)
Health Studies Initiated by ATSDR

Site Name	CERCLIS No.	Study Type	Study Title	Started	Completed
Maywood Chemical Co.	NJD980529762	Health Statistics Review	Maywood Area Cancer Investigation, New Jersey	9/16/93	
McClellan AFB	CA4570024337	Disease and Symptom Prevalence	McClellan Air Force Base, Sacramento, CA	8/5/93	
McGraw-Edison Company	MID005339676	Registries	Trichloroethylene	8/1/88	
McKin CO.	MED980524078	Biological Indicators of Exposure	McKin Dump Site Health Effects Study, Gray, ME	9/1/87	
Minker/Stout/ Romaine Creek Site	MOD980741912	Registries	Dioxin	8/31/87	
New Bedford Site	MAD980731335	Epidemiology	Greater New Bedford, MA, PCB Health Effects Study	8/8/84	6/1/87
Newsom Brothers Old Reichold Site	MSD980840045	Biological Indicators of Exposure	Newsom Brothers NPL Site, Columbia, MS	7/1/88	10/1/89
NL Industries/TARACORP Lead SMELT SITE	ILD096731468	Biological Indicators of Exposure	Illinois Multi-Site Lead Exposure Study,IL	9/29/90	
Oronogo-Duenweg Mining Belt	MOD980686281	Biological Indicators of Exposure	Missouri Multi Site-lead Exposure Study Joplin, MO	9/29/90	
OTIS Air National Guard/Camp Edwards	MA2570024487	Disease and Symptom Prevalence	OTIS Air Force Base, Falmouth, MA	4/16/93	
Palmerton Zinc Pile	PAD002395887	Biological Indicators of Exposure	Palmerton Lead and Cadmium Study, Palmerton, PA	3/12/91	
Quail Run Mobile Park	MOD980688634	Reg... ies	Dioxin	8/31/87	
Quail Run Mobile Park	MOD980688634	Epidemiology	Missouri Dioxin Adipose Tissue Study	5/1/85	8/1/87
Rocky Mountain Arsenal	CO5210020769	Biological Indicators of Exposure	RMA Pilot Exp Study Part I, CO	9/1/89	9/30/93
Rocky Mountain Arsenal	CO5210020769	Biological Indicators of Exposure	RMA Repro/Neurobehav Disorders in Communities, CO	9/30/91	
Roto-Finish Co.	MID005340088	Epidemiology	Analytic Epidemiologic Study of MBOCA, MI	9/25/91	
RSR Corp**	TXD079348397	Biological Indicators of Exposure	Childhood Blood Lead Testing, TX	4/1/93	
SE Rockford Groundwater Cont	ILD981000417	Registries	Trichloroethylene	8/1/88	
Shenandoah Stables	MOD980685838	Registries	Dioxin	8/31/87	
Silver Bow Creek	MTD980502777	Biological Indicators of Exposure	Silver Bow Creek Superfund Site, Rocker, MT	8/1/89	1/1/92
Silver Bow Creek	MTD980502777	Biological Indicators of Exposure	Silver Bow Creek, Blood Lead Study, Walkerville, MT	8/25/87	3/1/88
Smuggler Mountain	COD980806277	Biological Indicators of Exposure	SMUGGLER Mountain Site, Aspen, CO Cir Creek Part 1	3/1/87	9/15/92
Solvents Recovery Service of New England	CTD009717604	Biological Indicators of Exposure	Solvents Recovery Services of New England, CT	*	
Times Beach	MOD980685226	Registries	Dioxin	8/31/87	
Triumph Mine Tailings Piles**	IDD984666024	Biological Indicators of Exposure	Triumph Parker Mine Dump Site IDAHO	9/16/93	
Tucson Intl Airport Area	AZD980737530	Disease and Symptom Prevalence	Tucson International Airport Site, AZ	*	
United Creosoting Co.	TXD980745574	Site-Specific Surveillance	United Creosoting Company NPL, TX	9/30/92	
Verona Well Field	MID980793806	Epidemiology	Battle Creek Health Effects Study, MI	2/1/85	
Verona Well Field	MID980793806	Registries	Trichloroethylene	8/1/88	
VERTAC, Inc.	ARD000023440	Biological Indicators of Exposure	VERTAC Exposure Study, Jacksonville, AR	5/1/91	
Vestal Water Supply 1-1	NYD980763767	Registries	Benzene	6/2/89	
Warner Electric Brake & Clutch Co	ILD008114151	Registries	Trichloroethylene	8/1/88	

* Study protocol has been approved; data collection has not started.
**Public Health Assessment under development.
Information based on records in ATSDR's HazDat database, November 1993.

Question #12

Site Operations:

The majority (69%) of all non-Federal Facility sites report a single past use, while the remaining sites (31%) report multiple uses. Of the 750 single-use sites, the most common category of activities was waste management (362 sites), followed by industrial (230 sites) and miscellaneous (158 sites). Of the 333 multiple-use sites, past industrial activities were cited most often (at 242 sites), followed by miscellaneous (at 223 sites) and waste management activities (at 160 sites).

Of all 1,083 non-Federal Facility sites reporting, the most common waste management activity involved the operation of landfills (267 sites).

For non-federal sites only, please identify what kind of operation/activity was present at the facility, from the list of possible operations/activities provided. Only one category should apply to each facility.

Of the 1,083 non-Federal Facility sites providing information on past activities, 750 sites (69%) had a single past use and 333 sites (31%) had multiple uses. Of the 750 sites reporting a single past use, the most common category of activities was waste management (362 sites), followed by industrial (230 sites) and miscellaneous (158 sites).

Almost one-half of the sites in the single-use category reported past waste management activities. The primary waste management activity at National Priorities List (NPL) sites involved the operation of landfills. The most common past industrial activity associated with single-use sites involved the production of "Chemicals and Allied Products (Standard Industrial Classification (SIC) code 28)" (71 sites). *(See Exhibit 12-1 for other types of operations at single-use industrial sites).*

Of the 333 sites with multiple uses, some sites had multiple activities over time (e.g., the facility changed operations), while at other sites there were two or more concurrent uses. Thus the total number of uses exceeds the number of sites. The most common category of past activities was industrial (at 242 sites), followed by miscellaneous (at 223 sites) and waste management (at 160 sites). *(No corresponding exhibit).*

Background Information

About Site Activities

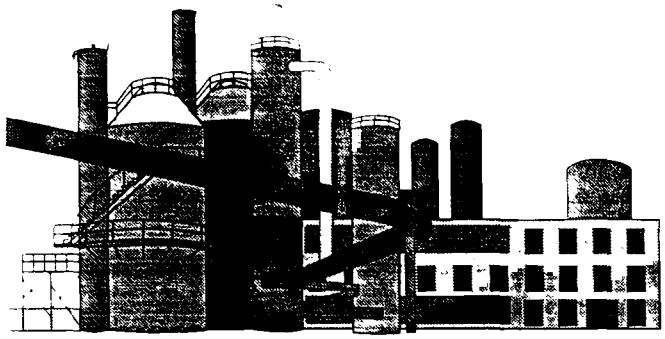
At many Superfund sites a variety of production and waste management activities caused contamination. For example, an industrial site might have had several past production processes, as well as several practices for managing the waste generated by these processes. As a result, most of the non-Federal Facility sites fall into the 'Other' category as defined by the Congressional inquiry. In order to more accurately categorize sites, EPA requested that site managers provide a listing of *all* Standard Industrial Classification (SIC) Codes that characterize the *full range* of past site activities.

What Is a Standard Industrial Classification (SIC) Code?

The SIC was developed to classify establishments by the type of activity in which they are engaged. The SIC is intended to cover the entire field of economic activities. Major groups of economic activities are designated as two-digit codes and used here in the analysis of past operations at Superfund sites.

Exhibit 12-1

Types of Operations for Single-Use, Industrial, Non-Federal Facility Sites



■ INDUSTRIAL (230 sites)

SIC 28	Chemicals and Allied Products (71 Sites)
SIC 34	Fabricated Metal Products – except machinery and transportation equipment (45 Sites)
SIC 36	Electronic and Other Electrical Equipment and Components – except computer equipment (37 Sites)
SIC 33	Primary Metals Industries (28 Sites)
Other Industrial (49 Sites)	

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E4b and E5), CERCLIS database and Woodtreat database.

2) *The full universe of sites addressed by the question:* Those 1,126 final and deleted non-Federal Facility sites listed on the NPL as of July 1993.

3) *The subset of the universe for which data are provided:* The 1,083 out of 1,126 non-Federal Facility sites providing information on past site uses/types.

Question #13

Number of Parties at National Priorities List (NPL) Sites:

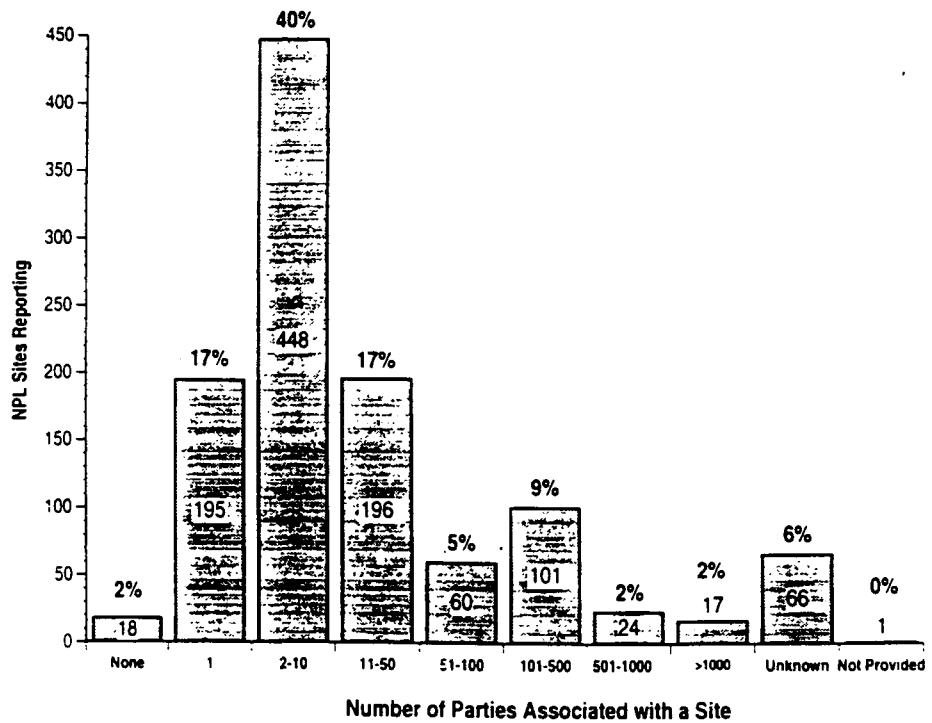
Three-quarters (75%) of the non-Federal Facility sites have between 1 and 50 parties associated with them. Fifty-nine percent (59%) of sites have 10 or less parties associated with them.

Please identify whether the best estimate of the total number of PRPs associated with the facility that could potentially be held liable under section 107 *(irrespective of whether EPA decides to pursue all of them)* is (1), (2-10), (11-50), (51-100), (101-300), (301-1,000), (1,000+).

Three-quarters (75%) of the non-Federal Facility sites (839 out of 1,126) have between 1 and 50 parties associated with them. The mode and median range of parties associated with these sites is between 2 to 10 parties. *(A distribution of sites by range of parties associated with the site is provided in Exhibit 13-1).*

Exhibit 13-1

Number of Parties Associated with Non-Federal Facility Sites *



Three-quarters (75%) of the non-Federal Facility sites reporting (839 out of 1,126 sites) have between 1 and 50 parties associated with them. The mode and median range of parties associated with a site is between 2 to 10 parties.

NOTE: Responses in the 'None' and 'Unknown' categories may include sites where baseline PRP search activities have not been completed.

* This question only addresses 1,126 out of the 1,249 NPL sites because 123 sites are Federal Facilities.

Background Information

What is a "party associated with a site"?
A party associated with a site is one that EPA initially identifies as being potentially liable under CERCLA, and may include owners or operators of the site, generators of the waste, or transporters who disposed of material at the site.

What is a mode?
The mode is defined as the observation which occurs most frequently in a group of observations.

What is a median?
A median has a two-part definition: 1) the median is defined as the middle observation of an odd-numbered group of observations that are ordered from smallest to largest; or 2) the median is defined as the number halfway between the two middle observations of an even-numbered group of observations that are ordered from smallest to largest.

Data Source

1) *The source:* August 1993 RPM Data Collection (question E13).
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites listed on the NPL as of July 1993.
3) *The subset of the universe for which data are provided: Exhibit 13-1:* The 1,125 out of 1,126 final and deleted non-Federal Facility sites listed on the NPL that reported parties associated with the site.

Question #14

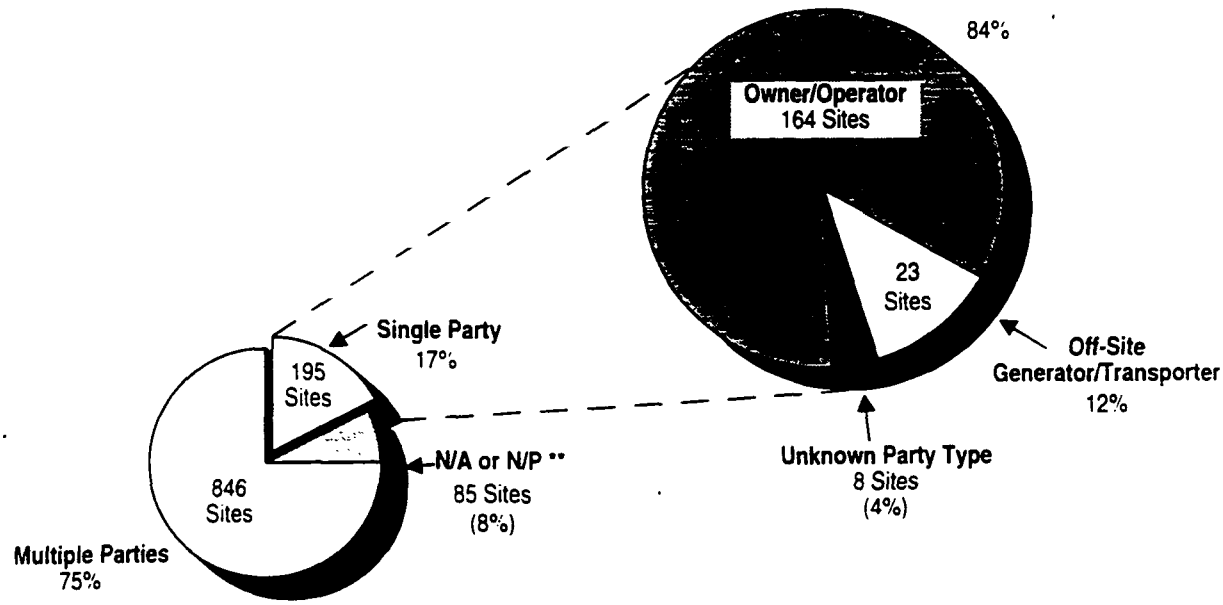
Types of Parties Associated with Sites:

About one-fifth (17%) of the non-Federal Facility sites have only a single party associated with the site. Of these 195 single party sites, 164 (84%) are owner/operator sites.

For each facility where there is only one Potentially Responsible Party (PRP), please indicate whether that PRP is an owner/operator.

Of the 1,126 non-Federal Facility sites listed on the NPL, 17% (195 sites) are single-party sites. Of these 195 single-party sites, 164 (84%) are owner/operator sites. (*See Exhibit 14-1*).

Exhibit 14-1
Single-Party Owner/Operator Sites*



Of the 1,126 non-Federal Facility sites on the NPL, 195 sites have only 1 (a single) identified party. Of these 195 single-party sites, 164 (84%) are owner/operators (i.e., no off-site generation of waste). In addition, some of the 846 multiple-party sites may also be owner/operator-*only* sites.

* This question only addresses 1,126 out of the 1,249 NPL sites because 123 sites are Federal Facilities.

** *NOTE: N/A or N/P represents sites where information was either not applicable or not provided.*

Background Information

What is an owner/operator - *only* site?
Sites with *only* owner/operator parties are defined as those sites where no hazardous substances were contributed by any off-site generator/transporters. The universe of single-party, owner/operator sites reported includes those parties who could potentially be held liable under CERCLA, irrespective of whether EPA decides to pursue them.

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E13, E14, E26 and E28).
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites listed on the NPL as of July 1993.
3) *The subset of the universe for which data are provided:* The 1,041 non-Federal Facility sites that reported at least 1 PRP.

Question #15

Owner/Operator Parties:

Forty-one percent (41%) of non-Federal Facility sites have *only* owner/operators as PRPs.

Please indicate where the only potentially responsible parties are owner/operators (i.e., no hazardous substances were contributed to the facility by off-site generator/transporters).

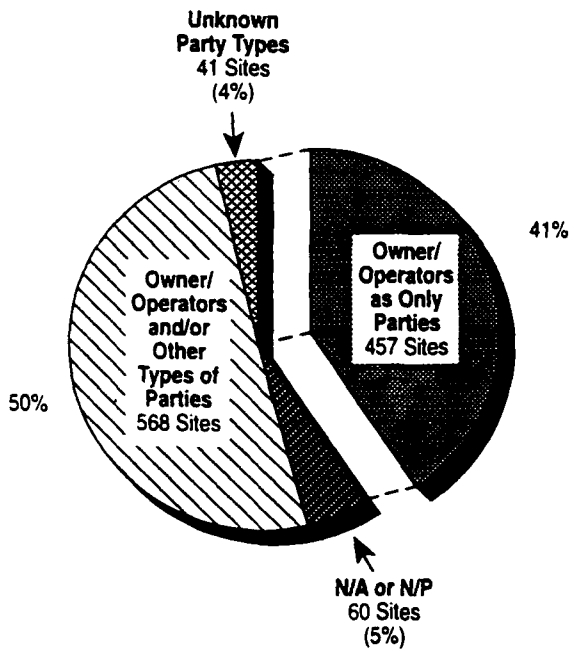
Of the 1,075 (out of 1,126) non-Federal Facility sites that indicated the types of parties associated with the sites, 41% (457 sites) have only owner/operators associated with them (i.e., no off-site wastes were contributed to the site). *(See Exhibit 15-1).*

Data Source

1) *The source:* August 1993 RPM Data Collection (question E14).
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites as of July 1993.
3) *The subset of the universe for which data are provided:* The 1,075 (out of 1,126) non-Federal Facility sites reporting, which include those parties who could potentially be held liable under CERCLA, irrespective of whether EPA decides to pursue them.

Exhibit 15-1

Breakout of Parties Associated with Non-Federal Facility Sites *



* This question only addresses 1,126 out of the 1,249 NPL sites because 123 sites are Federal Facilities.

** *NOTE: N/A and N/P represents sites where information was either not applicable or not provided.*

Question #16

De Minimis Parties:

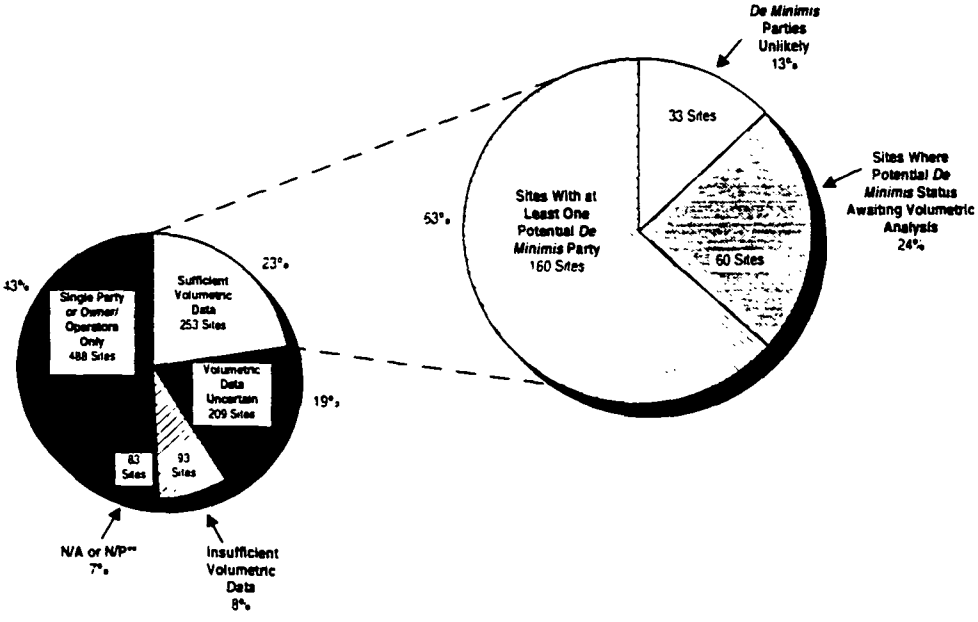
There are 220 sites where sufficient volumetric data exist to establish whether there are parties associated with the site who contributed "minimal" amounts of hazardous substances to facilities and *could be* considered *de minimis.* The new *de minimis* guidance, issued in July 1993, establishes that the Agency must simply find that the individual *de minimis* party's contribution is minimal in comparison to the total waste at the site. At the sites where sufficient data exist to determine volumetric contribution, almost two-thirds have been identified as having at least one potentially *de minimis* party; however *de minimis* settlements may have already been reached. In addition, at 33 sites where sufficient data is available, data indicate that no *de minimis* parties are likely to exist.

Please indicate whether sufficient volumetric data exist to establish whether there are PRPs who contributed small amounts of hazardous substances to facilities and could be considered *de minimis* parties.

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.* (*See Exhibit 16-1*).

Exhibit 16-1

Distribution of Sites with Potential *De Minimis* Parties *



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.* EPA regional officials have indicated that there may be *de minimis* parties at 160 of these sites. Of the 60 remaining sites, once the volumetric data is analyzed, some may be found to have no *de minimis* parties.

* This question only addresses 1,126 out of the 1,249 NPL sites because 123 sites are Federal Facilities.

** *NOTE: N/A and N/P represent sites where information was either not applicable or not provided.*

Background Information

How does a party qualify as *de minimis*?
De minimis waste contributors are generators or transporters whose waste contribution is minimal – in both volume and toxicity – compared to the other hazardous substances at the site. Frequently these parties have contributed less than one percent of the waste at the site. However, whether individuals qualify for a *de minimis* settlement depends on a variety of site-specific factors. For example, the cut-off established for *de minimis* eligibility often varies from site to site.

What is a waste-in list?
A volumetric ranking, or "waste-in list," is an inventory of all the off-site waste generators involved at a site and the waste contribution of each. Organized in descending order of contribution volume, this ranking facilitates a *de minimis* determination. Although an extensive waste-in list frequently identifies some number of *de minimis* parties, some sites where a waste-in list has been (or could be) prepared may not involve any *de minimis* parties.

What does the "Streamlined Approach for Settlements with *De Minimis* Waste Contributors" say?
This new guidance, issued on July 30, 1993, establishes the minimum level of information required before EPA can make a *de minimis* finding. The guidance states that it is no longer necessary to prepare a waste-in list or volumetric ranking before considering a party's eligibility for a *de minimis* settlement. However, EPA still must demonstrate that the potential *de minimis* party's waste contribution is minor, in both volume and toxicity, and that the settlement is in the public interest and involves only a minor portion of the response costs at the site.

For each such facility, please indicate the number of potential *de minimis* parties.

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. *(No corresponding exhibit).*

Of the remaining 60 sites, once the volumetric information is analyzed, some may be found to have no *de minimis* parties. Thus, EPA cannot currently estimate "the number of potential *de minimis* parties" at each of the 220 sites. *(No corresponding exhibit).*

For each such facility, please identify where a waste-in list has been or could be prepared based on the data available to EPA.

Of the 220 sites where sufficient volumetric data exist to establish whether there are PRPs who contributed "minimal" amounts of hazardous waste, a waste-in list has been prepared, or could be prepared, at 145 sites. *(No corresponding exhibit).*

NOTE: According to the recently issued "Streamlined Approach with *De Minimis* Waste Contributors," the preparation of a waste-in list is not required prior to finding a party eligible for *de minimis* settlement.

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E17, E18a, E19, E20a and E20b).
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites listed on the NPL as of July 1993.
3) *The subset of the universe for which data are provided:* Those 220 sites where PRPs could be considered *de minimis* parties.

Question #17

Financial Viability and Waste Contribution:

Over one-third of NPL sites (398) have at least one non-viable responsible party. Non-viable parties are more likely to be owner/operators (81% of sites), than generator/transporters (52% of sites). Non-viable generator/transporters, on average, contributed 42.5% of the waste volume at sites with sufficient waste volume information available.

Please indicate where there are orphan parties (i.e., parties that are not financially viable or cannot be located).

Of the 1,105 non-Federal Facility sites reporting, 398 (36%) have at least 1 non-viable responsible party.

NOTE: Twenty-one (21) of the 1,126 non-Federal Facility sites did not respond to this question. Two hundred and twenty-five (225) sites reported the parties as 'Unknown,' indicating that the financial viability of all PRPs at these sites has not been determined. At a majority of these sites, all PRP search activities have not been completed. Therefore, some or all of the 225 sites reporting 'Unknown' may have non-viable responsible parties.

For each of those same facilities, indicate whether all the owner/operators are orphan parties.

Of the 398 sites with non-viable responsible parties reporting, 321 (81%) have one or more (but not necessarily all) owner/operators as non-viable parties. One-hundred and thirty-two (132 or 41%)of the sites with non-viable owner/operators also had one or more (but not necessarily all) non-viable generator/transporters. *(See Exhibit 17-1).*

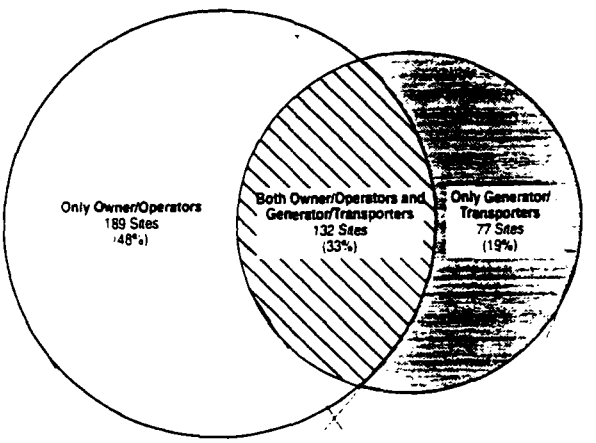
Where sufficient volumetric data exist, please provide the best estimate of the percentage, by volume, of waste contributed to the site by generator/transporter orphan parties.

Of the 211 sites reporting the presence of non-viable parties that are generator/transporters, 87 sites (41%) had sufficient volumetric data to report the average volume of waste contributed to sites by these non-viable generator/transporters. The average volume contributed to sites by these parties is 42.5%.

Exhibit 17-1

Sites with Non-Viable Responsible Parties

Total number of sites reporting where there is at least one non-viable responsible party = 398



Total Sites with One or More Owner/Operators
321 Sites
(81%)

Total Sites with One or More Generator/Transporters
209 Sites
(52%)

NOTE: Twenty-one (21) of the 1,126 non-Federal Facility sites did not respond to this question. Two hundred and twenty-five (225) reported the financial viability of parties as 'Unknown,' indicating that the financial viability of all PRPs at these sites has not been determined. At a majority of these sites, all PRP search activities have not been completed. Therefore, some or all of the 225 sites reporting 'Unknown' may have non-viable responsible parties.

NOTE: Questions 17, 18 and 19 must be read in tandem to obtain a more complete picture of the potential Fund exposure.

Background Information

What is a non-viable responsible party?
For the purpose of this analysis, a non-viable responsible party was defined as a party associated with a site who the Agency cannot locate or believes is not financially viable.

Data Source

1) *The source:* August 1993 RPM Data Collection (questions E21, E22, E23 and E24).
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites on the NPL as of July 1993.
3) *The subset of the universe for which data are provided:* Those 398 non-Federal Facility sites reporting non-viable responsible parties, excluding those 225 sites reporting financial viability as 'Unknown'.

Question #18

Sites with Non-Viable Parties:

There are currently 93 sites on the NPL with no enforcement potential. The government does not expect to obtain work or recover costs from PRPs at these sites.

Please indicate whether the government believes that there are no financially viable parties, or no parties that can be found, and that the Trust Fund will have to pick up 100% of site study and cleanup costs.

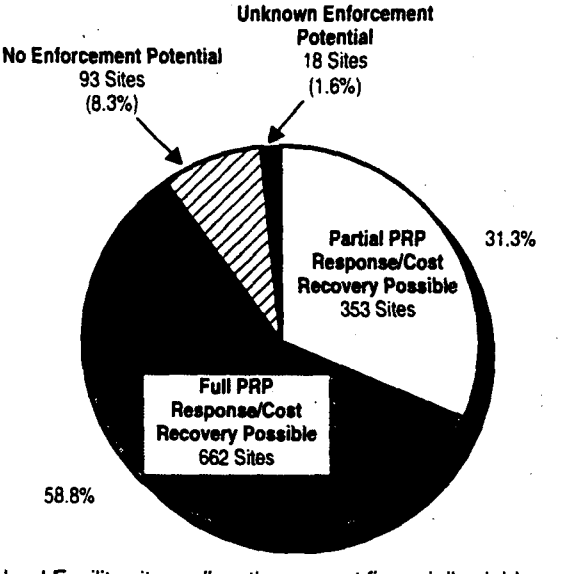
At less than 10% (93 sites) of the 1,126 non-Federal Facility sites, *all* parties are not financially viable or cannot be located. *(See Exhibit 18-1).*

NOTE: 'Unknown' responses may include sites where baseline PRP search activities have not been completed.

NOTE: Questions 17, 18 and 19 must be read in tandem to obtain a more complete picture of the potential Fund exposure.

Exhibit 18-1
Enforcement at NPL Sites *

Total Sites Reporting
Excluding Federal Facilities = 1,126



At 93 sites (8.3%) of the 1,126 final and deleted non-Federal Facility sites, *all* parties are not financially viable or cannot be located and have no enforcement potential.

*This question only addresses 1,126 out of the 1,249 NPL sites because 123 sites are Federal Facilities.

NOTE: 'Unknown' responses may include sites where baseline PRP search activities have not been completed.

Data Source

1) *The source:* August 1993 RPM Data Collection (question E26).
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites on the NPL as of July 1993.
3) *The subset of the universe for which data are provided:* The 1,126 non-Federal Facility sites listed final and deleted on the NPL.

Question #19

Fund-lead Sites:

About one-quarter of sites (317) are Fund-lead. Of these, 90% will continue to have Fund-lead events, while only 7% of the non-Federal Facility sites are expected to have Fund-financed work for the first time in the future.

Please indicate whether the facility is Fund-lead or expected to be Fund-lead.

Site activities are often led by one or several parties over the course of the entire site cleanup process. This analysis focuses on the lead for key cleanup activities at sites (i.e., RI/FS, RD and RA). *(See key to Exhibit 19-1).*

While some sites are currently Fund-lead and others may have future Fund-financed work, their status is subject to change as response actions progress. Therefore, any given site can have events financed both by PRPs and the Fund. Since EPA assigns leads only to individual events such as site studies, design and construction, a Fund-lead site simply means that all these site events have been, or are now being paid for, by the Fund.

Of the 1,126 non-Federal Facility sites, 317 sites (28%) are currently Fund-lead, 732 sites (65%) are PRP-lead and States have financed cleanups at 36 sites (3%). At the 41 remaining sites (4%) no response events have been started. *(See Exhibit 19-1).*

Site managers reported that of the 317 current Fund-lead sites, 308 *will continue* to be Fund-lead. The *PRPs* are expected to be doing all future work at 646 sites, 78 sites are *expected* to have Fund-financed work for the first time in the future and the future lead status is *undetermined* at 94 sites. *(See key to Exhibit 19-1).*

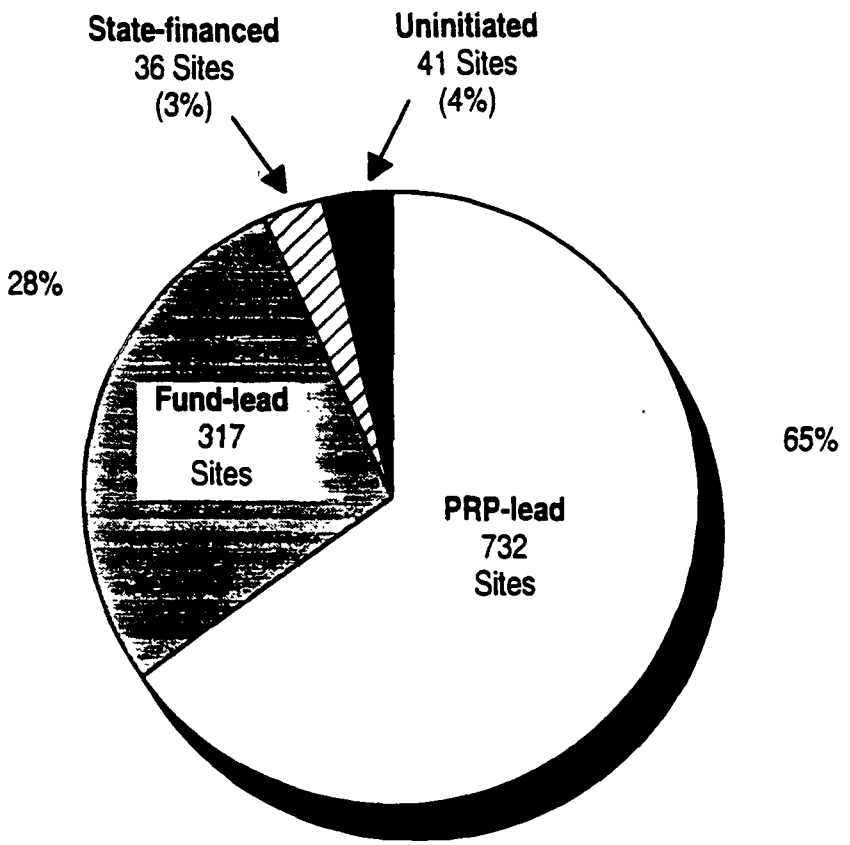
PRPs are increasingly taking responsibility for the RA (construction phase) of site cleanup, which is the costliest phase of cleanup. *(See Exhibit 19-2).* Data from CERCLIS (Superfund's official information system) suggest PRP involvement at 70% of remedial design starts and 77% of remedial action starts at NPL sites during FY 92 and FY 93.

Data Source

1) *The source:* August 1993 RPM Data Collection (question E27) and CERCLIS database.
2) *The full universe of sites addressed by the question:* The 1,249 final and deleted NPL sites as of July 1993 (123 Federal Facilities and 1,126 non-Federal Facility sites).
3) *The subsets of the universe for which data are provided:* The 1,126 non-Federal Facility sites.

NOTE: Questions 17, 18 and 19 must be read in tandem to obtain a more complete picture of the potential Fund exposure.

Exhibit 19-1
Current Superfund Site Leads*

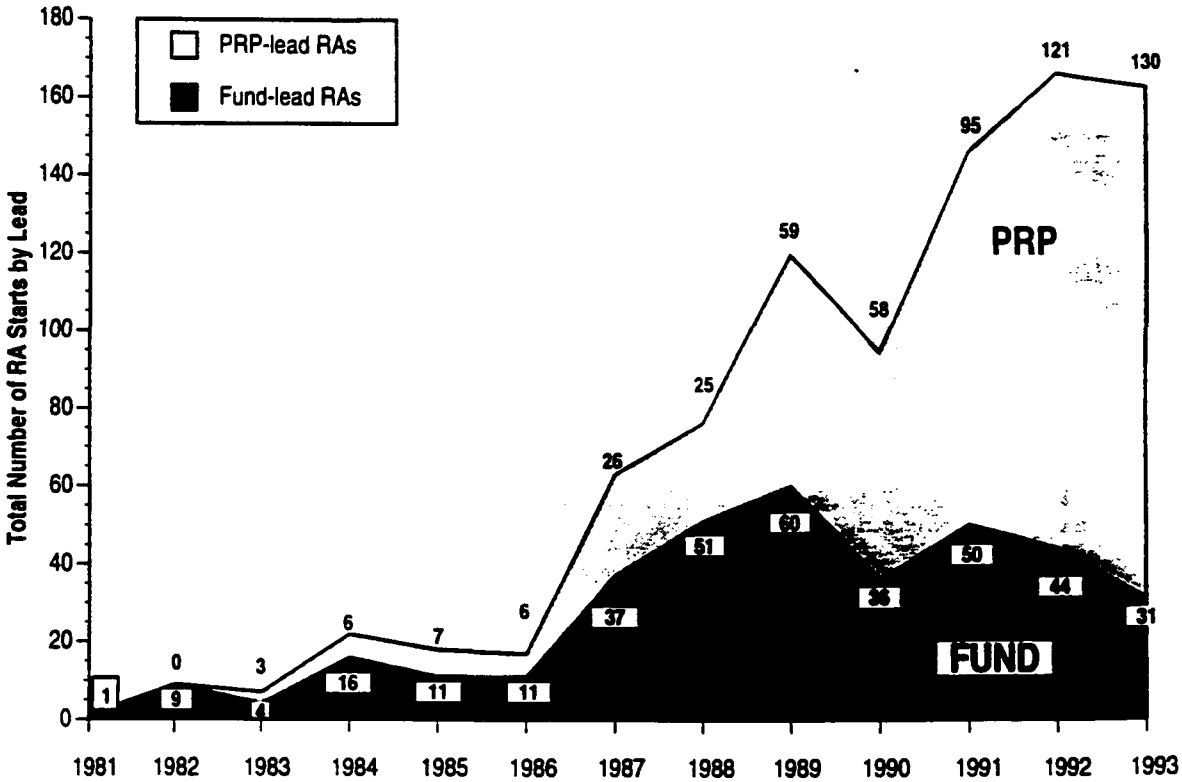


Lead	Definition
PRP	Some or all site study (RI/FS), design (RD) and construction (RA) events have been or are being paid for by PRPs. Some Fund or State dollars are spent to provide oversight for PRP cleanup activities.
Fund	RI/FS, RD and RA events at the site have been or are now being paid for by the Fund. Some State dollars also may have been spent.
State-financed	All RI/FS, RD and RA events have been or are being paid for by the State (no Fund dollars are involved).
Uninitiated	Either no response events have been planned, or none will occur.

Of the 1,126 non-Federal Facility sites, 317 sites (28%) are currently Fund-lead, 732 sites (65%) are PRP-lead and States have financed cleanups at 36 sites (3%). At the 41 remaining sites, no response events have been planned.

* This graphic only addresses 1,126 out of the1,249 sites because 123 sites are Federal Facilities.

Exhibit 19-2
Construction Start (RAs) Lead Trends
Fund vs. PRP



Data show that PRPs are increasingly taking responsibility for the RA (construction phase) of site cleanup, which is the costliest phase of cleanup.

Question #20

Cost Recovery:

EPA can potentially recover almost $4 billion in past costs at more than 3,000 National Priorities List (NPL) and non-NPL sites. EPA has already taken some action to recover past costs of $2.17 billion at more than 2,000 of these sites (67%). Slightly more than $1 billion has been recovered, leaving an additional $1 billion currently being sought.

Please indicate where EPA has expended funds that are recoverable under Section 107 and the amount of those recoverable expenditures.

Omitting orphan sites (sites where EPA has not identified a financially viable PRP) and Federal Facilities, there are approximately 3,185 sites (NPL and non-NPL) at which EPA has incurred costs that are recoverable under CERCLA Section 107. Potentially recoverable past costs at these sites is just under $4.0 billion.

Indicate whether a cost recovery action has been filed to recover those funds, whether funds have been recovered and the amount that has been recovered.

EPA has taken cost recovery action to address $2.17 billion in past site costs at 2,140 sites (67% of the non-orphan, non-Federal Facility sites). Of this amount, $1.11 billion has been recovered through settlements with PRPs; the balance is still being sought.

Cost recovery actions to date include 639 cases which were referred to the Department of Justice for legal action. A total of $1.35 billion has been achieved or is still being sought through these cases.

Indicate whether or not the statute of limitations (SOL) is expected to be a bar to cost recovery of any amount.

There are 103 non-Federal Facility sites at which the initial SOL will expire in fiscal year 1994 (FY 94). EPA hopes to address all of the FY 94 SOL cases, either by initiating a cost recovery action or by documenting the reasons why cost recovery action will not be taken prior to the expiration of their SOLs. EPA has planned a total of 119 cost recovery actions in FY 94.

Data Source

1) *The source:* Financial data from SCORES, including both direct and indirect costs for each site, CERCLIS data as of 10/22/93, U.S. Treasury Collections Data as of 9/30/93 and Cost Recovery Branch FY 94 Targeting Report.
2) *The full universe of sites addressed by the question:* The 1,126 final and deleted non-Federal Facility sites on the NPL and 2,161 non-Federal Facility sites *not* on the NPL for which cost data is readily available.
3) *Subset of the universe for which data are provided:* Revised universe of NPL sites is 1,024 after subtracting 93 orphan sites; data are provided for all 2,161 non-NPL sites.

Question #21

Projected National Priorities List (NPL) Additions:

Based on a poll of the Regions, EPA estimates that between 75 and 95 sites will be added to the NPL in FY 94, and an additional 340 to 370 sites will be added between October 1, 1994 and October 1, 1999. In 1994, EPA expects that the majority of new sites will be industrial facilities (61%) and waste management facilities (26%). Additions to the NPL between the beginning of FY 95 and the end of FY 99 are expected to be nearly 70% industrial and 15% waste management. Actual NPL listings will depend on resource commitments, reauthorization mandates and policy decisions.

Please obtain from Regional officials in each Region their best informed judgement with respect to the number of facilities in their Region that will be added to the NPL in the period from October 1, 1993 to October 1, 1994 and in the five year period from October 1, 1994 and October 1, 1999. To the extent possible, please obtain information concerning the types of facilities that will be added to the NPL during the periods referenced above.

The projected additions to the NPL from October 1, 1993 through September 30, 1994 is between 75 and 95 sites. Of these sites, 68% are expected to be non-Federal Facility sites and 32% are expected to be Federal Facilities. The estimated breakdown of the non-Federal Facility sites by type is: 62% industrial, 26% waste management and 12% miscellaneous. The industrial category consists of metal fabrication, electrical manufacturing and equipment, lumber/wood treaters, dry cleaners and chemical manufacturing. *(See Exhibits 21-1 and 21-2).*

The projected additions to the NPL from October 1, 1994 through September 30, 1999 is between 340 and 370 sites. Of these sites, 80% are expected to be non-Federal Facility sites and 20% are expected to be Federal Facilities. The estimated breakdown of the non-Federal Facility sites by site type is: 68% industrial, 15% waste management and 17% miscellaneous. *(See Exhibits 21-3 and 21-4).*

These projections are based on a range of factors related to site assessments:

- Staffing and site-specific budget allocations;
- Impact of the implementation of the Superfund Accelerated Cleanup Model, reauthorization and other program improvement initiatives;
- States' role in site assessments;
- The number of sites currently in the pipeline for NPL proposal, a portion of which will not actually be proposed because they do not meet the technical specifications for listing; and
- In some Regions, the priority needs of addressing Federal Facilities in response to legal actions.

Please obtain the opinion of Regional officials with respect to the number of facilities currently on CERCLIS, other than those for which a determination has been made not to list, which are ultimately likely to be added to the NPL.

All Regions found it difficult to estimate the number of facilities currently in CERCLIS that are likely to be added to the NPL. The Regions cited lack of active site discovery programs and a backlog of completed site inspections without listing decisions as factors that prohibit making an accurate estimation.

Data Source

EPA polled all Regional officials involved in site assessment screening; however, accurate NPL listing forecasts were difficult to make because of the uncertainty of future resources. NPL listing is always a resource-constrained consideration.

Estimated Additions to the NPL by Site Type

Exhibit 21-1
FY 94
Total Universe = 75-95 Sites

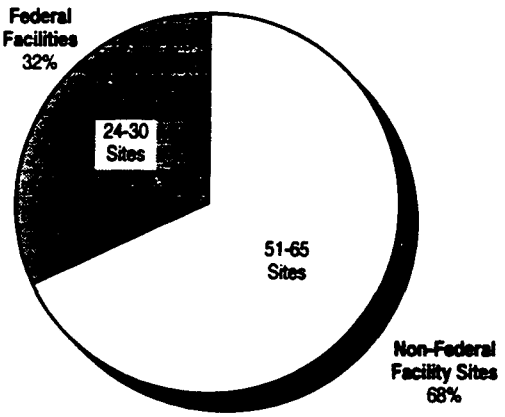


Exhibit 21-3
FY 95-FY 99
Total Universe = 340-370 Sites

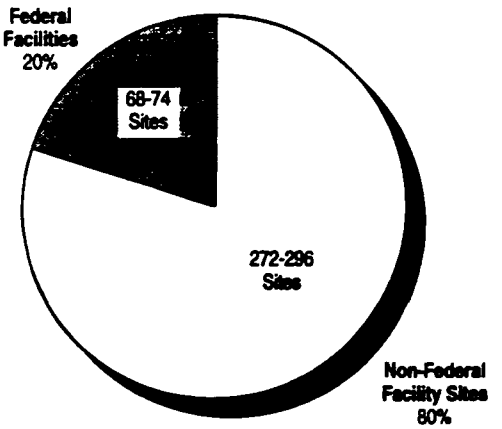


Exhibit 21-2
FY 94
Non-Federal Facility Sites = 51-65 Sites

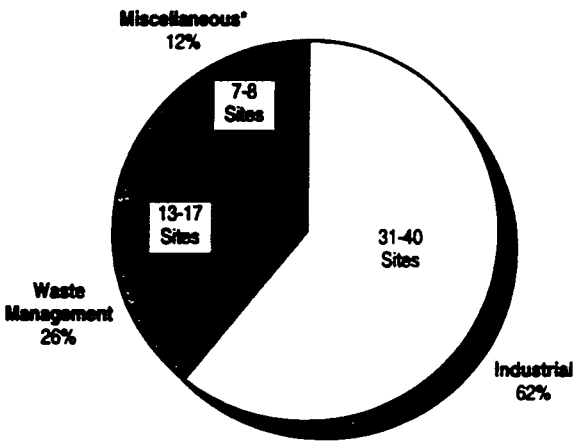
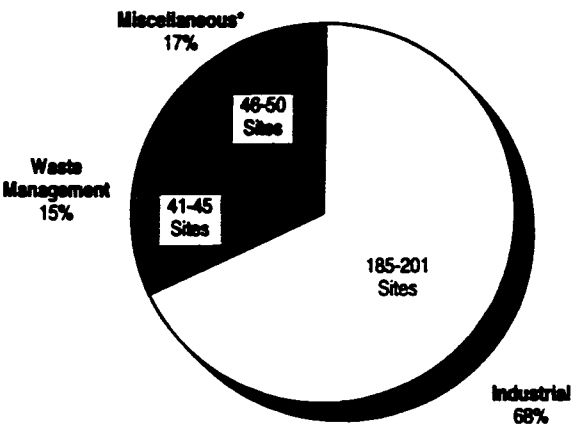


Exhibit 21-4
FY 95-FY 99
Non-Federal Facility Sites = 272-296 Sites



* The 'Miscellaneous' category includes those facilities that do not have either industrial or waste management operators on-site, and are often contaminated by off-site operations, activities or as a result of spills (e.g., residential areas, storage facilities, wells).

NOTE: Ranges in pie charts were calculated based on the percent of each site type Regional officials expect to be listed.