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Superfund Post Remediation Accomplishments: Uses of the Land and Environmental Achievements

Volume 1

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Superfund Post Remediation Accomplishments:
Uses of the Land and Environmental Achievements

Volume 1

Final

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Washington, DC 20460

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EXECUTIVE SUMMARY

INTRODUCTION

Superfund is a national program that was created to reduce risks to human health and the environment by cleaning up sites that have been contaminated by past disposal practices. Since 1980, thousands of Superfund actions have been taken to protect people and the environment from the dangers posed by hazardous substances at contaminated sites. Superfund actions benefit many people through activities or responses that reduce or eliminate potential exposure to hazardous materials, that result in improved amenities, and that alleviate uncertainty about the extent of contamination and the associated offsite exposure risks.

The National Priorities List (NPL) identifies the most serious sites in the Nation targeted for cleanup by Superfund authorities. A facility is included on the Construction Completion List (CCL) after the construction of all cleanup activities implementing the remedy are completed. Sites that will require years to achieve cleanup goals (e.g., the cleanup of contaminated ground water to protective standards) are placed on a part of the CCL called the Long Term Response Action list (LTRA). Those CCL sites where cleanup goals have been completely achieved are deleted from the NPL. The CCL is a dynamic and growing list. EPA has set a goal of achieving 650 construction completions by the year 2000. As of September 1995, the list totaled 346.[1]

In any given year, the completed cleanup of NPL sites represents a relatively small proportion of the cleanup and risk reduction activities undertaken by the Superfund program. Interim cleanup activities are undertaken at NPL sites long before the final construction is complete. In addition, as of the third quarter of 1995, cleanup activities have been undertaken at over 2,500 non-NPL sites through the Superfund emergency response program (called the Removal Program). Because removal actions–both at NPL sites and at non-NPL sites–often produce substantial cleanup achievements, case examples of the environmental benefits associated with the removal program are provided in Appendix B to this report.

PURPOSE AND SCOPE OF THE STUDY

The primary purpose of this study was to examine some of the benefits achieved by completing construction to clean up the sites on the NPL and examine the uses of sites after cleanup and the factors that affect these uses. In addition, this study lays a foundation for future studies that may evaluate other economic benefits not addressed

[1]All data in this report were collected before the fall of 1995. Budget debates, furloughs, and budget reductions can be expected to result in a slowing of program acceleration and will likely influence EPA's ability to achieve Year 2000 goals.

here, such as changes in property values. The study looks at a relatively narrow set of accomplishments, and is not a comprehensive analysis of all the benefits of the Superfund program. Clearly, many other measures of the program success could potentially be analyzed (such as a more quantitative assessment of the levels of risk reduction achieved or economic ripple effects on surrounding communities). For this study, the analysis was directed at the 228 sites on the CCL as of March 1994; however, 37 sites were not included in the analyses because they had negligible land areas (i.e., were wellhead treatment sites with no affected land surface), were sites for which information on beneficial use was not obtainable (e.g., outside the continental United States), or after investigation, were found to require no action by the Superfund program. Benefits examined included benefits to human health and the environment such as protecting drinking water aquifers and the economic and noneconomic beneficial use of properties.

FINDINGS

The sites for which construction of cleanup activities have been completed represent significant actions to protect human health and the environment. At the 191 sites that are the subject of this study, actions have been taken to ensure that the land media are safe at 172 of these sites.[2] Cleanup goals have been achieved in all cases. At 18 sites, ground-water cleanup goals have been achieved, while at 23 sites, surface water quality goals have been achieved. Ground-water or land (surface) cleanup activity continues at 75 sites. Most of these continuing activities are ground-water remediation.[3]

The majority of the CCL sites that are the subject of this study (124 out of 191 sites) are in beneficial use. This "beneficial use" can be either a traditional "economic use" (e.g., industrial use of the property) or a noneconomic use (e.g., as a closed, but permanent waste repository or floodplain management area). Most sites that are in an economic use have been in continuous use throughout the site cleanup process. Many of these uses have changed or improved as a result of cleanup. Currently, 31 of the 124 sites are in beneficial uses that are different than their original uses. At eight of these sites, old dumps or landfill areas are used for recreation. Other new uses include: a plant nursery, a fast food restaurant, a commercial nonhazardous waste landfill, or a new commercial area. Thirty-five percent of the cleaned sites that are the subject of this study are vacant lands. Most of the vacant sites are in rural or remote areas where there is little pressure for active land use. In addition, the economic use of property appears to be affected by leaving waste onsite for long-term management. The study shows a more active economic use (e.g., industrial or commercial) when the land surface is cleaned and no waste

[2]The term "land media" refers to contamination on the surface of the land that offers potential exposure to humans and animals through direct contact with soil, sludge, debris, or waste.

[3]Numbers are all subsets of the 191 sites that are the focus of this report. Numbers add to more than 191 because individual sites address more than one media.

remains to be managed, than when treated waste or landfills are managed permanently on site. Although there is no clear evidence with regard to the impact of NPL status on use, initial evidence suggests that any impact from previous contamination on the economic use of property stems from the presence of managed waste on site. There is little current evidence of a Superfund NPL stigma that by itself carries forward after cleanup.

The total value of the property in the CCL universe is just over $203 million. This valuation reflects property assessments conducted for tax purposes and, in a few cases, reflects resale values of properties. It does not reflect overall economic value to society of a wide variety of uses (e.g., recreational or environmental use). A number of factors appear to affect the value of the property, including locational type (i.e., urban, suburban, medium town, rural, remote, small town), type of use (e.g., industrial or commercial), and regional (geographic part of the country) location. Only in Region 9 (which includes the State of California) does the geographic location of the site appear to be a determining factor. When the California data are pulled out of the analysis, it is clear that locational type and use of the property can be equally influential. In general, urban properties in industrial or commercial use have a higher value than any of the other mixes of locational type and uses. Industrial use property is generally higher valued than either commercial or residential use.

Because most of the sites in the CCL universe have been completed since 1990, changes in property use may not yet have had time to occur. In addition, any increases in property value due to cleanup are not likely to have accrued. The cleanup of over 60 percent of the sites (both in use and vacant) has occurred since 1989. This study is based on data collected in 1993 and 1994.

The sites for which construction for final cleanup had been completed as of March 1994 represent a diverse group of sites. The sites are both similar and different than the rest of the Superfund universe. To the degree that they are similar, the benefits accrued from cleanup are likely to continue to be reflected in the remainder of the Superfund universe as other sites reach completion.

- The sites in the completion universe are similar to the NPL universe as a whole in their regional distribution, the distribution of minorities around sites, and the type of land use at the time of contamination.

- The sites in the completion universe are moderately reflective of the NPL universe in the number of operable units per site, the use of removal or quick response actions to conduct the cleanup, the cost of cleanup, the reliance on responsible parties to conduct the cleanup, the RCRA status of the sites, and the date of site listing.

- The CCL universe is not reflective of the NPL universe in the size of the site or the percent of sites with ground-water contamination involved. In both of these cases, the CCL sites are smaller than the

NPL sites (on average), and are somewhat less likely to have ground-water contamination. However, the CCL universe is also less reflective of the more highly valued suburban properties than the NPL universe as a whole -- thus suggesting that the property values reflected by the CCL universe may under represent the NPL universe.

Limited data available on the cost of cleanup suggest that CCL sites may reflect a similar distribution of cost ranges to the NPL universe as a whole, but may under represent the higher end of the range. However, PRP cost data are not available, and the above comparison is based on fund financed cleanups alone.

ENVIRONMENTAL ACCOMPLISHMENTS AT SUPERFUND CCL SITES

The risk reduction activities reflected by CCL sites have been substantial.

- The land surface has been cleaned up or made safe at 172 of the 191 sites in the study. At 86 sites, the land has been cleaned for a designated use (e.g., for residential or industrial use) with no waste remaining onsite to be managed. At the 86 sites where waste continues to be managed on the site, management of this waste assures that the site is protective of human health and the environment. The cleanup of the land surface has often removed a continuing source of ground-water or surface water contamination.

- Construction of ground-water remedies have been completed at 73 sites, and ground-water cleanup is ongoing through the operation of pumping and treating systems. Use restrictions will ensure that contaminated ground water is not used until drinking water or other appropriate standards are met.

- The cleanup of sites often protected drinking water supplies. At 25 percent of the sites in the study, protection of drinking water wells where people currently rely on an underground aquifer as a source of drinking water is a major goal.

BENEFICIAL USES OF CONSTRUCTION COMPLETION (CCL) SITES

Of the 191 CCL sites included in this study, 65 percent (124 sites) have a beneficial use. For the purposes of this study, "beneficial use" is defined as an active or passive use of the property that provides a direct benefit to society. These benefits may relate to a tangible economic value such as the values derived from an industrial use of property, or they may relate to a societal good for which establishing a clear economic (or dollar) value is more difficult (e.g., environmental protection).

Of these sites, 80 (64 percent) have economically beneficial uses or plans for their economic use are well underway. The vast majority of these sites (80 percent) are in industrial, service, or commercial use. Only four sites (3 percent) are residential. The remaining 44 sites (36 percent) have noneconomical beneficial uses: 29 are permanent waste management areas, and 15 are used for environmental protection (e.g., floodplain and/or wetlands protection.)[4] Figure ES-1 shows the number of sites in different types of beneficial use for the 124 sites in beneficial use as well as vacant sites and sites that were not included in this study.

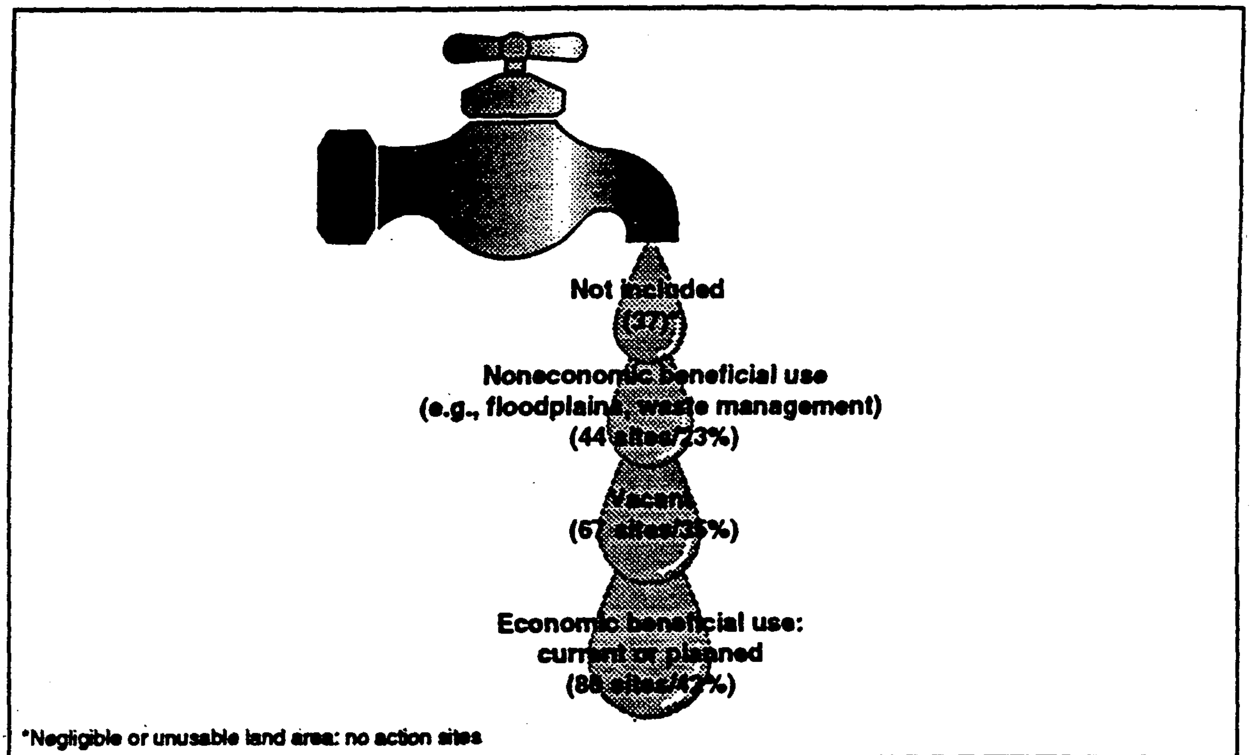

Figure ES-1. Completion Sites in Beneficial Use

[4]Permanent waste management areas are old landfills that have been closed and capped for long-term management as a waste repository--their original designated use.

Many factors influence the use of a CCL site. The two most important factors identified in this study are the location (i.e., proximity of the site to a major population center) and the continuing presence of waste onsite that will require management into the future. Of the 100 sites in urban, suburban, or medium-sized town locations, almost 76 percent currently have beneficial use. Suburban locations have the highest percentage of sites that are beneficially used. Conversely, rural, remote, and small town locations have the highest percentage of vacant sites. Two thirds of the vacant sites are in these locations, which make up less than half of the completion universe. Figure ES-2 shows the total number of sites in each location category and the number of sites in these locations that are in beneficial use. The data from this study also suggest that when waste is managed onsite, there is direct impact on the immediate economic use of the property. A higher proportion of landfill sites and other types of sites where waste is managed on the surface of the land are considerably less likely to be used or reused for a tangible economic use (e.g., industrial or commercial use).

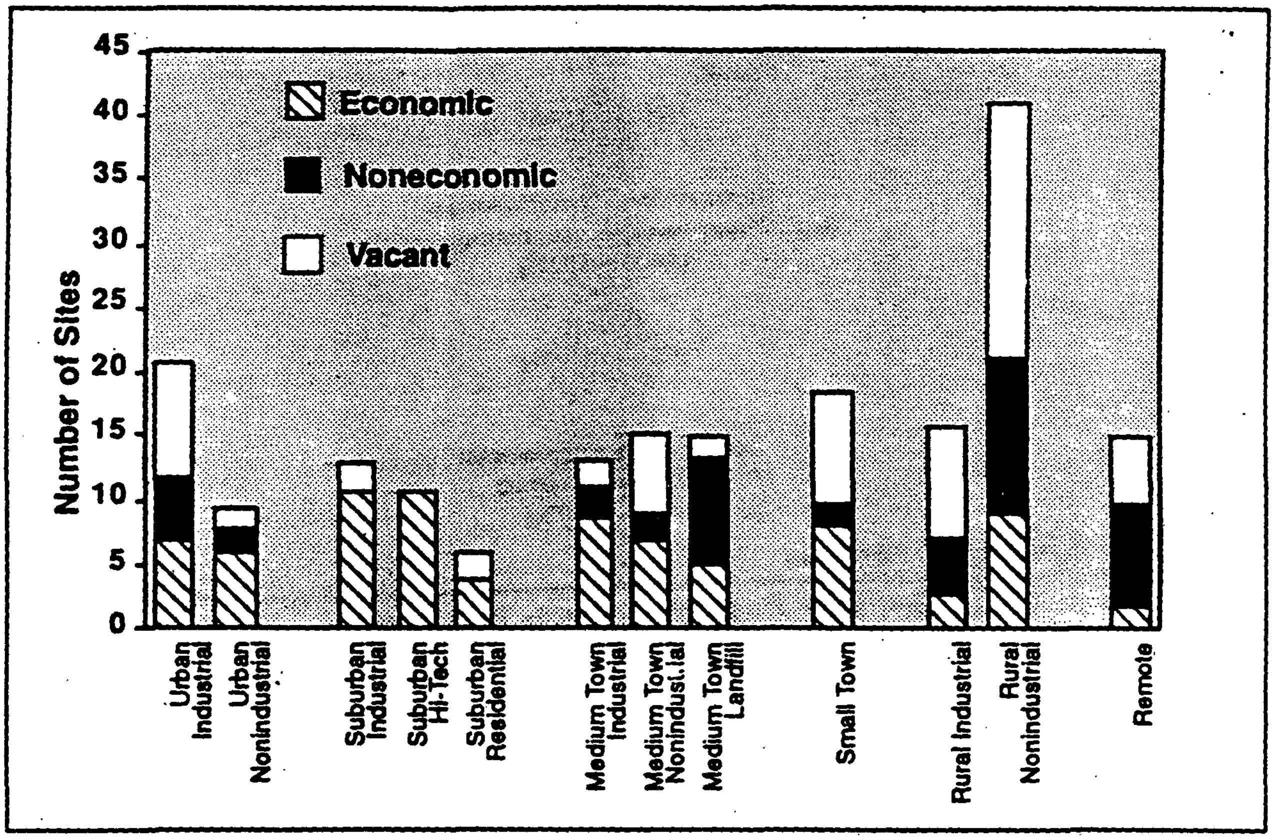

Figure ES-2 Ratio of 191 CCL Sites in Economic and Noneconomic Uses, and Vacant by Location Category (191)

ENVIRONMENTAL ACCOMPLISHMENTS OF THE SUPERFUND REMOVAL PROGRAM

Although not the major focus of this study, accomplishments of the Superfund Emergency Response Program (Removal Program) are highlighted because removal actions at both NPL and non-NPL sites often produce substantial cleanup achievements. Selected case examples of the environmental benefits associated with the removal program are provided in Volume 2 to this report to help illustrate the contributions of the program.

All removal case studies for which environmental benefits were assessed (76 in all) were selected because of substantial risk reductions achieved and availability of information. At all of these sites, actions were directed at making the land surface safer. At 18 of these sites, cleanup is completed, and the achievement similar to that of NPL sites on the CCL. Although all removal actions focused on making the land surface safe, the cleanup of the land media often protected other media--ground water, surface water, air, and ecological values. In addition, at 26 percent of the sites in the removal universe addressed by case studies, immediate risks through exposure to fire and explosion were eliminated. It should also be noted that the removal program actions were significant in the cleanup of much of the CCL universe. Over 90 percent of the CCL sites that are part of this study had between 1 and 3 removal actions. This percentage is consistent with the pace of removal actions in the NPL universe as a whole.

REPORT ORGANIZATION

Volume 1 of this report summarizes some of the environmental benefits achieved by cleaning CCL sites and describes the beneficial uses of the sites. Information is provided in three chapters. Chapter 1 provides the background of the study and describes the manner in which the completion sites subject to this study compare to the NPL universe. Chapter 2 addresses environmental benefits of Superfund cleanup. Chapter 3 describes the current beneficial use status of sites and factors that affect this use. Brief case examples illustrate each type of benefit. Appendix B to Volume 1 provides a separate description, along with case study examples for the achievements of the removal program. An intentional effort has been made to keep the analysis of the CCL and Removal Program sites separate. Volume 2 of this report contains 300 Fact Sheets that describe the current status and associated environmental risk reduction accomplishments of each CCL site and some selected removal sites. (This volume contains fact sheets on 224 CCL sites and 76 non-CCL sites where removal actions were significant.)

1.0 INTRODUCTION

1.1 Background to the Study

Superfund is a national program, created to reduce risks to human health and the environment by cleaning up sites that have been contaminated by past disposal practices. Since its creation in 1980, thousands of actions have been taken to protect people and the environment from the dangers posed by these substances. Many of these responses have addressed acute threats and have achieved long-term cleanup goals. Some sites have required emergency responses, such as cleanup of hazardous substance spills and the actions to prevent fire and explosion; other sites have required long-term actions to respond to contamination that may have been accumulating for decades.

To take a simplistic look at Superfund sites, they are often characterized by whether they are or are not on the National Priorities List (NPL). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) directs the U.S. Environmental Protection Agency (EPA) to identify those sites that are of highest priority. Using a scoring system called the Hazard Ranking System, EPA assesses the relative threat associated with actual or potential releases of hazardous substances at sites and ranks those sites that are referred to it by citizens, communities, or States. Those sites that score above a certain level (28.5) are eligible to be placed on the NPL. These NPL and non-NPL sites are located in every State and affect millions of people. Although the distinction between NPL and non-NPL sites often reflects the time and expense involved in cleanup, in reality NPL and non-NPL sites may have similar characteristics in terms of land use and contamination. At sites that are not on the NPL, emergency actions (through the removal program) may be taken to stabilize or cleanup contamination. Many seriously contaminated sites are cleaned up by the removal program and never make it to the NPL. In addition, the removal program often takes actions at NPL sites to reduce risk (or, in some cases, to cleanup the site).

As the Superfund program entered its second decade, lessons have been learned. Over 4,000 removal actions have been taken at over 3,000 sites. Completed cleanup is accelerating at NPL sites. In March 1994, 228 sites had been completed (i.e., the physical construction was complete, and an operating remedy was in place). By September 1995, that number had increased to 346 and is expected to reach 650 by the year 2000.

When construction has been completed at an NPL site, it is placed on a separate NPL list called the Construction Completion List (CCL). This list consists of sites where all the construction associated with a remedy has been completed. If all cleanup goals for the site have been achieved, the sites will then be deleted from the NPL; however, if any residual waste remains onsite as a result of remedies selected for the sites, the remedies at these sites will be reviewed every 5 years to ensure that the remedy remains safe. If construction is completed, but some cleanup goals have not yet been achieved (e.g., ground-water cleanup is not yet complete and may take many years of pumping and treating before standards are achieved), the site will be placed on the CCL, and will be designated as undertaking Long Term Response Actions (LTRA). The LTRA categories include: ground water pump and treat, soil vapor extraction, and in-situ bioremediation.

Following the Superfund response actions, the sites are often restored to their previous use or, in some cases, are suitable for redevelopment for a new type of beneficial use. In fact, economic redevelopment of several former NPL sites has occurred or is in the planning stages. Use restrictions (e.g., deed restrictions prohibiting building on a capped area) are placed on some sites, where wastes are left onsite, to ensure that material that has been stabilized is not disturbed. Use restrictions may be limited to one section of a site, while other parts of the site may be developed without restrictions. In other cases, the beneficial use of the site may not be an economic use. Many NPL sites, for example, are large municipal landfills. These sites were designed as permanent waste repositories, and many will not receive any other use. Other sites are located in floodplains on or near wetland areas. For these sites, their beneficial use may be the environmental protection use for which they were designed by nature.

1.2 Purpose and Scope of the Study

The purpose of this study is twofold:

- To summarize the direct benefits to human health and the environment associated with the cleanup of Superfund sites; and

- To discuss the post-cleanup uses of such sites, and the potential for reuse of previously unused or under-utilized properties.

The purpose of the Superfund program is to protect people and environments from exposure to previously uncontrolled hazardous chemicals. Protective goals are established on an individual site basis and relate directly to the nature of the contaminated media, the nature of the chemicals, and the actual or potential exposure of people and environmental receptors to contamination. Cleanup levels are typically expressed for each medium in terms of chemical concentrations to be met, or levels of risk considered appropriate for the site.[1] Because the chemicals and the appropriate cleanup levels may be quite different for each site, this report summarizes environmental

[1] Superfund considers that cleanup of a site to a risk range (for carcinogenic substances) of excess cancer cases of 1 in 10,000 to 1 in 1,000,000 is protective of human health and the environment. Risk goals for noncarcinogens are expressed in terms of a Hazard Index of less than 1. Environmentally driven cleanup levels are determined on a case-by-case basis and are not reported in uniform terms.

progress in terms of simple achievements that may be aggregated across many sites. Some of these measures include:

- The achievement of cleanup goals for specific contaminated media;
- The number of sites cleaned to an unrestricted use (e.g., the site is suitable for any use, including residential, without any additional controls); and
- The completion of actions to protect aquifers, and for which protection of drinking water resources was a major goal.

One question raised about the Superfund program is to what uses may sites be put after they are cleaned up. The question arises in two contexts. First, concerns have been expressed about whether the Superfund program is cleaning up sites of little economic or social value, which will remain unused in the future, in part, because of the stigma of being a Superfund site. Second, a corollary question, asks what is the economic benefit of the expenditure of public funds used to cleanup these sites (i.e., will the benefits exceed costs). The study attempts to address the first question (but stops short of being definitive due to the recent nature of most cleanups), and it does not attempt to answer the second. However, the information provided in this study will help provide a foundation for understanding potential economic benefits associated with the cleanup of Superfund sites. Such benefits (not a focus of this study) may include: increases in the value of previously contaminated property; increases in the value of properties and activities surrounding Superfund sites; and potential "ripple" effects associated with increased or new uses of cleaned property, including increased tax revenues and employment benefits to the community.[2]

The study that follows examines the beneficial uses to which cleaned up Superfund sites are put, and examines a variety of factors that appear to impact whether or not sites are used (or are vacant). While no attempt is made to extrapolate findings to the remainder of the Superfund universe, the analysis of factors that affect beneficial use has clear implications for the remainder of the Superfund NPL universe for which cleanup has not yet been completed.

Although the major focus of the quantitative analysis is on NPL sites where construction of the long-term remedy is complete, the direct accomplishments of some significant cleanup actions at sites (both NPL and non-NPL) that are not part of the CCL are discussed. (This discussion can be found primarily in Appendix B.)

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[2]This study looks at a relatively narrow set of accomplishments, and is not a comprehensive analysis of all the benefits of the Superfund program. Clearly, many other measures of the success of the program potentially could be analyzed.

1.3 Organization of the Report

The remainder of the report is organized as follows:

- *Chapter 1* continues with description of the CCL universe and compares the CCL to the NPL universe as a whole.

- *Chapter 2* highlights some of the environmental and community benefits accomplished by the Superfund program. Selected site actions to avoid contamination of essential aquifers, surface waters, and ecologically sensitive areas are described. (More detailed case studies, and a larger number of such studies, can be found in Volume 2 of this report).

- *Chapter 3* addresses the beneficial uses--both economic and noneconomic--for NPL sites that are deleted from the NPL or designated "construction complete."

- *Three appendices* provide details to augment the information in Chapters 1, 2, and 3. *Appendix A* lists, by EPA Region, the construction completion sites addressed in this report. Sites excluded from the study are listed in a separate table in Appendix A. *Appendix B* presents a summary and case study examples of the accomplishments of the Removal Program. *Appendix C* provides details of the methodology applied in carrying out the comparison of the CCL universe to the NPL universe as a whole.

- *Volume 2* is a catalog of Fact Sheets that highlight benefits of the response actions at 300 Superfund sites--224 CCL sites and 76 sites where removal actions have been taken. Included are all construction completion sites as of March 1994 (except for those outside the continental United States). Fact sheets are provided on the sites for which the Superfund program took action, as well as the sites for which no action was found to be necessary. In addition, fact sheets are also provided on sites that are not addressed in this study (due to negligible land area) as well as selected NPL and non-NPL sites where a removal action has been completed but which are not included as a CCL site.

1.4 The Universes Addressed by This Study

1.4.1 NPL Construction Completions Universe. The major focus of this study is 228 sites on the CCL as of March 16, 1994. Of these sites, 37 were deleted from the analysis for a variety of reasons: they have negligible land areas, they are outside the continental United States, no data were available at the time of report preparation, or no action was required to be taken by the Superfund program. The analysis in this report, therefore, examines cleanup benefits at 191 CCL sites where action was taken. Appendix A contains two tables. One table lists the 37 sites not included in the study, and a second lists the 191 sites that were the focus of this study. Volume 2 of this study contains Fact Sheets describing 224 completed sites in this study including those excluded from the analysis in the report.[3]

Because a major focus of this study is to identify the beneficial uses for construction completion sites, a system was developed to classify sites according to location that might be expected to be associated with use and reuse conditions as well as potential property value increases. Six location categories are distinguished: urban, suburban, medium town, small town, rural, or remote. (The locational definitions are presented in Section 3.4.1.) Location category assignments were made for the 191 CCL sites based on the population density in the area surrounding the site. The location categories were further subdivided to distinguish the surrounding land use (e.g., industrial, residential) or a particular type of site (e.g., landfill site).

1.4.2 Comparison of the CCL Universe to the Superfund Universe as a Whole. Based on information from the 1991 Superfund NPL Characterization Study[4] and other sources, the 191 sites that are part of this study appear to be reflective, but not necessarily representative, of all sites on the NPL. Although no attempt has been made to extrapolate study results to the Superfund universe as a whole, in order to gain a better understanding of the degree to which the CCL is reflective of the NPL universe as a whole, the two groups of sites were compared using 12 categories. Various data bases were used to pull together the data for the comparisons. A description of the methodology used is included in Appendix C. The comparison categories selected were based on a combination of several factors including data availability and the degree to which the data might provide insight into answering questions about why completion sites may have been cleaned up first. A specific area of focus is an examination of factors that reflect the manner in which the cleanup of CCL sites may or may not be as complex an undertaking as cleanup that will follow. The NPL universe that is used in this comparison is the 1,244 sites contained in a Remedial Project Manager (RPM) site evaluation data base compiled in August 1993 in support of congressional requests for information. The results of the comparison, summarized below, provide some interesting insights into the two groups of sites. It must be recognized, however, that the comparative exercise is not meant to be a comprehensive statistical study, but instead provides for some gross and qualitative comparisons.

Comparison Summary. The comparison data show that the completion universe is, for the most part, moderately to highly reflective of the NPL universe as a whole. Table 1 summarizes the results of each comparison category, and Figures 1 through 13 present graphically the data referenced in the table. Areas where the CCL is highly reflective of the NPL universe include: distribution across EPA Regions, land use at the time of

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[3]Four sites located outside the continental United States do not have fact sheets.

[4]National Results: NPL Characterization Projects, October 1991, EPA 540/8-91/069

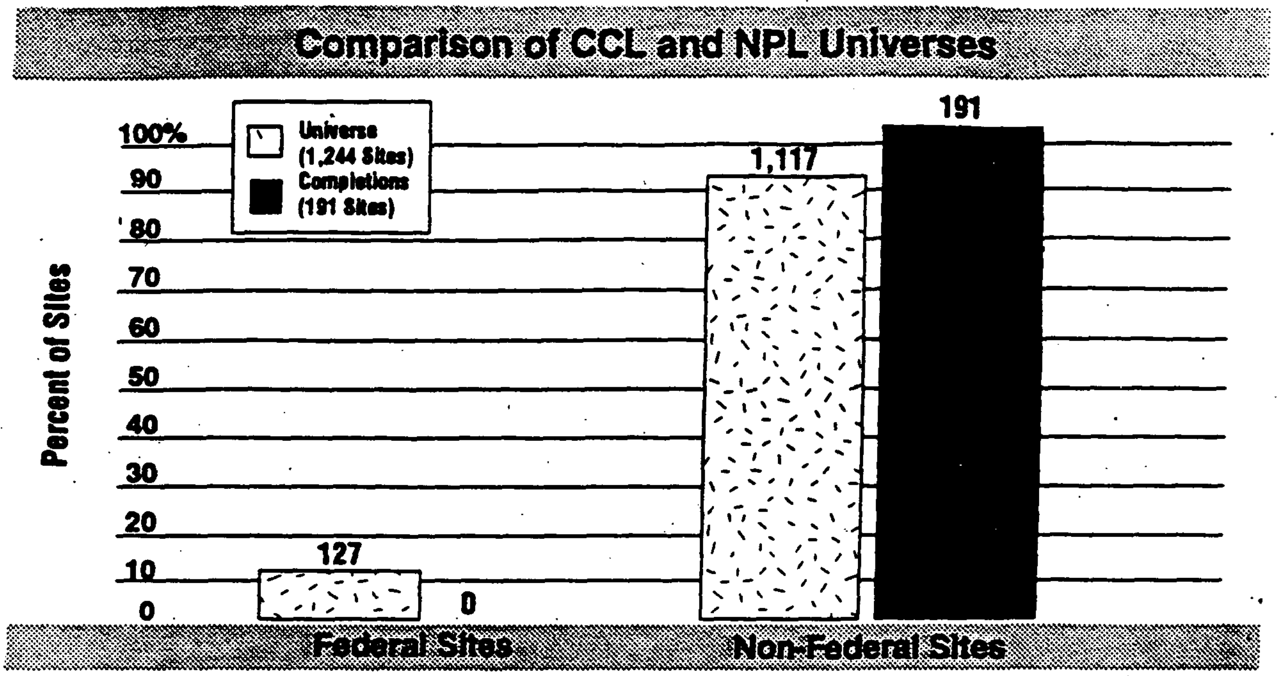
contamination, and environmental justice. The CCL was found to be moderately reflective in 7 of the 12 categories. One of these categories was for cost of remediation.

TABLE 1. Comparison of CCL Universe to the NPL Universe

Category of Comparison	Degree to Which Completion Universe Reflects the NPL Universe	Comments/Explanation
Federal vs. Non-Federal Sites	Moderately Reflective	The CCL did not include any Federal facility sites as of March 1994; however, only about 10% of the NPL universe were comprised of Federal facilities at the time of creation of the RPM site evaluation data base. In addition, Federal facilities typically contain many more areas of concern (sites) than private sites and will take much longer before completion or deletion.
Regional Distribution of Sites (EPA Regions 1-10)	Highly Reflective	There is a less than 3% difference between the NPL and CCL universes for all Regions, except Region 2 - where there is a modest 6% lower percentage of completions than for sites in the NPL universe.
Land Use at the Time of Contamination	Highly Reflective	The percentage of sites for each land use category for both universes is within a percentage point or two for all but one category -- commercial. The CCL universe is about 5% lower for commercial than the NPL universe.
RCRA Status (active vs. inactive treatment storage or disposal facilities)	Moderately Reflective	86% of the NPL universe are classified as non-RCRA sites, while 95% of CCL sites are non-RCRA.
Size of Sites	Not Reflective	The CCL is only reflective of the NPL universe in one of four size categories (5 - 20 acres). There is a significantly higher percentage of smaller acreage (<5 acres) CCL sites as compared to the NPL universe. There is a significantly smaller percentage of larger acreage (20-100 and greater than 100 acres) CCL sites as compared to the NPL universe.
Sites With vs. Without Ground-water Contamination	Not Reflective	CCL sites are, to date, less likely to involve ground-water contamination than the NPL universe (48% CCL vs. 80% NPL). This difference may be somewhat exaggerated because experience suggests that potential contamination identified early (i.e., at the site screening/scoring or PA/SI stage) for NPL sites, may not actually exist after investigations are complete.
Number of Operable Units (OUs) per Site	Moderately Reflective	A majority of the sites in both universes fall within the 1-3 OUs per site category (86% of NPL and 99% of the CCL). However, while about 15% of the NPL sites are in the 4-6 and 7+ OU categories, only 1 CCL site falls within those groupings.

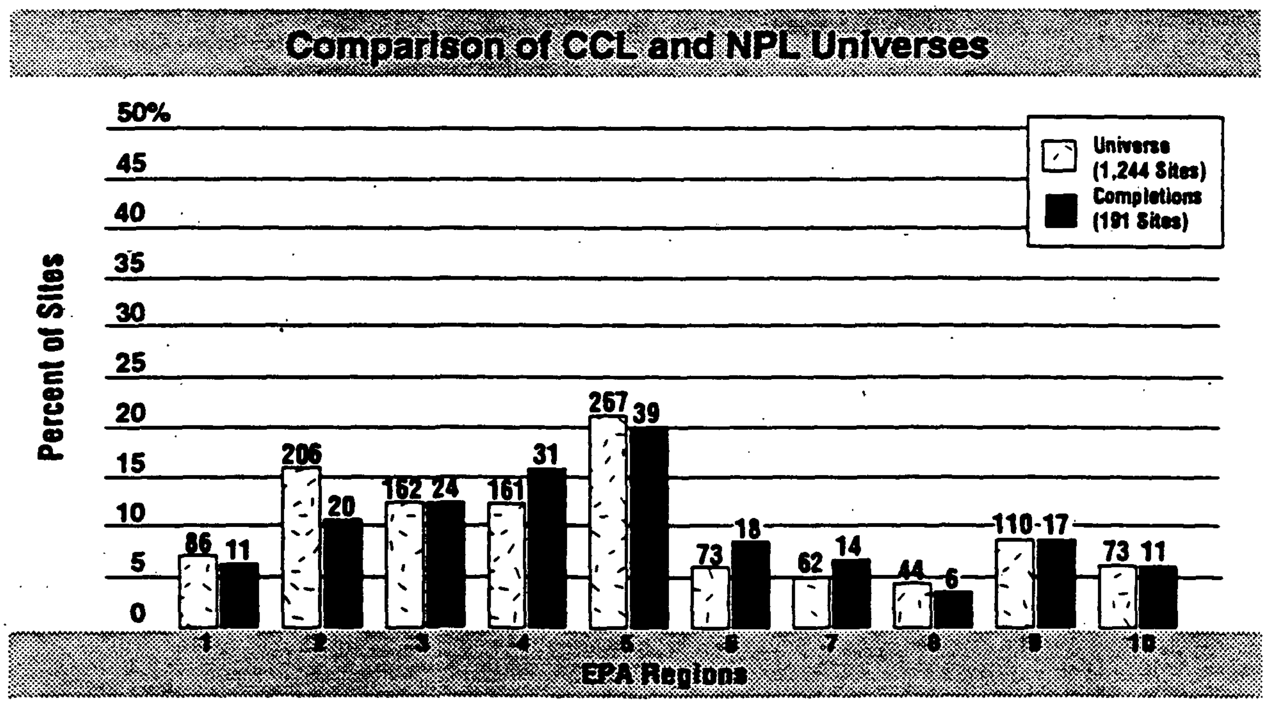
TABLE 1 (cont.)

Category of Comparison	Degree to Which Completion Universe Reflects the NPL Universe	Comments/Explanation
Sites by Lead Agency	Moderately Reflective	Fund-lead only sites represent a higher proportion of the completion universe (40%) than the universe as a whole. The percentage of mixed fund and PRP lead sites and the percentage of PRP lead only sites are lower for the CCL than for the NPL universe.
Number of Removal Actions per Site	Moderately Reflective	About equal portions of both the NPL and CCL universe (50%) have sites where removal actions have been undertaken. For both groups, a majority of the sites have had between 1 and 3 removal actions. Three percent of the CCL had more than 3 removals as compared to 16% of the NPL universe with more than 3 removals.
Date Proposed for Listing on the NPL	Moderately Reflective	The distribution of CCL sites by listing date is, for the most part, consistent with the NPL universe. The majority of both NPL and CCL sites are from the earlier listing years (i.e., prior to 1984).
Remediation Costs	Moderately Reflective	Adequate data on cost were only available for fund-lead sites. For the fund-lead sites, the two universes--CCL and the NPL--are similar across a range of costs. A large number of sites had unknown costs. The vast majority of these were PRP-lead sites.
Environmental Justice (% non-white minority population within a 1-mile radius of sites)	Highly Reflective	The distribution of sites with varying percentages of non-white minority population within a 1-mile radius of the site was similar for both the CCL and the NPL universes.



Note: Numbers indicate number of sites per category.
Source: RPM Site Data Base.

Figure 1. Federal vs. Non-Federal Sites



Note: Numbers indicate the number of sites per region.
Sources: RPM Site Data Base.

Figure 2. Breakdown of Sites by Region

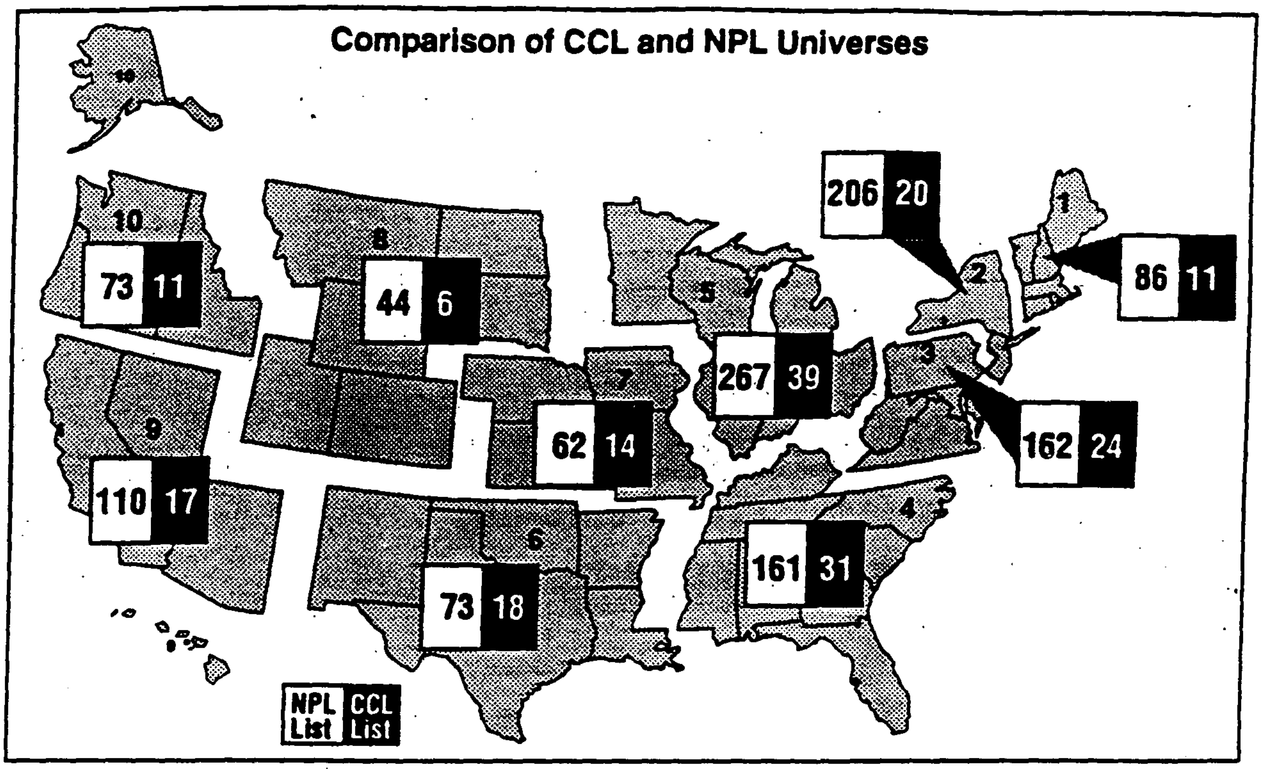
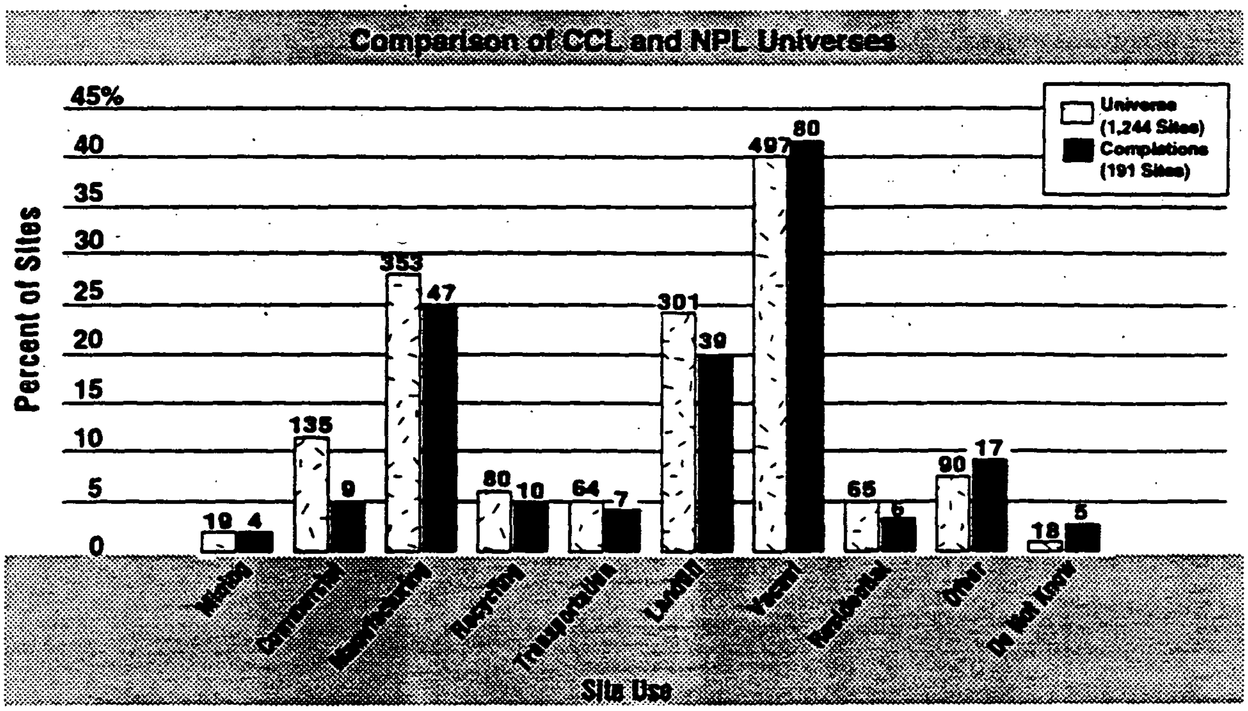
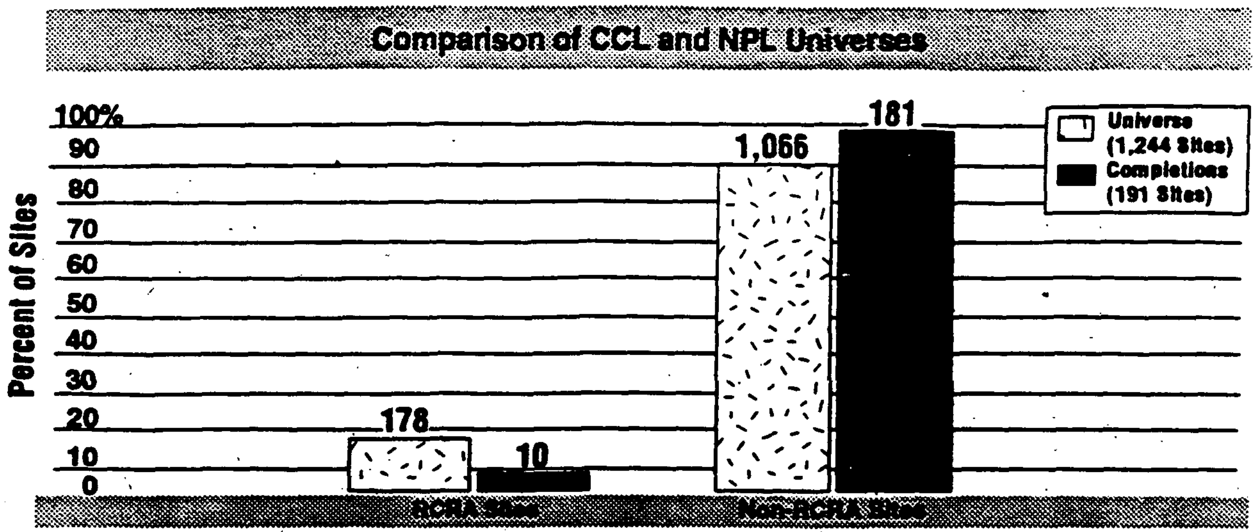


Figure 3. Regional Location of 191 sites on CCL in Relation to NPL Universe (1,244 sites in RPM Site Data Base)



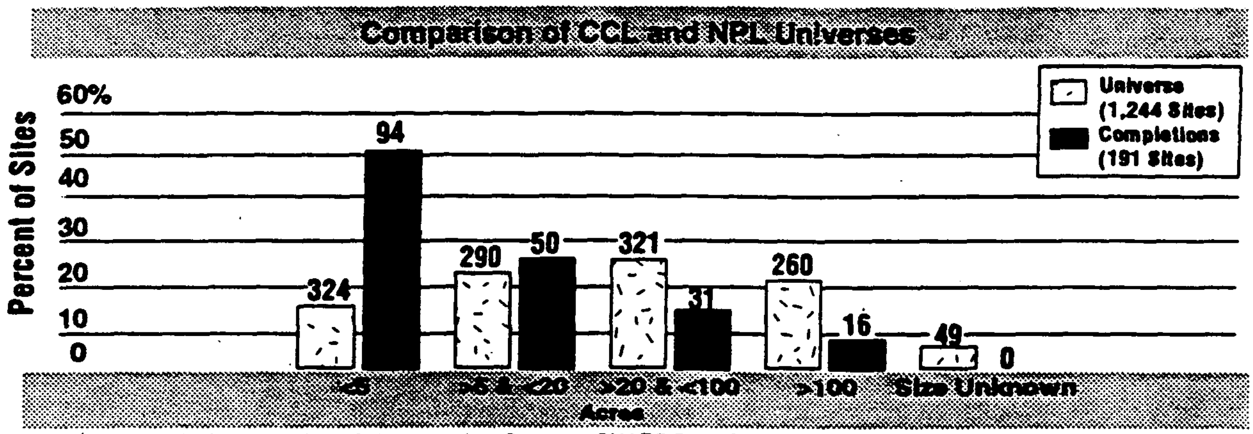
Note: Numbers indicate the number of sites per land use. Totals are larger than the total number of sites in each categories because some sites had multiple uses. Land uses compared here are at the time of contamination in contrast to current uses of sites cited in other parts of this report. Sources: RPM Site Data Base.

Figure 4. Land Use During Time of Contamination



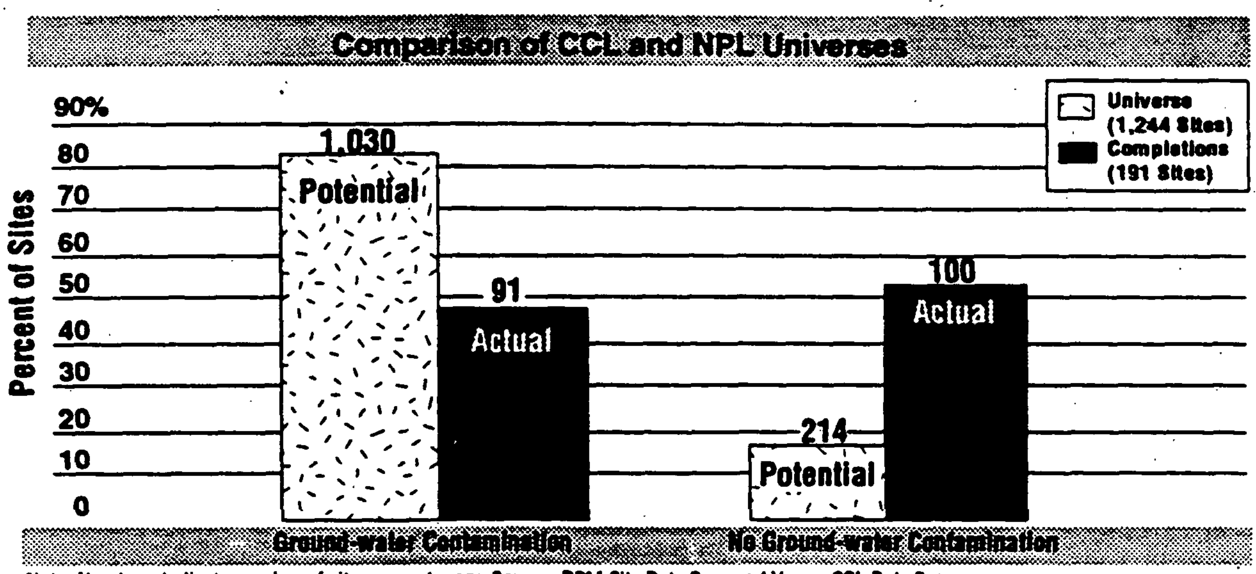
Note: Numbers indicate number of sites per category. Source: RPM Site Data Base.

Figure 5. RCRA Status



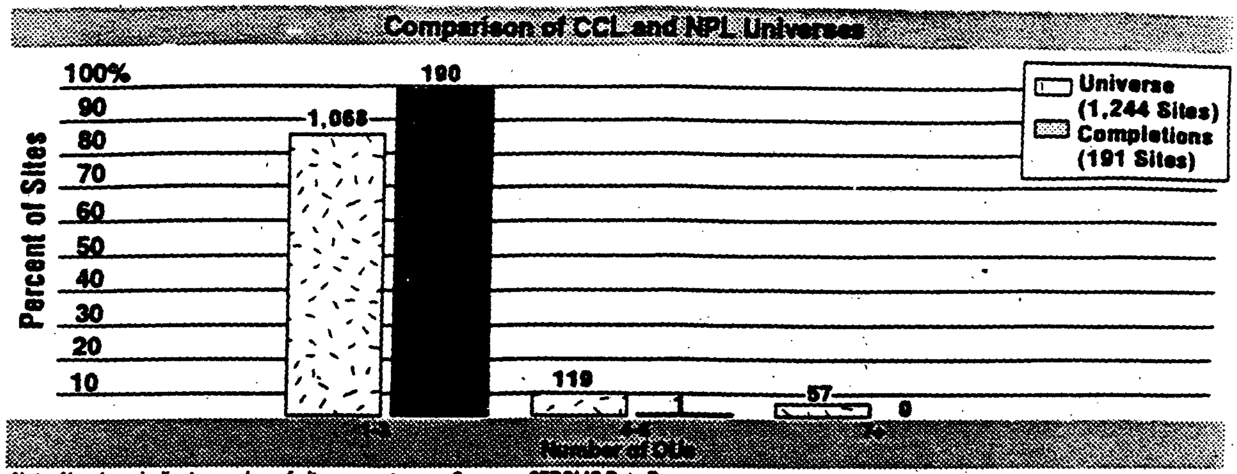
Note: Numbers indicate number of sites per size. Sources: SNAPS Data Base and Versar CCL Data Base.

Figure 6. Size of Sites



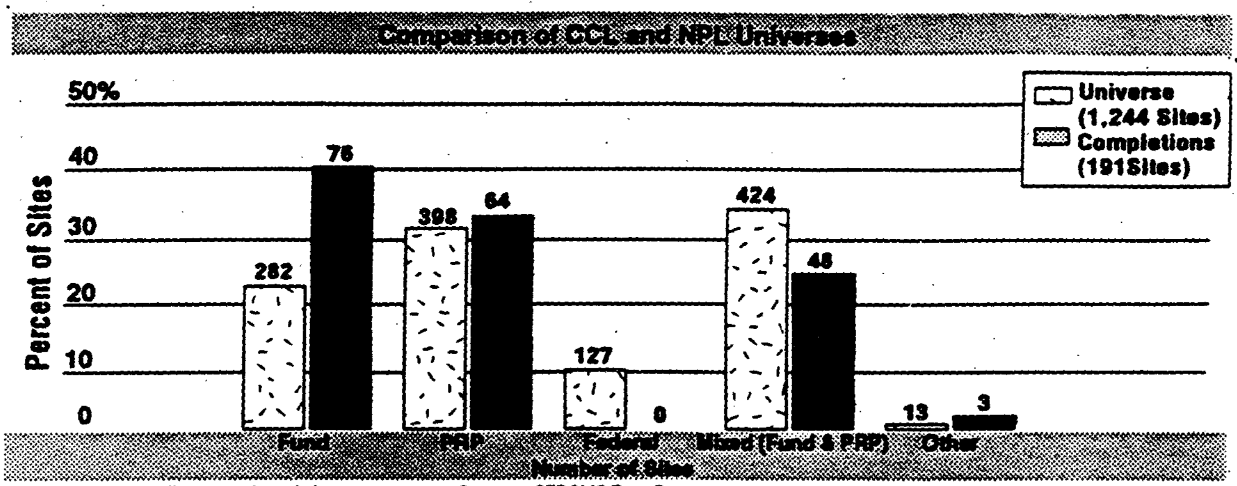
Note: Numbers indicate number of sites per category. Source: RPM Site Data Base and Versar CCL Data Base.

Figure 7. Sites with Ground-water Contamination



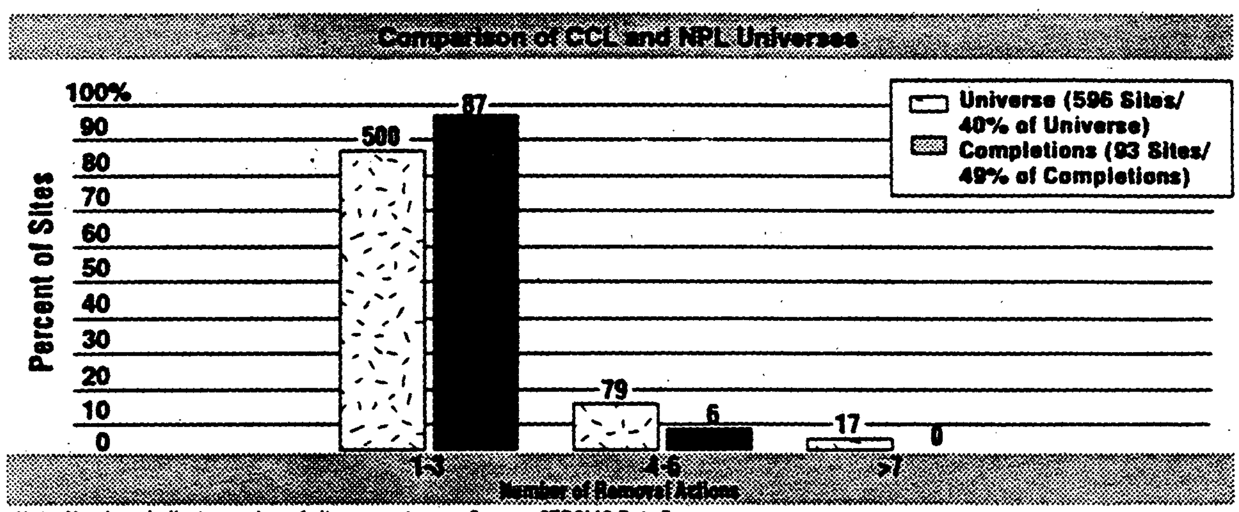
Note: Numbers indicate number of sites per category. Sources: CERCLIS Data Base.

Figure 8. Number of Operable Units per Site



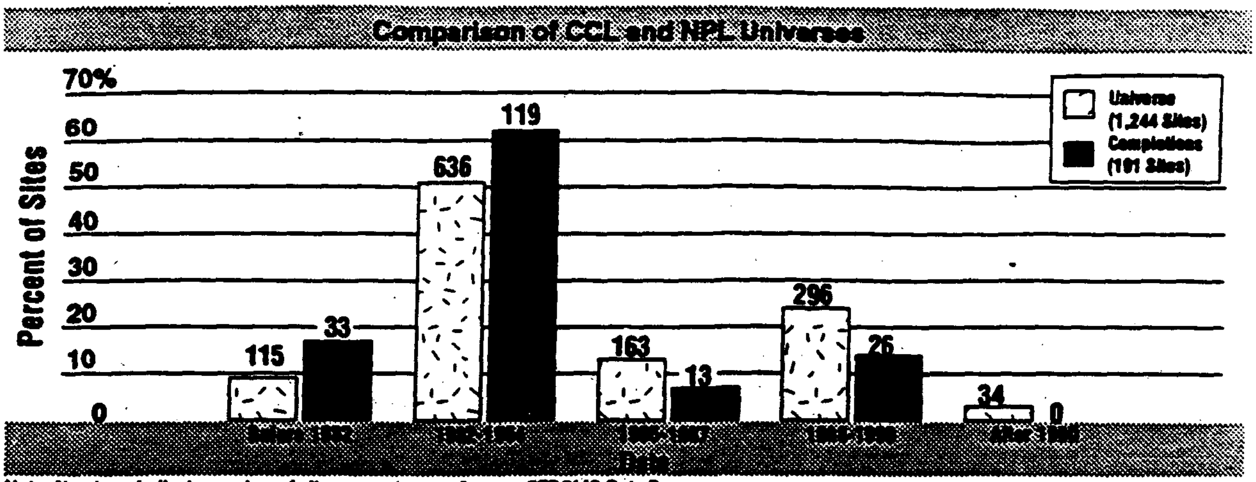
Note: Numbers indicate number of sites per category. Sources: CERCLIS Data Base.

Figure 9. Breakdown of Sites by Lead



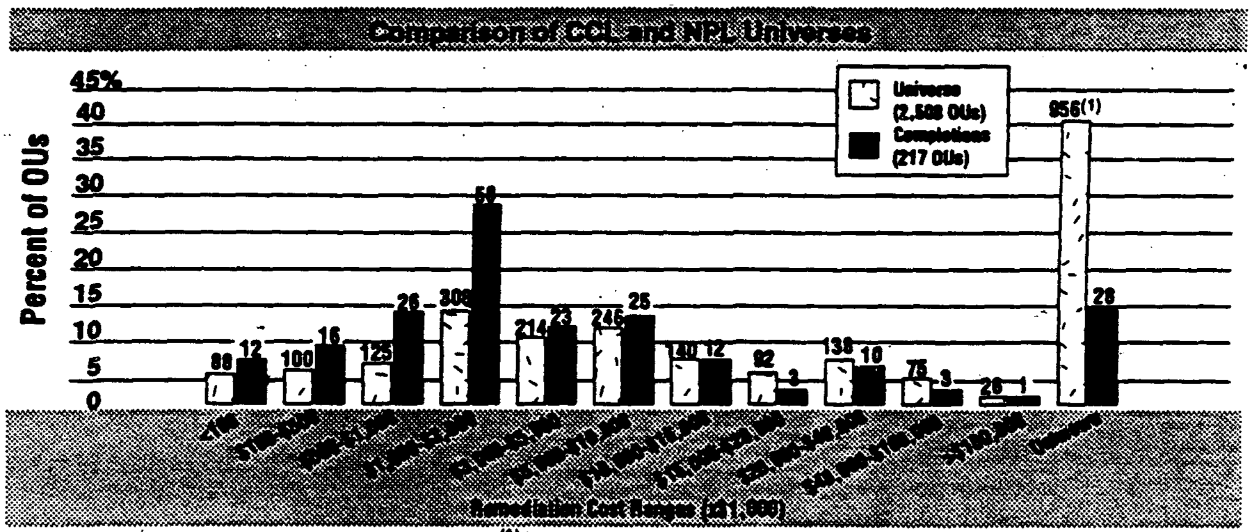
Note: Numbers indicate number of sites per category. Source: CERCLIS Data Base.

Figure 10. Number of Removal Actions per Site at Sites That Have Had Removals



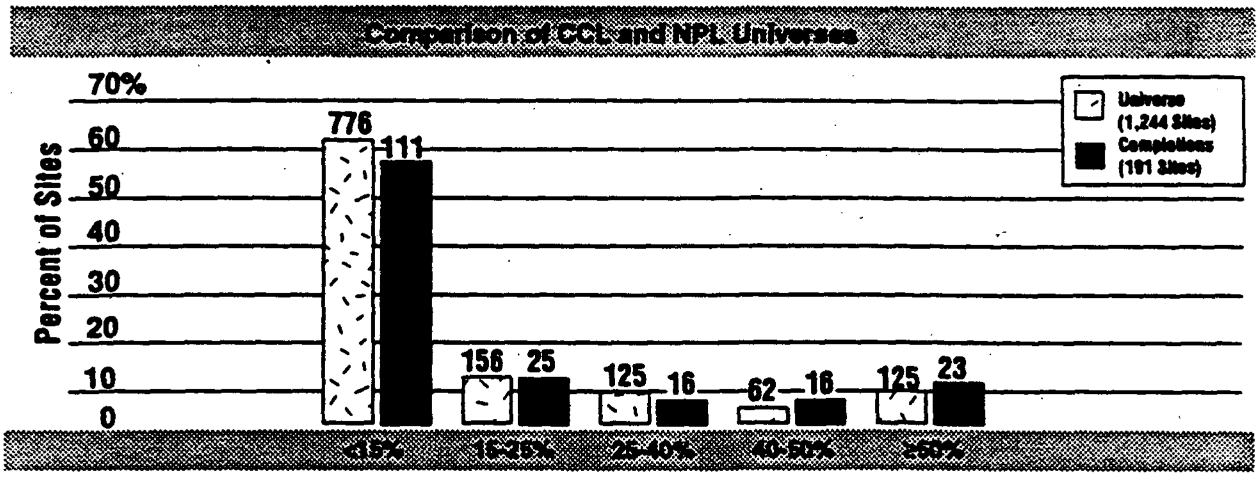
Note: Numbers indicate number of sites per category. Source: CERCLIS Data Base.

Figure 11. Breakdown of Sites by Proposed Listing in National Priorities List



Note: Numbers above colums indicate number of OUs in that category. (1)The majority of unknown sites are PRP lead sites. Sources: RPM Site Data Base, OPM Cost Spreadsheet.

Figure 12. Remediation Cost (Calculated by Operable Unit)



*37 out of 1,244 NPL sites had 0 population within a 1-mile radius. **3 of 191 CCL sites had 0 population within a 1-mile radius.

Figure 13. Distribution of Minority (Non-White Population) Within a 1-mile Radius

In order to address the questions of whether the cleanup of CCL sites is less costly than that anticipated for the universe as a whole, this study examined the distribution of cost ranges among operable units (OUs) for the NPL universe and the CCL universe. While there were a large number of sites in the comparison for which there was no cost information, these were primarily private party lead sites. The cost information available was primarily for fund lead sites.[5] Looking at this information, and if fund lead sites can be used as an indicator of the costs of the Potentially Responsible Party (PRP) sites, the distribution of costs shows that about 64 percent of the CCL operable units have costs of less than $5 million and 82 percent of the CCL operable units have costs of less than $15 million. This compares similarly with the NPL universe with 53 percent of the universe estimated to have costs of less than $5 million and 72 percent estimated to have costs of less than $15 million.[6]

Areas where the CCL universe shows the largest deviation from the NPL universe include the following categories:

- Size of Site - A larger percentage of the CCL sites are concentrated in the smaller acreage sites as compared to the NPL universe.

- Ground-water Contamination - A much smaller proportion of the CCL has actual ground-water contamination compared to sites on the NPL identified in the RPM site evaluation data base as having the potential for ground-water contamination. Experience suggests, however, that as investigations are completed at NPL sites, sites originally thought to have contamination may, in fact, not. Therefore, the differences between the two universes may be narrowed as the site investigations are completed. However, the differences are significant enough that they are likely to remain.

- Lead Agency - A higher proportion of CCL sites are fund lead (meaning, Federal employees and contractors using Superfund Trust Fund money are conducting the cleanup activity) as compared to the NPL universe, which has a higher proportion of private party and Federal Facility Lead sites.

- In addition to the comparison data in the above table, an examination of the 1991 NPL universe characterization study leads one to conclude that the typically higher value suburban properties may be under represented in the CCL universe. The 1991 study states that over one-third of the NPL universe (at the time of that study) were located in suburban areas. Only 15 percent of the CCL universe in this study are in suburban locations. Even allowing for imperfect matches in the definition of "suburban" location, the discrepancy seems significant and could cause any extrapolation to the universe to undervalue economic impacts.[7]

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[5]Private party lead sites are those where private individuals or companies pay for the cost of cleanup. Fund lead sites are primarily supported by resources from the Superfund Trust Fund and managed by EPA.

[6]Average costs frequently cited for cleanup of NPL sites and which are used for forecasting purposes typically aggregate high and low cost sites. Average estimates used are in the $25-million range.

[7]No graph is provided in this report, because graph data were not available to make a consistent comparison.

1.4.3 The Removal Program Universe. As described at the beginning of this chapter, the removal program undertakes cleanup actions at NPL and non-NPL sites to reduce risks, stabilize sites, or cleanup contamination. The accomplishments of this program are substantial; however, they are not the main focus of this report. An effort has been made to keep the discussion of the removal program separate from the main report and the accomplishments as represented by the CCL, by putting it in an appendix.

The universe for removal sites is large, containing over 4,000 actions at over 3,000 NPL and non-NPL sites. The sheer size of the universe made selection of a representative sample difficult. For this study, 76 sites, involving 178 removal actions, were chosen subjectively from the universe for inclusion. Volume 2 of this report contains fact sheets for each of the 76 sites. The environmental benefits attributable to removal actions at the 76 sites are described in Appendix B. In general, the sample of the removal universe in this study represents both a larger average dollar value than the removal universe as a whole and is more likely to be at NPL sites than the removal universe as a whole.

2.0 SUPERFUND ACCOMPLISHMENTS

2.1 Introduction

The purpose of the Superfund program is to reduce risks to human health and the environment by cleaning up sites that have been contaminated by past disposal practices. This chapter describes the environmental accomplishments of Superfund actions and focuses specifically on those benefits that are difficult to quantify in monetary terms. Underlying all of these environmental benefits are the immeasurable values of protecting human life, health, and well being and providing protection to future generations. Benefits addressed in this chapter include: cleanup of surface contamination, protection of aquifers and waterways, protection of ecologically sensitive areas, prevention of fire and explosion, and reduction of air contaminants, while restoring a sense of security to surrounding communities, providing environmental justice, demonstrating the use of innovative technologies, and reusing previously contaminated sites.[8]

Cleanup actions to reduce risk occur long before site work has been completed and at many sites that are not on the Superfund NPL. Long-term actions, called "remedial actions," are taken at NPL sites as portions of the site have been investigated and are ready for cleanup. Removal actions are taken at both NPL and non-NPL sites to reduce risk and address imminent hazards. The Superfund program has completed more than 4,000 removal actions at more than 3,000 sites. Many of these actions were undertaken to alleviate a serious immediate threat to persons living near sites with uncontrolled hazardous substances and represent substantial levels of cleanup. In a number of cases, removal actions alone were used to cleanup NPL sites. In other cases, removal actions not only make non-NPL sites safe, but result in a "complete" cleanup of a site that, had it been on the NPL, would have been put on the CCL or would have been deleted from the NPL. In these latter cases, the site can be restored to valuable use in the community. In order to maintain the focus of the report on the accomplishments of the Superfund program as measured by the CCL, examples of case studies illustrating the benefits of the removal program are not included in this chapter; instead, they are presented separately in Appendix B.

[8]While this report focuses on a specific list of benefits, these are clearly not the only benefits of the Superfund program. Many others--both environmental and economic--could potentially be addressed.

2.2 Summary of Environmental Benefits at Construction Complete Sites

The most common environmental benefits at the CCL sites relate to the cleanup of surface contamination to make sites safe and protect ground water and surface water.[9] Cleanup levels with regard to the land media have been achieved at 89 percent of the CCL sites, while cleanup of the land media employing innovative technology (i.e., bioremediation and soil flushing) is ongoing at two sites. Figure 14 depicts media cleanup achieved and underway at 191 CCL sites.

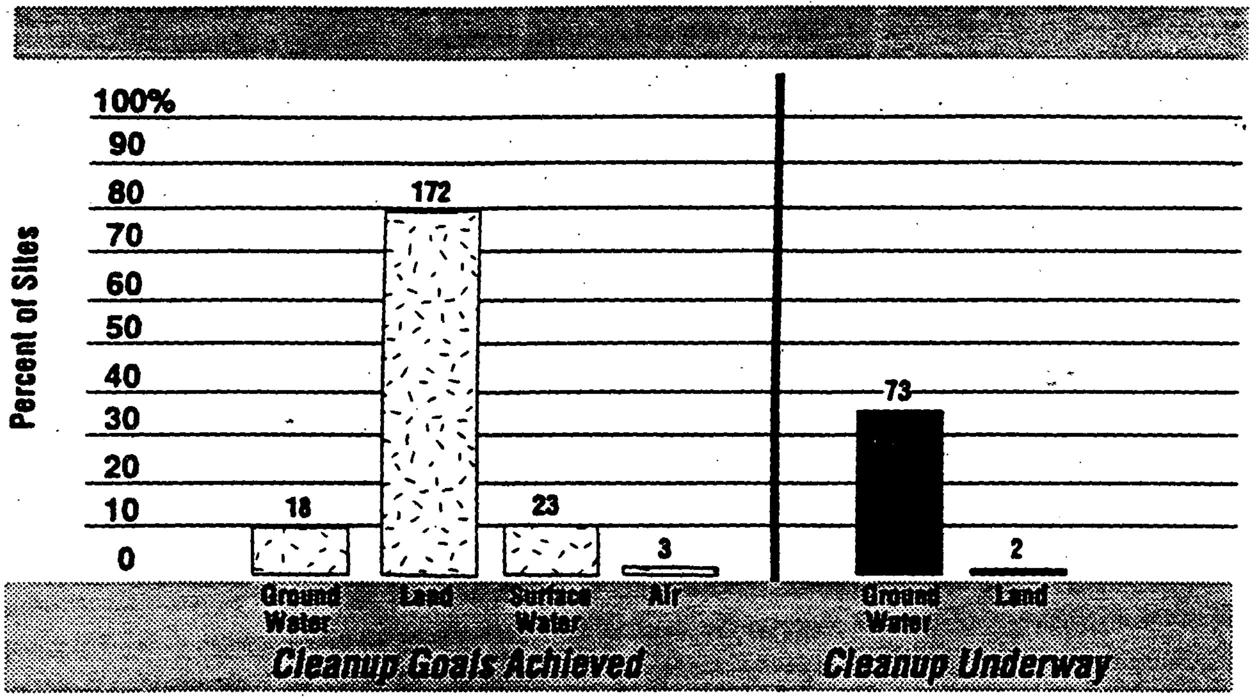

Figure 14. Risk Reduction at Completed Sites

[9]The environmental benefits at both CCL sites and removal sites are remarkably similar. The 76 removal action fact sheets (contained in Volume 2) also describe the most common actions as being surface cleanups, often to eliminate an imminent hazard such as risk from fire, explosion, or other direct contact as well as against further release to other media (e.g., ground water).

Achieving cleanup goals is accomplished in a number of different ways at Superfund sites. For surface cleanup, waste may be removed entirely, and the surface cleaned for unrestricted surface use, or some waste may be contained onsite with use restrictions that ensure the containment remains protective. Containment can involve the surface capping of high volumes of soil with low levels of contamination, the management of residuals that are the end product of treatment, and capping of large landfills. In some cases, containment involves building a secure vault to encapsulate waste, in addition to capping. Of 172 sites for which contaminated land surfaces were made safe, 86 sites were cleaned to unrestricted use, and 86 sites had long-term waste management on the surface.

Surface cleanup not only protects people and animals from direct exposure to contaminated lands, but often removes a source of continuing ground-water and surface water contamination. Surface cleanups have resulted in the protection of ground water in 77 of the completed sites that were the subject of this study. Achieving this protection normally involves removal or containment of contaminated materials in and on the surface.

The actual cleanup and restoration of the ground-water medium are completed at 18 sites and underway at another 73 sites. (Some sites have also had a surface or source control measure that protected ground water and are counted among the 77 sites with surface cleanup to protect ground water.) Achievement of ground-water goals can be accomplished by pumping and treatment of ground water to return the ground water to selected standards, allowing natural attenuation to achieve selected standards (along with active monitoring of the contamination), and stabilizing a plume of contamination to ensure that it no longer migrates. At over 90 percent of the sites with ground-water management underway, the cleanup activity involves active pumping and treating of ground water to meet selected cleanup standards.

Superfund cleanups have helped improve water quality at some of our Nation's most important waterways by alleviating contamination sources at sites near tributaries and rivers. By alleviating the contaminated sources, cleanups at such sites benefit the immediate site vicinity and also end water pollution downstream. Left unabated, the contamination to the waterways could have enormous environmental, human health, and economic consequences. Ecologically sensitive areas have been protected by Superfund cleanups in highly populated areas as well as in remote areas. These include the protection of floodplains, wetland habitats, and endangered species.

In some cases, Superfund cleanups have enabled the development of community amenities, such as recreation areas. Examples are the Chisman Creek site near Newport News, Virginia, where a community sports park has been developed, and the Petersen Sand & Gravel site in Libertyville, Illinois, where a recreational lake is planned. Successful businesses now occupy some former NPL sites. Two examples are the Luminous Processes, Inc., site in Athens, Georgia, now occupied by a McDonald's restaurant, and the Tri-City Oil Conservation site near Tampa, Florida, now occupied by an automobile garage and service center.

Innovative soil treatment technologies, including thermal desorption processes and bioremediation technologies, have contributed to the success of cleanups at several Superfund sites. By demonstrating the effectiveness of innovative approaches, these sites have served to advance the state-of-the-art in hazardous waste cleanups. Other sites will benefit by the experience gained through application of the innovative technology.

2.3 Benefits

2.3.1 Benefits of Cleaning up Surface Contamination. As described above, the cleanup and/or stabilization of surface contamination not only removes the threat of direct exposure to potentially dangerous chemicals, but also removes the source of contamination to other media such as ground water, surface water, and air. The most common cleanup actions that have been completed are surface contamination cleanups. These actions can include complete removal of a surface contamination source to health-based levels, the capping of a contaminated area or landfill to ensure that rainwater does not infiltrate and carry contaminants to the ground water or surface water, or treatment of waste with replacement and capping of the residuals. Institutional controls such as deed restrictions are used in combination with surface cleanup measures when waste is left onsite and capped to ensure that the capped portion of the site is not used for inappropriate purposes and that the cap is maintained properly. Cleanup actions at 172 CCL sites have included making the surface safe. At 86 of these sites, surface cleanup has made the site safe for totally unrestricted use. Examples are cited in Box 1:

- ☞ The A.L. Taylor site in Kentucky was one of the worst illegal dumps in the Nation and the site of the largest drum removals in the history of the Superfund program. The site was contaminated with over 140 different chemical compounds being discharged from over 17,000 deteriorating and leaking drums. Cleanup actions ensured that the recreational uses and biota in downstream surface waters would be protected.

- ☞ At the Luminous Processes, Inc. site in Georgia, over 18,000 cubic feet of soil and contaminated materials were removed for offsite disposal. The site was contaminated with radioactive isotopes that had been used to paint clock dials. As a result of cleanup, the site no longer poses a threat to the neighboring community.

Box 1. Examples of Sites Where Surface Contamination Was Cleaned Up

2.3.2 Benefits of Avoiding Contamination of Essential Aquifers. Estimates at NPL sites suggest that as many as 70 to 80 percent of the sites have ground-water contamination. Cleanup of this contamination can be a difficult and lengthy process and often involves pumping and treating of ground water for many years. For this reason, a section of the CCL is designated for Long Term Response Actions (LTRA) where cleanup activities on the surface are largely complete, but pumping and treating of ground water may be ongoing.[10] Many actions at sites, however, protect ground water long before the cleanup of the ground water is complete. Surface actions taken to make sites safe (removal of waste or capping of material) not only protect people and animals from exposure to hazardous materials, but also remove a continuing source of ground-water contamination (as well as controlling sources of runoff into surface water bodies and potential air contamination). Initiation of ground-water pumping and treating is designed to treat the contamination. In addition, it stops the continuing spread and draws in the boundaries of the plume long before cleanup-to-standards has been achieved.

Among some of the most important Superfund cleanups are actions taken to prevent serious contamination to major aquifers that are the drinking water source for large population centers. At 25 percent of the construction complete sites, protection of drinking water wells where people currently rely on an underground aquifer as a source of drinking water is a major goal. While the numbers of people dependent on the ground water at these sites vary widely, at 30 percent (15) of these sites, the range of people served exceeds 5,000, with several over 100,000. In addition, protected aquifers discharge to other aquifers, to surface water bodies, or to other sensitive ecological environments (e.g., wetlands). Twenty-seven percent of the CCL sites protected other environmental values through aquifer protection. (See Figure 15.) Examples of completed sites where essential aquifers have been protected are described in the Box 2.

☞ An area-wide approach has been taken in the South Bay area of San Francisco, California, to alleviate threats to ground water from several sites. Contamination threatened public and private drinking water wells in the densely populated area and posed a potential threat to the common ground-water basin serving the entire San Francisco Bay area. If left unabated, the cumulative effect of ground-water contamination in the area could affect the only municipal water source. Extensive treatment of the water could become necessary prior to distribution. The added costs, as well as real or perceived risks associated with the water supply, would have a substantial negative impact on the desirability of housing and the value of real estate.

Box 2. Examples of Sites Where Contamination of Essential Aquifers Was Avoided

[10] Two sites on the CCL LTRA list have ongoing soil cleanup actions that are similar to ground-water pump and treat in that they may take a number of years to complete.

Seven NPL sites in the South Bay area of San Francisco, all with ground-water contamination, are grouped closely enough to cause extensive cumulative impacts to the regional water supply. Facilities at these sites have used a variety of toxic chemicals in the processing of semiconductors and other high-technology parts. Chlorinated organic solvents and other organic compounds are the primary cause of contamination in the soil and ground water. The San Francisco Bay Regional Water Quality Control Board is overseeing the ground-water cleanup. Both the EPA and the California Department of Health Services are providing support to the Regional Board during the investigation and cleanup processes.

Within a 3-mile radius of these groupings of sites, nearly 700,000 residents rely on local drinking water sources. More than 89,000 owner-occupied housing units are potentially affected. The approximate aggregate value of homes potentially affected is more than $24 billion. Although the analysis used a 3-mile radius, the radius of the area potentially affected by the ground water extends far beyond 3 miles, because ground water for the county is extracted from a regional aquifer and supplied to dwellings via municipal water lines. As a result, distance to the origin of contamination may have little bearing on the likelihood of the occupants of a given residence discovering that its drinking water supply is contaminated.

☛ At the Alpha Chemical Corporation (now Alpha Resins Corporation) site near Lakeland, Florida, the State discovered volatile organic compounds (VOCs), especially ethylbenzene, in the near-surface aquifer stemming from an unlined wastewater impoundment on the surface. Alpha Chemical has produced polyester resin at the 32-acre site since 1967 and used the impoundment to contain wastewaters long enough for the organic components to evaporate or break down through natural processes. If left unchecked, continued use of the impoundment would have threatened the much deeper Floridian Aquifer, which supplies drinking water to several communities. The contamination source was capped to prevent further spreading of the chemicals. Quarterly monitoring has shown decreasing levels of the chemicals of concern. Alpha Resins has modified its processes and upgraded its wastewater treatment to control pollutants.

☛ When the Gold Coast Oil left its solvent reclaiming site in Miami, Florida, it abandoned some 2,500 corroded and leaking drums. Soil and shallow ground water beneath the facility were contaminated with lead, zinc, and various organic pollutants, including methylene chloride. This contamination was of major concern because the deeper Biscayne Aquifer is the principal source of drinking water in southern Florida and is a nationally designated Sole Source Aquifer. The site cleanup included removing contaminated liquids, sludges, drums, and soil from the surface of the site. Extraction and treatment of ground water continues.

Box 2. Examples of Sites Where Contamination of Essential Aquifers Was Avoided (cont.)

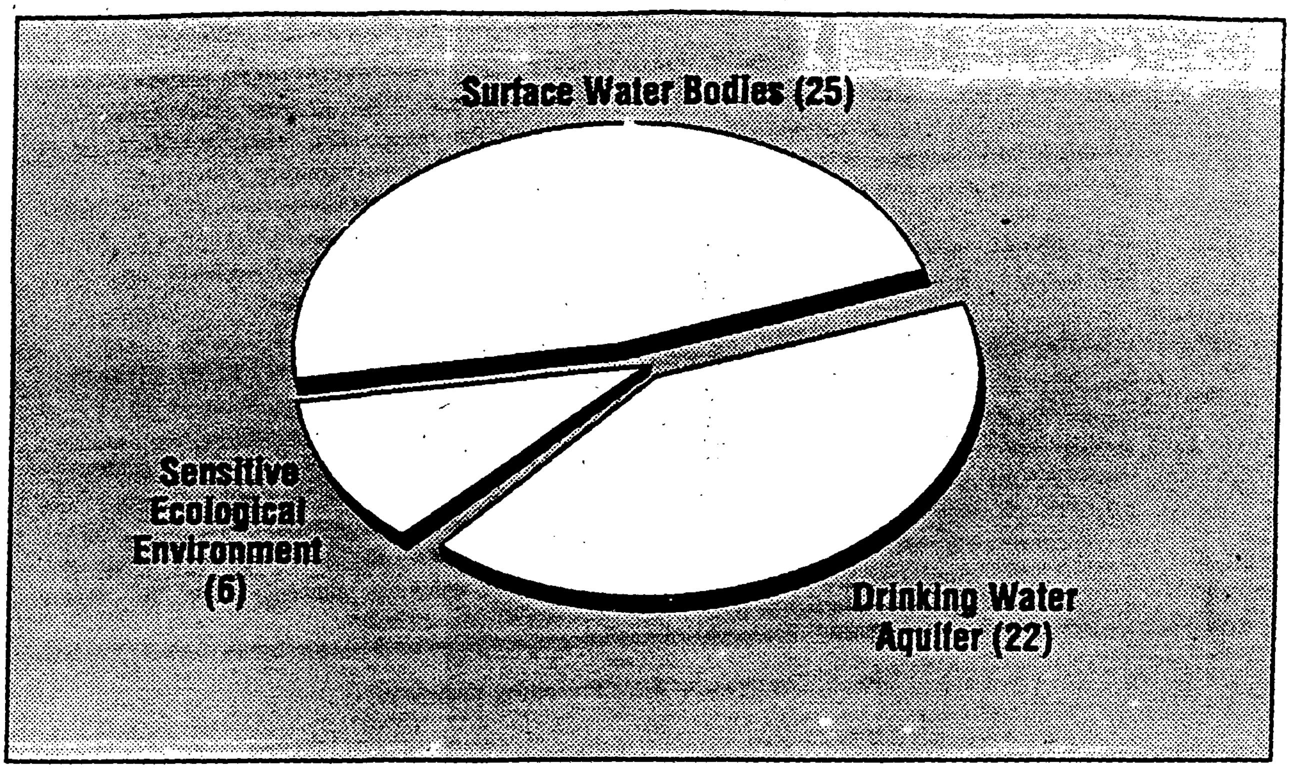

Figure 15. Protected Aquifers Discharge to Other Environments

2.3.3 Benefits of Protecting Waterways. In the not-too-distant past, landfills and other types of disposal facilities were often deliberately located in floodplains close to large rivers. A popular view held by industry and by many municipalities was that dilution by the river was a good way to get rid of unwanted chemicals. Some of our Nation's worst water pollution problems stem from sites where this philosophy was practiced. Because current hazardous waste and water pollution regulations limit such actions, many sites near major waterways have been abandoned and are now included on the Superfund NPL. By alleviating the contaminating sources, cleanups at such sites benefit the immediate site vicinity and also stop water pollution downstream. As shown in Figure 15, cleanup of ground-water aquifers is often related to the protection of surface water bodies. Contaminated ground water often discharges to surface water and can be a continuing source of contamination. At 25 sites, protection of surface water quality was a goal of aquifer protection. Examples of sites where waterways were protected are presented in Box 3.

☞ The 6-acre Bruin Lagoon NPL site in Pennsylvania is located on Bear Creek, a tributary of the Allegheny River. This site was used for 40 years for disposal of refinery and other wastes, and periodic flooding spread contamination from the site to the river. The Allegheny River is an important water supply source for many industries and communities, including Pittsburgh. On at least one occasion, a fishkill resulting from the Bruin Lagoon contamination was seen 100 miles downstream. Construction and cleanup have finally ended the environmental problems emanating from this site. The cleanup work involved stabilizing, containing, or removing contaminated liquids and sludges. All wastes remaining on the site have been stabilized and capped.

☞ The FMC Corporation NPL site is located adjacent to the Mississippi River in Fridley, Minnesota. For about 20 years, until the early 1970s, the company disposed of hazardous waste in an 11-acre unlined landfill at the site. Contaminated leachate from the disposal pits has seeped into the near-surface and confined alluvial aquifers that discharge to the Mississippi River. The water supply intake for the city of Minneapolis is located 1,500 feet downstream from the FMC property. The remedial actions at the site, which include soil aeration and ground-water extraction, are protecting the Minneapolis drinking water intake. Construction of the remedy has been completed at this site. FMC's naval ordnance manufacturing complex continues operations adjacent to the area where ground water is being extracted to confine and alleviate the contamination.

Box 3. Examples of Sites Protecting Waterways

2.3.4 Benefits of Protecting Ecologically Sensitive Areas. Polluted waters from a contaminated site can sometimes pose a major threat to wetlands and other ecologically sensitive areas. These areas often include important habitats, the disruption of which could damage entire ecosystems. Superfund cleanups at construction completion sites have resulted in environmental benefits in ecologically sensitive areas.

Of the 191 CCL sites in this study, 15 have a current use that is identified as an environmental use. Most of these sites are in floodplains; several also contain or are adjacent to wetland areas, and two serve as wildlife preserves. At six sites, the discharge to sensitive ecological environments was the concern in protection of a ground-water aquifer. Examples of these types of sites are summarized below in Box 4.

☞ Cleanup and construction completion at the remote Bayou Sorrel site in Louisiana removed imminent threats to the wetland environment and eliminated a dangerous, illegal disposal operation. Petrochemical wastes were received in large, unlicensed ponds at the site beginning in 1977. The facility was closed after State and EPA regulators found some 36,000 cubic yards of waste. Flooding and poor drainage at the site threatened a large wetlands area that included the habitat of three endangered species. All exposed disposal areas were dewatered, filled, and covered. Final cleanup actions were taken to control runoff, limit erosion, and eliminate surface water ponding; the

Box 4. Examples of Sites Protecting Ecologically Sensitive Areas former disposal areas were drained, capped, and covered. All contaminants have now been contained, and exposure potential has been eliminated. The capped area is fenced and maintained by the party responsible for the contamination. Hunting and fishing are again safe and continue in the area surrounding the site.

☞ The Triana/Tennessee River site in Alabama covers 11 miles along two tributaries of the Tennessee River. From 1954 to 1970, operations at Olin Corporation and the nearby Redstone Arsenal released DDT into an adjacent tributary system. It is estimated that more than 400 tons of DDT residues accumulated downstream in the sediment. Although the Olin plant was demolished in 1971, the DDT residues persisted and eventually contaminated fish and the nearby Wheeler Wildlife Refuge. Construction and cleanup actions at the site involved bypassing and burying onsite the sediments from the most contaminated channel. Studies to monitor the movement of contaminants through the water and wildlife are continuing. Four years after beginning the cleanup, overall DDT levels in fish have decreased by as much as 86 percent and DDT levels in water by 93 percent. The cleanup effort by the Olin Corporation was nominated for the National Wildlife Corporate Conservation Council Award in 1990 and 1991.

☞ The Cecil Lindsey site in Arkansas was used as a salvage operation during the 1970s and 1980s. Machinery, cars, scrap metals, drums of pesticides and oils containing heavy metals, and industrial and municipal wastes were disposed of onsite. Heavy metals and VOCs were found in the ground water and the soil. The site is adjacent to the Village Creek wetlands and forested bottomland. Cleanup activities at this site reduced the threat to these environmentally sensitive areas.

☞ Superfund actions at the Woodbury Chemical Company site in Florida eliminated potential risks to manatees, a designated endangered species that frequented a canal located approximately 2,350 feet northeast of the site. Woodbury Chemical Company formulated pesticides and fertilizers on site beginning in 1975. Surface contamination from agricultural chemicals was discovered in 1985. Removal of contaminated soils reduced the threat of offsite migration and contamination of the Biscayne Aquifer.

☞ As a result of remedial activities at the Mowbray Engineering Company site in Alabama, sensitive wetlands were spared further contamination. For more than 20 years, during its electric transformer repair operations, the company disposed of approximately 9,000 gallons of PCBs in transformer waste oils at the site. EPA's remedy included treating or disposing of waste oils in the swamp area, diverting surface runoff around the swamp area, and regrading and replanting the swamp. Cleanup activities also eliminated soil, surface water, and ground-water contamination, making the site safe for nearby residents.

Box 4. Examples of Sites Protecting Ecologically Sensitive Areas (cont.)

2.3.5 Benefits of Fire and Explosion Prevention. Superfund actions have also reduced threats to human health and the environment from fires and explosions. Examples are shown in Box 5, which follows.

- Explosive, flammable, toxic, and reactive wastes were removed from the Keefe Environmental Services site in New Hampshire. These actions protected 1,300 nearby residents and the water resources adjacent to the site.
- The Walcotte Chemical Co. site in Mississippi was contaminated with explosive chemical wastes that originated from the storage of chemicals used in producing fertilizers, including formic acid, various pesticides, and VOCs. Due to the explosive nature of the wastes, local residents were temporarily evacuated while cleanup occurred. Cleanup involved removing the deteriorated drums from the site. These actions eliminated the threat of explosion and fire.
- The threat of explosion was eliminated at Lee's Lane Landfill in Kentucky. Residents around the site reported flash fires around their water heaters. These fires resulted from the presence of methane and other toxic gases venting from the landfill. The State installed a gas venting system at the landfill, removed contaminated drums from the site, and implemented institutional controls to protect human health and the environment.

Box 5. Examples of Sites Preventing Fire and Explosion

2.3.6 Benefits of Reducing Air Contaminants. Several construction completion sites have had remedial actions that reduced threats associated with air contaminants. Examples are presented in Box 6.

- At the Johns Manville Corporation site in Illinois, the cleanup eliminated the threat of airborne asbestos fibers. Manufacturing wastes laden with asbestos and toxic substances had been dumped in pits at the site. Airborne asbestos from the pits endangered approximately 5,000 workers and residents and threatened ecological areas in the adjacent State park. Capping the waste materials with a multilayer cap and implementing institutional controls reduced the threats associated with the site.
- Remediation of the Pesses Chemical Company site in Texas alleviated the potential health threat posed by airborne contaminants in a nearby freight yard to area residents and patients at a neighboring rehabilitation center. The site conducted metals reclamation operations, resulting in emissions of cadmium. Operations at the site were discontinued, and contaminated materials were covered with a concrete cap.

Box 6. Examples of Sites Reducing Air Contaminants

2.3.7 Benefits of Innovative Treatment Technologies. Innovative treatment technologies include cleanup approaches that are not considered to be established technologies. Viable innovative technologies may have performance or cost advantages compared to established traditional treatment technologies. Innovative treatment technologies have been used in the cleanup of soil at a number of NPL sites. Innovative approaches have also been developed to facilitate cleanups during removal actions. The site experience with the innovative treatments serves to demonstrate the applicability and effectiveness of the technologies, thus promoting their use elsewhere. For these innovative treatment sites, benefits accrue to the site, and to the community, in the cleanup of the site itself. An additional benefit, however, is the advancement of the particular technology employed for the use of other sites. Examples of sites using innovative treatment technologies are presented in Box 7.

- An innovative thermal desorption process was employed in the cleanup at the McKin Co. site in Gray, Maine. This site was formerly used as a waste collection, transfer, and disposal facility. An innovative soil aeration process was used to remove VOCs from contaminated soil. The excavated soil was carried to the onsite treatment facility on an enclosed conveyor belt. The soil was then heated in a rotating drum to remove the VOCs. Approximately 12,000 cubic yards of contaminated soil (enough soil to cover a football field to a depth of 10 feet) were excavated, treated onsite, and returned to the excavated area.

- For the cleanup at the Wide Beach Development site in Brant, New York, soil contaminated with PCBs was treated using an anaerobic thermal process (ATP) that was originally developed to recover crude oil from tar sands and oil shales. The ATP treatment technology was successful in lowering the PCB levels from as high as 1,000 parts per million (ppm) to less than 2 ppm and resulted in a permanent solution that did not necessitate the transfer of contaminated soil from the site. Approximately 40,000 tons of soil were treated successfully.

- At the Brown Wood Preserving site in Live Oak, Florida, innovative bioremediation technologies were employed to treat soils containing carcinogenic creosote constituents. The contaminated soils were treated onsite in a 14-acre treatment area constructed with a liner and an internal drainage and spray irrigation system.

Box 7. Examples of Sites Using Innovative Treatment Technologies

2.3.8 Benefits of Restoring a Sense of Security. Restoring a sense of security to surrounding communities is an important benefit of the Superfund cleanup activities. Restoring a sense of security and well-being to a community haunted previously by the specter of contamination is an accomplishment that cannot be easily measured. In some cases, the Superfund response has involved actions to reduce the immediate threats to the community. Depending on the nature of the threat, these actions have included relocating residents temporarily, decontaminating homes, issuing public health advisories, and extending public water supply lines or other actions to guarantee potable water to residents previously dependent on private wells. Long-term actions that restore sites to beneficial use also provide residents with a sense of well-being. The following examples in Box 8 illustrate how Superfund cleanups have benefited communities by alleviating the dangers associated with releases of hazardous chemicals and restoring a sense of security. Ongoing monitoring of sites also ensures that the threat has been removed and contributes to a community's peace of mind.

- The Wide Beach Development site in Brant, New York, is once again a quiet lakeside community. Construction of the remedy has been completed at this site. The 55-acre site encompasses more than 60 homes. As a result of remedial action, threats posed by widespread PCB contamination in the small community have been mitigated. When contamination stemming from PCBs in oil sprayed on dirt roads was discovered, EPA moved quickly to protect the community. The initial actions were aimed at minimizing exposure by: decontaminating homes; providing temporary pavements to the contaminated roadways, driveways, and drainage ditches; and installing filters on individual drinking water wells. The long-term cleanup that followed involved excavating and chemically treating PCB-contaminated soils, backfilling all excavated areas, and repaving roads and driveways. Some families were relocated temporarily to nearby hotels during the cleanup. An onsite wetlands area damaged during the cleanup was restored in 1992.

- Residents living in the vicinity of the Matthews Electric Plating site near Roanoke, Virginia, no longer need to rely on bottled water or be concerned about health effects of chromium-contaminated ground water. By extending the Salem water supply lines, the Superfund action has eliminated the community's water problems. Twenty-eight homes were connected to the public water supply in 1986. As a result, these properties have experienced an increase in value.

Box 8. Examples of Sites Demonstrating Restoring a Sense of Security

2.3.9 Beneficial Use and Environmental Justice. Some Superfund sites are located in inner cities. This may result in increased risks of exposure to onsite contaminants among specific subsets of the population (i.e., minorities). Cleanup of these sites provides benefits to these populations by alleviating the threats from these sites.

Analysis of population and demographic data collected by the Superfund office at EPA indicates that approximately 12 percent of the CCL sites have a majority (i.e., more than 50 percent) non-white population within a 1-mile radius of the sites. Of these, approximately 50 percent are in urban locations. Box 9 presents two examples of such sites.

- Remediation of the Pesses Chemical Company in Fort Worth, Texas, successfully controlled contaminant migration to surrounding properties. Consolidation of contaminated onsite and offsite materials and their subsequent stabilization alleviated a potential source of health risk. The potential health threat posed by airborne heavy metal contamination to nearby workers, residents, and patients at a neighboring rehabilitation center was averted. Five schools and 20,000 people live and/or work within a 1-mile radius of this inner-city site.

Box 9. Examples of Sites With Environmental Justice Benefits

Chemical Metals Industries occupied two parcels of property from the 1950s until 1981 in the mainly residential inner-city section of Westport in Baltimore, Maryland. The cleanup of the site was the Nation's first Superfund activity that included remedial action. The site was an abandoned precious metals recovery facility that housed drums of caustics and corrosive liquids. The two parcels are now used as field headquarters by the Maryland Department of the Environment and a neighborhood park.

Box 9. Examples of Sites With Environmental Justice Benefits (cont.)

2.4 Environmental Benefits Through Removal Actions

Most of this report describes 191 sites on the NPL for which construction of long-term cleanup activities has been completed. The removal program with its immediate risk reduction activities also accomplishes substantial environmental and economic benefits at NPL and non-NPL sites. Insight into the benefits of the removal program is provided by 178 removal actions conducted at 76 sites that are included as case studies in this report. A more detailed description of some of the benefits of the removal program is provided in Appendix B.

2.5 Superfund Successes Addressed in Volume 2

Volume 2 of this Beneficial Use Study is a catalog of Fact Sheets for 300 Superfund sites (224 construction completions and 76 removals). The 224 CCL sites include the 191 sites contained in this study, as well as most of the 37 sites that were outside of the scope of this study. The response actions at these sites have resulted in immediate and long-term benefits to surrounding communities and others who might have been affected had cleanup not occurred.

3.0 BENEFICIAL USE FOR NPL CONSTRUCTION COMPLETION LIST (CCL) SITES

3.1 Introduction

In order to understand the potential beneficial uses of Superfund sites, it is important to understand the nature of these sites, their locations, their natural environment, and the uses that may be reasonably anticipated. For the purpose of this study, beneficial use includes both economic and noneconomic uses of the land. It may include any functional use that serves the community by providing jobs, housing, recreation, or environmental and economic protection. The particular use can be almost anything--an industrial facility, a commercial establishment, a private residence, a public park or recreational use area (either formal or informal), a government office, a pasture for grazing cattle, or a permitted landfill. Beneficial uses also include uses that may not fit into traditional economic uses such as planned permanent waste management areas (e.g., capped and closed municipal or industrial landfills), floodplains, or wetlands. These uses protect both environmental and economic goods and are considered beneficial uses. In some cases, sites in environmental use are also the focus of more direct economic uses. In others, however, the use of a site as a floodplain or permanent waste management area precludes any other beneficial use. Although economic and noneconomic uses of land are both considered beneficial uses for the purposes of this study, a component of this study is a special focus on the factors associated with the economic use and reuse of properties.

Information on the 191 sites that are the focus of this study was compiled from completion closeout reports for the sites and other site documents.[11] Telephone calls to local authorities, tax offices, and owners provided additional information on the current status and future plans for many of the sites.

3.2 Summary

A review of current land use at sites deleted from the NPL or where construction of the remedy is substantially complete shows that 124 sites (almost 65 percent of the 191 sites) are currently in beneficial use or

[11]Thirty-seven of the 228 Construction Completions as of March 1994 were not included in this study for a variety of reasons described in Chapter 1.

have active near-term plans for such use.[12] The types of land use at these sites include industrial, commercial, service, recreational, residential, agricultural, waste management, and environmental uses.

Of the 191 sites included in this study, at least 80 sites are in economic use or are planned for economic reuse. Most of these uses are industrial or commercial. Forty-four sites are in use as either a permanent waste management area (e.g., closed municipal landfill) or in an environmental use such as floodplains, wetlands, or wildlife protection.

Not surprisingly, an analysis of factors associated with economic and noneconomic use, and vacancy suggests that location is one of the most significant factors associated with the use status of the site. A second major factor appears to be the presence of waste being managed onsite. Other factors analyzed appear to play a less significant role.

3.3 Beneficial Uses of Completed Sites

Of the 191 completions that are a focus of this study, 124 sites, or 65 percent, are in some kind of beneficial use. The other 35 percent are vacant. Almost two-thirds (80 sites) of the sites in beneficial use are in economic beneficial use. Of the sites in economic beneficial use, 80 percent are in some kind of industrial, light industrial, service, or commercial use. Figure 16 shows the beneficial use status of the sites in this study. Figure 17 shows the specific use categories into which the 124 sites can be divided.

The largest number of sites (39 sites) in current economic use are industrial sites. Many of these sites have been in continuous use prior to listing on the NPL and have remained in such use throughout the cleanup process. The second largest number of sites (25 sites) in economic use is a diverse category that includes light industrial, service, commercial, and governmental institutions. Warehousing and storage, government offices, restaurants, laundries, a plant nursery, automotive operations, airport use, and an active nonhazardous waste landfill are just some of the diverse activities conducted on these properties. Four sites in this category have an active, near-term planned use. Only four sites are in residential use, eight in recreational use, and four in a mix of unclassified uses (including cattle grazing, mining, and private use garage).

[12]Data on the uses at sites were collected in several stages that spanned over 2 years. The use status of specific sites may has changed in the interim with some sites previously vacant, now in economic use, and some sites previously in economic use now vacant.

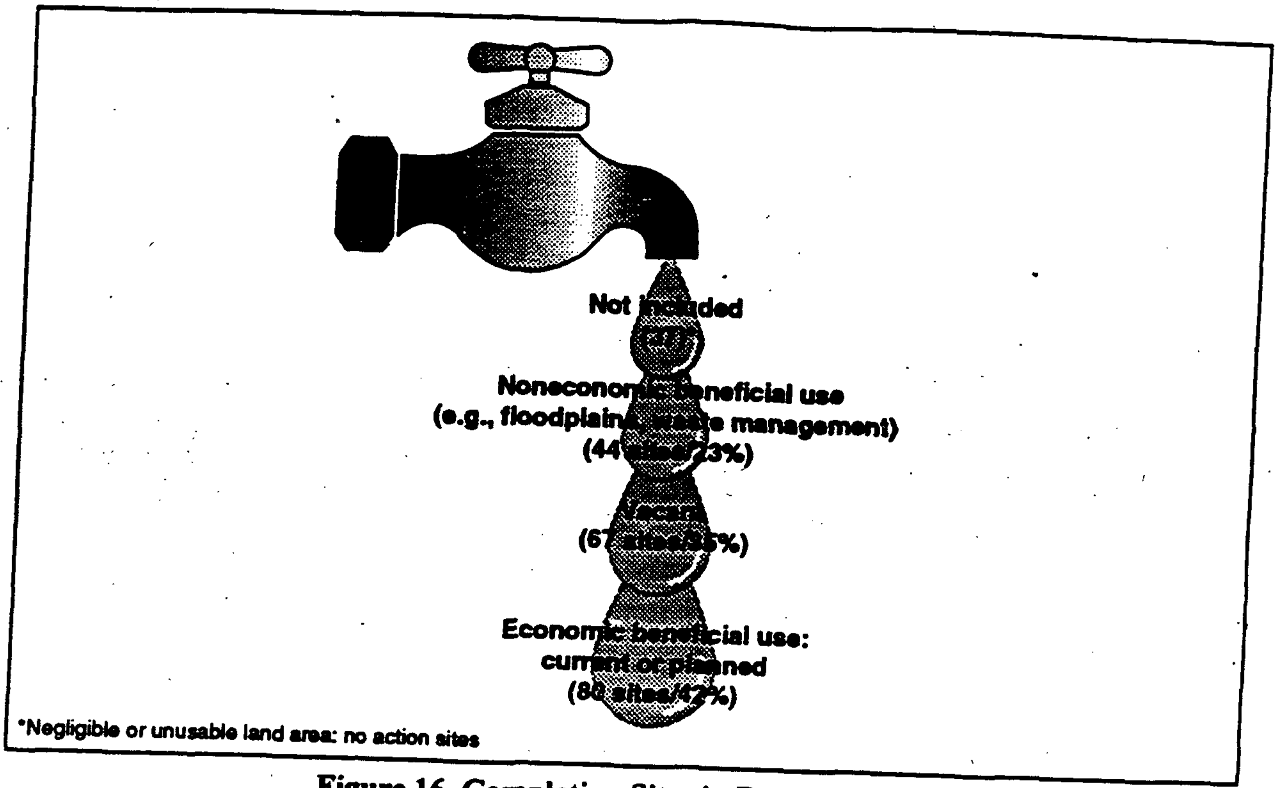

Figure 16. Completion Sites in Beneficial Use

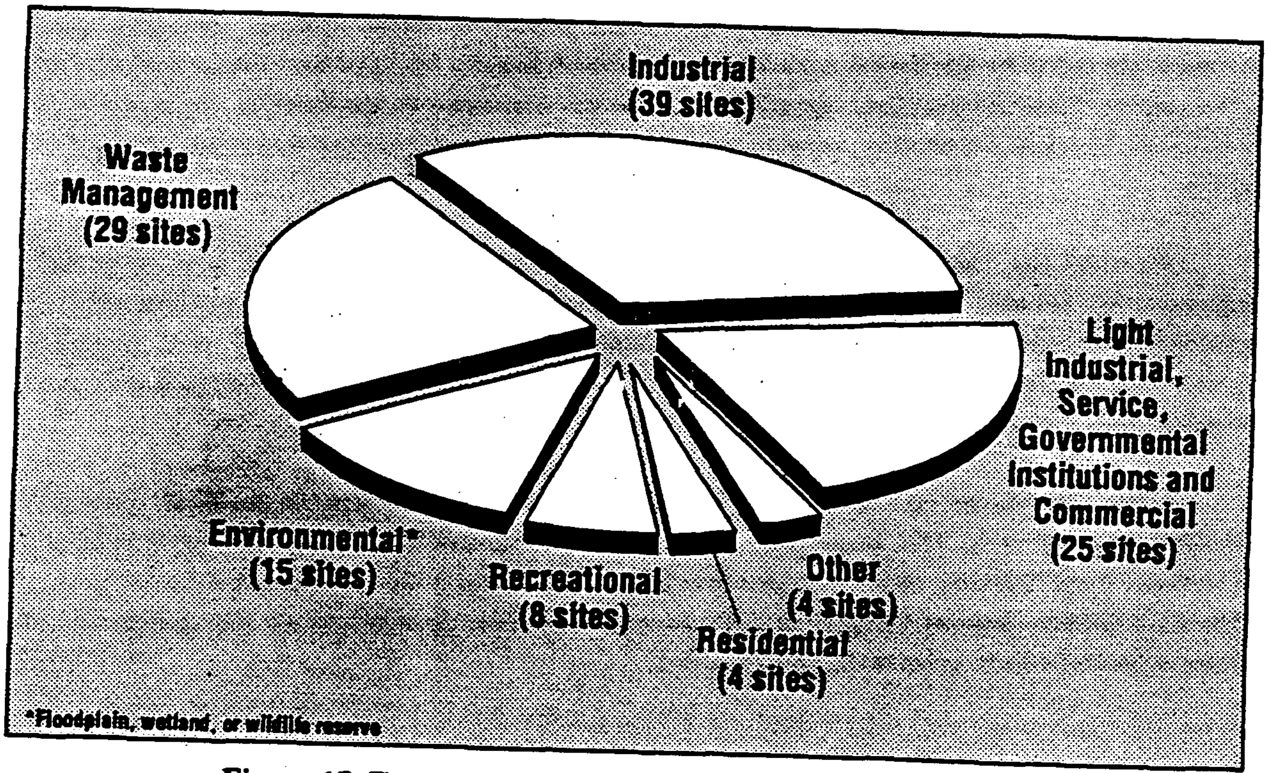

Figure 17. Types of Beneficial Use by Use Category (124 sites)

Tables 2 to 8 organize the 124 sites in beneficial use according to use category and describe the current use of these sites. In addition to describing the current use of the sites, these tables also describe the past use of the sites. Most of the sites in economic use are in the same (and, in many cases, continuous) use as they were in prior to cleanup. Thirty-one of these sites are in a different use than their original use. This includes 23 sites in industrial, commercial, or some other traditional economic use and 8 sites for which the current use is recreational and the previous use was as a waste disposal area. Most of the closed landfills are permanent waste repositories and are expected to stay in that use into the future. For other use categories, the past site use is quite different than the current use.

For cases where the current beneficial use is similar to the type of use that preceded the NPL designation and contributed to the contamination problems at the site, appropriate changes have been made to ensure that there will be no further uncontrolled releases. For example, the Mid-South Wood Products site in Arkansas continues to be used for wood treatment; however, the operation has been changed so that the site will not be further contaminated. Another example is the Independent Nail Co. site in South Carolina, which was contaminated by wastewaters from an earlier plating operation (different owner). The current nail coating process does not pose further risk of contamination.

Some sites that were in use prior to the NPL designation have remained in continuous use during the site investigations and cleanup. This is the case for several large sites where the contaminated area affected only a fraction of the total site, allowing a major facility on the same property to continue operation. Examples include the Varsol Spill site in Florida (located at the Miami International Airport), the John Deere (Ottumwa Works) site in Iowa, and the Alpha Chemical Corp. site in Florida. At several semiconductor manufacturing sites in California, the properties have been in continuous use while ground-water investigation and later pump and treat operations are ongoing.

For some sites, the current beneficial use is entirely different from the land use prior to the NPL designation. For example, the Belvidere Municipal Landfill site in Belvidere, Illinois, now has walking trails and is slated to be incorporated into a park system. Another example is the Boise Cascade site in Fridley, Minnesota, a former wood treating site that is now used by two separate companies (Onan Corporation and Medtronics, Inc.) for manufacturing.

A few sites that are now in beneficial use were previously unused, except for the illegal "midnight" dumping that resulted in the NPL designations. The Krysowaty Farm site in New Jersey, now the location of a plant nursery, is one such site. Several sites in current minimal use may be further redeveloped in the future. Part of the old Woodbury Chemical Company in Colorado is currently used by a railroad for steel storage; unused portions of the land may be given to the town for a park.

Table 2. Beneficial Uses at NPL Construction Completion Sites: Current Use Industrial (39 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Action Anodizing Plating and Polishing, NY	Continued use metal finishing	Metal finishing
Advanced Micro Devices, Inc. (#915), CA	Semiconductor manufacturing	Semiconductor manufacturing
Allied Plating, Inc., OR	Crane maintenance	Chrome-plating facility
Alpha Chemical Corp., FL	Polyester resin manufacture	Polyester resin manufacture; unlined impoundments
Anderson Development Co., MI	Specialty organic chemicals	Specialty chemical manufacturer
Applied Materials, CA	Silicon wafer manufacturing	Silicon wafer manufacturing equipment manufacturer
Beckman Instruments, CA	Circuit board and electronic equipment manufacturer	Circuit board and electronic components manufacturer
Boise Cascade/Onan/Medtronics, MN	Commercial and manufacturing facilities	Wood treatment facility
Celanese Corp. Shelby Fibers, NC	Operating industrial site, polyester production	Polyester production facility
City Industries, FL	Currently sheet metal work; future industrial site	Hazardous waste handling facility
CTS Printex, Inc., CA	Circuit board manufacturing	Circuit board manufacturing
Fairchild Semiconductor Corp., CA	Semiconductor manufacturing	Semiconductor manufacturing
FMC Corp., MN	Naval ordnance manufacturing plant; floodplain	Burning and disposal of wastes from naval ordnance
Hedblum Industries, MI	Aircraft manufacturing	Airplane and automobile parts manufacturer
Hollingsworth Solderless Terminal, FL	Solderless electrical terminal manufacturer	Solderless electrical terminal manufacturer
Hydro-Flex, Inc., KS	Manufacturing tubing hoses, heat exchangers	Tubing, hosing, and heat exchanger manufacturer
Independent Nail Co., SC	Paneling nail coating operation	Metal screw and fastener manufacturer
Intel Corp. (Santa Clara #3), CA	Various chemical processes	Various chemical processes
Intel Magnetics, CA	Magnetics process testing	Magnetics products testing
Intersil/Siemens Components, CA	Semiconductor manufacturing	Semiconductor manufacturing
John Deere (Ottumwa Works), IA	Active farm machinery plant and inactive dump site	Farm machinery plant; chemical disposal

Table 2. (continued)

Site Name, State	Current Beneficial Use	Former Site Activities
Johns Manville Corp., IL	Manufacture of building materials; asbestos no longer used	Manufacture of building materials containing asbestos
Kimberton Site, PA	Portion of site used by asphalt coatings manufacturer	Biochemical research and resin and tile production
Libby Groundwater Contamination, MT	Plywood and lumber mill	Wood treatment facility
Mid-Atlantic Wood Preserves, Inc., MD	Industrial and service use	Wood treatment facility
Mid-South Wood Products, AR	Wood treatment plant	Wood treatment plant
Monsanto Corp. (Angus), GA	Active industrial site with 2 landfills (75 acres)	Chemical producer
Mystery Bridge Road, WY	Chemical manufacturer/commercial trucking/residential	Two residential subdivisions and an industrial area
Northern Engraving Co., WI	Continued production of metal parts	Production of small metal parts for automotive industry
Pesses Chemical Co., TX	Facility for reclaiming metals from electronics components	Metals recycling facility
SOLA Optical USA, Inc., CA	Manufacturing ophthalmic lenses	Optical lens manufacturing
Spectra Physics, Inc., CA	Gas lasers and electronics manufacturing	Gas lasers and electronics manufacturing
Synertek, Inc., CA	Electronics manufacturing	Electronics manufacturing
Teledyne Semiconductor, CA	Semiconductor manufacturing	Semiconductor manufacturing
Tronic Plating Co., NY	Warehouse and eye lens manufacturing	Electroplating operations
TRW Microwave Inc. (Building 825), CA	Semiconductor, microwave manufacturing	Assembly of microwave components and semiconductors
Wilson Concepts of Florida, Inc., FL	Metal machining and finishing facility	Metal machining and finishing facility
Witco Chemical Corp., NJ	Technical research	Specialty chemical research facility
Woodbury Chemical Co., FL	Same owners continue pesticide and fertilizer formulation	Pesticide and fertilizer formulation

Table 3. Beneficial Uses at NPL Construction Completion Sites: Current Use Light Industrial, Commercial, Service, and Governmental Institutions (25 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Arkansas City Dump, KS	Small businesses on areas overlapping site boundaries	Refinery/dump
BEC Trucking, NY	Part of land used for storage of construction equipment; support of sawmill	Truck body manufacturing
BioClinical Laboratories, NY	Commercial/industrial	Industrial chemical warehouse operation
Chemical Metals Industries, MD	Maryland Department of the Environmental Field Office; park	Facility to recover precious metals from waste chemicals
Crystal City Airport, TX	Local airport with limited use	Pesticide spill area within airport boundary
Enterprise Avenue, PA	Vacant fenced area; may be included in airport runway extension	Illegal chemical and ash disposal area
Firestone Tire, CA	Warehouse facilities	Tire manufacturing plant
Flowood Site, MS	Two industrial sites; over 70 percent owned by utility	Corrugated box/stoneware cookery production plants
General Mills/Henkel Corp., MN	Multibusiness technical center and research laboratories	Research laboratory waste disposal
Grand Traverse Overall Supply Co., MI	Commercial laundry	Commercial laundry
Harris (Farley St.), TX	Class IV (nonhazardous) active landfill	Abandoned chemical waste landfill
Hebelka Auto Salvage Yard, PA	Auto graveyard	Auto salvage yard
Henderson Road Site, PA	Capped 7.64-acre landfill and BFI garage operations	Waste transfer and recycling
Jibboom Junkyard, CA	Uses under consideration include: State offices, museum, or highway cloverleaf	Metal salvage yard, power plant
Kearsarge Metallurgical Corp., NH	Site will partially used as a parking lot; remainder of site will be vacant	Stainless steel casting manufacturer
Krysowaty Farm, NJ	Plant nursery	Illegal dumping area off a road embankment
Luminous Processes, Inc., GA	McDonald's restaurant	Watch factory (produced radium-faced watches)
Miami Drum Services, FL	Public transit maintenance yard	Drum recycling facility

Table 3. (continued)

Site Name, State	Current Beneficial Use	Former Site Activities
Nutting Truck & Caster Co., MN	Businesses including woodworking, food service, and county offices	Disposal of foundry wastes in gravel pit
Revere Textile Print Corp., CT	Light industrial park	Textile processing facility which burned in 1980
Sol Lynn/Industrial Transformers, TX	Various commercial operations	Electrical transformer cleaning and recycling
Tri-City Oil Conservation, FL	Auto garage	Waste oil collection and distribution center
Varsol Spill Site, FL	Miami International Airport	Miami International Airport (contamination)
Whittaker Corp., MN	Excavation company (offices, parking, and storage of heavy equipment)	Production of resins and industrial coatings
Woodbury Chemical Co., CO	Portion owned by railroad used for steel storage; 1.4 acres portion vacant	Chemical manufacturing, pesticide formulation

Table 4. Beneficial Uses at NPL Construction Completion Sites: Current Use Residential (4 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Lansdowne Radiation Site, PA	Two-family residence	Radium processing in basement of private home
North-U Drive Well Contamination, MO	Petroleum contamination; residential area	Rural residential area
Ringwood Mines/Landfill, NJ	Residential; closed municipal landfill	Iron ore mining and waste disposal
Wide Beach Development, NY	Residential community	Housing and resort area; contamination from PCBs

Table 5. Beneficial Uses at NPL Construction Completion Sites: Current Use Recreational (8 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Belvidere Municipal Landfill, IL	Closed landfill; owned by County Conservation District and included in park system	Landfill (received municipal and industrial wastes)
Chisman Creek, VA	Recreational park facility with sports fields and walking trails	Fly ash disposal site
Gratiot County Golf Course, MI	Municipal golf course	Burning and disposal of industrial wastes
New Lyme Landfill, OH	Private landfill (80 acres) converted to wetlands and recreational area	Landfill
Newport Dump, KY	Informal recreation; reuse under consideration; Port Authority owns one desirable riverfront location	Municipal and industrial waste dump
Petersen Sand & Gravel, IL	Sand mining; future recreational lake; on floodplain	Sand and gravel mining; disposal area
Rose Park Sludge Pit, UT	Park with playground and recreation fields	Petroleum waste disposal
Westline Site, PA	Seasonal recreational areas; restaurant/bar	Lumber company converting wood into charcoal

Table 6. Beneficial Uses at NPL Construction Completion Sites: Current Other Economic Use (4 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Big River Sand Co., KS	Continued sand mining	Sand and gravel mining operation
Matthews Electric Plating, VA	Private use garage	Auto bumper repair and electroplating facility
Pioneer Sand Company, FL	Inactive quarry; 8 acres; returned to active use as a sand quarry	Industrial waste dump
Silver Mountain Mine, WA	Cattle grazing	Precious metal extraction operation

Table 7. Beneficial Uses at NPL Construction Completion Sites: Current Use Environmental (15 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Bower's Landfill, OH	Private landfill (80 acres) converted to wetlands	Gravel pit operation
Cannon Engineering Corp., MA	Unused; part of site wetlands	Illegal storage and incineration of hazardous waste
Cecil Lindsey, AR	Inactive agricultural area; floodplain; adjacent to wetland	Salvage yard and industrial dump
Chemical & Minerals Reclamation, OH	Vacant; floodplain	Chemical reclamation facility
Conservation Chemical Co., MO	Fenced and vacant; floodplain; restricted area	Chemical storage and disposal facility
E.I. DuPont deNemours, IA	Wildlife use; deed restrictions	Chemical manufacturer
Fulbright/SAC River Landfills, MO	Inactive landfill; on floodplain; deed restrictions	Municipal and industrial landfill
Highlands Acid Pit, TX	Fenced site with surrounding area used for recreation; in 10-year floodplain	Illegal dumping of sulfuric acid sludges
Keefe Environmental Services, NH	Wetland; cleanup ongoing	Hazardous waste building and treatment facility
LaBounty, IA	Vacant and inactive landfill; floodplain of Cedar River	Sludge disposal site
Lee's Lane Landfill, KY	Inactive landfill; floodplain of Ohio River	Landfill
Lehigh Electric & Engineering Co., PA	Vacant; on floodplain of Lockwanne River	Coal processing facility
Saco Tannery Waste Pits, ME	Wildlife preserve	
Velsicol Chemical Corp., MI	Fenced and posted lot adjacent to Pine River	Injection wells, lagoons, radioactive disposal area
Whitewood Creek, SD	Unused; floodplain	Housing and livestock uses

Table 8. Beneficial Uses at NPL Construction Completion Sites: Current Use Waste Management (29 Sites)

Site Name, State	Current Beneficial Use	Former Site Activities
Algoma Municipal Landfill, WI	15-acre municipal landfill site with fence	Municipal landfill
Ambler Asbestos Piles, PA	15-acre asbestos landfill; area fenced to restricted areas	Pharmaceutical and asbestos insulation manufacturer
Amnicola Dump, TN	18-acre inactive construction debris landfill site; deed restrictions	Construction debris dump
Bio-Ecology Systems, Inc., TX	Closed 11-acre landfill with fences and warning signs	Solid waste management facility
Burrows Sanitation, MI	10-acre municipal landfill site with fence	Municipal landfill
Clothier Disposal, NY	15-acre inactive municipal landfill with deed restrictions	Privately owned dump
Coker's Sanitation Service Landfills, DE	Closed 25-acre landfill	Solid waste disposal sites
Combe Fill North Landfill, NJ	Closed 65-acre municipal landfill	Municipal landfill
Compass Industries, OK	Abandoned 30-acre municipal/industrial landfill	Municipal and industrial landfill
E.H. Schilling Landfill, OH	Industrial/commercial landfill (3 acres)	Industrial waste landfill
General Tire & Rubber Co., KY	Closed 58.5-acre industrial landfill; ground water used in plant operations	Landfill for a tire manufacturing plant
Helen Kramer Landfill, NJ	Closed 66-acre municipal landfill (with O&M)	Sand and gravel excavation
Industrial Waste Control, AR	Closed and covered 8-acre industrial landfill previously operated under permit	Liquid and solid waste dump
Lawrence Todtz Farm, IA	Fenced inactive landfill	Solid and liquid industrial waste disposal site
Lewisburg Dump, TN	Closed 20-acre municipal landfill; fence and deed restriction	Limestone quarry
Marshall Landfill, CO	Closed/inactive 160-acre landfill; methane recovery ongoing	Municipal waste landfill
Monroe Township Landfill, NJ	Closed 86-acre municipal landfill	Municipal landfill
Northside Landfill, WA	Solid waste management unit; 345-acre municipal landfill	Commercial/residential landfill

Table 8. (continued)

Site Name, State	Current Beneficial Use	Former Site Activities
Northwestern States Portland Cement Co., IA	Closed 150-acre industrial landfill	Portland Cement producer
Oak Grove Sanitary Landfill, MN	Closed 104-acre municipal and commercial landfill site; capped unit; vacant	Sanitary landfill
Old Bethpage Landfill, NY	Closed 72-acre municipal landfill	Landfill for industrial process wastes and drums
Peppers Steel & Alloys, FL	Closed 6-acre industrial landfill (monolithe)	
Powersville Landfill, GA	Capped 15-acre landfill with deed restrictions	Sand and gravel quarry
South Brunswick Landfill, NJ	Closed 68-acre municipal landfill	Solid waste landfill
Taylor Borough Dump, PA	125-acre capped landfill	Industrial waste landfill
Upper Deerfield Township Sanitary Landfill, NJ	Inactive 14-acre landfill; area revegetated	Gravel pit/municipal landfill
Washington County Landfill, MN	Inactive 40-acre landfill	Landfill
Wildcat Landfill, DE	None; closed 44-acre landfill	Municipal and industrial landfill
Windom Dump, MN	11-acre closed landfill	Landfill

For a number of cases, old municipal and industrial landfills have been cleaned up, capped, and otherwise made protective for human health and the environment. There are 29 sites where the sole beneficial use is as a closed landfill. The beneficial use of these huge sites has always been (and will be) as a waste management area. In some cases, these landfills may eventually have a secondary beneficial use, such as recreation. In part, this depends on their location and other amenities. Belvidere Municipal Landfill in Illinois is an example of this. The Newport Dump in Kentucky is an old municipal and industrial waste dump located on a riverfront and is currently used by the community for recreation. In other cases, landfills may coexist with other uses--such as industrial uses--when part of the property is a landfill and the other part is useable for economic uses. An additional 10 sites that are in some other kind of economic beneficial use (i.e., industrial, recreational) also have landfills present on site.

Fifteen sites on the CCL are in environmental use. Most are in floodplains; some are adjacent to wetlands, as well. Two sites are now wildlife reserves. Two sites are also permanent waste management areas that are located on floodplains and from which releases have now been controlled.

3.4 Analysis of Sites in Beneficial Use and Vacant Sites

A number of factors were analyzed separately and in relation to each other to assist in understanding the nature of the CCL sites in use (both economic and noneconomic) and vacant. Among these factors are: physical/ population, location characteristics; geographic location (as reflected in EPA regional distributions); presence of ongoing onsite waste management; property ownership; and the length of time that has expired since the last act of physical construction on site (through removal or remedial action).

3.4.1 Location Categories Used to Analyze Beneficial Use. Some NPL sites are located in densely populated areas (e.g., areas near major metropolitan districts) where land values are high. Such sites may stay in or return to use within a short time following cleanup. At the other extreme are NPL sites in remote areas where economic use of the land after cleanup is unlikely. Most NPL sites fall somewhere between these two extremes.

To examine patterns of use (and for the purposes of potential future evaluation of property value changes) for construction completion sites, a system was developed to classify sites according to their location. Six location categories are distinguished: **urban, suburban, medium town, small town, rural, or remote.** Location category assignments were made for 191 CCL sites based on the population density in the area surrounding the site. The distribution of 191 sites among the six location categories is shown in Figure 18.

The location categories are further subdivided to distinguish the surrounding land use (e.g., industrial use, residential use) or a particular type of site (e.g., landfill site). Table 9 lists the number of sites in 12 location/site type categories, the number of sites in beneficial use, and the types of land use.

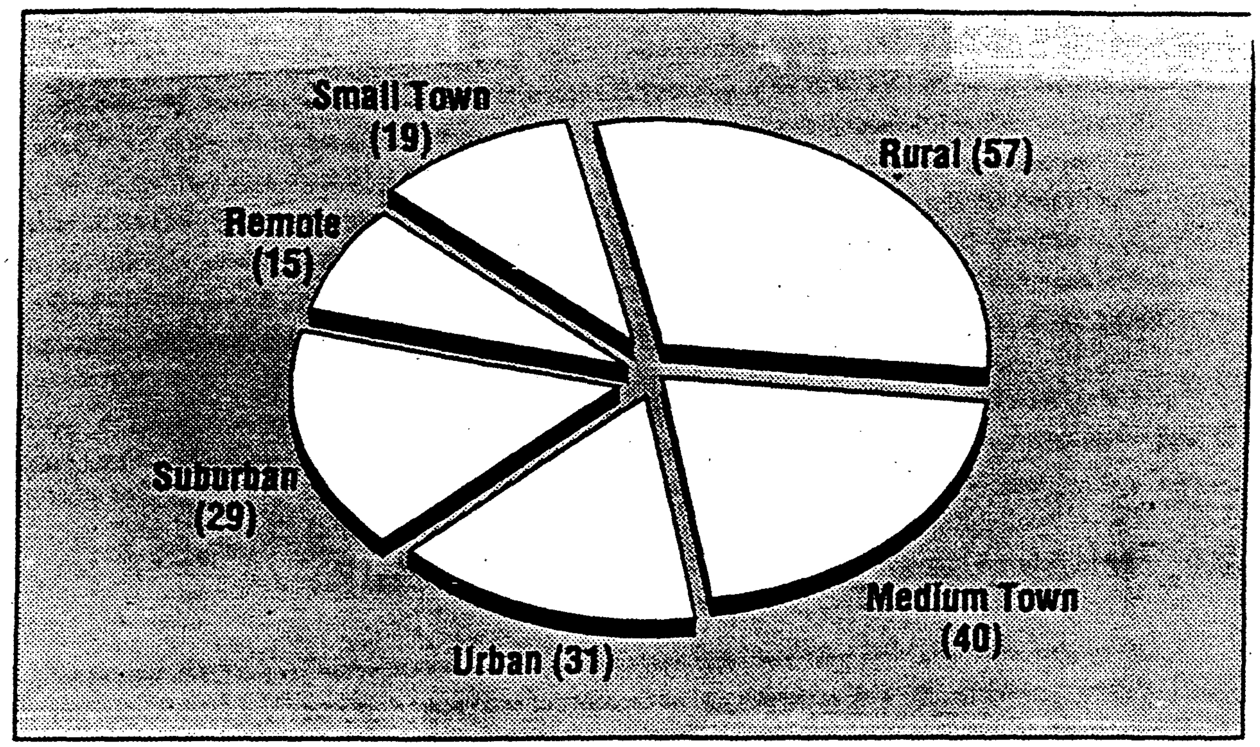

Figure 18. Number of Sites by Location Category (191 sites)

The location categories are further subdivided to distinguish the surrounding land use (e.g., industrial use, residential use) or a particular type of site (e.g., landfill site). Table 9 lists the number of sites in 12 location/site type categories, the number of sites in beneficial use, and the types of land use.

Urban sites are located within large municipalities and have a population greater than 20,000 within 1 mile. Separate categories are distinguished for urban industrial sites and for urban nonindustrial sites. Suburban sites have populations between 10,000 and 20,000 within 1 mile and are located near a large municipality of higher population density. Separate categories are distinguished for suburban industrial sites, suburban sites with high-tech electronics manufacturing, and suburban residential sites. Suburban sites with high-tech electronics manufacturing are distinguished as a separate category because the property values at such sites are closely linked to their regional location and to their particular manufacturing use. Such sites are typically located very close to suburban residential sites.

Medium town sites are independent of, but sometimes economically related to larger municipalities and have populations between 3,000 and 10,000 within 1 mile. People in such communities may shop or work in

Table 9. NPL Construction Completion Sites in Beneficial Use by Category/Site Type

Location category/site type	Number of sites in category	Number of sites in use[1]	Types of reuse
Urban industrial	21	12	Manufacturing, commercial, storage, vehicle maintenance, floodplain, wetlands, research lab, closed waste management area
Urban nonindustrial	10	8	State office, active landfill, airport, recreation, recycling, closed waste management area[2], floodplain
Suburban industrial	12	10	Commercial, manufacturing, metal working, chemical research, warehouse, auto garage
Suburban high-tech electronics manufacturing	11	11	Electronics manufacturing, other manufacturing
Suburban residential	6	4	Residential, plant nursery, park
Medium town industrial	12	10	Manufacturing, commercial, warehouse, storage, closed waste management area, floodplain
Medium town nonindustrial	14	8	Commercial, manufacturing, sports facility, golf course, closed waste management area, floodplain
Medium town landfill	14	13	Commercial, sand quarry, park, recreation, closed waste management area, floodplain
Small town	19	10	Metal coating, manufacturing, wood treatment, airport, garage, closed waste management area, wetlands
Rural industrial	16	7	Manufacturing polyester resin, closed waste management area
Rural nonindustrial	41	21	Manufacturing, mail coating, seasonal recreation area, future recreational lake, sand mining, private garage, commercial, floodplain, wildlife reserve, closed waste management area
Remote	15	10	Cattle grazing, auto graveyard, floodplain, closed waste management area, wildlife reserve
Total	191	124	

[1]Includes five currently vacant sites with active plans for reuse.
[2]A waste management area is a closed municipal landfill.

larger regional centers that are nearby. Separate categories are distinguished for medium town industrial sites, medium town nonindustrial sites, and medium town landfill sites.

Small town sites also have populations between 3,000 and 10,000 within 1 mile. Small towns are considered to be self-supporting, separate, and distinct from nearby larger towns. They are often located in rural or remote areas.

Rural sites have populations between 250 and 3,000 within 1 mile. Area residents rely on larger population centers and must travel for most goods and services. Separate categories are distinguished for rural industrial sites and rural nonindustrial sites. Remote sites are characterized by sparse population density (i.e., fewer than 250 people residing within 1 mile). In general, accessibility to remote sites is limited; however, one or more private residences may be nearby. Mining operations or agricultural uses (e.g., cattle grazing) may be the predominant use of surrounding properties.

The highest number and percentage of sites in use are suburban sites. Of the 29 sites classified as suburban in this study, only 4 are vacant. All of the remainder (86 percent) are in economic use. Medium town sites have the next highest percent use, with 77 percent of the sites in use and 47 percent in economic use or reuse. Urban sites have a smaller percentage of sites in use (65 percent) with 42 percent of the sites in urban locations in economic use or reuse. Finally, remote areas have a relatively high percentage of properties in use (67 percent) but only 2 sites (13 percent) of the sites in remote areas are in economic use. Forty-nine percent of the rural sites are in some kind of use; only 23 percent are in economic use. As might be expected, both the largest number and the highest percentage of vacant sites are found in rural areas. Figure 19 depicts the number of sites in economic use, noneconomic use, and vacant for each of the 12 locational categories.

When this picture is examined from the perspective of the type of use, some fairly strong relationships emerge. Of the 39 industrial sites, 46 percent are in the suburban locations, and 31 percent are in medium town or rural locations. For the 25 commercial/light industrial sites, 40 percent are in urban locations, and 28 percent are in medium town locations. Forty-one percent of the landfills are located in rural locations, and 24 percent in medium town locations. One category of medium town locations is specifically called "medium town landfills" and reflects the fact that numerous landfills are in the vicinity. Seven of the 29 sites for which the only use is as a waste management area are located in "medium town landfill" locations. Table 10 shows the distribution of beneficial uses and vacant properties among location types.

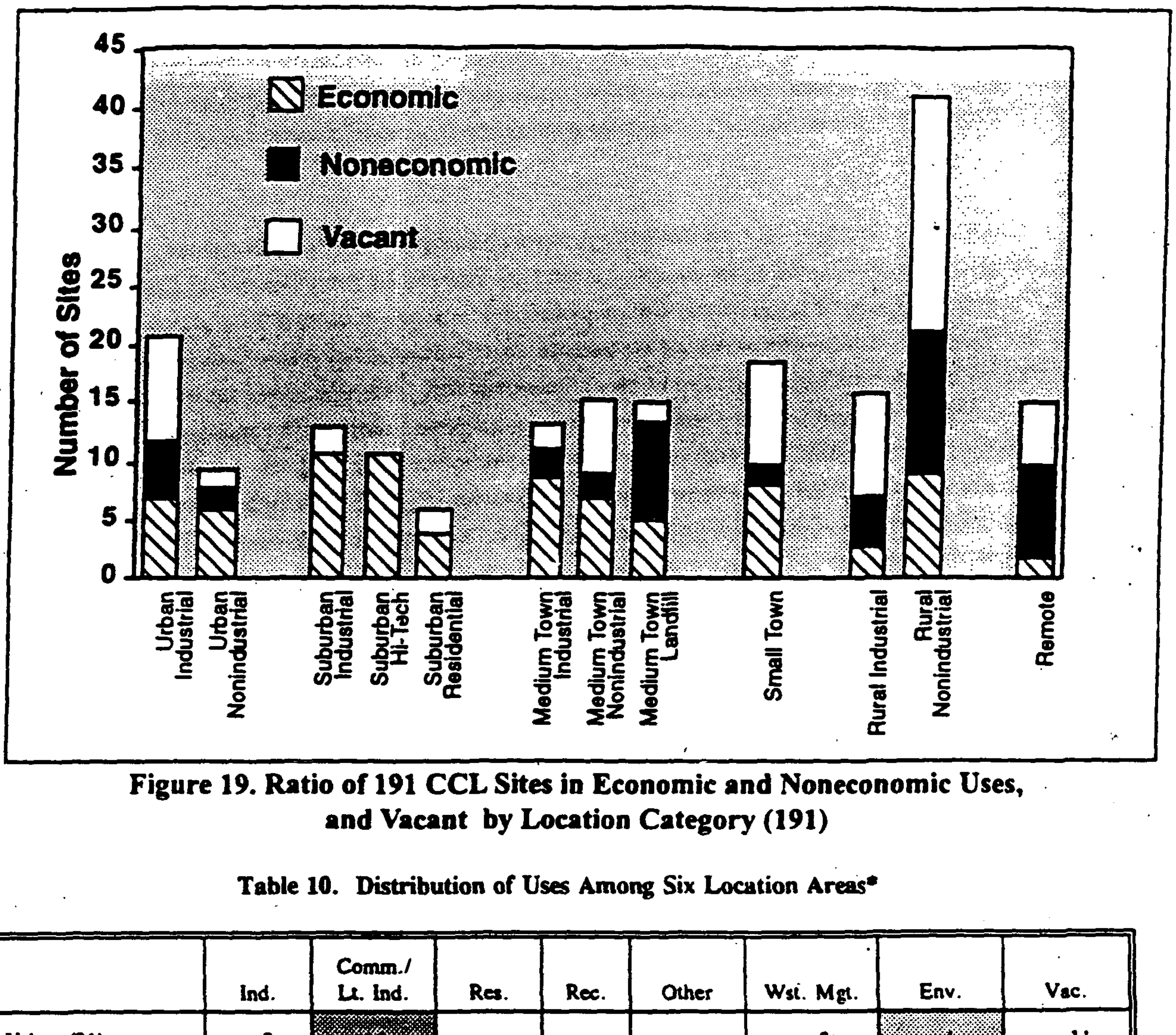

Figure 19. Ratio of 191 CCL Sites in Economic and Noneconomic Uses, and Vacant by Location Category (191)

Table 10. Distribution of Uses Among Six Location Areas*

	Ind.	Comm./ Lt. Ind.	Res.	Rec.	Other	Wst. Mgt.	Env.	Vac.
Urban (31)	3	10				3	4	11
Suburban (29)	18	4	2	1				4
Medium Town (40)	6	7	1	4	1	7	5	9
Small Town (19)	6	2				1	1	9
Rural (57)	6	1	1	3	2	12	3	29
Remote (15)		1			1	6	2	5
Total (191)	39	25	4	8	4	29	15	67

*Highlighted boxes are largest concentrations of use types.

3.4.2 Geographic Regional Distribution. While geographic location (part of the country) appears to have some influence on the number of sites in use (both economic and noneconomic), it appears that relationship is not always strong and that other factors such as locational type (e.g., urban, suburban) may play a stronger role in most cases. (See above.)

As discussed in Chapter 1, EPA divides its Regions into geographic regions that are roughly coincident with distinct parts of the country--Region 1, for example, is the New England Region; Region 4 the Southeast; Region 5 the Midwest; etc. Figure 20 suggests that the geographic location in the country may play a limited role in economic beneficial use. The rapidly growing Southeast Region (Region 4) has the second largest number of CCL sites in the study, and the third highest percent of sites in economic use. This high level of economic use is present even though almost half of the Region 4 sites are in rural or remote locations.[13] Rural and remote locations generally have the highest number of vacant sites and sites in noneconomic beneficial use. Region 9 (which includes California) shows a very high share of sites in economic use as does Region 8. The high use of the Region 9 sites reflects the presence of 11 "suburban high-technology" sites that have been in continuous use throughout cleanup. Appendix A lists CCL sites by EPA Region and State.

While 29 percent of the CCL universe are located in the three northeastern regions, 42 percent of the landfills are located there--specifically in Regions 2 and 3. The heavy concentration of landfills reflects, in part, the older industrial areas and the waste management practices associated with those areas. In addition, this large percent of landfills clearly influences the number of sites in active economic use. Most of the other landfills are in Regions 4 and 5, although they represent a somewhat smaller share of the CCL universe in those Regions.

3.4.3 Ownership of Construction Completion Sites. Currently, 70 percent of the CCL sites are in private ownership. Most of the rest--18 percent--are in a mix of local government ownership--city, county, or town. Nine sites are owned by States. One site is owned by an airport authority.

When the relationship of current ownership to current use is examined, few surprises and few insights are to be gained. All industrial use sites are privately owned as are most commercial sites. Fifty-eight percent of the landfill sites are in private ownership, while the remainder are divided among local government (city, town, or county). Of the sites in environmental uses, 86 percent are in private ownership, as are 74 percent of the vacant sites.

[13]Rural and remote locations generally have the highest number of vacant sites and sites in noneconomic beneficial use.

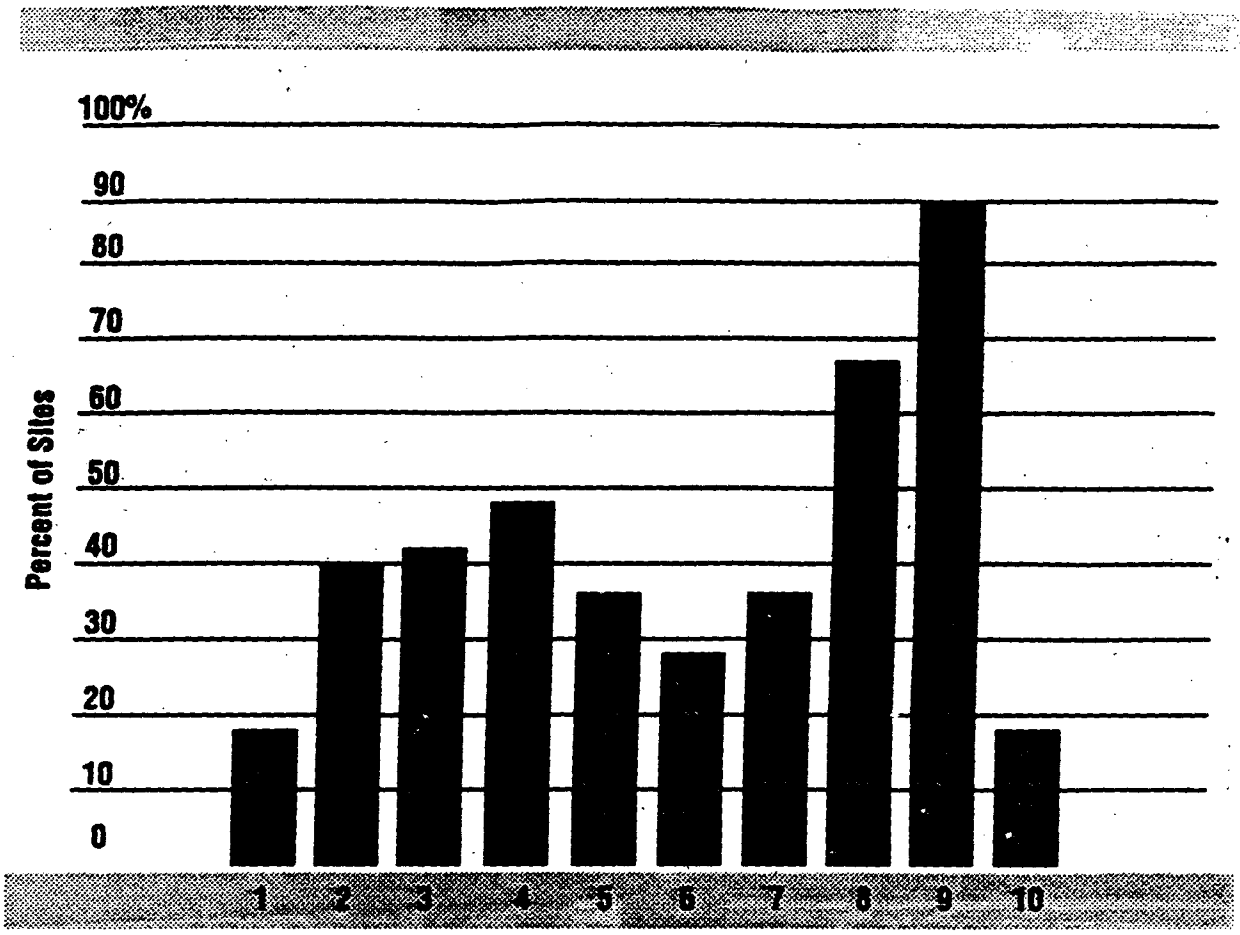

Figure 20. Percent of CCL Sites in each EPA Region in Economic Use

3.4.4 The Property Value of CCL Sites. The economic value of the CCL list sites as measured by their property value is, not surprisingly, influenced by the use of the property, the demographic/locational type of the property, and, to a lesser extent, the geographic region of the country. Property values, based on assessed property valuation (or value of a recent property transfer), were gathered on all sites in the CCL universe. These values were normalized to 1992 dollars and, for comparison purposes, are further normalized to per acre property values.[14] Figure 21 shows the total number of acres in each location category. No attempt is made in the discussion below to attribute a portion of property value to the cleanup itself. The per acre values presented

[14]The CCL sites that are part of the study contain sites of vastly different acreage.

incorporate the value of the previously contaminated parcel, as well as those parts of the site that were not contaminated. This examination of the property values and their relationship to beneficial uses is presented to help provide a foundation for further possible studies in this area, and to help shape our understanding of the anticipated distribution of that particular set of economic benefits.

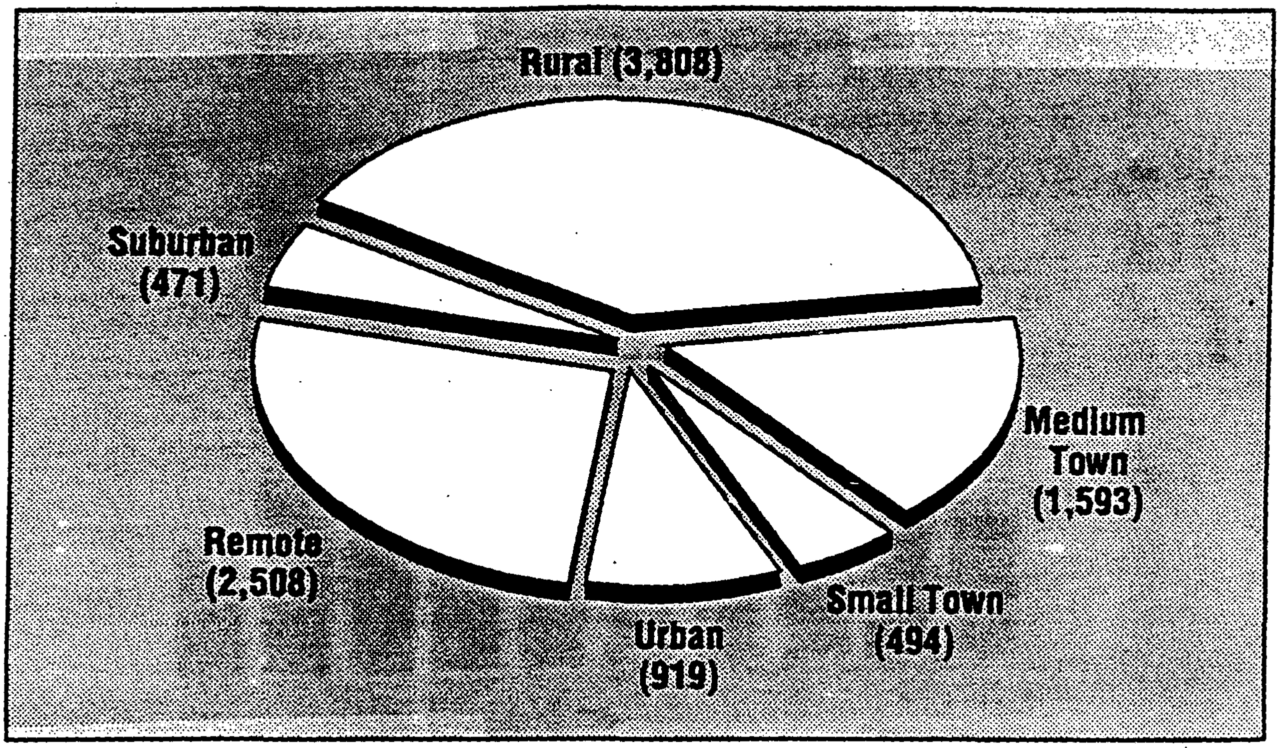

Figure 21. Acreage at CCL Sites (9,793 Total)

The total "current" value of properties (both the contaminated and uncontaminated portions of the property) in the CCL universe that is part of this study is just over $203 million.[15] The bulk of this number is made up of properties in suburban, urban, and medium town locations. Almost half of the value is in suburban locations, with urban and medium town locations comprising over one third of the total property value of CCL sites. Figure 22 presents the distribution of the total property values among each of these demographic/location types. As previously discussed, industrial sites make up the largest number of sites in use (39). Among all of the categories of sites

[15]The "current" value reflects data collected over a 5-year span in 1993 and 1994, but normalized to 1992 values.

(economic use, noneconomic use, and vacant), industrial sites have the third highest acreage--1,425 (after environmental uses at 2,728 acres, and vacant property at 2,231 acres). The total value of industrial sites is almost $121 million. The total value of the 25 commercial sites is over $47 million. (See Figure 23.)

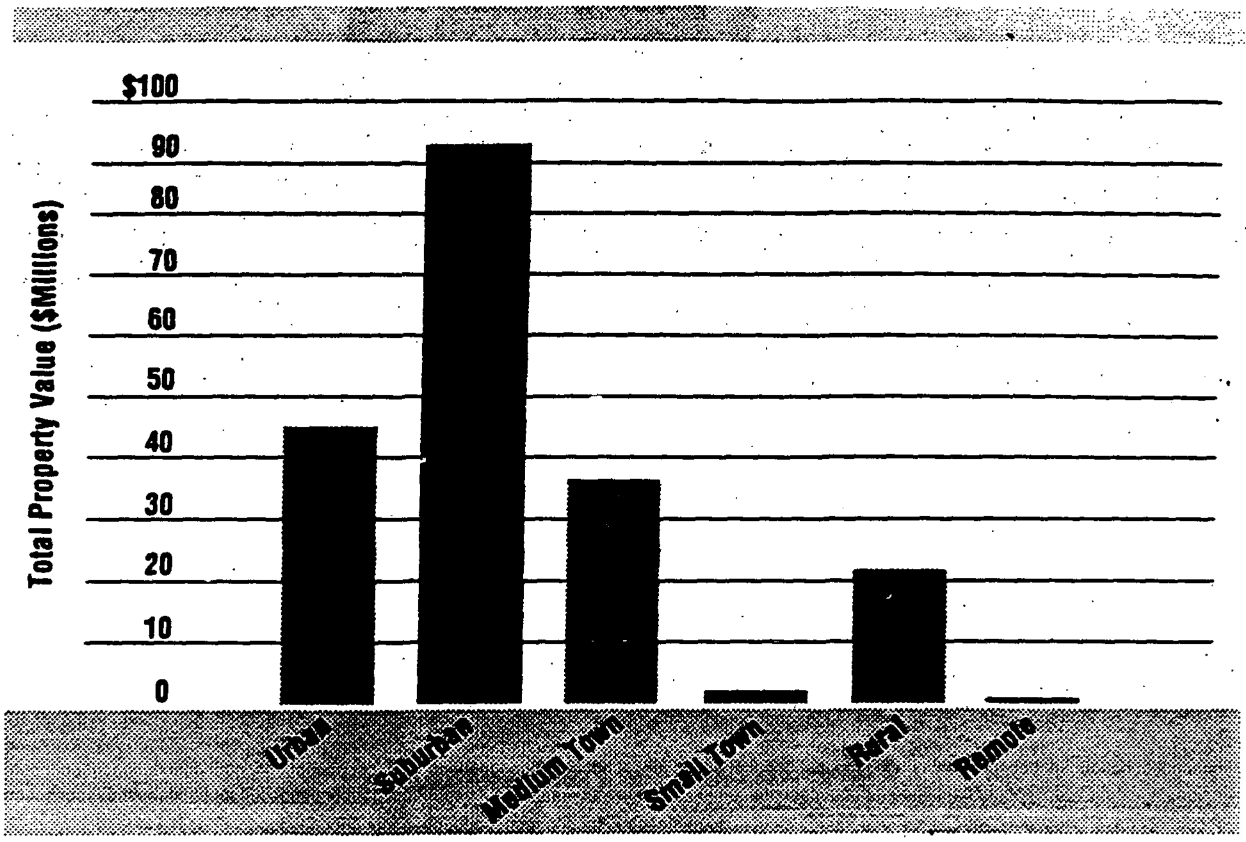

Figure 22. Location Category Property Values

When per acre values of sites are considered, the results are more informative. The highest valued sites in the CCL universe that is part of this study are 12 sites in California that are classified as Suburban High Technology (industrial) sites. These sites have been in continuous use, and represent 71 percent of the value of suburban sites. A closer examination of the data suggests a slightly different picture of the relationship between demographic/location type and post cleanup use. The average land value per acre of sites in economic use in suburban locations versus urban locations suggests that value per acre of suburban sites is, on average, 4 percent more than the value per acre of urban locations. When California sites are treated as outliers, the per acre value of urban locations in economic use is significantly higher than the per acre value of the remaining suburban locations in economic use. However, it is important to recognize that suburban properties have the lowest number of sites in noneconomic use or vacant, and that the per acre value of the sites not in economic use in suburban areas is significantly higher than the per acre value of sites not in economic use, in any other type of location--$22,109 per acre for suburban properties not in economic use, compared to $5,679 per acre for the next highest valued locations not in economic use (medium town sites).[16]

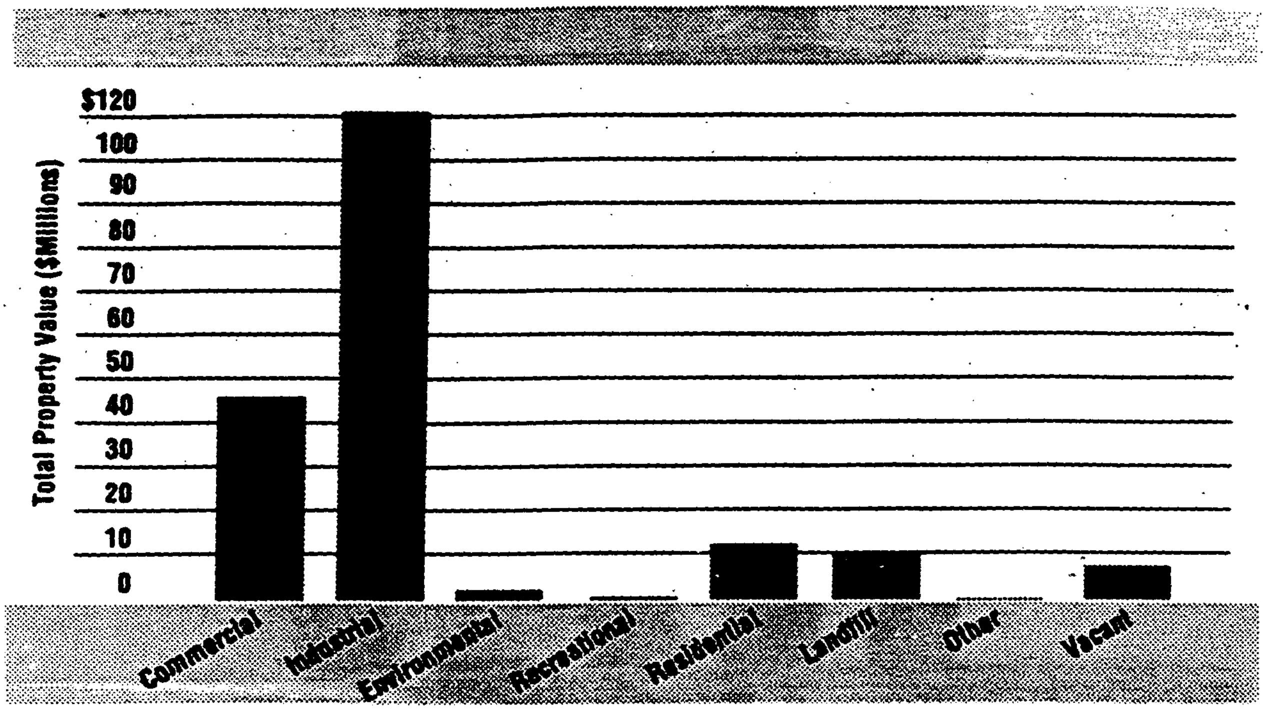

Figure 23. Land Use Property Values

With California sites removed from the equation, commercial properties have a significantly higher national average per acre property value than industrial properties.[17] The average per acre property value of commercial sites in this instance is $84,966, and the average per acre property value of industrial sites drops to $41,940 per acre. However, site types (e.g., urban, medium town) can influence this relationship and reverse it in some instances. Figures 24 and 25 depict the relationship between per acre property values for locational type and use with and without the California numbers included.

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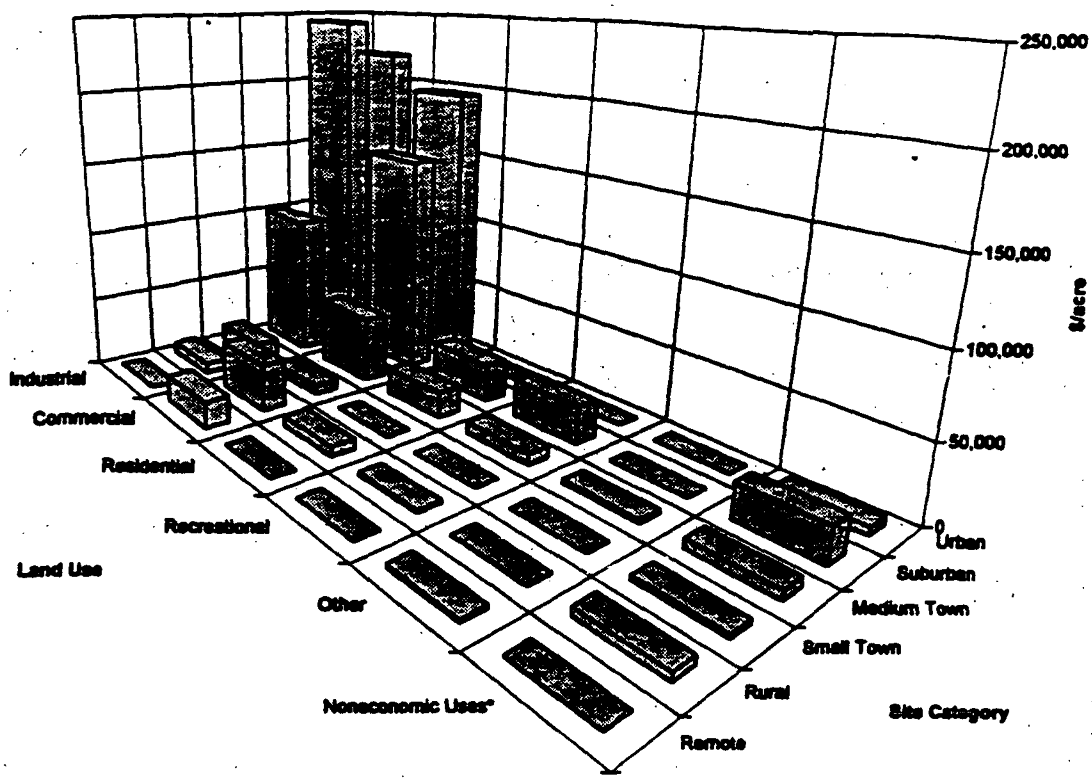
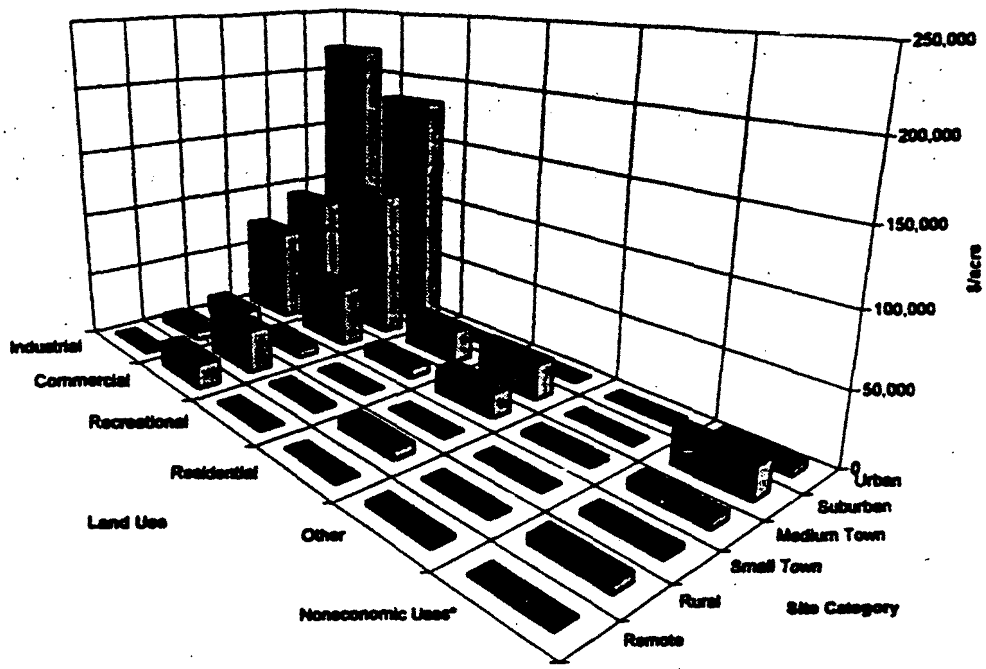
[16]Whenever this discussion refers to sites "not in economic use" that discussion includes sites in "noneconomic" beneficial uses, and vacant sites.

[17]This statement refers to the national average value.



* Noneconomic uses include vacant, waste management, and environmental sites.

Figure 24. Property Values as a Function of Land Use and Site Location (California included)



* Noneconomic uses include vacant, waste management, and environmental sites

Figure 25. Property Values as a Function of Land Use and Site Location (minus California)

Regional (geographic) location appears to play a relatively less significant role in most cases. Region 9 (Western, including California) has the highest per acre property value. EPA Region 5 (Midwest--headquartered in Chicago) has the next highest per acre property values--$35,347 per acre. Region 3 (Mid-Atlantic) is next with average per acre property values of $22,312, followed closely by Region 4 (Southeast) with average per acre property values of $18,234. These averages combine the values for sites in economic use and those not in economic use. With so many variables at work, a clear picture is not entirely possible. However, an examination of the per acre property value of sites not in economic use, along with the percent of sites located in the relatively more highly valued locations and the percent of sites in the more highly valued industrial and commercial uses, is suggestive of the weight some of the factors influencing these values. Regions 5, 3, and 4, after Region 9, have the highest per acre property values, respectively and appear to have a mix of factors influencing these values.[17] Region 5, for example, has the highest per acre property value for sites not in economic use. It also has a relatively high proportion of its sites in the more highly valued locations--urban, suburban, and medium town. Region 3 has a lower per acre value of sites not in economic use. It also has a relatively smaller proportion of sites not in economic use, as well as a relatively high concentration of sites (50 percent) in urban, suburban, and medium town locations. Region 4 has one of the highest percentage of sites in economic use--after Regions 9 and 8. In addition, the value of property not in economic use is relatively higher than most other Regions.

Table 11 depicts some of the relationships described above. In examining the table, it is important to note that in several cases, very small numbers (e.g., one or two sites) make any conclusions difficult because the nature of the few sites that form the basis for other numbers is extremely important, and there can be a wide variation in value in sites within the same use category (e.g., commercial sites can be a relatively high valued restaurant, or a relatively low valued storage area.)

3.4.5 Understanding Sites Not in Economic Beneficial Use. Many factors can influence whether a CCL site will continue in economic use or will be used again. There is no evidence of a Superfund "stigma" that carries through cleanup and affects the future use of the site, even after cleanup is complete. Other factors, however, show a strong correlation to future economic use of property. One of the most important factors is the location (i.e., proximity of the site to a major population center). A second important factor is the degree to which the remedy constructed onsite leads to the permanent management of waste on site (e.g., capping of large landfills or containment of the residuals of treatment) or whether ongoing ground-water cleanup may take a number of years to accomplish.

[17]When the per acre values of all properties within a region are averaged, Region 9 has the highest per acre values at $117,000, Region 5 is next at $35,000; followed by Regions 3 and 4 (at $22,000 and $18,000, respectively.)

Table 11. Regional Comparison of Key Factors in Property Value

Region	Per Acre Property Value: Sites in Economic Use	Percent and Number of Sites Not in Economic Use	Per Acre Property Value: Sites Not in Economic Use.	Percent of Sites in Commercial/ Industrial Use	Percent of Sites in Urban, Suburban, and Medium Town Locations
1 (11 sites)	$28,654	82% (9)	$4,174	18%	45%
2 (20 sites)	$26,265	60% (12)	$7,176	30%	50%
3 (24 sites)	$49,139	58% (14)	$4,153	25%	50%
4 (31 sites)	$38,706	52% (16)	$6,216	42%	45%
5 (39 sites)	$63,201	64% (25)	$8,748	31%	59%
6 (18 sites)	$9,805	72% (13)	$3,944	28%	50%
7 (14 sites)	$39,916	64% (9)	$1,124	21%	57%
8 (6 sites)	$7,329	33% (2)	$ 279	50%	75%
9 (17 sites)	$324,027	12% (2)	$2,073	88%	76%
10 (11 sites)	$139,790	82% (9)	$3,466	9%	55%

Role of Location For Sites in Noneconomic Use and Vacant. The role of location for sites in use or reuse was described in Section 3.4.1. When examining the relationship of location to noneconomic uses or to vacancy, correlations are quite strong.

Of the 100 sites in urban, suburban, or medium town locations, 57 percent are currently in economic beneficial use. Of the 91 sites in small town, rural, and remote locations, 25 percent are in current economic use. The remainder are in noneconomic use or vacant. As shown previously in Table 10, landfills are heavily concentrated in medium town, rural, and remote locations. Eighty-six percent of those sites solely in use as permanent waste management areas are in medium town, rural, and remote locations.

Sixty-four percent of vacant properties (43 sites) are concentrated in small town, rural, and remote locations. (See Table 10.) Fourteen percent are in medium town locations, and 22 percent are in urban and suburban locations. Figure 26 shows the distribution of vacant property among broad location categories.

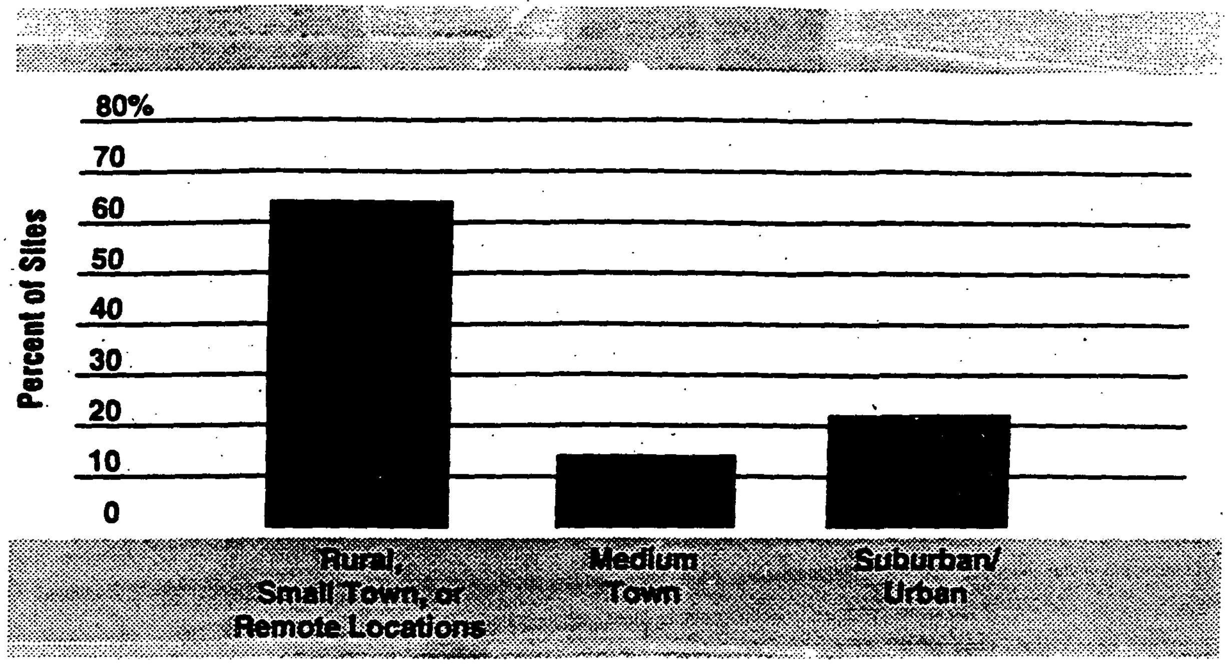


Figure 26. Sites Not Currently in Beneficial Use (67)

Role of Waste Management on Sites in Noneconomic use or Vacant. The cleanup of Superfund sites often requires the management of waste products long into the future. This happens for a number of reasons:

- In most cases, it is not practical to remove or treat the waste from large landfill sites. Many sites on the NPL were designed as municipal, solid waste, or industrial waste management facilities. Created before current waste management practices were in place, these sites can cause significant environmental degradation. Their size can range from 3 to 6 acres to hundreds of acres. The approach to such sites is usually to treat highly contaminated areas (also called "hot spots") and design an effective container or "cap" over the site, plant grass, vent methane gases that might release, and as appropriate, treat ground-water releases that have already occurred.

- Large volumes of low waste concentrations of contaminated soil may be consolidated into a protected area on site and managed similarly to landfills.

- When waste is treated, residuals of the waste treatment process often remain. When these residuals continue to contain hazardous constituents, they will often be managed in a secure area on site (or transported to an offsite hazardous waste landfill).

- Finally, the cleaning of ground water often takes many years. As has been previously described, when construction of ground-water remedies is complete, but the treatment is ongoing, these sites are placed in a special category of the CCL called the Long Term Remedial Action (LTRA) list.

When waste is left onsite, deed restrictions and other institutional controls can ensure that exposure to the managed waste is prevented, and that the integrity of the remedy is not breached. In addition, EPA reviews the site at least every 5 years to ensure that the remedy remains protective.

The data from this study suggest that when waste continues to be managed onsite, it has an impact on the immediate economic use of the property. Other variables may also play a role--such as location in rural areas, part of the country, etc. This study does not attempt to distinguish the impact of the variables. Nonetheless, clear patterns emerge that suggest that onsite waste management is at least an issue in economic use or reuse of sites.

Of the 172 sites where the land surface has been made safe, 86 sites have been cleaned to unrestricted use (meaning the sites present no threat to human health and the environment in any potential use scenario--residential, child care, etc.), and 86 sites continue to have waste managed on the land surface of the site. Of these sites, 29 are large landfills whose sole current use is as a permanent waste management area. (As noted in the discussion that follows, eight other landfills are in other noneconomic or economic use.) In addition, 33 of the 86 sites where the land has been cleaned for unrestricted uses have an ongoing pumping and treating operation that is cleaning the ground water. Most of these have deed restrictions in place that restrict the use of ground water until cleanup levels are achieved. (Forty-one of those sites with surface waste contained on the land also have a ground-water pump and treat operation underway.) Figure 27 shows the distribution of types of waste management that may be ongoing among the 119 sites with surface management of waste or ground-water management (but no surface management).

Altogether, 45 percent of the CCL universe in this study have continued waste management on the land surface, and 17 percent have ongoing ground-water pump and treat, but no surface waste management. These percentages, however, divide unevenly between the sites in noneconomic use or vacant and the sites in economic use or reuse. Of the sites in noneconomic use or vacant, 53 percent have surface waste contained onsite, as compared to 35 percent of the sites in economic use. The impact of ongoing ground-water pump and treat appears to be relatively insignificant. Forty-eight percent of those sites with ongoing ground-water cleanup and no surface containment are in noneconomic use or vacant. Fifty-two percent of that universe are in economic use. Figure 28 graphically describes these relationships.

Landfills represent approximately 20 percent of the total Superfund universe and the same percent of the CCL that is part of this study. This includes 29 sites (80 percent) where the sole use is as a landfill and 10 additional landfills with some economic use. The beneficial use of the sites solely in use as a landfill was originally as a waste management area and will continue to be into the future. One landfill on the CCL continues in economic use as a nonhazardous waste landfill. Other economic uses occur when a portion of the site does not contain a landfill. Monsanto Corporation in Georgia is an active industrial facility with two landfills onsite. The Belvidere Municipal Landfill in Illinois has been turned into a recreation area and park by the location community. Table 8

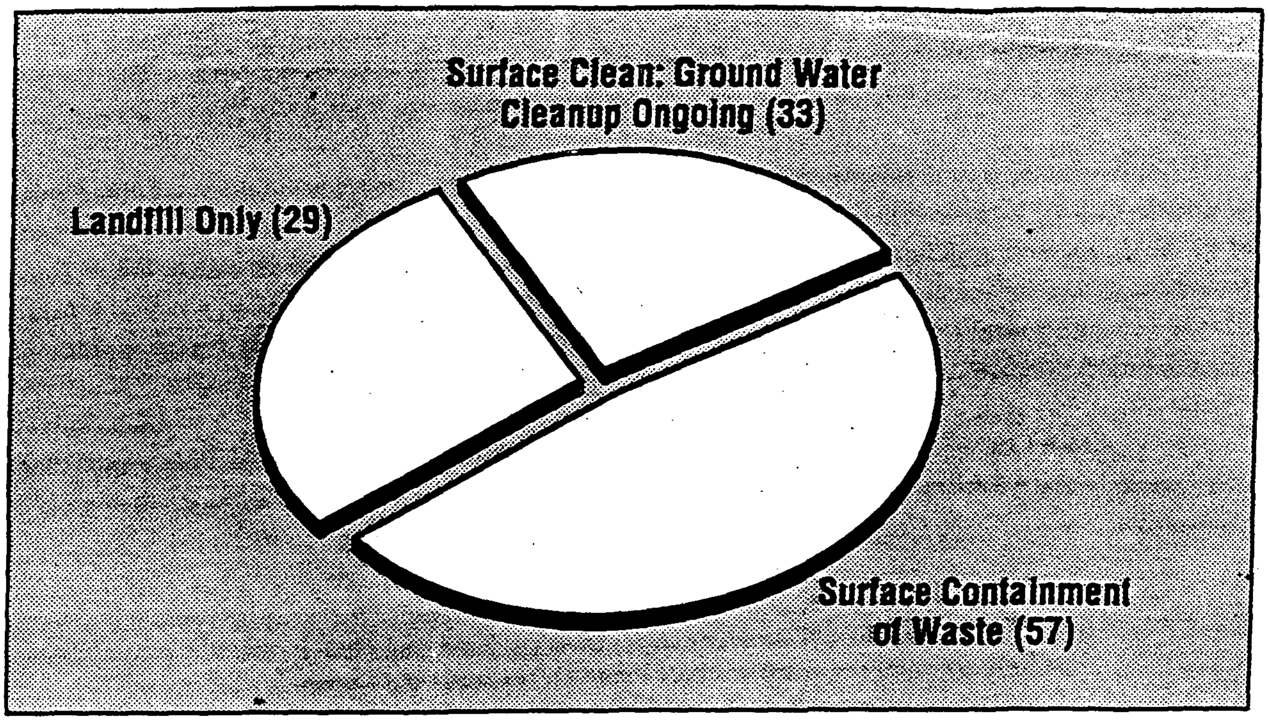


Figure 27. Completed Sites With Waste Management Ongoing

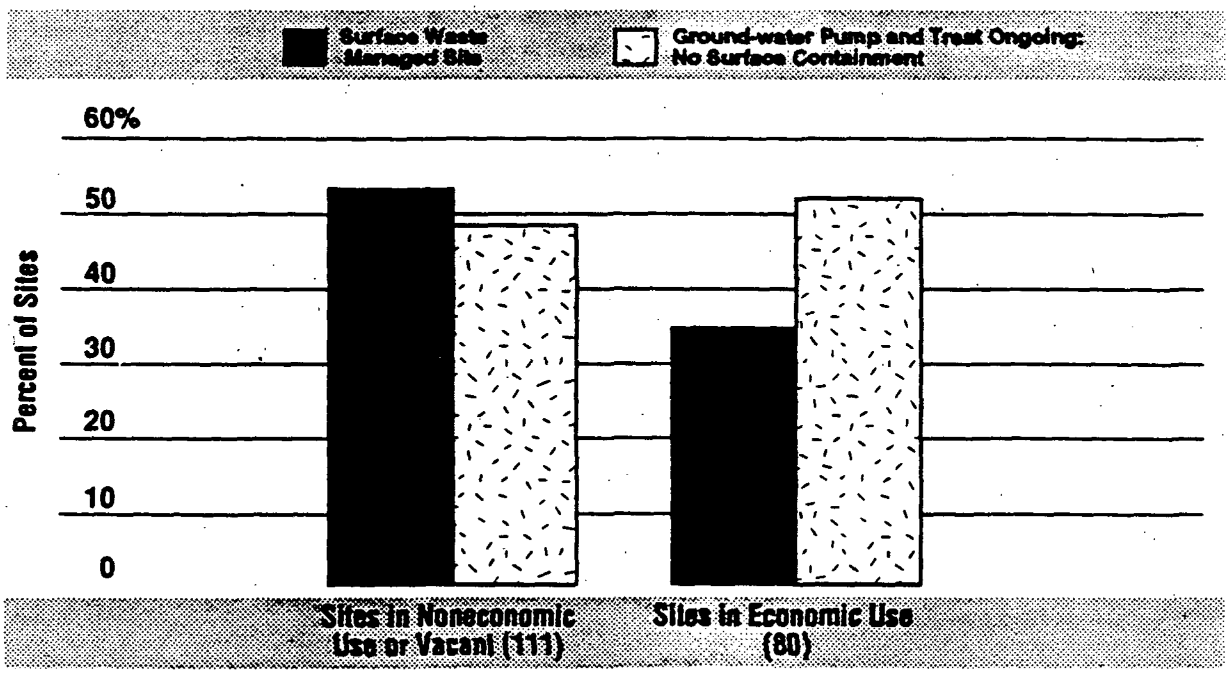


Figure 28. Role of Ongoing Waste Management in Economic Use or Reuse

describes those landfills that are on the CCL and whose sole use is a permanent waste repository. These landfills range in size from 3 acres (one site) to 345 acres, with the most common size range being 15 to 75 acres.

Other factors, such as environmental value, may play a role in why sites are not in economic use. Fifteen sites on the CCL are exclusively in an environmental use as a floodplain, wetland, or wildlife reserve. While some of the floodplain areas may be subject to pressure for future development, arguably their current use is due to environmental laws and regulations for flood control, wetlands protection, habitat enhancement, and other benefits. It could be argued that the value of these areas for such environmental use has been increased through the removal of contaminants from soil, sediments, ground water, and/or surface water.

A focused look at 72 sites on the CCL examined impediments to economic use at these sites.[18] This examination yielded results that amplify some of the factors discussed above and show the interaction of some of these factors.

- Twenty-two of the 72 sites are large landfills (from the list of 29 permanent waste management areas). The presence of waste managed onsite and associated deed restrictions supporting use limitations are perceived as major impediments to economic use or reuse.
- Twenty-five of the 72 sites have no identified impediments to use. Twenty of these are currently in use; five sites with no impediments to use are vacant; and four are also in rural locations.
- Of the 25 sites with impediments to economic use that are not landfills, 17 sites are vacant. Twelve of these vacant sites are in rural, remote, or small town locations with no economic drivers for use. All but two of the vacant sites have surface waste managed onsite or an ongoing ground-water pump and treat operation or both.

The Role of Timing in Economic Use and Reuse. A question that frequently arises concerning the economic use of Superfund sites is the degree of impact that the timing of a recently completed cleanup has on whether a site has yet gone into economic use. To answer this question, the study compared the last date of physical construction (through either a removal or remedial action) at vacant sites in comparison to those sites in economic use.[19]

As reflected on Figure 29, there is no current evidence that the date of actual construction completion has had any impact on the economic use of the properties in this study. This, in part, reflects the fact that most of the

[18]These 72 sites were simply all of the last 72 sites on which data were gathered and were not designed to be reflective of the universe. Data were collected through interviews with regional RPMs, State managers, tax assessors, and real estate personnel.

[19]Data on the completion of the last cleanup action were obtained from EPA's CERCLIS data base.

sites in economic use have been in continuous use, even prior to cleanup. However, over time, this picture could change. Because almost 60 percent of the completions have occurred since 1990, the impact of a time lag on vacant properties may not yet have occurred.

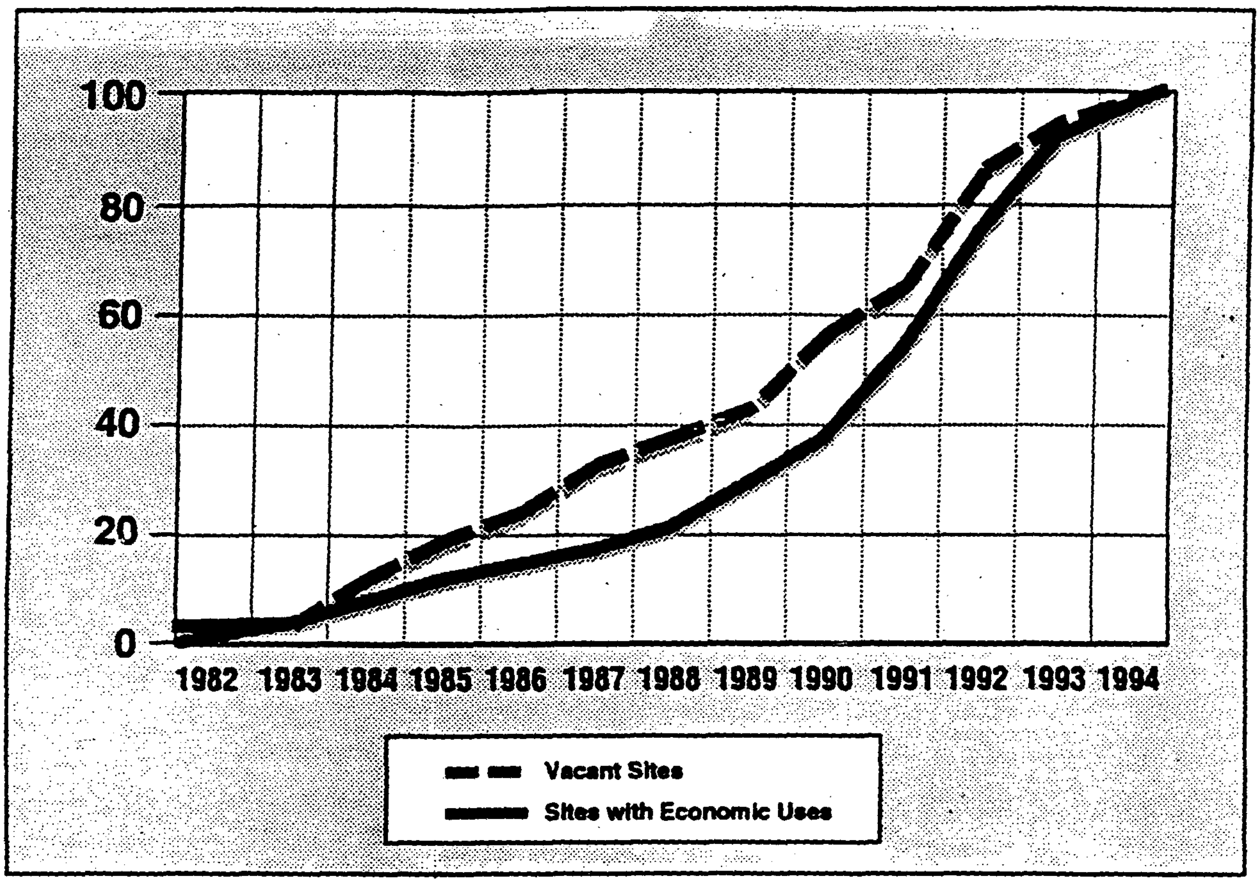


Figure 29. Timing Analysis of CCL Sites - Vacant vs. Economic Uses

APPENDIX A

NPL CONSTRUCTION COMPLETION SITES

APPENDIX A: NPL CONSTRUCTION COMPLETION SITES

A.1 Introduction

Appendix A contains the following information on National Priorities List (NPL) construction completion sites examined in this study:

- Definition of Location/Area Categories.
- List of 191 NPL Construction Completion Sites included in Beneficial Use Study. Sites are listed by EPA Region. The location category is listed for each site.
- List of 37 NPL Construction Completion Sites not included in the study. Sites are listed by EPA Region. The reason each site is omitted is listed.

A.2 Definition of Location/Area Categories

For the purposes of the beneficial use study, a site is classified as an urban site if it is located in a large municipality and has a population greater than 20,000 within 1 mile. A total of 31 sites, 16 percent of the 191 sites, are located in urban areas. Separate categories are distinguished for **urban industrial sites** and for **urban nonindustrial sites**. Sites located in areas dominated by heavy industry are designated urban industrial. Sites designated as nonindustrial are typically located near industrial areas, but residential areas are also nearby.

Suburban sites have populations between 10,000 and 20,000 within 1 mile and are located near a large municipality of higher population density. A total of 29 sites, about 15 percent of the sites in the study, are suburban sites. Separate categories are distinguished for **suburban industrial sites**, **suburban sites with high-tech electronics manufacturing**, and **suburban residential sites**. Suburban industrial sites are located in areas where heavy industry is the predominant land use. Suburban sites with high-tech electronics manufacturing are distinguished as a separate category because the property values at such sites are closely linked to their regional location and to their particular manufacturing use. Such sites are typically located very close to suburban residential sites. Suburban residential sites are in areas where residences surround and characterize the land use.

Medium town sites are independent of large municipalities and have populations between 3,000 and 10,000 within 1 mile. A total of 40 sites, about 21 percent of the total number of sites in the study, are in medium towns. Separate categories are distinguished for **medium town industrial sites**, **medium town landfill sites**, and **medium town nonindustrial sites**. Industrial sites are located in areas where heavy industry is the predominant land use. Landfill sites may be active or inactive sites that have received both municipal and industrial wastes in the past.

Sites that are located in medium towns and not characterized as industrial or landfill sites are grouped together in the category called medium town nonindustrial.

Small town sites have populations between 3,000 and 10,000 within 1 mile. Small towns are considered to be self-supporting, separate, and distinct from nearby larger towns. A total of 19 sites, about 10 percent of the total number of sites in the study, are located in small towns.

Rural sites have populations between 250 and 3,000 within 1 mile. Area residents rely on larger population centers and must travel for most goods and services. A total of 57 sites, about 30 percent of the sites in the study, are located in rural sites. **Rural industrial sites** are located in areas with industrial operations. Most rural location sites, however are not in industrial areas and are grouped together in a category called **rural nonindustrial sites**.

Remote sites are characterized by sparse population density, (i.e., fewer than 250 people residing within 1 mile). Accessibility to remote sites is limited, in general, although one or more private residences may be nearby. Mining operations or agricultural uses (e.g., cattle grazing) may be the predominant use of surrounding properties. Fifteen sites, about 8 percent of the total 191 construction completion sites analyzed, are classified as remote.

Table 12. List of 191 NPL Construction Completions Included in Study

EPA Region	Site name	State	Location category
1	Cannon Engineering Corp.	MA	Urban industrial
	Darling Hill Dump	VT	Rural nonindustrial
	Kearsarge Metallurgical Corp.	NH	Medium town industrial
	Keefe Environmental Services	NH	Rural nonindustrial
	McKin Company	ME	Rural nonindustrial
	Mottolo Pig Farm	NH	Rural nonindustrial
	Plymouth Harbor/ Cannon Engineering Corp.	NH	Urban industrial
	Revere Textile Print Corp.	CT	Medium town industrial
	Saco Tannery Waste Pits	ME	Rural nonindustrial
	Sylvester's/Gilson Road	NH	Medium town landfill
	Western Sand & Gravel	RI	Rural industrial
2	Action Anodizing Plating and Polishing	NY	Suburban industrial
	BEC Trucking	NY	Medium town industrial
	BioClinical Laboratories	NY	Suburban industrial
	C & J Disposal Leasing Co. Dump	NY	Small town
	Clothier Disposal	NY	Remote
	Combe Fill North Landfill	NJ	Small town
	Friedman Property	NJ	Rural nonindustrial
	Goose Farm	NJ	Rural nonindustrial
	Helen Kramer Landfill	NJ	Rural nonindustrial
	Krysowaty Farm	NJ	Suburban residential
	Monroe Township Landfill	NJ	Rural nonindustrial
	Old Bethpage Landfill	NY	Medium town landfill
	Ringwood Mines/ Landfill	NJ	Medium town landfill

Table 12. (continued)

EPA Region	Site name	State	Location category
2 (continued)	South Brunswick Landfill	NJ	Rural nonindustrial
	Tabernacle Drum Dump	NJ	Remote
	Tronic Plating Co.	NY	Medium town industrial
	Upper Deerfield Township	NJ	Remote
	Vineland State School	NJ	Medium town nonindustrial
	Wide Beach Development	NY	Suburban residential
	Witco Chemical Corp.	NJ	Suburban industrial
3	Ambler Asbestos Piles	PA	Medium town nonindustrial
	Bruin Lagoon	PA	Rural industrial
	C & R Battery Co., Inc.	VA	Rural nonindustrial
	Chemical Metals Industries	MD	Urban nonindustrial
	Chisman Creek	VA	Medium town nonindustrial
	Coker's Sanitation Service Landfills	DE	Rural nonindustrial
	Enterprise Avenue	PA	Urban nonindustrial
	Hebelka Auto Salvage Yard	PA	Remote
	Henderson Road Site	PA	Small town
	Kimberton Site	PA	Rural nonindustrial
	Lansdowne Radiation Site	PA	Suburban residential
	Leetown Pesticide	WV	Rural nonindustrial
	Lehigh Electric & Engineering Co.	PA	Medium town industrial
	Matthews Electric Plating	VA	Rural nonindustrial
	Mid-Atlantic Wood Preservers, Inc.	MD	Small town
	Middletown Road Dump Site	MD	Suburban residential
	New Castle Spill Site	DE	Medium town industrial

Table 12. (continued)

EPA Region	Site name	State	Location category
3 (continued)	Route 940 Drum Dump	PA	Rural nonindustrial
	Sealand Ltd.	DE	Rural industrial
	Taylor Borough Dump	PA	Medium town landfill
	Voortman Farm	PA	Rural nonindustrial
	Wade (ABM)	PA	Urban industrial
	Westline Site	PA	Rural nonindustrial
	Wildcat Landfill	DE	Remote
4	A.L. Taylor (Valley of the Drums)	KY	Rural nonindustrial
	Alpha Chemical Corp.	FL	Rural industrial
	Amnicola Dump	TN	Urban industrial
	Brown Wood Preserving	FL	Rural industrial
	Celanese Corp. Shelby Fibers	NC	Rural nonindustrial
	Chemtronics Inc.	NC	Rural industrial
	City Industries	FL	Suburban industrial
	Distler Farm	KY	Rural nonindustrial
	Flowood Site	MS	Rural industrial
	General Tire & Rubber Co.	KY	Rural industrial
	Gold Coast Oil	FL	Suburban industrial
	Hollingsworth Solderless Terminal	FL	Suburban industrial
	Independent Nail Co.	SC	Rural nonindustrial
	Lee's Lane Landfill	KY	Medium town landfill
	Lewisburg Dump	TN	Rural nonindustrial
	Luminous Processes, Inc.	GA	Medium town nonindustrial
	Miami Drum Services	FL	Urban industrial
	Monsanto Corp. (Angus)	GA	Medium town industrial

Table 12. (continued)

EPA Region	Site name	State	Location category
4 (continued)	Mowbray Engineering Co.	AL	Rural industrial
	Newport Dump	KY	Medium town landfill
	Parramore Surplus	FL	Rural nonindustrial
	Peppers Steel & Alloys	FL	Rural industrial
	Perdido Groundwater Contamination	AL	Remote
	Pioneer Sand Company	FL	Medium town landfill
	Powersville Landfill	GA	Remote
	SCRDI Dixiana	SC	Rural nonindustrial
	Tri-City Oil Conservation	FL	Suburban industrial
	Varsol Spill Site	FL	Urban nonindustrial
	Walcotte Chemical Co.	MS	Medium town nonindustrial
	Wilson Concepts of Florida, Inc.	FL	Suburban industrial
	Woodbury Chemical Co.	FL	Small town
5	A & F Materials Reclaiming, Inc.	IL	Rural industrial
	Algoma Municipal Landfill	WI	Remote
	Anderson Development Co.	MI	Medium town industrial
	Belvidere Municipal Landfill	IL	Medium town landfill
	Boise Cascade/Onan/ Medtronics	MN	Suburban industrial
	Bower's Landfill	OH	Small town
	Burrows Sanitation	MI	Remote
	Cemetery Dump Site	MI	Small town
	Chem-Dyne Corp.	OH	Medium town nonindustrial
	Chemical & Minerals Reclamation	OH	Urban industrial

Table 12. (continued)

EPA Region	Site name	State	Location category
5 (continued)	E.H. Schilling Landfill	OH	Rural industrial
	FMC Corp.	MN	Urban industrial
	General Mills/Henkel Corp.	MN	Urban industrial
	Grand Traverse Overall Supply Co.	MI	Medium town nonindustrial
	Gratiot County Golf Course	MI	Medium town nonindustrial
	Hedblum Industries	MI	Small town
	IMC Terre Haute East Plant	IN	Urban industrial
	Johns Manville Corp.	IL	Suburban industrial
	LaSalle Electric Utilities	IL	Rural nonindustrial
	Laskin/Poplar Oil Co.	OH	Rural nonindustrial
	New Lyme Landfill	OH	Rural nonindustrial
	Northern Engraving Co.	WI	Small town
	Nutting Truck & Caster Co.	MN	Medium town nonindustrial
	Oak Grove Sanitary Landfill	MN	Rural nonindustrial
	Old Mill	OH	Small town
	Petersen Sand & Gravel	IL	Rural nonindustrial
	Poer Farm	IN	Rural nonindustrial
	Republic Steel Corp. Quarry	OH	Suburban residential
	Schmalz Dump	MI	Urban industrial
	Seymour Recycling Corp.	IN	Medium town industrial
	Tri-State Plating	IN	Small town
	Union Scrap Iron and Metal Co.	MN	Urban industrial
	U.S. Aviex	MI	Suburban industrial
	Velsicol Chemical Corp.	MI	Medium town nonindustrial
	Washington County Landfill	MN	Medium town landfill

Table 12. (continued)

EPA Region	Site name	State	Location category
5 (continued)	Wedzeb Enterprises, Inc.	IN	Medium town nonindustrial
	Wheeler Pit	WI	Rural nonindustrial
	Whittaker Corp.	MN	Urban industrial
	Windom Dump	MN	Medium town landfill
6	Bayou Sorrel Site	LA	Remote
	Bio-Ecology Systems, Inc.	TX	Medium town landfill
	Cecil Lindsey	AR	Rural nonindustrial
	Cimarron Mining Corp.	NM	Small town
	Compass Industries	OK	Medium town landfill
	Crystal City Airport	TX	Small town
	Dixie Oil Processors, Inc.	TX	Rural nonindustrial
	Geneva Industries/ Fuhrmann Energy	TX	Urban nonindustrial
	Harris (Farley St.)	TX	Urban nonindustrial
	Highlands Acid Pit	TX	Urban nonindustrial
	Industrial Waste Control	AR	Rural nonindustrial
	Midland Products	AR	Remote
	Mid-South Wood Products	AR	Small town
	Pagano Salvage	NM	Medium town nonindustrial
	Pesses Chemical Co.	TX	Urban nonindustrial
	Sol Lynn/Industrial Transformers	TX	Urban industrial
	Stewco, Inc.	TX	Small town
	Triangle Chemical Co.	TX	Medium town nonindustrial
7	Aidex Corp.	IA	Rural industrial
	Arkansas City Dump	KS	Medium town landfill
	Big River Sand Co.	KS	Rural nonindustrial

Table 12. (continued)

EPA Region	Site name	State	Location category
7 (continued)	Conservation Chemical Co.	MO	Urban industrial
	E.I. DuPont deNemours	IA	Remote
	Fulbright/SAC River Landfills	MO	Medium town landfill
	Hydro-Flex, Inc.	KS	Medium town industrial
	John Deere (Ottumwa Works)	IA	Medium town industrial
	Johns' Sludge Pond	KS	Urban nonindustrial
	LaBounty	IA	Medium town industrial
	Lawrence Todtz Farm	IA	Rural industrial
	North-U Drive Well Contamination	MO	Rural nonindustrial
	Northwestern States Portland Cement Co.	IA	Urban nonindustrial
	Solid State Circuits, Inc.	MO	Small town
8	Libby Groundwater Contamination	MT	Small town
	Marshal Landfill	CO	Rural nonindustrial
	Mystery Bridge Road	WY	Rural industrial
	Rose Park Sludge Pit	UT	Suburban residential
	Whitewood Creek	SD	Remote
	Woodbury Chemical Co.	CO	Urban industrial
9	Applied Materials	CA	Suburban high-tech electronics manufacturing
	Advance Micro Devices, Inc. (#915)	CA	Suburban high-tech electronics manufacturing
	Beckman Instruments	CA	Rural nonindustrial
	CTS Printex, Inc.	CA	Suburban high-tech electronics manufacturing
	Del Norte Pesticide Storage	CA	Rural nonindustrial

Table 12. (continued)

EPA Region	Site name	State	Location category
9 (continued)	Fairchild Semiconductor Corp.	CA	Suburban high-tech electronics manufacturing
	Firestone Tire	CA	Suburban industrial
	Intel Corp. (Santa Clara #3)	CA	Suburban high-tech electronics manufacturing
	Intel Magnetics	CA	Suburban high-tech electronics manufacturing
	Intersil Inc./Siemens Components	CA	Suburban high-tech electronics manufacturing
	Jibboom Junkyard	CA	Urban nonindustrial
	Mountain View Mobile Home Estates	AZ	Small town
	SOLA Optical USA, Inc.	CA	Medium town nonindustrial
	Spectra Physics, Inc.	CA	Suburban high-tech electronics manufacturing
	Synertek, Inc.	CA	Suburban high-tech electronics manufacturing
	Teledyne Semiconductor	CA	Suburban high-tech electronics manufacturing
	TRW Microwave Inc. (Building 825)	CA	Suburban high-tech electronics manufacturing
10	Alaska Battery Enterprise	AK	Urban industrial
	Allied Plating Inc.	OR	Urban industrial
	ARRCOM (Drexler Ent.)	ID	Rural nonindustrial
	FMC Corp.	WA	Small town
	Joseph Forest Products	OR	Rural industrial
	Northside Landfill	WA	Urban industrial
	Silver Mountain Mine	WA	Remote
	Toftdahl Drums	WA	Remote
	United Chrome Products, Inc.	OR	Urban industrial

Table 12. (continued)

EPA Region	Site name	State	Location category
10 (continued)	Western Processing Co., Inc.	WA	Urban industrial
	Yakima Plating Co.	WA	Urban industrial

Table 13. List of 37 NPL Construction Completion Sites Not Included in Beneficial Use Study

EPA Region	Site name	State	Reason not included
1	Town Garage/Radio Beacon	NH	Well head site, negligible land area
2	Beachwood/Berkeley Wells	NJ	Well head site, negligible land area
	Cooper Road	NJ	Negligible land area
	Katonah Municipal Well	NY	Well head site, negligible land area
	Lodi Municipal Well	NJ	No action ROD[1]
	M&T DeLisa Landfill	NJ	Referred to another authority
	Pomona Oaks Residential Wells	NJ	Well head site, negligible land area
	Suffern Village Well Field	NY	Well head site, negligible land area
3	New Castle Steel	DE	No action ROD[1]
	Presque Isle	PA	Well head site, negligible land area
	Reeser's Landfill	PA	No action ROD[1]
	Suffolk City Landfill	VA	No action ROD[1]
4	Beulah Landfill	FL	No action ROD[1]
	Chemform, Inc.	FL	No action ROD[1]
	PCB Spills, 243 miles of road	NC	Roadside, unspecified land area
	Triana/Tennessee River	AL	Waterway, unspecified land area
5	Adrian Well Municipal Well Field	MN	Well head site, negligible land area
	American Anodco, Inc.	MI	No action ROD[1]
	Charlevoix Municipal Well Field	MI	Well head site, negligible land area
	Eau Claire Municipal Well Field	WI	Well head site, negligible land area
	Lehillier/Mankato Site	MN	Well head site, negligible land area
	Mason County Landfill	MI	No action ROD[1]
	Metal Working Shop	MI	No action ROD[1]

Table 13. (continued)

EPA Region	Site name	State	Reason not included
5 (continued)	Morris Arsenic Dump	MN	Unspecified land area
	Novaco Industries	MI	No action ROD[1]
	Twin Cities Air Force Reserve Base	MN	Federal facility
	Whitehall Municipal Wells	MI	Well head site, negligible land area
8	Arsenic Trioxide Site	ND	Unspecified land area
9	Celtor Chemical Works	CA	Indian Reservation; no information available
	Ordot Landfill	GU	Outside the U.S.
	PCB Warehouse	GU	Outside the U.S.
	PCB Wastes	PT	Outside the U.S.
	Taputimu Farm	SA	Outside the U.S.
10	Lakewood Site	WA	No information available
	Pesticide Lab/Yakima	WA	Referred to another authority

[1]Occasionally, a site is listed on the NPL that is thought to be contaminated and for which subsequent investigation shows there is no risk. This occurs because the investigation that is performed to list a site on the NPL is a screening investigation with limited information designed to ensure that false negatives do not lead to a site not being listed that should be. If, after listing on the NPL, a more detailed investigation shows that the site does not pose a risk to human health and the environment, a "no action" Record of Decision (ROD) is signed to record that finding and delete the site from the NPL.

APPENDIX B

REMOVAL PROGRAM ACCOMPLISHMENTS

APPENDIX B: REMOVAL PROGRAM ACCOMPLISHMENTS

B.1 Introduction

As described in Chapter 1 of the Beneficial Use of NPL Completions report, the removal program undertakes cleanup actions at National Priorities List (NPL) and non-NPL sites to reduce risks, stabilize sites, or cleanup contamination. Although not a major focus of this study, 76 Fact Sheets in Volume 2 of this report describe 178 removal actions taken to reduce risk and make NPL and non-NPL sites safe. Although these sites reflect typical removal actions, the sheer size of the removal universe (over 4,000 actions at over 3,000 NPL and non-NPL sites) made selection of a representative sample of removal sites difficult. In general, the 76 Fact Sheets found in Volume 2 of this report represent both a larger average dollar value than the universe as a whole and are more likely to be at NPL sites. In addition, the removal sites in this study are somewhat less likely to reflect immediate emergencies and instead represent time critical or non-time critical actions with a different regional distribution than the universe taken as a whole.[1] Some of the environmental benefits associated with the removal program are described below.

B.2 Environmental Benefits Through Removal Actions

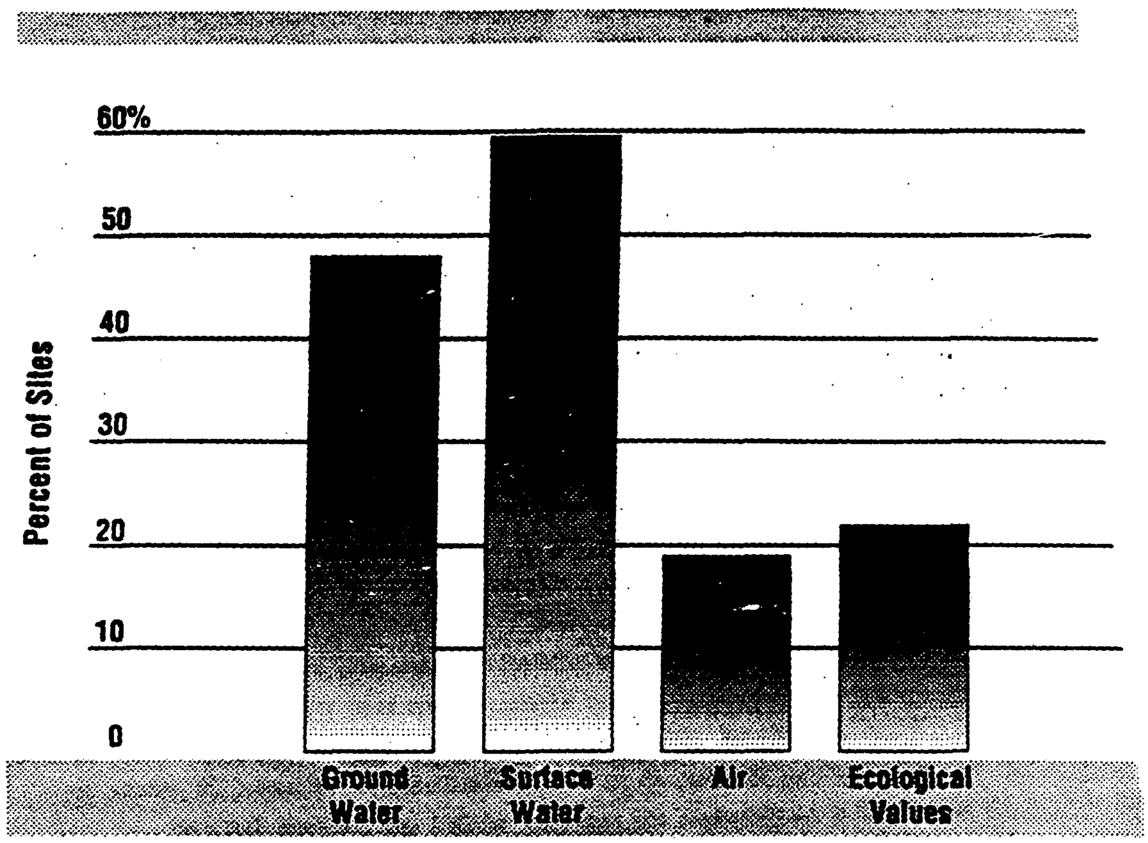
Removal actions are almost always oriented toward making the land surface safe. All 76 sites for which Fact Sheets were prepared involved this media. At 24 percent of the total number of removal sites in this study and 35 percent of the non-NPL sites, information available suggests that the cleanup of the land surface was a "complete" cleanup that warranted no further action to be taken.[2] The cleanup of the land surface can involve removal of waste from the site (for disposal and/or treatment offsite), containment of waste onsite, treatment onsite, or all three. Of the 18 sites for which a "complete" cleanup appears to have been achieved, 16 involved removal of waste, and 2 of these also involved treatment. Of the two other sites, one involved treatment alone, while one involved containment. For the remaining 58 sites, 45 percent involved removal of waste, 29 percent involved containment, 24 percent involved both (containment and removal), while 1 site involved treatment.

The value of removal actions at both NPL and non-NPL sites is measured by immediate threats eliminated and by the risk reduced to human health and the environment through making contact with the land surface safe. In addition, removal actions lead to the protection of other media by the removal or management of sources of contamination on the land. At 26 percent of the removal examples in the study, immediate risks through

[1]All comparisons are to the 1991 removal universe study summarizing characteristics of removal actions taken between 1987 and 1991. All data on the 76 sites are taken from CERCLIS.

[2]Because the goal of the removal program is to reduce risk and eliminate immediate threats, once a non-NPL site is stabilized, generally the Superfund program is no longer involved.

exposure to fire and explosion were eliminated. At another two sites, clean water suppl contaminated drinking water were provided. Finally, the protection of other media--particularly , surface water--was achieved at a significant percent of the removal sites in this study. (See Figu



*At all sites, the land surface was made safer. At 34 sites, protection of other media was an explicit goal.

Figure 30. Protection of Other Media by Removal Actions at 34 Sites*

Cleanup of a Surface Contamination. Surface cleanup actions are the most common removal response All removal sites in this study involved action to make the surface safe. Examples include:

- Removal actions at the Wells Finishing site in Massachusetts have eliminated threats to the environment and human health from onsite contamination and made use of this commercial site possible. The site contained open, leaking metal plating vats containing acids and caustics strong enough to induce respiratory failure in anyone who touched the vats or breathed the fumes. Many people lived and worked near the site. The contaminants onsite were shipped offsite for proper disposal, and the threat of direct exposure and contamination of local surface waters was eliminated.

- The Jackson Ceramics Lead site in Falls Creek, Pennsylvania, was also cleaned up as a result of removal actions. Transformers containing polychlorinated biphenyl (PCB), and flammable and explosive solids and liquids were found onsite. These contaminants were removed from the site. The soil was also contaminated with lead residues from lead glazing operations conducted onsite. Contaminated soils were removed and disposed of, thus alleviating the threats to local residents and to wildlife in nearby surface waters.

Protecting Waterways. As discussed in relationship to the CCL sites, in many cases, cleanup of surface contamination can be expected to also protect aquifers. An example of a removal action site where this occurred is:

- Removal activities at the Wycoff/Eagle Harbor site in Washington have protected the waterway and wildlife habitat by cleaning contaminated sediments. The site was contaminated with polynuclear aromatic hydrocarbons (PAHs) from wood treating and shipyard operations. The contaminated sediments in the harbor bottom are being covered with clean sandy sediments from another site.

Protecting Ecologically Sensitive Areas. An example of this is:

- As a result of emergency actions taken by the removal program at the Eastern Surplus Supply Co. in Middybemps, Maine, an adjacent lake and river industry fisheries and spawning areas, a National Wildlife Refuge, and a habitat for the Bald Eagle were protected from surface contamination. The Eastern Surplus Supply Company retailed Army surplus and salvage material from 1946 until the mid 1980s. In addition to large volumes of scrap material, junked cars, old appliances, hazardous materials, and ammunition stored in dumps, compressed gas cylinders and 5-gallon cans were found and removed from the site, as were PCB-contaminated oils from electrical transformers and a trailer filled with calcium carbide.

Prevention of Fire and Explosion. Twenty sites in the removal study achieved this objective. Numerous removal actions have been taken to reduce or eliminate the risk of fire and explosion from silos. An example of such a site is:

- At the Arkansas Chemical site in Newark, New Jersey, over 20,000 drums, containers, and bags of hazardous waste, as well as 100 cubic yards of asbestos, 5 unknown compressed gas cylinders, 15,000 gallons of contaminated liquid, and several radioactive ampules were removed, not only eliminating the threats at the site, but allowing the building to be made suitable for occupancy. The current estimated property value is over $2 million.

Reduction of Air Contaminants. Six removal sites in this study reduced threats associated with air contaminants.

- As a result of removal actions taken at the Nagel residence in Wayne County, Michigan, a densely populated residential area was protected from the release of mercury vapors from a clandestine smelting operation for recovering silver from dental amalgam being run out of the basement of a three-bedroom residence. Elevated mercury levels were found inside the house, and all occupants of the home subsequently died of complications due to mercury poisoning. The removal involved decontaminating certain personal items, and sealing and placing the house under negative pressure to prevent the release of mercury vapor. Mercury vapor in the house was converted to a salt, and some of the walls were further encapsulated with latex paint. Material was removed from the interior and disposed of as a hazardous waste. The structure was demolished, and the basement floor and foundation excavated and placed in an approved landfill. The current assessed value of the property is $10,000.

Demonstrating Effectiveness of Innovative Treatment Technologies. Innovative treatment technologies include cleanup approaches that are not considered to be established technologies. Examples of innovative approaches developed to facilitate cleanup during removal actions are as follows:

- Waste recycling was the primary cleanup strategy at the Eastern Diversified Metals site in Rush Township, Pennsylvania. More than 350-million pounds of plastic insulation waste were disposed of onsite. Two recycling methods were used to remediate this site. The first was a bulk processing method that converts "fluff" into a solid plastic mass. The second separates soil and debris from the plastics, which are then formed into pellets. These can be used as raw materials in the manufacture of new plastics or in concrete or blacktop.

- At the French Limited site in Harris County, Texas, an estimated 300,000 cubic yards of waste from area petrochemical industries are being treated using bioremediation technology. Pumps are used to mix lagoon liquids with thick sludges from the bottom of the lagoon. Contaminated soil beneath the bottom sludge is dredged and mixed with other material in the lagoon. The activity of micro-organisms already present in the lagoon is enhanced by nutrients injected into the sludge and contaminated soil. Oxygen is forced into the mix to increase the rate of biological degradation of the organic chemicals from the waste.

Restoring A Sense of Security. Restoring a sense of security to surrounding communities includes reducing immediate threats, long-term actions to restore a site to beneficial use, and on-going monitoring of sites to ensure that the threat has been removed. Examples of this include:

- The Fike/Artel Chemical site in Nitro, West Virginia, is located just across a busy railyard from downtown Nitro. The site was used by a local specialty chemicals producer who, upon dissolution of the company, abandoned the site. Responding to a request from the State, EPA Region 3 Emergency Response personnel secured the site and began to assess the extent of the chemicals and mitigate the immediate threat to the town. Approximately 2,500 drums and tanks were found in various states of disrepair, a 30-pound cylinder of hydrogen cyanide, 56,000 pounds of metallic sodium,[3] 9,600 gallons of methyl mercaptan,[4] as well as an assortment of bulk liquid and solid materials of lesser threat. Because hydrogen cyanide is a lethal gas, nearby citizens of Nitro were evacuated voluntarily for safety when the hydrogen cyanide cylinder was destroyed by the Emergency Response Team. Nearby chemical companies assisted the cleanup effort by accepting the metallic sodium and methyl mercaptan. Nearly 10-million gallons of contaminated water were treated and discharged, and other laboratory chemicals and equipment were removed for proper disposal. The community response to this cleanup was so positive that the On-Scene Coordinators (OSCs) were made honorary citizens of Nitro. The site has been stabilized and is now ready for extensive surface and subsurface cleanup.

- The Radium Chemical Company site is located in a densely populated urban area in Woodside, New York, immediately adjacent to the Brooklyn-Queens expressway. The Radium Chemical Company (now insolvent) handled sealed sources of radium-226 for use in cancer therapy. Several thousand radioactive "needles" had been left onsite. Two rooms contaminated by other radioactive materials also housed a large number of laboratory chemicals, including potentially shock-sensitive ethers and other flammables. A public health advisory was issued because of the concern that widespread radiation contamination would result if a fire occurred at the site. EPA immediately initiated 24-hour site security and took other actions to avert a potential disaster. All radioactive materials were removed to an approved radioactive waste disposal facility. The ether was destroyed onsite, and other laboratory chemicals were removed. The immediate threat to nearby residents, businesses, and motorists from a possible fire or explosion was eliminated. The abandoned building has been dismantled, and excavation of contaminated soil was completed in March 1992.

Beneficial Use and Environmental Justice. The location of some Superfund sites, for example, in inner cities, may result in an increase in exposure to onsite contaminants among specific subgroups of the population (i.e., minorities). Examples of these types of sites addressed by the removal program include:

- The Signo Trading International, Ltd. site is located in a densely populated inner-city area in Mount Vernon, New York. Approximately 30,000 people live within a 0.5-mile radius of the site, and numerous schools are located in the immediate area. The Signo site contained a large amount of flammable liquids and solids, poisons, oxidizers, acids, alkalies, and air/water reactives as a result of chemical trading and exporting operations.

  Numerous local residents near the Signo Trading site were treated at a hospital as a result of breathing of vapors from the site. Removal actions at the site included destruction of hazardous materials and detonation of explosives. The threats of fire, explosion, and direct exposure to toxic materials, and contamination of surface water has been eliminated, and the buildings on site currently house other businesses that provide jobs to the community.

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[3]Metallic sodium reacts vigorously with water to form lye and hydrogen. Heat from the reaction can easily ignite the hydrogen, resulting in an explosion.

[4]Methyl mercaptan is a gas similar to hydrogen sulfide, but with a stronger and more disagreeable odor of rotten cabbage.

- Cleanup at the American Street Tannery site in Philadelphia, Pennsylvania, alleviated poı to the surrounding densely populated inner-city neighborhood. The site containe substances in drums, barrels, tanks, and bulk storage containers, posing a threat of fire c Removal and disposal of these materials, as well as removal of the building on site, hav the reduction of threats to the neighboring community. The site is now ready for devel

APPENDIX C

CCL/NPL COMPARISON METHODOLOGY

APPENDIX C: CCL/NPL COMPARISON METHODOLOGY

C.1 Introduction

An analysis was conducted comparing the universe of sites on the National Priorities List (NPL) to those sites on the Construction Completion List (CCL). The purpose of the comparison was to examine, for the categories compared, the degree to which the CCL is reflective of the NPL universe as a whole. A wide range of comparison topics were considered before selecting the 12 categories that were compared in this study. The categories selected were based on a combination of the availability of data and the usefulness of the information in comparing the two groups. A key criterion for selection of categories was the degree to which that category could be suggestive of the complexity of site cleanup.

C.2 Methodology

Table 14 provides a definition of the categories compared, along with the suggested reason for making the comparison, the data sources used, and notes on use of specific data for some categories.

Analyses were conducted at a facility level as opposed to an operable unit (OU) level. However, in many cases, information from the OU level was examined to determine the status of a site at the facility level. In general, if a single OU at a site exhibited a certain characteristics, the facility as a whole was then considered to have that characteristic.

For the most part, a field in one of the data base sources cited in Table C-1 contained information necessary for the aforementioned analyses. The field was analyzed, and the number of the various responses was tallied.

In order to maintain a consistent approach across all of the comparisons, the number of sites contained in the Remedial Project Manager (RPM) data base (1,244) was used as the basis for the NPL universe. The 1,244 sites in the RPM were selected because these same sites were also found in all other data bases used and because the RPM data base was used more frequently as a basis for comparison than the other data bases.. The CCL universe was comprised of the same 191 sites used throughout the Beneficial Uses Study.

Table 14.
Description of Categories and Data Sources Used to Compare the NPL Universe to the Completions Universe

Potential Category	Definition	Reason for Comparison	Data Sources				
			CERCLIS	SNAPS[1]	RPM Site DB[2]	Other	Notes on Use of Data Sources
EPA Region	Regions 1-10	Shows regional geographic distribution of completed sites compared to the distribution of the universe.			✓		
Federal Facility	Yes or No	As of March 1994, Federal facilities were only about 10% of the total universe; however, as of the date of this report focus (March 1994), no Federal facilities were on the completion list.			✓		
Minority Population Living Near Site	% living within 1- mile radius of site	Addresses questions and concerns of environmental justice.				OPM [4]	
Site Type/Land Use (at time of contamination)	- Mining - Commercial - Manufacturing - Recycling - Transportation - Landfills	Information is available in several data bases.			✓		- Data were available at the OU level. Information was tallied to give a presentation at the facility level. - Multiple answers were given to sites which had multiple OUs with different land uses.
RCRA Status	Yes (active or inactive) or No	RCRA sites have the potential to be more complicated sites and provide an indication of the types of wastes managed.			✓		
Site Size	Sites are grouped in acreage ranges.	Size of site may be an indicator of the scale and complexity of a site.		✓		Ver-C DB[3]	

Table 14. (continued)

Potential Category	Definition	Reason for Comparison	Data Sources				
			CERCLIS	SNAPS[1]	RPM Site DB[2]	Other	Notes on Use of Data Sources
Ground-water Contamination	Yes or No	May help to illuminate hypothesis that easier sites (not involving ground-water contamination) are cleaned up first.			✓		- Data were available at the OU level. Information was tallied to give a presentation at the facility level. - If ground water was contaminated at a single OU for a facility, ground water was assumed to be contaminated for the entire facility.
Number of Operable Units (OUs)/Site	- 1-3 OUs - 4-6 OUs - 7+ OUs	May provide a further indicator of site complexity.	✓				
Cleanup Lead	- Fund - PRP - Federal facility	May give an indication of whether speed of cleanup is influenced by the source of funding.	✓				- Data were available at the OU level. Information was tallied to give a presentation at the facility level. - Multiple answers were given to sites which had multiple OUs with different cleanup leads.
Cleanup Costs, All OUs	- Estimated or actual costs across ranges by OU.	Information for hypothesis that cheaper sites may be cleaned up first.			✓	OPM DB[3]	- Data were available at the OU level. Information was tallied to give a presentation at the facility level. - Costs were given in ranges, and the analysis was performed on the number of OUs per cost range. - Compared mostly fund financed sites.

Table 14. (continued)

Potential Category	Definition	Reason for Comparison	Data Sources				
			CERCLIS	SNAPS[1]	RPM Site DB[2]	Other	Notes on Use of Data Sources
Removal Actions	- Number of sites with removal actions and - Number of removal actions/site: - 0 - 1-3 - 4-6 - 7+	Addresses questions of whether completed sites were able to be cleaned up because they made more active use of removals.	✓				- Data were available at the OU level. Information was tallied to give a presentation at the facility level.
Date Listed on NPL	- 3-year ranges	Are sites listed earlier being cleaned up first? Is there evidence to suggest that completions are the older sites?	✓				

(1) SNAPS is the Superfund NPL Characterization Project data base (up-to-date as of May 1995). Information originally from *Superfund NPL Characterization Project - National Results Report* EPA/540/8-91/069. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. Publication 9345.1-09-0. September 1991.

(2) RPM Site DB is the Remedial Project Manager Site Data Base. Information from Users Guide to the RPM Site Data, EPA 540/R-94/041. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Office of Solid Waste and Emergency Response. Publication 9355.0.54, August 1994. ***NOTE: The information in the RPM Site DB contains status information on NPL sites only up to August 1993.***

(3) Versar Completion Data Base (March 1995).

(4) OPM (Office of Program Management) Lotus spreadsheet containing information on population and demographic information (September 5, 1995).

(5) OPM Lotus spreadsheet containing information on lead agencies and costs (August 24, 1995).