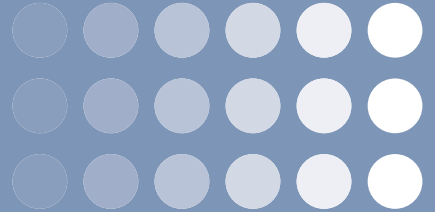


FY 2007 SUPERFUND Annual Report



Building on Success: Protecting Human Health and the Environment



Message from the Directors

This report highlights some of the many accomplishments of EPA's Superfund remedial, removal, enforcement, and federal facilities programs during Fiscal Year 2007. The Superfund program protects the public and the environment by requiring cleanup of the nation's worst hazardous waste sites and by taking short-term actions to mitigate immediate threats to human health and the environment. EPA continues to focus its management attention and resources on the sites that present the greatest risk. Removal actions often are taken to protect the public and the environment even in situations where remedies to achieve long-term protection are being developed and constructed.

To turn Superfund sites into community assets, EPA partners with local governments and communities to seek out land revitalization opportunities when selecting and implementing remedies. With so many sites (1,030) reaching the final stage of remedy construction completion, the program is focusing greater attention on the achievement and maintenance of long-term protection at these sites. Since the early 1990s, all of these actions have been taken using the "enforcement first" paradigm, which ensures that the party responsible for the contamination is first required to implement the cleanup. The cumulative value of private party cleanup commitments and cost recovery settlements is more than \$25 billion. EPA's enforcement efforts have allowed the Agency to focus appropriated funds on sites where potentially responsible parties (PRPs) cannot be identified or are unable to pay for or conduct the cleanup.

Within this report are many local success stories that document the Superfund program's involvement with and contributions to communities throughout the country over the past fiscal year. It is our hope that these stories, together with the facts, images, and Web links herein, convey the diversity of effort, the innovative problem solving at all levels, and the high level of enthusiasm that characterize the Superfund program. This report also highlights the strengthening of efforts toward greener remediation at Superfund sites. For example, the cover and last section of the report depict the increasing use of wind turbines and solar cells to generate power-sustaining cleanups and long-term stewardship of sites.

Even while we recognize these accomplishments, we know that much still remains to be done to protect the public and its natural resources. For instance, EPA still expects to return ground water to beneficial use wherever practicable. The Agency continues to look to the latest science to inform its risk management decision-making. EPA, together with states, tribes, local governments, private parties, and other federal agencies, must continue to focus its collective efforts on reducing the number of National Priorities List (NPL) sites where the public may be exposed to contamination. We need our collective efforts to make sure that the potential for future exposures is minimized as well.

We hope you find the report interesting, informative, and reflective of the progress underway in your community.

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Introduction

The purpose of this report is to communicate the progress made by the Superfund program in Fiscal Year (FY) 2007 (October 1, 2006-September 30, 2007). The United States Environmental Protection Agency (EPA or the Agency) prepared this report in an ongoing effort to provide the public with information on Superfund and related programs, including Emergency Response, Enforcement, and Federal Facilities (hereinafter referred to as “Superfund”).

In 1980, Congress created the Superfund program to protect human health and the environment from the risks posed by hazardous waste sites. To limit exposures across the country, EPA undertakes a variety of Superfund response actions. From providing alternative water supplies for communities to performing residential yard cleanups, the Superfund program continues to protect public health and the environment. The Superfund program guards against direct human exposure to environmental contamination at these sites, assures the protection of those who work and live nearby, and serves as a principal source of information on the associated risks to human health and the environment.

The Superfund program has been tremendously successful. Remedy construction has been completed at two-thirds of the sites listed on the National Priorities List (NPL).¹ In addition to completing construction on the remaining sites, the program is now focusing on making sure that these sites are ready to be returned to beneficial use by the community, putting both people and property back to work.

In recent years, nationally significant events, such as Hurricanes Katrina and Rita, have presented the United States with unprecedented challenges that require large-scale government response. Beginning in 2003, EPA introduced an Agency-wide National Approach

to Response (NAR) that was designed to efficiently utilize emergency response assets and to clarify the Agency’s preparedness roles and responsibilities at all levels. EPA has been working to ensure that its internal NAR, which is consistent with the government-wide National Response Framework, is fully implemented in conjunction with federal, state, local, and tribal partners. Currently, the NAR priorities include a decontamination strategy, laboratory analyses, crisis communications, training and exercises, information technology advancements, field communications, equipment, and radiation response coordination.

Accomplishments of the program’s emergency management and removal activities include:

- Establishing a National Decontamination Team;
- Training over 2,000 EPA employees in the Incident Command System;
- Developing a National Incident Management System Implementation Plan and Incident Management Handbook; and
- Conducting over 9,400 removal actions at more than 6,900 sites to address immediate threats (as of the end of FY 2007).

The Superfund program spent \$520.7 million for construction and post-construction activities and for conducting and overseeing emergency response actions in FY 2007. This figure includes \$380 million for construction and post-construction projects and \$140.7 million for 351 emergency response and removal actions to address immediate and substantial threats to communities. More than \$82 million was provided to start cleanup construction at 19 projects across the country. These 19 projects represent all of the projects ready to receive funding to initiate cleanup activities, and are in addition to ongoing projects.

¹ Please note that terms of art or words that may not be commonly understood to readers (such as “National Priorities List”) are defined in the glossary (Appendix B) if they appear more than once in this report. If they appear only once, such terms of art or unfamiliar words are defined where they appear.

In the online version of this report (available at www.epa.gov/superfund), readers may access additional information on terms or site names highlighted in blue or beige by clicking on the highlighted text.

Working with states, tribes, communities, local governments, and many other stakeholders, by the end of FY 2007, the Superfund program:

- Selected final cleanup plans at 75 percent of the sites listed on the NPL (1,180 of 1,569 sites);
- Controlled all identified unacceptable human exposures at a net total of 13 additional sites, exceeding the annual target of 10 and bringing the program's cumulative total to 1,282 sites;
- Controlled the migration of contaminated ground water through engineered remedies or natural processes at a net total of 19 additional sites, exceeding the target of 10 for the year and bringing the program's cumulative total to 977 sites;
- Completed construction at 24 sites across the country (for a total of 1,030 sites, or 66 percent of the sites on the NPL);
- Determined that 64 sites (covering 25,790 acres) are ready for reuse;
- Conducted 631 long-term, ongoing cleanup projects at 409 sites (includes EPA funded sites, potentially responsible party (PRP)-lead sites, and federal facility sites); and
- Secured more than \$1 billion in cleanup commitments and cost recoveries from the private parties responsible for toxic waste sites.

EPA and its partners continued to identify new threats to human health and the environment. In 2007, EPA listed 12 new sites on the NPL and proposed an additional 17 sites. The Superfund program spent \$199 million to conduct and oversee site assessments and investigations, select and design cleanup plans, and support state, tribal, community involvement, and other activities. EPA selected final cleanup plans at 26 sites.

The program continues to emphasize community involvement in decision making. The efficiency and effectiveness of cleanup remedies are enhanced when EPA works closely with the local community, particularly on important choices regarding the future land uses of sites and the use of local institutional controls (ICs) to help ensure the long-term protectiveness of cleanups.

As the Superfund program continues to evolve, it faces new challenges. At its inception, the Superfund program was often the only program available to clean up a toxic waste site. That is no longer true. Following site assessment, EPA and its state and tribal partners identify the most appropriate program to address sites that require cleanup. This may be a state voluntary or enforcement program, the Resource Conservation and Recovery Act (RCRA) corrective action program, the Superfund removal program, or the Superfund remedial program, either as a Superfund Alternative Site or by listing on the NPL. The universe of sites not yet complete and the sites being listed today on the NPL are very different from the universe of sites on the list 10 or more years ago. EPA completed work at many smaller, lower-cost sites that were listed in the past, while many new sites in this category are being addressed through other programs. The sites that have not yet reached completion are larger and more complex, requiring more work to reach completion. In FY 2007, nearly 44 percent of EPA's Superfund obligations were committed to long-term cleanup work at large, complex sites. This phenomenon reflects the evolution and maturation of the program, not a diminution in EPA's cleanup efforts.

Furthermore, while completing cleanup construction continues to be a useful measure by which to assess program progress, completing cleanup construction may not represent achievement of all cleanup goals, nor does it indicate that needed controls are in place to assure long-term site protection. As the Superfund program evolved, EPA looked for additional ways to assess program progress beyond construction completion and helped keep the public informed about site cleanup milestones. To better measure long-term progress, in 2007 the program adopted a Site-Wide Ready for Anticipated Use measure. This measure tracks the number of NPL sites where the remedy is constructed (construction completion) and all of the controls are in place to ensure that the land is protective for reasonably anticipated uses over the long term. Those anticipated uses and needed controls are outlined in the site Record of Decision (ROD). EPA expects to make at least 30 sites ready for anticipated use in FY 2008 and FY 2009. In FY 2007, EPA exceeded its goal of 30 sites, making 64 Superfund sites ready for anticipated use.

FY 2007 Superfund Annual Report

I. A Brief History of Superfund

In the late 1970s, several events made clear that serious legacy hazardous waste problems were falling through the cracks of existing environmental laws. The **Love Canal** community of Niagara Falls, N.Y., had to be relocated due to hazardous substance contamination of the ground water. At the **Valley of the Drums** in Kentucky, 10,000 leaking chemical barrels produced one of the nation's most notorious abandoned hazardous waste sites. The little town of **Times Beach**, Mo., was eventually evacuated after dioxin in oil that was applied to roadways to control dust was discovered in the community's soil and water. At that time, no federal program had comprehensive authority to respond to these emergencies.

This time also marked the first efforts by the U.S. Department of Defense (DoD) to address environmental contamination at its facilities. In the 1980s, other federal agencies, such as the U.S. Department of Energy (DOE), also began addressing environmental contamination.

In 1980, Congress passed the **Comprehensive Environmental Response, Compensation and Liability Act** (CERCLA or Superfund) to address the dangers of abandoned or uncontrolled sites contaminated with hazardous substances. CERCLA provides EPA and other federal agencies the authority to respond to a release or substantial threat of a release of a hazardous substance into the environment, or a release or substantial threat of a release of "any pollutant or contaminant which may present an imminent and substantial danger to public health or welfare."² The law established a trust fund known as the "Superfund" for EPA to use in cleaning up sites when the parties liable for the contamination could not be found or were financially unable to pay for the cleanup. Superfund was financed primarily by an excise tax on crude oil and certain chemicals, and an income tax on corporations and general revenues. The legislation also enabled the federal government to recover the costs of its

Love Canal, New York

- From 1942–1952, 21,000 tons of chemical waste were deposited.
- More than 200 homes and a nearby school were built around a covered landfill.
- Increased health problems and cancer were experienced among residents.
- President Carter declared a State of Emergency in 1978 and 1980.
- On September 1, 1983, EPA added Love Canal to the NPL.
- Federal funds were used to permanently relocate 900 families.
- In September 2003, EPA issued a five-year review report that showed the remedies implemented at the site adequately control exposures necessary for the protection of human health and the environment (next review 2008).
- On September 30, 2004, Love Canal was removed from the NPL.
- Neighborhoods north and west of the canal have been revitalized; 240 formerly boarded-up homes have been renovated and sold to new owners and 10 newly constructed apartment buildings have been occupied.
- The area east of the canal has been sold for light industrial and commercial redevelopment.



² Petroleum and gasoline are not included under CERCLA as hazardous substances.

actions from the responsible parties or to compel them to clean up sites at their own expense.

In 1986, Congress passed the [Superfund Amendments and Reauthorization Act](#) (SARA), which established many improvements to the Superfund program that the Agency was implementing administratively. The box on this page (“Provisions of SARA”) shows some of the changes in the Superfund program as a result of SARA.

Provisions of SARA

- For a removal action, increased the expenditure limit to \$2 million and the duration to one year
- Authorized waiver of removal limits consistent with long-term remedial action or long-term cleanup
- Required cleanup actions to meet state and federal laws, to the extent practicable
- Made CERCLA applicable to federal facilities
- Required EPA to consider alternatives to disposal and to treat wastes to the extent practicable
- Stipulated the disposal of wastes removed from sites at RCRA-compliant facilities
- Provided deadlines for negotiating and settling with responsible parties
- Authorized EPA to share the cost of cleanup with responsible parties and to settle with *de minimis* parties
- Increased state involvement in listing and deleting sites from the NPL and negotiating and settling with responsible parties

II. FY 2007 Financial Overview³

For the past five years, Congress has appropriated funding levels averaging \$1.25 billion for the Superfund program, and private party commitments for future work have averaged \$630 million.

EPA continued to prioritize sites to receive cleanup funding. EPA also encouraged innovative public and private financing. In FY 2007, the Superfund program spent \$520 million on construction and post-construction

activities at NPL sites and for cleanup and oversight of emergency response and removal actions to address threats to the community.

Since the inception of Superfund in 1980, EPA has:

- Placed 47,281 sites in the Superfund data system;
- Removed or archived 35,053 sites from the data system;
- Retained 12,228 active sites;
- Listed 1,569 sites on the NPL;
- Deleted 324 sites; and
- Completed construction at 1,030 sites.

FY 2007 Enforcement Accomplishments:

- Securing more than \$1 billion in cleanup commitments and cost recoveries from the parties responsible for toxic waste sites;
- Entering into 140 agreements with responsible parties to initiate response work;
- Achieving 86 settlements with funds designated for special accounts, eight *de minimis* settlements, and three orphan-share settlements; and
- Initiating 23 new PRP-lead remedial actions or long-term cleanups.



Valley Solvent and Chemical Fire in Fort Worth, Texas, a site in Region 6's new program to recover costs from smaller emergency removals.

³ Please see Appendix A for the “Superfund National Accomplishments Summary,” which includes a full list of accomplishments for FY 2007.

Escambia Wood Treating Company Site Cleanup Underway

Cleanup of the **Escambia Wood Treating Company Superfund site** in Pensacola, Fla., began in September 2007. Through this remedial action, EPA Southeast (Region 4) will permanently address all soil contamination attributable to the site and design the cleanup to be compatible with the planned commercial reuse of the property. EPA's involvement at the site began in 1991 with an emergency removal action that produced a stockpile of more than 200,000 cubic yards of soil, informally known as "Mount Dioxin." Investigation and residential relocation activities over the next 15 years, which involved environmental justice concerns, Grand Jury investigations, Congressional interest, and challenging negotiations with the State of Florida over cleanup standards, led to a final Record of Decision (ROD) in 2006.



All permanent relocations are planned for completion by December 2008, at which point EPA will have relocated more than 400 households surrounding the former wood treatment facility. This has included conducting a National Relocation Evaluation Pilot project that addresses the site's Clarinda Triangle neighborhood. The project was carried out in two phases, successfully incorporating lessons learned from the first phase into the second. Through several years of intensive community involvement efforts, Region 4 has developed broad support for the cleanup of this once contentious site.

More Than \$27 Million Obligated to Libby Asbestos Site in FY 2007

The health effects associated with the former and current exposure from the asbestos-contaminated vermiculite from the **Libby, Mont.**, mine continue to be a subject of intensive study and overt public health concern. In February 2007, EPA, other federal agencies, and several universities began a joint effort, called the "Libby Action Plan," to study and evaluate the toxicity of Libby Amphibole asbestos. This study is expected to take a minimum of two years to complete and should help EPA complete its Baseline Risk Assessment at the site. In addition, assessment and removal action at residential and commercial properties in Libby continued in FY 2007, with actions taken at 160 properties. This brings the overall total number of properties addressed since 2002 to 954. In addition, in the nearby town of Troy, a full-scale assessment of properties began in 2007 (550 of the 1,198 properties targeted were sampled).

Concurrently, W.R. Grace, under an EPA Administrative Order, commenced work to delineate the nature and extent of the necessary cleanup and restoration of the former vermiculite mine. Overall, EPA obligated \$27.6 million for work at Libby in FY 2007 and has obligated more than \$182 million in total at this site.

Cleanup Completed at Atlas Tack Corporation

EPA New England (Region 1), after slightly more than two years of activity, completed the approximately \$21 million cleanup construction of the **Atlas Tack Corporation site** in Fairhaven, Mass. EPA removed approximately 108,129 tons of contaminated material. During the course of the cleanup, nearly 7,000 truck trips were made through the neighborhood. The upland portion of the site was backfilled and seeded and the wetlands were restored to pre-industrial conditions with additional fresh water wetland enhancements. The site now meets commercial/industrial cleanup standards and remains private property. Different types of future land use would require further risk assessment by the owner or developer and approval and supervision by EPA. Any zoning changes required for a different use are under town authority.



III. Key Superfund Program Components

Assessing Sites

The site assessment process includes three primary screening activities: Preliminary Assessment, Site Inspection, and application of the Hazard Ranking System model to score sites for potential inclusion on the NPL. During the Preliminary Assessment, EPA collects and reviews readily available information (such as site history, drinking water sources, and surrounding populations) about a site to determine whether a threat or potential threat exists and to decide if further investigation is needed. During the Site Inspection, EPA and other government agencies further evaluate the extent to which a site presents a threat to human health or the environment. A Site Inspection involves field work to determine whether hazardous substances are present at the site and are migrating to the surrounding environment.

As a part of the site assessment process, EPA applies the Hazard Ranking System model to derive a preliminary site score. The site score is used to determine whether further investigation is necessary or whether the site should receive a “No Further Remedial Action Planned” (NFRAP) designation. A NFRAP designation means that further remedial assessment under

EPA’s Superfund program is not planned, although a Superfund removal assessment and action may still take place. EPA may refer sites that present an immediate threat to human health and the environment to its removal program for emergency response. Sites also can be referred to state or other response programs for further consideration (such as RCRA Corrective Action).

EPA also may make a final assessment decision (FAD) based on a review of available information. A FAD indicates no further site assessment work is necessary under the Superfund program. A FAD also may be used to track progress related to completing site assessment work at sites entered into CERCLIS. About 85 percent of all FADs indicate that no further site assessment work is necessary, and about 15 percent of all FADs indicate that cleanup attention is needed under Superfund or other federal, state, or tribal environmental cleanup programs.

FY 2007 Superfund Accomplishments

- EPA concluded 395 FADs in FY 2007, bringing the cumulative total of FADs made to 39,766.
- EPA’s 2006 - 2011 Strategic Plan includes a target for completing a cumulative total of 40,491 FADs by the end of FY 2011.

A Number of Firsts Under Superfund

- 1982 – First cleanup/construction completion (pre-NPL) at Walcotte Chemical Site in Greenville, Miss.
- 1983 – 406 sites identified and placed on the newly promulgated NPL
- 1986 – First eight sites deleted from the promulgated NPL
- 1987 – First federal facilities added to the NPL (total of 32 federal facilities added)
- 1995 – First major, multi-party settlement—South Carolina Recycling and Disposal, Inc.
- 2006 – 1,000th construction completion
- 2007 – Largest civil enforcement judgment (\$127 million) in *U.S. v Vertac Chemical Corp.*

Hazard Ranking System and National Priorities List

In response to a Congressional mandate to identify the worst hazardous waste sites in the nation, EPA created the Hazard Ranking System, a numerically based screening system that assesses the hazards a site poses to human health and the environment. The Hazard Ranking System score is calculated by analyzing waste characteristics, their pathways of exposure (e.g., ground water, surface water, soil, and air), and potential targets (e.g., human populations or sensitive environments).

Sites with Hazard Ranking System scores at or above 28.5 are eligible to proceed through a rule-making process, including a public comment period, whereby they are first proposed and then finalized for inclusion on the NPL. Some of the factors influencing the

Cleanup Study Authorized at the Lower Darby Creek Area Superfund Site

In FY 2007, EPA Mid-Atlantic (Region 3) entered into a landmark agreement with 14 private PRPs to perform the remedial investigation/feasibility study (RI/FS) at the Folcroft Landfill portion of the **Lower Darby Creek Area Superfund site** in Delaware County, Pa. The agreement represents two milestones: (1) For the first time, private parties will conduct a Superfund investigation on federal lands under EPA's oversight; and (2) It incorporated language (based on the Supreme Court decision in *Cooper Industries, Inc., v Aviall Services, Inc.* [543 U.S. 157]) providing the participating PRPs with the ability to pursue nonparticipating PRPs for contribution to the cost of the RI/FS.



prioritization of sites for listing include the degree of risk to human health and to sensitive environments; the need for a response; the level of support for listing from states, tribes, and communities; and program management considerations affecting the types and numbers of sites selected for proposal. EPA also seeks alternative cleanup programs before sites are listed on the NPL in order to ensure that all sites are addressed, whether by placement on the NPL or through other cleanup approaches.

EPA continues to list sites every year as new sites serious enough to warrant Superfund attention are identified by the Agency and its partners. The final listing begins the response process, which can take several years, and involves investigation, study, selection of remedy, and design and implementation of the remedy. Only after a remedy is selected for long-term

cleanup are private party or orphan sites eligible for long-term cleanup funding.⁴ In addition, EPA monitors sites for any change in status that may require additional short-term or emergency cleanup.

The first NPL, announced in 1983, contained 406 sites. The vast majority of NPL sites, including many of the largest and most complex sites, were listed in the early years of the program (more than 75 percent were listed before 1991). As new sites are identified, typically by referral from state agencies, the NPL is periodically updated. Through FY 2007, EPA had listed a total 1,569 sites (including 172 federal facilities); proposed but not yet finalized 66 sites (including five federal facilities); and deleted 324 sites (including 15 federal facilities). At the end of FY 2007, 1,245 sites were on the NPL.

In early FY 2005, the Agency issued a policy to update the NPL at least twice a year. These scheduled updates, currently planned for spring and fall, help EPA budget its resource requirements. Each update comprises a proposed rule and a final rule, as needed, for including sites on the NPL. EPA retains the discretion to promulgate "special rules" as needed



Among the sites deleted from the NPL in FY 2007 were two Region 2 Superfund sites in New Jersey, Grand Street Mercury (pictured above) and Mannheim Avenue Dump.

⁴ Under section 111 of CERCLA, federal facilities on the NPL are not eligible for remedial action funding from EPA's budget.

Protecting Human Health and the Environment Remains Superfund's Top Priority

In FY 2007, the Superfund program:

- Controlled all identified unacceptable human exposures at a net total of 13 additional sites, exceeding the annual target of 10 and bringing the program's cumulative total to 1,282 sites with human exposure under control; and
- Controlled the migration of contaminated ground water through engineered remedies or natural processes at a net total of 19 additional sites, exceeding the target of 10 for the year and bringing the program's cumulative total to 977 sites under control.

to address unique circumstances for particular sites needing immediate proposal or finalization to the NPL.

During FY 2007, EPA added 12 new sites and proposed 17 others to the NPL. All appropriate responses were implemented and no further cleanup was required at all or part of 10 sites, allowing EPA to delete seven sites (including one federal facility) from the NPL and partially delete three others.

Responding to a Release at a Site

Without regard to whether a site is listed on the NPL, when EPA determines that a federal response is necessary, CERCLA provides two options for responding to an actual or potential release of a hazardous substance, pollutant, or contaminant. The first is a removal action and the second is a remedial action.

Removal Actions

Three types of removal actions are: (1) emergency removals, where action is required within hours or days; (2) time-critical removals, where timely action must begin to protect human health or the environment and the lead agency has up to six months to plan the response; and (3) non-time-critical removals, where the lead agency has at least six months to plan the response action. Using its removal authorities, EPA takes such actions as removing leaking drums from a site or providing alternative drinking water

at NPL and non-NPL sites if the Agency determines that available supplies are unsafe.

To address immediate threats to communities, EPA obligated more than \$140.7 million to conduct and oversee 351 emergency response and removal actions in FY 2007. Of these, 200 were Superfund-lead removals and 151 were responsible party-lead. These emergency response and removal actions ranged in size from a catastrophic explosion and fire in Danvers, Mass., to a residential mercury release in Yakima, Wash. While the **Danvers fire**, to which EPA New England (Region 1) responded, affected hundreds of residents and businesses, EPA Pacific Northwest's (Region 10) response to the **Yakima mercury spill** had very localized impacts, requiring partial demolition of two homes, substantial excavation of two yards, and treatment of streets and sidewalks.

Danversport Explosion

On Wednesday, November 22, 2006, EPA responded to an early morning explosion at a chemical plant in Danvers, Mass. (about 15 miles northeast of Boston). EPA coordinated multiple efforts to clear debris, remove destroyed buildings, and conduct monitoring designed to identify if any contaminants were released into the local environment.

The catastrophic explosion and fire entirely destroyed a 10,000 square-foot specialty paint manufacturing facility. In addition, the Liberty Marina, six other commercial businesses, and approximately 250 residential homes in the surrounding neighborhood were damaged (some severely). More than 300 residents were believed to be at home at the time of the explosion; 10 people reportedly suffered minor injuries. In addition, 300 commercial and passenger vehicles and approximately 100 boats at Liberty Marina were damaged. The energy released from the explosion was felt up to 25 miles away.



EPA often is faced with contaminated sites that have immediate as well as long-term hazards. In these instances, a time-critical response can be used to address the immediate threat (such as the presence of drums or highly contaminated soil) while the Agency selects a long-term response. This was the case at the [Omaha Lead Superfund site](#), where time-critical removals were instituted at child care centers having high soil lead concentrations and at homes with children exhibiting high levels of lead in their blood. A long-term remediation, which is ongoing, was then extended to cover homes contaminated with lower concentrations of lead.

Remedial Actions

Remedial actions are the second type of response action, and generally involve long-term cleanup efforts that prevent or minimize the release or threat of release of hazardous substances, pollutants, or contaminants. Remedial actions may require years to complete and are intended as a permanent remedy for the contamination.

EPA's 2007 report, *Treatment Technologies for Site Cleanup: Annual Status Report*, shows that treatment remedies are planned or implemented at 63 percent of NPL sites (data includes RODs signed through FY 2005). The report shows increased use of in situ remedies at those sites where treatment was selected. For example, 78 percent of source control treatment projects selected in 2005 (for which the latest data are available) were for in situ treatment. In 2005, 31 percent of RODs for ground water indicated in situ treatment, which is the highest annual value based on available data (through 2005).

Superfund Marks the 1,000th Construction Completion

EPA Southeast (Region 4) reports that the [Macalloy Corporation site](#) in North Charleston, S.C., became the 1,000th Superfund site to reach the construction completion milestone in the fall of 2006. As of the end of FY 2007, an additional 30 of the 1,569 sites on the NPL have had all immediate threats eliminated. At sites that are construction complete, a remedy has been designed and built that prevents contaminants from spreading through the soil, surface water, or ground water.

Major Milestone Reached in Protecting Children at Omaha Lead Superfund Site

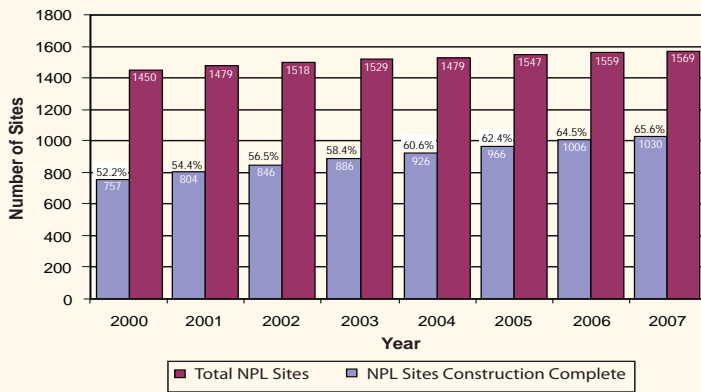
In FY 2007, EPA Region 7 completed the removal of lead-contaminated soil from over 1,000 residential yards at the [Omaha Lead Superfund site](#) in Nebraska. This represents the third consecutive year that EPA has cleaned up more than 1,000 yards in a single year—a record-breaking accomplishment for the Superfund program. As part of the cleanup process, EPA removed contaminated soil and replaced it with clean soil and sod. This investment in protecting the health and future of Omaha's children is unprecedented.



In FY 2007, there were 24 construction completions, bringing the cumulative total to 1,030 sites (or 66 percent of the current NPL). Construction completion is the stage of the cleanup when physical construction of all cleanup remedies is complete and all immediate threats have been addressed. Long-term cleanup goals need not be met for a site to be classified as construction complete. In addition, most remedies are based on reasonably anticipated future land use, so many sites where construction is complete require land use restrictions called institutional controls (ICs) to ensure long-term protectiveness of the remedy. EPA ensures that these additional milestones are reached at sites through its Ready for Anticipated Use (RAU) measure.

The community-based identification of reasonably anticipated future land uses informs all stages of the remedial or long-term decision-making process, strengthens EPA's relationships with communities, and creates opportunities to target planning and potentially

Figure 1. Percentages of NPL Sites Construction Complete Have Increased 2000 - 2007



reduce the cost of long-term cleanups. Since the enactment of the Brownfields legislation in 2002 and the 2004 launch of Superfund Redevelopment’s “Return to Use Initiative,” EPA and local governments have been identifying and removing obstacles that may unnecessarily prevent the reuse of non-NPL sites, hinder construction completion, or delay NPL site deletion. Removing these obstacles may permit the reintegration of completed or deleted NPL sites into the community and local economy.

Superfund post-construction completion encompasses activities needed to reach RAU status, as well as several related activities, including:

- Operation and maintenance of long-term remedial actions or long-term cleanups to monitor and confirm that remedies perform as intended;
- Five-year reviews (203 completed in FY 2007) to evaluate the performance of remedies, identify potential problems, and adjust operations and maintenance as necessary;
- Optimization of remedies to improve performance or reduce operating costs of remediation systems without compromising protectiveness; and
- Notification and solicitation of comments on EPA’s decision to remove sites from the NPL (seven deleted in FY 2007).

The Superfund program has assumed a leadership role in developing a national tracking system to manage and review data on ICs. In 2004, the Superfund program outlined its strategy for making certain that ICs are successfully implemented where needed to ensure protectiveness in its *Strategy to Ensure Institutional Control Implementation at Superfund Sites*. The

strategy serves as a roadmap for EPA Regional and Headquarters personnel in preparing Region-specific action plans and conducting the work necessary to ensure the proper implementation of ICs at Superfund sites. Information on ICs also has been gathered and entered into the Institutional Controls Tracking System (ICTS), which is currently in development. Through ICTS, IC information will be made available to the public on a site-by-site basis through Web-based site profiles. As ICTS is further developed, the Superfund program will participate in coordinating the exchange of IC information with other federal agencies, states, tribes, local governments, and industrial entities that also have an interest in managing and reviewing information on ICs.

A key challenge to the effectiveness of this network is the overlapping and often disconnected responsibilities of different levels of government for implementing, monitoring, and enforcing institutional controls. The success of this network will rely on the standardization of terms and the willingness of federal, state, tribal, and local agencies, as well as industry representatives, to use the system to collect and exchange information. Superfund Site Progress Profiles and fact sheets provide information on sites addressed under the Super-

Remediation Completed at Fernald Preserve Superfund Site

EPA Region 5 announced in late 2006 the completion of all remediation (with the exception of ongoing ground water pump and treatment) at the **Fernald Preserve Superfund site** in Fernald, Ohio. The site, which has gone by many names over the years, is a former 1,050-acre, government-owned nuclear production facility located 18 miles northwest of Cincinnati. From 1951 to 1991, high-purity uranium metal was produced onsite in support of national defense programs.

In 1990, DOE entered into an agreement with EPA to clean up the site. EPA and the Ohio Environmental Protection Agency worked in close partnership to provide oversight of this massive project. More than \$4 billion in cleanup costs were used to address millions of pounds of products and billions of pounds of waste at the site. The vast majority of the property has been restored for use as an undeveloped park, and the remedy provides for restoration of the Greater Miami Aquifer to drinking water standards by 2025.

fund program. Additionally, site-specific details are available on regional Web sites.⁵ For more information, visit the individual site profiles available on the Superfund Site Information Web site at <http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm>.

Enforcement

CERCLA's strong enforcement provisions help to encourage prompt settlements, minimize litigation, and concentrate resources on actual cleanup.⁶ EPA has three options in response to a release at a non-federal facility. EPA has the legal authority to: (1) conduct the cleanup and seek cost recovery from responsible parties; (2) enter into settlement agreements; or (3) issue a Unilateral Administrative Order to compel responsible parties to conduct or pay for a cleanup. Through its "enforcement first" policy, EPA assigns the highest priority to locating responsible parties and getting them to address cleanup. The Agency's goal is that the liable, financially viable parties must pay for the cost of cleanup.

Cleanup of Lower Fox River's Final Stretch Begins

In late 2007, EPA Region 5 ordered a group of companies responsible for the PCB-contaminated sediments at the **Lower Fox River site** in northeastern Wisconsin to begin cleanup of the remaining stretch of the river. During the 1950s and 1960s, mills located along the Lower Fox River routinely used materials contaminated with PCBs. These PCBs ultimately contaminated the river, which is surrounded by communities that are home to approximately 270,000 people.

In July 1998, EPA proposed the Fox River Natural Resource Damage Assessment/PCB Releases site to the NPL. Cleanup of the site is anticipated to cost an estimated \$400 million. The recently issued Unilateral Administrative Order is focused on Operable Units 2 through 5 of the site, which include a stretch of the river from Appleton to the mouth of Green Bay.

Successful Negotiations Between EPA and General Electric Result in Consent Decree for Hudson River Polychlorinated Biphenyls (PCB) Cleanup

On November 6, 2007, a Consent Decree between EPA and the General Electric Company (GE) was entered in Federal Court. The agreement requires GE to construct a sediment processing/transfer facility in Fort Edward, N.Y., and to begin dredging. The dredging project will result in the removal of more than two million cubic yards of PCB-contaminated sediment and is expected to cost more than \$600 million.

The dredging project includes two phases: Phase 1 is the first year of the dredging program, and Phase 2 is the remaining 5 years of the program. The Phase 1 dredging program will be peer reviewed to determine whether engineering performance standards or the project design need to be modified for the Phase 2 program. The agreement also calls for GE to pay EPA about \$78 million for the Agency's past and future costs at the site if GE agrees to conduct the next phase of dredging, and about \$43 million for such costs if GE does not agree. These amounts are in addition to the approximately \$37 million in cost reimbursement that GE had already made under earlier settlements with EPA.

A very critical part of the project is the construction of the 110-acre sediment processing facility. The construction of this facility began in April 2007. This facility is likely to cost close to \$100 million and will take 18–24 months to complete from start to finish. Significant progress has been made on the facility; construction will be completed in a time-frame that will allow dredging to start in June 2009.



⁵ The electronic version of this report contains a link to individual site profiles describing EPA's progress in addressing threats at the sites.

⁶ Courts have interpreted CERCLA to impose retroactive, strict, and joint and several liability.

As a result of Superfund enforcement and other remediation agreements, responsible parties committed a total of more than \$1 billion in FY 2007. This includes \$688 million to clean up contamination and \$252 million to reimburse EPA for past cleanup costs. These parties agreed to clean up a record-setting 79 million cubic yards of contaminated soil, enough to cover more than 12,000 football fields to a depth of three feet. In addition, they agreed to clean up 1.4 billion cubic yards of contaminated water, which is enough to fill more than 425,000 Olympic-size swimming pools.

Federal Facilities Cleanup

EPA's Federal Facilities Program under Superfund has programmatic and enforcement components. The Office of Enforcement and Compliance Assurance's Federal Facilities Enforcement Office is responsible for ensuring that interagency and federal facility agreements required by section 120(e) of CERCLA are in place for NPL facilities. The Federal Facilities Enforcement Office also has the lead for addressing disputes arising under interagency and federal facility agreements. The Federal Facilities Restoration and Reuse Office is the EPA lead for response activities, such as overseeing cleanup at NPL and selected non-NPL sites, addressing response policy issues related to cleanup, supporting DoD's Base Realignment and Closure (BRAC) program, and promoting revitalization of federal properties. EPA oversees environmental cleanups resulting from past improper hazardous materials/waste handling and disposal operations primarily at DoD installations.

For all remedial actions or long-term cleanups, program-to-date accomplishments total 807 remedial actions completed at NPL facilities. At the end of FY 2007, 657 remedial projects were underway at NPL sites. Approximately 153 NPL federal facilities have interagency and federal facility agreements signed.

EPA's Federal Facilities Enforcement Office has reached agreements with other federal agencies governing the cleanup at almost all federal facility NPL sites. These agreements are required under CERCLA section 120(e). In 2007, EPA, the U.S. Navy, U.S.

FY 2007 Federal Facilities Accomplishments

The government made progress in protecting human health and the environment at many federal facility sites. FY 2007 accomplishments for the Federal Facilities Program included:

- Issuing 110 cleanup decision documents at federal facility sites;
- Starting 37 RI/FSs;
- Beginning 49 remedial actions;
- Completing 62 remedial actions;
- Achieving four site construction completions;
- Achieving Sitewide Ready for Anticipated Use status at eight federal facility sites; and
- Completing 32 five-year reviews.

Department of the Interior, and the Commonwealth of Puerto Rico signed an agreement for the cleanup of the Navy's former Atlantic Fleet Weapons Training Area on the island of Vieques, off the east coast of Puerto Rico. EPA also issued enforcement orders to require the following federal agencies to do the necessary cleanups:

- The U.S. Air Force and Raytheon to clean up Region 9's Tucson Airport Superfund Site (also known as the Air Force Plant 44 site) in Tucson, Ariz.;
- The U.S. Air Force to investigate and clean up Region 2's McGuire Air Force Base in New Jersey; and
- The U.S. Army to assess the nature and extent of contamination at 14 waste sites at Region 3's Fort Meade in Maryland and to implement appropriate cleanup actions.

For more information, visit: <http://cfpub.epa.gov/compliance/resources/reports/endofyear/fy2007/landhighlights/index.cfm#1246>.

Privatization at Federal Facility Sites

EPA Pacific Southwest (Region 9) reports that in FY 2007, the Fort Ord and McClellan Air Force Base teams completed the nation's first two "privatized" federal facility cleanup agreements. Under the privatization concept, the military provides funding to a non-liaible party, such as a reuse authority or a developer. The non-liaible party assumes the primary responsibility for the site cleanup; however, the military service remains liable for it. Since a privatization agreement had never been done before at an NPL site, the policies and procedures were not well defined. The teams coordinated with EPA Headquarters and the U.S. Department of Justice to develop an innovative Administrative Order on Consent (AOC), whereby the non-liaible party agrees to perform the work under regulatory oversight. EPA Region 9 negotiated and completed an AOC with each private party, Federal Facility Agreement Amendment, and Finding of Suitability to Early Transfer with each military service.



The response will include \$100 million for investigation and cleanup of any unexploded ordinance on nearly 3,500 acres at Fort Ord, and approximately \$11 million for work to address volatile organic compounds in soil on a 62-acre parcel at McClellan Air Force Base, both of which are located in California. Anticipated reuses of the sites include residential, commercial, industrial, recreational, and natural habitat. The documents and procedures developed for these privatization agreements will form the basis for future privatization efforts nationwide, saving all parties significant time and money. For more information on EPA's Federal Facilities Restoration and Reuse Office (FFRRO), please visit <http://www.epa.gov/fedfac/>.



Streamlining Cleanup Process

EPA is leading an effort to reach out and address barriers to cleanup involving other federal agencies. EPA is also partnering with DoD on many policy and guidance efforts to streamline the cleanup of munitions sites. The DoD inventory contained approximately 3,316 munitions response sites as published at the end of FY 2006.

FY 2007 Federal Facilities NPL Deletions

- Army Materials Technology Laboratory Site (Mass.)—a 47-acre military facility was deleted from the NPL on November 21, 2006.
- Rocky Flats Plant (Colo.)—a 25,413-acre partial deletion occurred at this site on May 25, 2007. The partial deletion at this DOE site pertains to the surface media (soil, surface water, sediment) and subsurface media including ground water within the peripheral Operable Unit and Operable Unit 3 of the Rocky Flats Plant. Following transfer to the Department of Interior, this paved the way for creation of a National Wildlife Refuge.

Community Involvement and Stakeholder Participation

Stakeholder involvement is an integral part of cleanup planning and implementation. It begins early and is sustained throughout all stages of site work. Superfund engages stakeholders (communities, local governments, tribal nations, states, and other interested organizations and groups) at each site. This involvement is based on the recognition that stakeholders should have a say in the cleanup decision-making process, and that robust stakeholder involvement will improve the quality and acceptability of the cleanup. EPA enables community participation in many ways, including:

- Awarding a total of 305 Technical Assistance Grants to communities affected by Superfund cleanups, including those at federal facilities, since 1988; and
- Providing support for Community Advisory Groups in 56 communities across the nation.

At many sites, EPA's community involvement activities exceed the mandatory basic requirements

for public participation by providing more frequent information and specially developed opportunities for input. An example is EPA Pacific Northwest's (Region 10's) efforts at the [Lower Duwamish Waterway](#) (Wash.) and [Portland Harbor](#) (Ore.) sites. The third Duwamish River Festival and second Portland Harbor Superfund Field Day are raising awareness about contaminated river sediments, providing information on how to safely eat fish from the river, and giving local residents from diverse ethnic backgrounds the means to learn about Superfund cleanup. At Duwamish Waterway Park, south of Seattle, Vietnamese and Hispanic interpreters were on hand to help share information, while hundreds of people enjoyed kayak tours, local dance troupes, and booths. At Cathedral Park in north Portland, over 100 community members took part in hands-on activities and viewed exhibits. Community groups, environmental organizations, tribes, and businesses, as well as local, state, and federal agencies joined EPA in making these events successful.

Redevelopment and Reuse

EPA places a high priority on land revitalization as an integral part of its Superfund response program mission. The Agency's policies have increasingly addressed the issue of making Superfund NPL sites protective for current and future users. For example, one of EPA's key responsibilities under CERCLA is to ensure that contaminated property owned by the federal government is environmentally suitable for transfer or lease. EPA has been involved in making environmental determinations pertaining to site use since the first BRAC legislative action in 1988, and continues to ensure protective use at both operating and closed



Future scientists explore the Living Stream Exhibit at Cathedral Park (on the Willamette River, Ore.).

federal facilities undergoing CERCLA environmental response actions.

Building on its experience supporting reuse at Superfund sites, in 1999 EPA created the Superfund Redevelopment Initiative to help communities and other stakeholders in their efforts to return Superfund NPL sites to productive use. In April 2003, EPA announced its Land Revitalization Action Agenda, a plan for addressing the nation's contaminated lands to enable their reuse by communities. Using this framework, in November 2004 the Agency developed the programmatic performance measures described in the Superfund Revitalization Performance Measures guidance, which serve to report the progress of EPA's activities in making Superfund NPL sites ready for their anticipated future use.

For the last decade, EPA's redevelopment initiatives have offered communities assistance with reuse planning to identify reasonably anticipated future land uses for properties addressed under cleanup authorities.

For example, EPA Southeast (Region 4) implemented an innovative prospective purchaser agreement at the former [St. Augustine Gas Company Superfund site](#) and supported reuse at the Florida Steel Superfund site. The former St. Augustine Gas Company



*Lower Duwamish Waterway Festival
(also featured on front cover)*

Midvale Slag

Several decades ago in Midvale City, Utah, smelting and mining operations led to slag heaps, decaying smelters, and mills. Today at the **Midvale Slag Superfund site**, a large-scale development called Bingham Junction is under construction. The 350-acre development will include major retail stores, housing units, and office parks served by the future mid-Jordan light rail line. The scenic proposed development is located along the Jordan River and will include a river walk linking up with the Great Salt Lake area trail system. Through the Superfund program, EPA Mountains and Plains (Region 8) provided assistance to the Midvale Slag site through a Technical Assistance Grant in 1999, participation in the Superfund Redevelopment Pilot Program in 1999, and support as a **Return to Use demonstration project** in 2006.



Superfund site is a former manufactured gas plant contaminated with coal tar, a byproduct of gas production. EPA worked together with the City of St. Augustine, Fla., and the San Sebastian Harbor Partners to integrate environmental protection with urban revitalization. This public-private partnership spurred cleanup of the contaminated site, restored and created salt marshes, and created the Sebastian Inland Harbor, a waterfront redevelopment located in the heart of America's oldest city. The project, which includes condominium and loft residences, retail shops and restaurants, a boutique hotel and spa, and a marina, is the centerpiece of the revitalized gateway into historic St. Augustine.

From 1970 until 1982, the **Florida Steel Superfund site** housed a steel mill that recycled steel from old cars into steel reinforcement bars for concrete. EPA Southeast (Region 4) reports that the **Floridian Natural Gas Storage Company** (FGS) plans to build a liquefied natural

Tinkham Garage

Formerly a waste disposal site, the **Tinkham Garage Superfund site** in Londonderry, N.H., has been revitalized into a retail shopping complex and an active senior housing development called The Nevins. EPA New England (Region 1) reports that the residents of Londonderry now have the benefit of shopping at a Home Depot, a Staples office supply store, a 99 Restaurant, and a Dunkin' Donuts. When the town of Londonderry and other stakeholders refused to let the site linger as a vacant, fenced property, EPA responded by providing easily understandable information to prospective buyers to encourage reuse of the site. Reuse of the Tinkham Garage Superfund site has encouraged greater economic activity, thereby resulting in higher tax revenue and increased property values. The Tinkham Garage site was a **Return to Use demonstration project** in 2006.

gas storage facility on approximately 145 acres of the site. Because the new facility only encompasses a small portion of the site, the remaining acreage provides a greenbelt buffer for the gas storage facility. Cleanup and reuse of the site are significantly increasing the property value, and Martin County is benefiting from the additional property tax revenue. The FGS facility is answering a real need for natural gas storage that is close to consumers and provides the highest level of reliability. Gas storage also will provide an important backup fuel source for Florida should fuel supplies be interrupted by a hurricane or other unexpected event.



St. Augustine Gas Company Superfund Site

Environmentally Responsible Redevelopment and Reuse (ER3) at Empire Canyon Daly West Mine Site

The cleanup and reuse of contaminated sites produces significant environmental benefits. However, some development practices can have unintended environmental consequences, such as wildlife habitat destruction, stormwater runoff, use of scarce resources, and energy consumption.

EPA Mountains and Plains (Region 8) believes that by incorporating sustainable practices and principles into their projects, developers of contaminated sites can minimize the impact of the project on the environment without sacrificing profitability. This is the goal of EPA's ER3 Initiative. One FY 2007 success story is the proposed construction of a hotel, spa, and condominium at the **Empire Canyon Daly West Mine site** in Region 8, to be known as the Montage Resort & Spa. The development will contribute to the cleanup of contamination at this former mining site in Park City, Utah. As an ER3 participant, the Montage Resort & Spa will incorporate "green" features into the design, construction, and operation of the development to minimize the project's environmental footprint.



Pursuant to Congressional mandate, many military bases are undergoing realignment or closure with the potential for severe economic impacts on the local communities. To mitigate economic dislocation and speed economic recovery of communities near military bases scheduled for realignment or closure, the federal government gives priority to local economic redevel-

Innovative Approach—Prospective Purchaser

EPA Region 6's site team developed an administrative order that the **Many Diversified Interests, Inc. (MDI)** trustee offered to would-be bidders for the property at the MDI NPL site in Houston, Texas. The agreement will allow a non-liable prospective purchaser to buy the site from the bankruptcy trustee, clean it up under EPA's oversight, and redevelop the property without acquiring liability for past contamination. The agreement saves EPA over \$6 million in future costs, and will return the land to productive use.



opment, provides transition and redevelopment assistance to workers and communities, puts cleanup on a fast-track, provides transition coordinators at major bases scheduled for closure or substantial realignment, and allocates more funds for economic development planning grants. For more information on the status of BRAC redevelopments, visit http://www.defensecommunities.org/Downloads/ADC_SBRR.pdf.

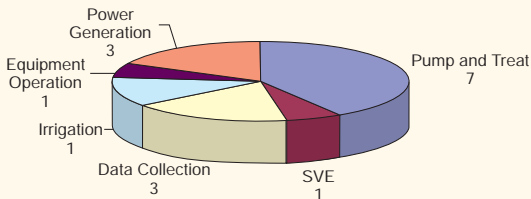
Additional information on the Federal Facilities Restoration and Reuse Office's base closure and property transfer activities can be found at <http://www.epa.gov/fedfac/documents/baseclosure.htm>.

Using Renewable Energy for Remediation Projects

Increasingly, remediation projects implemented under the authority of the Superfund Remediation, Removal, and Federal Facilities Programs, Brownfields Program, and RCRA are utilizing renewable solar and wind energy to power systems. In FY 2007, 15 projects across

the country utilizing renewable energy were identified and researched.⁷ Ten of the projects used solar power (photovoltaics), four projects used wind power (with another site in the process of constructing a system), one used landfill gas, and one used recycled vegetable oil as a fuel for site-specific purposes. Some sites used a combination of energy sources to achieve site goals. Ground water was the most common contaminated medium at these sites, and therefore, a majority of the sites employed pump and treatment systems. One site used soil vapor extraction as the remediation technology. Other small uses of renewable energy at sites included irrigation and data collection.

Figure 2. 16 Alternative Energy Uses at 15 Study Sites



For more information on the individual sites, locations, treatment type, and alternative energy use, see Appendix C. The study’s findings suggest that the use of renewable energy sources to power remediation systems is gaining ground but currently focuses on providing supplemental power to long-term pump and treatment systems. Findings also indicate that numerous opportunities exist for expanded integration of renewable energy sources in remedy selection and design.

The study also looked at green remediation. Green remediation is the practice of considering environmen-



The installation of a solar panel for irrigation using green remediation at Crozet Site, Va.

tal impacts of remediation activities at every stage of the remedial process in order to maximize the net environmental benefit of a cleanup. Considerations include selection of a remedy, energy requirements, efficiency of on-site activities, and reduction of impacts on surrounding areas. Remediation activities can have a negative impact on the environment, such as greenhouse gas (a gas, such as carbon dioxide or methane, that contributes to potential climate change) emissions from combustible fuels used by remedial technologies or from off-site water quality impacts of cleanup activities. In future years, EPA’s land remediation programs will increasingly consider green remediation and the use of renewable energy systems.



Solar Panels at the Pemaco Superfund site in Maywood, Calif.



Wind Turbine, Region 7

⁷ Dellens, A. 2007. *Green Remediation and the Use of Renewable Energy Sources for Remediation Projects*. U.S. EPA, National Network for Environmental Management Studies Fellow, Case Western Reserve University.

IV. Conclusions/Program Outlook

Protection of human health and the environment remains the highest priority for the Superfund program. EPA and its partners will continue to use Superfund authority to address the worst hazardous waste sites first, maintaining protective remedies and balancing the need to complete response actions across the more than 1,200 sites remaining on the NPL. The Agency will continue to ensure that available resources are disbursed in a fiscally sound manner. Maximizing PRP involvement remains a high priority.

EPA's strategic planning goals include enforcement and compliance assistance to determine who should pay and the implementation of sound science and research to address risk factors and identify innovative solutions. As cleanup costs continue to grow, a major challenge is to improve response capabilities and develop site assessment and remediation technologies that do a better and more cost-effective job of cleaning up hazardous waste sites, especially those with contaminated ground water. By developing and implementing prevention programs, improving response capabilities, and maximizing the effectiveness of response and cleanup actions, EPA will continue to apply the most effective approaches to protecting communities across the country.

An emerging area in the Superfund program is the Agency's attempts to maximize the net environmental benefits of cleanups by encouraging the use of green remediation techniques and technologies at hazardous waste sites. By promoting the use of renewable energy sources, such as wind and solar power, EPA is maintaining the effectiveness of remediation methods while reducing emissions of greenhouse gases from conventional power sources, such as coal-fired power plants.

In the area of responding to incidents of national significance, EPA has partnered with the Department of Homeland Security and other federal agencies to develop and implement the National Response Framework, the National Incident Management System, and the National Infrastructure Protection Plan. Together, these plans form a cohesive structure that integrates the incident management, protection activities, and emergency response capabilities and resources of federal, state, and local

governments into a national framework for domestic incident management.

Now that remedy construction has been completed at two-thirds of the sites listed on the NPL, EPA is looking ahead to the post-construction phase of the program, which has grown in size and complexity. This post-construction workload ensures that Superfund response actions remain protective of human health and the environment. Post-construction encompasses a number of discrete inter-related activities including: five-year reviews; implementation, monitoring, and enforcement of ICs; operation and maintenance of response actions—often for several decades; optimization of remedies; and deletion of sites from the NPL when all cleanup goals have been achieved. EPA, states, tribes, federal facilities, private companies, local governments, and communities all play an integral role in performing post-construction activities.

EPA has been promoting future use opportunities at contaminated sites with its partners for over a decade, beginning first with its Brownfields Program and through the BRAC program with DoD. As the focus on reusing contaminated sites became part of the mindset at Superfund sites, properties that were once thought to be unusable are now being “recycled” back into productive use. EPA will continue to encourage the reuse of Superfund sites by working to remove barriers to their use and making cleanup decisions that are consistent with intended reuse.

Experience has taught us that one of the best ways to clean up contaminated sites and to address blighted properties in communities is to expressly consider the future uses of this land. The country has accepted the economic and ecological importance of recycling various consumer products, and our understanding of sound resource management must now also embrace the recycling of contaminated properties. In addition, by incorporating “green” and sustainable approaches into redevelopment of Superfund sites, we can further increase the environmental benefits from land revitalization. We remain committed to the goal of restoring our nation's contaminated land resources and enabling America's communities to safely return these properties to beneficial economic, ecological, and societal uses.

Appendix A. Superfund National Accomplishments Summary Fiscal Year 2007

Disclaimer: These data represent a “snapshot in time” and future numbers may change based on data quality reviews, updates, corrections and changes to report select logic.

Protecting human health and the environment remains Superfund’s top priority:

- Controlled all identified unacceptable human exposures at a net total of 13 additional sites, exceeding the annual target of 10 and bringing the program’s cumulative total to 1,282 sites under control.
- Controlled the migration of contaminated groundwater through engineered remedies of natural processes at a net total of 19 additional sites, exceeding the target of 10 for the year and bringing the program’s cumulative total to 977 sites under control.

EPA’s Superfund program obligated \$520.7 million to perform construction and post-construction activities and to conduct and oversee emergency response actions:

- Obligated more than \$380 million in appropriated funds, state cost-share contributions, and potentially responsible party settlement resources for construction and post-construction projects.
- Obligated \$140.7 million to conduct 351 emergency response and removal actions to address immediate and substantial threats to communities.

EPA funded new construction:

Obligated more than \$82 million in appropriated funds, state cost-share contributions, and potentially responsible party settlement resources for 19 new construction projects ranked by the National Risk-Based Priority Panel (<http://www.epa.gov/superfund/programs/nrbpp/index.htm>) at 19 National Priorities List (NPL) sites. This represents all new construction projects that were ready for funding in Fiscal Year (FY) 2007.

Superfund is working on hundreds of construction projects:

- Conducted or oversaw 631 ongoing construction projects (by EPA, potentially responsible parties, and federal facilities) at 409 sites.
- Completed construction phase of cleanup at 24 sites across the country for a total of 1,030 or 66 percent of the sites on the NPL.

The Superfund remedial program prepared for future cleanup efforts:

- Listed 12 new sites on the NPL, and proposed 17 sites to the NPL.
- Completed 395 Final Assessment Decisions, for a cumulative total of 39,766.
- Obligated more than \$199 million in appropriated funds, state cost-share contributions, and potentially responsible party settlement resources to conduct and oversee:
 - Site assessments and investigations;
 - Selection and design of cleanup plans; and
 - Support for state, tribal, community involvement activities, and other activities.
- Selected final cleanup plans at 26 sites. These additional plans bring the cumulative total of sites with final cleanup plans to approximately 75 percent of 1,569 NPL sites.

Superfund ensures the protection of human health and the environment after construction is complete:

- Conducted 203 Five-Year Reviews, including 34 reviews at 32 federal facilities sites. These reviews are conducted to ensure that protective measures for waste that has been secured on-site remain intact.
- Deleted 7 sites, including 1 federal facility, and partially deleted 3 sites from the NPL.

Superfund committed to the “polluter pays” principle:

- EPA secured private party funding commitments of more than \$1 billion in FY 2007. Of this amount, potentially responsible parties agreed to conduct more than \$688 million in future response work, and to reimburse EPA for \$252 million in past costs. EPA billed private parties \$62 million for oversight costs.

Superfund faces constraints:

- In FY 2007, nearly 44 percent of Superfund obligations for construction and post-construction activities went to 11 sites.

Sites Receiving FY 2007 New Construction Funding
(<http://www.epa.gov/superfund/accomp/factsheets07/index.htm#funded>)

Appendix B. Glossary

-A-

Administrative Order on Consent – a legal agreement signed by EPA and an individual, business, or other entity through which the violator agrees to pay for correction of violations, take the required corrective or cleanup actions, or refrain from an activity. It describes the actions to be taken, may be subject to a comment period, applies to civil actions, and can be enforced in court. Unlike a consent decree, an Administrative Order on Consent does not have to be approved by a judge.

-B-

baseline risk assessment – an analysis of the potential adverse health effects (current or future) caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (i.e., under an assumption of no action). The results of the baseline risk assessment are used to help determine whether additional response action is necessary at the site, modify preliminary remediation goals, help support selection of the “no-action” remedial alternative, where appropriate, and document the magnitude of risk at a site, and the primary causes of that risk.

brownfields – abandoned, idled, or underused industrial and commercial facilities/sites, the expansion or redevelopment of which is complicated by real or perceived environmental contamination. They can be in urban, suburban, or rural areas. EPA’s Brownfields Program helps communities mitigate potential health risks and restore the economic viability of such areas or properties.

-C-

cleanup – actions taken to deal with a release or threat of release of a hazardous substance that could affect humans or the environment. The term “cleanup” is sometimes used interchangeably with the terms “remedial action,” “removal action,” “response action,” or “corrective action.”

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) – law, commonly known as Superfund, enacted by Congress on December 11, 1980, which established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party can be identified.

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) – an automated inventory of site information for all potential or confirmed Superfund sites.

consent decree – a legal document, approved by a judge, that formalizes an agreement reached between EPA and potentially responsible parties (PRPs) through which PRPs will conduct all or part of a cleanup action at a Superfund site; cease or correct actions or processes that are polluting the environment; or otherwise comply with EPA-initiated regulatory enforcement actions to resolve the contamination at the Superfund site involved. The consent decree describes the actions PRPs will take and may be subject to a public comment period.

contaminant – any physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil.

contamination – introduction into water, air, or soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use; also applies to surfaces of objects, buildings, and various household and agricultural use products.

construction completion – the stage in Superfund remedial actions when physical construction of all cleanup remedies is complete, all immediate threats have been addressed, and all long-term threats are under control. Though long-term cleanup actions may still be operating, the site is often ready for economic, social, or environmental reuse.

Corrective Action – statutory authority, added to the Resource Conservation and Recovery Act (RCRA) by the Hazardous and Solid Waste Amendments (HSWA), §3004(u), that allows EPA and RCRA-authorized states and territories to require treatment, storage, and disposal facilities handling hazardous waste to clean up spills resulting from failure to follow hazardous waste management procedures or other mistakes.

cost recovery – legal process by which PRPs who contributed to contamination at a Superfund site can be required to reimburse the federal trust fund for money spent during any cleanup actions by the federal government.

-D-

de minimis party – party whose contribution of hazardous substances to a facility is minimal, in both volume and toxicity (or other hazardous effects) relative to the other hazardous substances at the site. EPA will often offer small settlements to *de minimis* parties.

-E-

emergency cleanup – see emergency removal action.

emergency removal action – steps taken to remove contaminated materials (e.g., removal of leaking drums or the excavation of explosive waste) that pose imminent threats to local residents; and the state record of such removals.

emergency response – EPA actions to coordinate and implement a wide range of activities to ensure that adequate and timely response measures are taken in communities affected by emergencies involving hazardous substance and oil releases where state and local first-responder capabilities have been exceeded or where additional support is needed.

enforcement – EPA, state, or local legal actions to obtain compliance with environmental laws, rules, regulations, or agreements or obtain penalties or criminal sanctions for violations. Enforcement procedures may vary, depending on the requirements of different environmental laws and related implementing regulations. Under CERCLA, for example, EPA will seek to require PRPs to clean up a Superfund site or pay

for the cleanup. In other situations, if investigations by EPA and state agencies uncover willful violations, criminal trials and penalties are sought.

“Enforcement First” principle – policy by which EPA seeks to compel those who are responsible for hazardous waste sites to take the lead in cleanup, thus conserving the resources of the Superfund trust fund.

Environmentally Responsible Redevelopment and Reuse (ER3) Initiative – EPA’s use of enforcement and other Agency-wide incentives to promote sustainable redevelopment of contaminated sites.

-F-

federal facilities agreement – an interagency agreement to govern the cleanup of environmental contamination at federal facilities.

Five-Year Reviews – generally required by CERCLA or program policy when hazardous substances remain on site above levels that permit unrestricted use and unlimited exposure. Reviews are performed five years following the initiation of a CERCLA response action, and are repeated every succeeding five years so long as future uses remain restricted. EPA or the lead agency for a site can perform Five-Year Reviews, but EPA retains responsibility for determining the protectiveness of the remedy.

-G-

ground water – the supply of fresh water found beneath the Earth’s surface, usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, concern is growing over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

-H-

Hazard Ranking System – the principal screening tool used by EPA to evaluate risks to public health and the environment associated with abandoned or uncontrolled hazardous waste sites. A score is calculated based on the potential of hazardous substances spreading from the site through the air, surface water, or ground water, and on other factors such as density

and proximity of human population. This score is the primary factor in deciding if the site should be on the National Priorities List and, if so, what ranking it should have compared to other sites on the list.

hazardous substance – any material that poses a threat to human health or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive; any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or is otherwise released into the environment.

hazardous waste – by-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

-I-

incident command system – the organizational arrangement wherein one person, normally the fire chief of the impacted district, is in charge of an integrated, comprehensive emergency response organization and the emergency incident site, backed by an Emergency Operations Center staff with resources, information, and advice.

in situ – in its original place; unmoved unexcavated; remaining at the site or in the subsurface.

institutional controls (ICs) – actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use.

-L-

Libby amphibole asbestos – toxic form of naturally occurring asbestos called tremolite-actinolite series asbestos found in vermiculite ore mined in Libby, Mont., until 1990. The ore is waxy-silky white to greenish white, with fibrous strands running across the surface.

long-term cleanup – see remedial action/long-term response.

-M-

monitoring – periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements or pollutant levels in various media or in humans, plants, and animals.

-N-

National Oil and Hazardous Substances Contingency Plan (NCP, 40 CFR Part 300) – federal regulation that guides determination of the sites to be corrected under both the Superfund program and the program to prevent or control spills into surface waters or elsewhere.

National Priorities List (NPL) – EPA’s list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the list at least once a year. A site must be on the list to receive money from the Trust Fund for remedial action.

No Further Remedial Action Planned (NFRAP) – decisions made from a site assessment perspective only; they simply denote that further Superfund National Priorities List assessment work is not required based on currently available information. In contrast, the archival of WasteLAN sites is made only when no further Superfund interest exists at a site. This means that sites are not archived if there are planned or ongoing removal or enforcement activities or if other Superfund interest still exists, even if a NFRAP decision was made during site assessment activities.

non-time-critical removals – removals where based on site evaluation, the lead agency determines that a removal action is appropriate and that there is a planning period of more than six months available before on-site activities must begin. The lead agency for non-time-critical removals will undertake an engineering evaluation/cost analysis or its equivalent.

-O-

orphan share – the financial responsibility assigned to a PRP who is insolvent or defunct and unaffiliated with other liable responsible parties. Orphan share compensation provides a major incentive for responsible parties to perform cleanups and settle claims quickly without litigation, and reduces transaction costs by wholly or partly resolving the question of who should bear the burden of orphan shares.

-P-

pollutant – generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

polychlorinated biphenyls (PCBs) – PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

potentially responsible party (PRP) – any individual or company—including owners, operators, transporters or generators—potentially responsible for, or contributing to a spill or other contamination at a Superfund site. Whenever possible, through administrative and legal actions, EPA requires PRPs to clean up hazardous sites they have contaminated.

Preliminary Assessment – the process of collecting and reviewing available information about a known or suspected waste site or release.

-R-

Record of Decision (ROD) – a public document that explains which cleanup alternative EPA selected to address a site under the authority of CERCLA.

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

remedial action/long-term response – the actual construction or implementation phase of a Superfund site cleanup that follows remedial design.

remedial design – a phase of remedial action that follows the remedial investigation/feasibility study and includes development of engineering drawings and specifications for a site cleanup.

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

remediation – cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a Superfund site; for the Asbestos Hazard Emergency Response program, abatement methods including evaluation, repair, enclosure, encapsulation, or removal of greater than 3 linear feet or square feet of asbestos-containing materials from a building.

removal/removal action – short-term immediate actions taken to address releases of hazardous substances that require expedited response. Removal actions may be emergency, time-critical, or non-time-critical. See emergency removal action, non-time-critical removals, and time-critical removals.

response action – a generic term for actions taken in response to actual or potential health-threatening environmental events, such as spills, sudden releases, and asbestos abatement/management problems; a CERCLA-authorized action involving either a short-term removal action or a long-term removal response. This may include but is not limited to: removing hazardous materials from a site to an EPA-approved

hazardous waste facility for treatment, containing or treating the waste on site, identifying and removing the sources of ground-water contamination and halting further migration of contaminants; any of the following actions taken in school buildings in response to AHERA to reduce the risk of exposure to asbestos: removal, encapsulation, enclosure, repair, and operations and maintenance.

Resource Conservation and Recovery Act (RCRA) – law enacted by Congress in 1976 to protect human health and the environment from the potential hazards of waste disposal; to conserve energy and natural resource; to reduce the amount of waste generated; and to ensure that wastes are managed in an environmentally sound manner. In 1984, Congress enacted the Hazardous and Solid Waste Amendments (HSWA) that significantly expanded the scope and requirements of RCRA.

Return To Use Initiative – a policy that focuses on National Priorities List sites that were cleaned up prior to EPA’s current emphasis on considering reuse during response activities. Many of these sites have remained vacant. With appropriate oversight, communities can reclaim these vacant sites. Returning these sites to beneficial use will provide local communities with valuable green space, recreational amenities, or commercial property. Removing the stigma associated with fenced and vacant Superfund sites may also increase local property values and the tax base.

risk – a measure of the probability that damage to life, health, property, or the environment will occur as a result of a given hazard.

-S-

sediment – soil, sand, and minerals washed from land into water, usually after rain. They pile up in reservoirs, rivers, and harbors, destroying fish and wildlife habitat, and clouding the water so that sunlight cannot reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to wash off the land after rainfall.

short-term cleanup – see removal/removal action.

site assessment – an initial phase of the Superfund process through which hazardous waste sites are evaluated, using preliminary assessments and site inspections, to develop a Hazard Ranking System score.

Site Inspection – the collection of information from a Superfund site to determine the extent and severity of hazards posed by the site. This phase follows and is more extensive than a preliminary assessment. The purpose is to gather information necessary to score the site using the Hazard Ranking System, and to determine if the site presents an immediate threat requiring prompt removal.

Sitewide Ready for Anticipated Use – EPA performance measure to report the number of NPL sites where, for the entire site, all cleanup goals in the Record(s) of Decision or other remedy decision document(s) for media that may affect current and reasonably anticipated future land uses of the site have been achieved, and all institutional or other controls required in the Record(s) of Decision or other remedy decision document(s) have been put in place.

special accounts – cost recovery payments are deposited into “special accounts” that are sub-accounts within Superfund’s Trust Fund. Special accounts are most commonly used when certain potentially responsible parties “cash out” their liability at a site rather than perform the cleanup work.

stakeholder – any organization, governmental entity, or individual that has a stake in or may be impacted by the Superfund program.

strict, joint, and several liability – under CERCLA, this legal concept relates to the liability for Superfund site cleanup and other costs on the part of more than one potentially responsible party (i.e., if there were several owners or users of a site that became contaminated over the years, they could all be considered potentially liable for cleaning up the site).

Superfund – see CERCLA.

Superfund Amendments and Reauthorization Act (SARA) – legislation that amended the Comprehen-

sive Environmental Response, Compensation, and Liability Act (CERCLA) on October 17, 1986. SARA reflected EPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program. SARA stressed the importance of permanent remedies and innovative treatment technologies; required Superfund actions to consider the standards and requirements found in other state and federal environmental laws and regulations; provided new enforcement authorities and settlement tools; increased state involvement; increased the focus on human health problems; encouraged greater citizen participation; and increased the size of the Trust Fund to \$8.5 billion.

-T-

Technical Assistance Grants – grants provided to citizens' groups to obtain assistance in interpreting information related to cleanups at Superfund sites or those proposed for the National Priorities List. Such groups use the grants to hire technical advisors to help them understand the site-related technical information for the duration of response activities.

time-critical removals – removals where based on the site evaluation, the lead agency determines that a removal action is appropriate and that there is a period of less than six months available before response activities begin on-site.

toxic waste – a waste that can produce injury if inhaled, swallowed, or absorbed through the skin.

Trust Fund – a fund set up under CERCLA authority to help pay for cleanup of hazardous waste sites with revenues subject to congressional appropriation.

-U-

Unilateral Administrative Order (UAO) – a legal document issued by EPA directing a potentially responsible party to perform site cleanup. A UAO sets forth the liability of the party for the cleanup, describes actions to be taken, and subjects the recipient to penalties and damages for noncompliance. Unilateral orders may be enforced in court. A UAO is EPA's most potent enforcement tool and a powerful settlement incentive. EPA usually only issues them to parties that are the largest contributors of waste to a site, are financially viable, and against whom there is strong evidence of liability.

-V-

volatile organic compound (VOC) – any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

Appendix C. Green Remediation Site Summaries

Site Name	Site Type	Location	Region	Energy Source	Treatment Method	Alternative Energy Use	Contact
Aberdeen Proving Ground O-Field	Superfund NPL	Edgewood, Md.	3	Solar	Pump & treatment (P&T), hydraulic ground-water containment, landfill cap, removal of contaminated soils	Solar-powered data collection system	Frank Vavra
Altus AFB	Federal Facility (FF), Non-NPL	Altus, Okla.	6	Solar	Pilot-scale bioreactor	Solar-powered pump for groundwater circulation	Nancy Fagan
Apache Powder	Superfund NPL	St. David, Ariz.	9	Solar	P&T	Solar-powered pumps for recirculation in wetlands	Andria Benner Greg Hal
BP Paulsboro	NJDEP ISRA Voluntary	Paulsboro, N.J.	2	Solar	Soil vapor extraction (SVE), P&T	Solar- and gravity-powered irrigation system	Sasa Jazic Iain Bryant
Crozet Township Arsenic Site	Removal Response	Charlottesville, Va.	3	Solar	Phytoremediation with ferns	Solar- and gravity-powered irrigation system	Myles Bartos
Frontier Fertilizer	Superfund NPL	Davis, Calif.	9	Solar	P&T, electrical heating, bioremediation	Small solar-power system on the roof of the ground-water treatment plant	Bonnie Arthur
Lawrence Livermore National Lab (Site 300)	Superfund NPL (DOE)	Livermore, Calif.	9	Solar	Excavation/off-site disposal, SVE, P&T	Solar-powered pumps for granular activated carbon (GAC) systems	Kathy Setian Ed Folsom
Pemaco	Superfund NPL	Maywood, Calif.	9	Solar	High vacuum, dual phase extraction (HVDPE), ultraviolet oxidation (UV/Ox), GAC, flameless thermal oxidation (FTO), electrical resistance heating (ERH), SVE	Solar-powered system for emergency backup battery power	Rosemarie Caraway
Raytheon Beech Aircraft Site	RCRA Private-Party Led Cleanup	Boulder, Colo.	8	Solar	SVE, P&T	Solar-powered monitoring stations with wireless data-transmission well loggers	Noreen Okubo

Site Name	Site Type	Location	Region	Energy Source	Treatment Method	Alternative Energy Use	Contact
Savannah River Site	FF Superfund Final NPL (DOE)	Aiken, S.C.	4	Solar	Passive soil vapor extraction (PSVE), MicroBlower, GeoSiphon	10 solar-powered MicroBlower systems	Robert Pope
F.E. Warren AFB	FF Superfund NPL	Cheyenne, Wyo.	8	Wind	Excavation, landfill disposal, landfill cap, permeable reactive barrier (PRB)	Wind turbines for base power generation	Robert Stites
Former Nebraska Ordnance Plant	Superfund NPL Formerly Used Defense Sites (FUDS)	Mead, Neb.	7	Wind	P&T	Wind turbine for groundwater circulation well (GCW)	Scott Marquess
Getty Gasoline	SCDHEC Getty Gasoline Water Division	North Charleston, S.C.	4	Wind		Wind-powered pump	Lori Landmeyer
St. Croix Alumina Facility	RCRA	Kingshill, St. Croix, V.I.	2	Wind and Solar	P&T, recovered oil sent to HOVENSA refinery	Wind-driven turbine compressors powered by 6 large windmills; 6 solar array panels are used to power submersible pumps for oil recovery	Tim Gordon
Operating Industries Landfill	Superfund NPL	Monterey Park, Calif.	9	Landfill Gas	Landfill cap, landfill gas (LFG) collection, ground-water monitoring, monitored natural attenuation (MNA)	Microturbines to convert LFG to electricity	Pankaj Arora, Shiann-Jang Chern
Grove Brownfield	Brownfield	Austin, Texas	6	Vegetable Oil	Debris removal, ecological revitalization with native plants	Vegetable oil-powered tractor, biofuel generators, solar panels	Dorothy Crawford

Sites Currently Planning to Use Renewables:

Massachusetts Military Reservation	FF Superfund NPL	Barnstable Co., Mass.	1	Wind	Excavation/off site disposal, SVE/biosparging	Wind turbines to power ground-water treatment systems	Lynne Jennings
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Note: This chart has been updated from the original (available at <http://clu-in.org/download/studentpapers/Green-Remediation-Renewables-A-Dellens.pdf>) to reflect changes in site status since the report was first published in August 2007. Frontier Fertilizer, a pump and treatment site in Davis, Calif., has moved from the planning to the implementation phase for solar power generation. Casmalia Resources (Calif.) and Hassayampa Landfill (Ariz.), two sites in EPA Pacific Southwest (Region 9), no longer have immediate plans to implement renewable energy systems.

