



Reuse of CERCLA Landfill and Containment Sites

Through the "Superfund Redevelopment Initiative," EPA is helping communities restore properties, once restricted from use due to risk to human health and the environment, to productive uses. These uses may include a range of activities, such as commercial businesses, recreational facilities, and ecologically enhanced areas. This fact sheet is designed to assist Remedial Project Managers (RPMs), On-Scene Coordinators (OSCs), and State agencies in working with communities to incorporate reuse options into on-site containment remedies, such as the municipal landfill presumptive remedy, when possible. The fact sheet does not establish new policy, but rather illustrates how reuse of property has been accomplished successfully under the existing program at several sites. In addition, the fact sheet describes design considerations that were creatively implemented at the sites, identifies techniques to facilitate land use, and discusses potential reuse limitations.



Softball is played at an outdoor recreation complex developed at the Chisman Creek Superfund Site.

INTRODUCTION

For over eighteen years EPA has characterized and remediated municipal landfills under its Superfund program. Based on the wealth of information acquired and the lessons learned from evaluating and cleaning up these sites, the Agency developed a presumptive remedy for CERCLA municipal landfill sites (see OSWER Directive No. 9355.0-49FS). This presumptive remedy calls for containment of the landfill mass, and collection or treatment of landfill gas and/or leachate, as appropriate. The effectiveness of the remedy is dependent on a containment system that is properly operated and maintained, and institutional controls that provide for the continued integrity of the containment system, thereby ensuring long-term protection of future site users. EPA uses similar containment strategies at other sites where a decision is made to leave some contaminated material onsite. In either case, the containment system used at the site is designed to provide protection of human health and the environment for both current and future users of the site.

The Superfund Redevelopment Initiative reflects the Agency's belief that EPA's responsibility to local communities to clean up contaminated properties in a manner that protects human health and the environment, generally should be carried out such that cleanups are protective for reasonably anticipated future land use. Superfund sites can be recycled in a variety of forms, including redevelopment of the site (e.g., construction of a new facility), reuse of existing resources on the site (e.g., a new business in pre-existing buildings), or enhancing the ecosystem on and around the site. **EPA does not favor one type of reuse over another, as land use is a local decision.** Instead, EPA is working with community leaders to determine remedial action objectives for cleanups that will allow for reasonably anticipated future land uses, where possible. Although the landfill presumptive remedy and other containment requirements may limit future uses, EPA believes that a significant number of sites using containment strategies may be appropriate for future ecological, recreational, or commercial/industrial reuse. EPA believes that reuse should help to ensure proper maintenance of the remedy while providing tangible benefits to key stakeholders, especially the surrounding community. The possible benefits of reuse include:

- C Positive economic impacts for communities living around the site including new employment opportunities, increased property values, and catalysts for additional redevelopment activities;
- C Stakeholder acceptance of the municipal landfill presumptive remedy because of potential time and cost savings, and increased involvement in the restoration and redevelopment process;
- C Enhanced day-to-day attention, potentially resulting in improved maintenance of remedy integrity and institutional controls; and
- C Improved aesthetic quality of the area through discouragement of illegal waste disposal or trespassing on restricted portions of the site, as well as increased upkeep of the site by future site occupants.

This fact sheet provides information on reuse projects that have been implemented successfully at landfills and other sites using similar containment remedies. It identifies features to be considered during the design phase, and highlights examples of project designs that incorporated creative solutions to facilitate reuse. In addition, this fact sheet addresses reuse issues—such as transfer of operation and maintenance (O&M) responsibilities and implementation of institutional controls—that are crucial to the continued protection of human health and the environment. Finally, the fact sheet delineates EPA guidance and tools for stakeholders interested in reusing a landfill site.

IDENTIFYING REASONABLY ANTICIPATED FUTURE LAND USE

To ensure that a containment remedy is protective for the reasonably anticipated use(s) of a site, RPMs and/or OSCs should involve stakeholders as early in the Superfund decision-making process as possible. Discussions with local land use planning authorities, appropriate State and local officials, property owners, and the public, as appropriate, should be conducted as early as possible in the scoping phase of the Remedial Investigation/Feasibility Study (RI/FS).

To identify reasonably anticipated future land uses, the following types of information, much of which typically is available from local planning authorities, may be evaluated: current land use; zoning laws; zoning maps; comprehensive community master plans; population growth patterns and projections (e.g., Bureau of Census projections); accessibility of site to existing infrastructure (e.g., transportation and public utilities); institutional controls currently in place; site location in relation to urban, residential, commercial, industrial, agricultural and recreational areas; Federal/State land use designation (Federal/State control over designated lands range from established uses for the general public, such as national parks or State recreational areas, to governmental

facilities, which often have extensive site access restrictions, such as Department of Defense facilities); historical or recent development patterns; cultural factors (e.g., historical sites, Native American religious sites); natural resources information; potential vulnerability of groundwater to contaminants that might migrate from soil; environmental justice issues; location of on-site or nearby wetlands; proximity of site to a floodplain; proximity of site to critical habitats of endangered or threatened species; geographic and geologic information; and location of Wellhead Protection areas, recharge areas, and other areas identified in a State's Comprehensive Groundwater Protection Program.

Early discussions with stakeholders will assist EPA in understanding the reasonably anticipated future uses of the site and in identifying specific institutional and engineering controls that may be necessary. Three categories of land reuse have been employed at former municipal landfills—ecological enhancement, recreational reuse, and commercial/industrial reuse. Each of these categories is discussed in the sections that follow. Case studies are used throughout this fact sheet to illustrate engineering and policy considerations, and protective, feasible solutions for integrating site reuse with a containment remedy. Exhibit One summarizes key characteristics of the case studies included in this fact sheet. Detailed case studies of these sites are available on the Superfund homepage located at <http://www.epa.gov/superfund>.

Ecological Enhancement

The historical practice of siting landfills in remote areas often allows all or part of a landfill site to be used for future ecological use. Wildlife enhancement areas and wetlands provide green space and habitat for indigenous species, and often serve as a cost-effective and design-friendly means of returning landfills to beneficial use. Historically, EPA has accommodated restoration of ecologically significant areas, when possible, including landfills located in areas with significant, existing habitat. The first step is to consult with other Federal and State agencies, such as the U.S. Fish and Wildlife Service, to target specific indigenous birds and wildlife that are in need of habitat. Once this information has been gathered, it may be possible to conduct the cleanup in a manner that will support plant and animal species while ensuring that the selected vegetation and engineering controls will protect the landfill cover and maintain the effectiveness of the remedy.

One example of ecological restoration is at the Army Creek Landfill in New Castle County, Delaware. At this site, EPA and the potentially responsible parties (PRPs) turned a sixty-acre abandoned landfill into a wildlife enhancement area. This remedy and reuse project provided protective habitat for various native terrestrial and aquatic wildlife species.



The Army Creek Landfill Superfund Site after cleanup and ecological restoration. Today the area supports various terrestrial and aquatic species of wildlife.

Additionally, various grains, wildflowers, and custom vegetation were planted on the site cap to encourage migratory birds to stop, nest, and feed on the land. Revegetation of the site and reconstruction of the wetlands were completed at no additional cost to the Agency.

Another example of ecological restoration is the remedy implemented at the Bower's Landfill site in Pickaway County, Ohio. Knowing that



Army Creek Landfill Superfund Site before cleanup and ecological restoration.

part of the site was flooded an average of 29 days a year, EPA determined that converting a portion of the site into a wetlands would be both cost-effective and beneficial to the surrounding ecosystem. To make ecological restoration a reality, the RPM consulted with the Ohio Division of Wildlife and the U.S. Fish and Wildlife Service to design the wetlands area. EPA used clay from a portion of the site to build the cap over the landfill. The area that was excavated was then graded to provide waterways and retention ponds and to promote the growth of plants and wildlife with minimal maintenance. The seven-acre wetlands that were constructed now effectively control flooding of the landfill source, and provide food, shelter, and habitat for a variety of plants and animals.

Recreational Reuse

Former municipal landfills can also find new life as low-impact recreational areas. Landfills are a natural fit for this type of activity because they typically have a large surface area and the cap can be contoured to meet the specifications for ball fields or golf courses. In addition, communities are generally hospitable to new recreational areas because they have a tendency to increase property values and enhance the quality of life in the immediate area.

For instance, at the Chisman Creek Landfill in York County, Virginia, the cleanup plan developed by EPA and the PRPs was based on local residents' desire for a sports complex in the community. The site cap was engineered to serve as a foundation for future playing fields and graded to allow for park structures such as bleachers and fences. The Chisman Creek site is now a 41-acre complex that contains two lighted softball fields, four soccer fields, parking, vending facilities, and facility equipment storage.



Sunset at the Old Works Golf Course, Deer Lodge County, Montana. In 1997, 25,000 rounds of golf were played at the course.

Another case of recreational reuse at a site implementing a containment remedy is the Old Works/East Anaconda Smelter Superfund Site in Deer Lodge County, Montana. After extensive discussions with both the PRP and the local community, EPA approved a cleanup plan that accommodated the development of a golf course over a portion of the property. In order to construct the golf course, the PRPs utilized many unique design features that not only facilitated redevelopment, but also allowed for the protection of future golfers and a nearby trout stream, and future development around the golf course.

For landfills and other sites with mounds or sloped areas, the DuPage County Landfill/Blackwell Forest Preserve illustrates a recreational use that makes the most of this fairly common feature. Solid waste materials at the former landfill were deposited to a height of over 188 feet above ground level. After the site was closed, the town saw a need for a recreational resource, and decided to convert the former landfill and surrounding area into a multi-use area featuring hiking trails, camping facilities, and picnic areas for warmer months and a sledding/toboggan hill in winter months.

Industrial/Commercial Reuse

Some landfills, because of their locale or surroundings, may not be suitable for ecological or recreational reuse. These sites are generally located in industrialized areas that lack significant wildlife and/or habitat acreage. However, other factors, such as proximity to major transportation routes and suppliers or customers make these sites a potential setting for industrial or commercial redevelopment.

The remediation of the Raymark site in Fairfield County, Connecticut, is one of the first cases in which effective consideration of the reasonably anticipated future land use in developing a cleanup plan helped reuse occur. From 1995 through 1997, Region 1 and the Connecticut Department of Environmental Protection (CDEP) decontaminated and demolished all site buildings and structures, consolidated contaminated soils, addressed highly concentrated pockets of contaminated groundwater, installed a gas collection system, and capped the entire 33-acre property so that future development could occur. A partnership was formed among EPA, CDEP, the Town of Stratford, and a local developer, which ultimately will allow for the construction of a 300,000 square foot retail shopping complex on the site.



Remediation underway at the Raymark Superfund Site. The site will support a 300,000 square foot shopping complex.

The Delaware Sand and Gravel site in New Castle County, Delaware, is another example of industrial redevelopment of a former landfill. Although construction of a low-permeability landfill cap was required, the owner was interested in reusing a portion of the site for temporary storage of heavy equipment. Region 3 allowed PRP construction of a "wear surface" over a 5-acre portion of the RCRA landfill cap. The wear surface was designed and constructed to withstand daily use by a sixteen-ton load—the weight of the heaviest piece of equipment that was going to be used on the site in its new capacity. Similarly, the containment remedy at the Mid-Atlantic Wood Preserver site in Anne Arundel County, Maryland, allowed the site to be paved as a parking lot for the use of the adjacent business.

Another example of commercial/industrial redevelopment is the Industri-Plex site, which is located in a dense commercial and industrial area in Middlesex County, Massachusetts. Remediation of the site included PRP construction of permeable and/or impermeable caps and other covers (e.g., concrete foundations, asphalt parking lots, etc.) over approximately 110 acres of contaminated soils. Development projects planned or underway include construction of a Regional Transportation Center (RTC), a retail store on 19 acres, and up to 750,000 square feet of office and hotel space.

REMEDY CONSIDERATIONS

Pursuant to Section 121(d)(2) of CERCLA, remedial actions must meet or waive all applicable or relevant and appropriate requirements (ARARs) identified for a response. For landfills, ARARs generally include closure requirements in compliance with Subtitle D or Subtitle C of the Resource Conservation and Recovery Act (RCRA) (for more information on closure requirements as ARARs, see "Presumptive Remedy for CERCLA Municipal Landfill Sites, September 1993, Directive No. 9355.0-49FS). Whatever the intended future use of the site, the integrity of the cap and other components of the containment remedy must be

protected and maintained. The following sections identify remedy considerations that have been addressed at sites where it has been possible to accommodate reasonably anticipated land uses in the remedy. These considerations include design components for the containment remedies, implementation of appropriate institutional controls, and ongoing O&M activities.

Design Components

Plans and specifications for a landfill or other containment cap system generally provide the following components, regardless of the intended future use of the site: cap design and integrity; runoff collection system design and safety; monitoring well location and design; leachate/gas collection system design and safety; and vegetative choices. When a particular reuse of a site is anticipated, in general, EPA will attempt to conduct site activities in a manner that will be protective for the anticipated future use. The following sections provide examples of sites where remedial actions were conducted in such a way that desired future uses were successfully incorporated into the remedial design.

Exhibit One: Case Study Site Characteristics

Site Name	Land Use	Design Considerations	Operation & Maintenance	Objectives of Institutional Controls	RPM Information
Army Creek Landfill, DE Region 3 PRP lead	Wildlife refuge	Vegetative cover (species); O&M Schedule Burrowing animal control	PRP inspects and mows cap on rotating schedule; removes penetrating trees and other plants; monitors gas vents; removes nuisance reeds from wetlands; runs humane capture and release program; collects and treats groundwater and monitors air and groundwater	Ensure that any future use is consistent with, and protective of, the site remedy. Any activities performed at the site must be done in an environmentally and otherwise acceptable manner consistent with all laws, regulations, ordinances, zoning requirements, or other rules imposed by Federal, State, County, or Local government bodies.	Debra Rossi (215) 814-3228 rossi.debra@epa.gov
Bower's Landfill Site, OH Region 5 Fund lead	Wetlands habitat creation	Flood and erosion control Monitoring well integrity	State O&M program includes quarterly inspection for leachate and gas formation, groundwater monitoring, mowing cap vegetation, inspecting and repairing the cap, and repairing the fencing.	Prohibit groundwater extraction in west field and restricting disturbance of the landfill surface. If necessary, farming will be prohibited on land west of site.	David Wilson (312) 886-1476 wilson.david@epa.gov
Chisman Creek Site, VA Region 3 PRP lead	Soccer and softball fields	Wetlands preservation Prevention future direct contact	Routine O&M transferred to York County Parks and Recreation; PRP responsible for O&M of engineering control equipment. Post closure monitoring program for ground and surface water down gradient of the fly ash pits.	Prohibit excavation of soil, restrict building, and restrict groundwater use under and down gradient of the pits.	Andrew C. Palestini, (215) 814-3233 palestini.andrew@epa.gov
Anaconda Smelter Site, MT Region 8 PRP lead	18-hole golf course	Runoff and irrigation control Materials recycling	O&M and monitoring transferred to Deer Lodge County; O&M requirements include monitoring and maintenance of the vegetative cover and installation and maintenance of a fence around the perimeter of the site; Future transfer of site ownership will transfer O&M responsibilities.	Short-term institutional controls to control access and land use will be implemented throughout the area of the site. County responsible for land use decisions and issuing redevelopment permits.	Charles Coleman (406) 441-1150 Ext. 261 coleman.charles@epa.gov

Exhibit One: Case Study Site Characteristics

Site Name	Land Use	Design Considerations	Operation & Maintenance	Objectives of Institutional Controls	RPM Information
Raymark Site, CT Region 1 Fund lead	Retail shopping plaza	Designed to allow future development on top of cap such that no penetration of cap will be necessary	O&M program includes conducting routine monitoring of groundwater and surface water, O&M of DNAPL collection system, O&M of soil gas collection system, and O&M of enhanced gas collection system.	Some use restrictions on types of businesses that can operate on property and restrictions on excavating below impermeable layer.	Mike Hill (617) 918-1398 hill.michael@epa.gov
Delaware Sand & Gravel Site, DE Region 3 PRP lead	Storage facility for light industrial equipment	Load bearing; gas collection with vents located outside work area	Owner inspects RCRA cap; monitors gas vents; mows	Use of the surface area barrier is restricted by weight, spillage, storage, excavation, and other measures.	Phil Rotstein (215) 814-3232 rotstein.phil@epa.gov
Mid-Atlantic Wood Preserver Site, MD Region 3 PRP Lead	Parking lot for adjacent business	Wear surface over cap	Developer inspects and maintains asphalt paving and carries out environmental (air, surface water, sediments, & groundwater) monitoring.	Ensure the integrity of containment structure is not compromised by future use of the property.	Eric Newman (215) 814-3237 newman.eric@epa.gov
Industri-Plex Site, MA Region 1 PRP lead	Transportation center; retail store; office and hotel space	Design permeable and impermeable covers to prevent direct contact with soils contaminated with heavy metals. The design considers long-term protectiveness/effectiveness and freeze-thaw action.	Air, surface, and ground-water quality monitoring and post-closure care consistent with RCRA regulations.	Under development. The institutional controls will preserve the continued effectiveness of the remedy, which ensures the protection of human health and the environment, while allowing property owners greatest possible use of the site.	Joseph LeMay, P.E. (617) 918-1323 lemay.joe@epa.gov
DuPage County Landfill/Blackwell Forest Preserve, IL Region 5 PRP Lead	Natural recreation area; hiking and camping facilities; sledding hill; lake	Minimized tree removal over footprint of site. If existing landfill gas system is incapable of meeting recreational uses, system will go from passive to active (designed to be upgraded), additional gas collection wells will be added, and/or thermal treatment device will be added.	Forest Preserve District will handle all operation and maintenance. Rigorous inspections of cap integrity (i.e., after weather events, look for excessive wear in recreational areas)	Prohibit excavation of soil, restricting building and ground-water use. However, have petition flexibility to accommodate non-invasive improvements	Michael Bellot Region 5 312-353-6425 bellot.michael@epa.gov

Cap design and integrity

Basic considerations in cap design include material, thickness, permeability and slope stability. However, the future use of the site may require design components that incorporate specific reuse considerations. At the Chisman Creek site, the cap was engineered to serve as a foundation for future playing fields and graded to allow for park structures such as bleachers and fences. Precautions, such as placing underground utilities in oversized clay trenches, were taken to protect future workers from coming into contact with fly ash. At the Delaware Sand and Gravel site, the wear surface was constructed to withstand daily use by a sixteen-ton load—the weight of the heaviest piece of equipment onsite, an eight-ton forklift with a maximum front-end load of eight tons. Other design considerations may take into account unique site characteristics; for example, sledding at the DuPage Landfill site slope is limited to days during which there are at least three inches of snow on the ground. Caps can also be designed to accommodate large commercial buildings.



Capping underway at the Summitville Mine Superfund Site, Rio Grande County, Colorado.



At the Raymark Superfund Site in Connecticut, foundation pilings were engineered into the protective cap, which will support a 300,000 square foot retail complex.

For example, underlying soils and waste were compacted through surcharging and dynamic compaction, and in one area of the site, steel pilings were installed below the protective cap at the Raymark Industries site to support the loads of the cap, parking lot, and a 300,000 square foot retail shopping complex. Through a Prospective Purchaser Agreement (PPA) (see page 13 for a discussion of PPAs), the developer agreed to reimburse EPA for the additional costs associated with the soil stabilization techniques implemented in preparation for the future shopping complex, and agreed to avoid actions that could disrupt the protective cover.

Runoff collection system design and safety

Surface water runoff controls typically are used to prevent the migration of leachate or contaminant plumes with lateral drainage features. Again, site reuse may entail modifications of system designs to contain or treat the flow prior to release. Under EPA supervision, the PRP installed a state-of-the-art drainage system at the Old Works/East Anaconda Smelter site. This system directs runoff from the hills which surround the course into a large holding pond. The design of this unit protects the overall integrity of the cap, minimizes stormwater runoff to a nearby trout stream, and allows the water to be used as an irrigation source. At the Army Creek Landfill site, concerns of flooding in low lying areas where treated water feeds into the adjacent Army Creek resulted in modifications to the slope and discharge layout of several existing onsite sediment basins to create a standing wetlands area. One of the sediment basins, already colonized with native wetland plant species, was left in its natural state. The second basin was replanted with plant species typical to riparian wetlands in the area. At the Chisman Creek Landfill site, the surface water collection system was so efficient that the York County Parks and Recreation Department had to re-sod the support layer to slow rainwater drainage in order to maintain grass on the fields.

Monitoring well location and design

Containment remedies generally include monitoring wells to ensure that leachate from the contained mass does not migrate to underlying groundwater. The location and design of these wells can be planned so that site reuse does not affect use of the wells. At the Bower's Landfill site, monitoring wells in the constructed wetland area were fitted with risers and the surrounding earth was mounded to minimize water intrusion through the wells and to make access easier during flood conditions.

Leachate/Gas collection system design and safety

Leachate and gas collection and treatment systems are also design considerations that may be integrated with future land use. Both the placement of collection equipment and treatment options (e.g., vents and flares) can be planned to accommodate future reuse. Gas vents at the Delaware Sand and Gravel site were installed horizontally, away from the reuse area, and towards an unobstructed five acres. This portion of the property will not be reused due to unsuitable slope. Engineers at the Chisman Creek site discovered that the original design of the groundwater collection system would significantly impact the stability of the land under the highway bisecting the site and several nearby homes. To avoid these impacts, a series of horizontal drains were drilled laterally into the base of the ash pit. This lower-cost and more efficient design was adapted from highway construction projects and required the use of a specially constructed drill rig. At the Army Creek site, gooseberry was planted around the gas vents to provide a food source for animals as well as visual cover of the vent pipes. At the DuPage County Landfill site, the Forest Preserve District agreed to conduct breathing zone ambient monitoring that includes different seasonal variations and atmospheric changes. If the existing landfill gas system does not meet recreational use safety requirements, the Record of Decision is written to change the gas collection system from passive to active (the system was designed to be upgraded), to add additional gas collection wells, and/or to add a thermal treatment device.

Vegetation Choice

The vegetation selected for containment remedies generally will help reduce erosion and water penetration and enhance evapotranspiration. Vegetative support layers usually are organic silty loam topsoil, and vegetation generally has shallow roots and may be selected based on a low possibility of bioaccumulation. At the DuPage County Landfill site, the Forest Preserve District conducted an Arboreal Study to determine if the trees and brush were detrimental to the cap. Although some trees were eliminated to allow for the footprint of the planned site cap, every effort was made to remove as few trees as possible. At the Army Creek landfill site, EPA consulted with ecologists to identify specific grains, wildflowers, and vegetation that would attract migratory birds. The selected seed mixture provided the land coverage and erosion control needed to maintain the integrity of the cap, while providing food and habitat to a variety of plant and animal species. A similar revegetation strategy was used at the Delaware Sand and Gravel site for those portions of the property that were unusable for redevelopment because of slope or other terrain-related factors. One significant change in the seed mix used to revegetate the Delaware Sand and Gravel site was the absence of red clover seed, as previous experience at the Army Creek site indicated that this plant attracted unwanted burrowing animals.

Institutional Controls

Remedies that involve on-site containment of waste often incorporate institutional controls to prevent an unanticipated change in land use that could result in unacceptable exposures to contamination, or at a

minimum, alert future users to the residual risks and monitor for any changes in use. Examples of institutional controls include land use regulations imposed by local governments, property law devices such as easements and covenants that restrict future land or resource use, and informational devices such as deed notices that inform prospective purchasers of residual on-site contamination. For example, a local ordinance might prohibit the use of contaminated groundwater or require periodic maintenance of a parking lot or other engineered barrier.

Institutional controls play a key role in ensuring long-term protectiveness, and should be evaluated and implemented with the same degree of care as is given to other elements of a remedy. In developing remedial alternatives that include institutional controls, EPA determines the type of institutional control to be used, the existence of the authority to implement the institutional control, and the appropriate entity's resolve and ability to implement the institutional control. An alternative may anticipate two or more options for establishing institutional controls, but should fully evaluate all such options. Because of their importance in restricting future land uses, it is best to identify the need for institutional controls as early in the remedy selection process as possible to identify implementation and long-term enforcement issues. It also is vital that stakeholders be informed whenever institutional controls are added or modified so that future development can accommodate existing or altered land-use restrictions.



Jack Nicklaus testing out a sand trap at the Old Works Golf Course developed over a 120-acre capped area at the Anaconda Superfund Site. The 14,000 cubic yards of black sand in the course sand traps is finely ground inert smelting slag.



Native grasses and flowers at the restored Army Creek Landfill Site.

EPA personnel working at the Old Works/East Anaconda site crafted a creative solution for ensuring compliance with institutional controls while allowing for continued redevelopment at the site. Citizens, the PRP, and local, state, and federal government officials formed the Old Works/East Anaconda Development Area (OW/EADA) to promote redevelopment of a 1,300 acre area of the site. The Anaconda-Deer Lodge County Comprehensive Master Plan was then prepared to provide guidance for accommodating future development and its possible effects on the environment and surrounding land uses. The Master Plan incorporates a Development Permit System (DPS), which regulates proposed development activity or land use located anywhere on the site, such as drilling wells, excavation, or new construction, irrespective of land ownership, to ensure it is consistent with environmental and safety guidelines. Other institutional controls such as land use and groundwater restrictions, private land ownership controls, dedicated developments, covenants, and easements, will be implemented to complement the DPS and ensure overall compliance with the Master Plan.

The DuPage Landfill site has institutional controls in place that prohibit construction of buildings on the site; however, language does provide the flexibility to petition for non-invasive improvements. For example, the Forest Preserve District successfully petitioned to put a temporary building at the top of the hill during the winter months for the purpose of renting toboggans.

Operation and Maintenance

Operation and Maintenance (O&M) activities protect the integrity of the selected remedy for a site. O&M measures are initiated after the remedy has achieved the action objectives and goals outlined in the Record of Decision (ROD), and after the remedy is determined to be operational and functional (O&F) based on State and Federal agreement. Typically, remedies are considered O&F either one year after construction is complete or when the remedy is functioning properly and performing as designed—whichever is earlier. Remedies requiring O&M measures include landfill caps, gas collection systems, groundwater extraction/treatment systems, groundwater monitoring, and/or surface water treatment. Once the O&M period begins, the State or PRP is responsible for maintaining the protectiveness of the remedy in perpetuity. O&M monitoring typically includes four components: inspection; sampling and analysis; routine maintenance; and reporting. Although O&M activities may be transferred through a rental or purchase agreement to a new owner, the State or PRP is still ultimately responsible for the protectiveness of O&M activities. However, the costs for O&M activities can often be offset through reuse or redevelopment at a site.

For example, the softball fields and recreational sports complex created as part of the redevelopment of the Chisman Creek Superfund site are operated by York County. The O&M activities at the site, such as mowing the grass, preventing cap deterioration, and routine repairs, are now handled by the County as part of their normal park operations. This has, in effect, eliminated the costs for O&M at the site. Another example is the result of the redevelopment that took place at the Army Creek Landfill site. EPA determined that converting the site into a wildlife enhancement area would provide a much needed protective habitat for various birds and wildlife. Various grains, wildflowers and custom vegetation were planted on the site cap to encourage migratory birds to stop and feed on the land. Bird boxes also were installed along the riparian wetlands of Army Creek to encourage nesting. The site is mowed once a year before the nesting season to provide food and shelter for migratory birds. Additionally, the site is mowed on alternating years in vertical or horizontal grids that leave straight stands of protective, vegetative cover for terrestrial animals. Gooseberry was planted around the gas vents to provide a food source for animals as well as visual cover of the vent pipes. Cap integrity is maintained through removal of deep-rooting, woody plants from the capped area and a humane trapping and relocation of woodchucks that may burrow into the cap. O&M at this site also includes activities to minimize invasion of non-native reeds into the wetlands area. Revegetation of the site and reconstruction of the wetlands was completed at no additional cost to the Agency, has not significantly increased operation activities at the site, and has decreased some maintenance activities, such as mowing the site, to once per year.

REUSE CONSIDERATIONS

The following sections summarize select EPA guidance and tools for stakeholders interested in reusing a site at which containment is part of the remedy. These sections include discussions on early involvement of stakeholders, confirmation of reuse viability, and use of redevelopment tools that are available in the event that reuse is desired.

Solicit Input from Stakeholders

The actual reuse of a site is driven by many factors, including the local business climate, real estate and land prices, and natural site features. However, the most important aspect when determining the reasonably anticipated future land reuse is the early involvement of all interested parties. Throughout the cleanup process, from site discovery to construction completion, EPA encourages open dialogue with the community

to determine the reasonably anticipated future land reuse. Reuse can create many benefits that productively impact local communities, including new jobs, higher property values, and better quality of life through the preservation of open space and recreational areas. If all stakeholders, including the community, state, and, if applicable, PRPs, should reach an agreement on what they believe reuse may be as early as possible in the RI/FS process if a containment remedy is being considered for the site, EPA can be reasonably confident about the future use. For municipal landfill sites, the presumptive remedy allows for an up-front assumption regarding the appropriate remedial alternatives in the RI/FS process (i.e., scoping).

Fact sheets, notices in local newspapers and/or public meetings are appropriate notification tools for beginning the dialogue concerning reasonably anticipated future uses of the site. In addition, a letter, phone call or other appropriate communication to the local land use planning authority associated with the site may be made prior to such notifications. More focused communications, such as letters or fact sheets may be mailed or hand delivered to adjacent property owners, especially when a residential neighborhood is situated in close proximity to the site. This is especially important because in some instances the local residents near the Superfund site may feel disenfranchised from the local land use planning and development process. Also, if the site is located in a community that is likely to have environmental justice concerns, extra efforts may be made to reach out to and confer with segments of the community that are not necessarily reached by conventional communication vehicles or through local officials and planning commissions.

A critical component of the notification and discussion process is a clear explanation of the limits of reasonably anticipated future land uses. For example, reuse of municipal landfills as residential developments is discouraged. In addition, site managers should begin a dialogue with PRPs so that they continue the process if they assume responsibility for the RI/FS and future site remediation activities. Through early and open dialogue with stakeholders, EPA believes that realistic land-use scenarios can be developed that will facilitate the RI/FS, and expedite the cleanup and ultimately the redevelopment of the site.

Confirm Reuse Viability during RI/FS Process

Once the reasonably anticipated future land use(s) of a site is identified, it is important to confirm the viability of planned uses by analyzing data collected during the RI/FS, such as the nature and extent of contamination, containment alternatives, site topography, and other factors presented previously. Any combination of unrestricted uses, restricted uses, or use for long-term waste management may result, but it is important to confirm that the reuse options desired by the community are viable given the characteristics of the site. By maintaining an active role in site planning, EPA can attempt to accommodate site reuse, where possible, ensure that reuse options are consistent with the presumptive remedy or other containment design, and verify that any institutional controls ensure protection of human health and the environment and enforce limitations on reuse.

Redevelopment Tools

Once community outreach has been initiated and EPA has gathered information on possible reuse options, the Agency can attempt to ensure that the remedy is protective for the reasonably anticipated reuse. EPA has worked with States and localities to develop and issue guidance that will clarify the liability of prospective purchasers, lenders, property owners, and others regarding their association with activities at a site. These guidance documents state EPA's decision to use its enforcement discretion not to pursue such parties in specific situations. EPA anticipates that these clear statements will alleviate concerns these parties may have, and will facilitate their involvement in cleanup and redevelopment. Three guidance documents of

particular interest are described in greater detail below.

Prospective Purchaser Agreements

The prospective purchaser agreement (PPA) is a tool that EPA may use to facilitate cleanup and redevelopment of contaminated property, with over 90 PPAs signed through the end of fiscal year (FY) 1998. Through PPAs, EPA provides parties interested in acquiring contaminated property with CERCLA covenants not to sue for cleanup of preexisting environmental conditions. PPAs also shield purchasers from contribution claims by liable parties who may seek to recover some of their cleanup expenses from purchasers. PPAs may relieve the liability concerns of prospective purchasers, and, therefore, facilitate the cleanup and reuse of contaminated properties.

In 1995, EPA issued guidance expanding the circumstances under which the Agency will provide covenants not to sue to prospective purchasers of contaminated properties. The *Guidance on Agreements with Prospective Purchasers of Contaminated Property* gives the Agency greater flexibility to enter into agreements under which EPA agrees not to sue the purchaser for contamination that existed at the time of the purchase. Included in the guidance is a model PPA to streamline and facilitate negotiations with prospective purchasers.

PPAs ensure continued protection of the site after it is passed along to a purchaser. Through PPAs, a prospective purchaser must commit that the continued operation of the facility or redevelopment will not aggravate or contribute to the existing contamination or interfere with EPA's response action. The prospective purchaser also must agree that the future use of the property will not pose health risks to the community and those persons likely to be present at the site. Under the appropriate sections of the settlement document, EPA can include provisions to ensure that the remedy design specifications are not violated; that long-term O&M activities at the site are attended to; and that there is compliance with institutional controls. EPA and developers have entered into PPAs at the Anaconda Smelter, Mid-Atlantic Wood Preservers, Raymark, and Industri-Plex sites.

Partial Deletion from the National Priorities List (NPL)

Where there is substantial agreement among local residents, land use planning agencies, owners, and developers, EPA can be reasonably confident about the future use of the site. In such cases, site managers may consider the feasibility of deleting a parcel of land from the NPL. Site size and the extent of contamination are factors to consider in a decision to partially delete. If the site can realistically accommodate the entire remedial footprint, an appropriate buffer zone and the planned reuse option, then partial deletion of the site may be possible. EPA has used its partial deletion authority at 14 sites through the end of FY98.

The National Contingency Plan (NCP) establishes the criteria that EPA uses to delete sites from the National Priorities List. In accordance with 40 CFR § 300.425(e), sites may be deleted from the NPL where no further response is appropriate to protect public health or the environment. In making such a determination, EPA considers, in consultation with the State, whether any of the following criteria have been met:

- C Section 300.425(e)(1)(I). Responsible parties or other persons have implemented all appropriate response actions required;

- C Section 300.425(e)(1)(ii). All appropriate Fund-financed response under CERCLA has been implemented, and no further response action by responsible parties is appropriate; and
- C Section 300.425(e)(1)(iii). The remedial investigation has shown that the release poses no significant threat to public health or the environment and, therefore, taking of remedial measures is not appropriate.

Partial deletion of an NPL site is initiated when EPA prepares and publishes relevant documents, which are made available in the Deletion Docket at an official information repository. The State, with respect to the NPL site and applicable operable units, is asked to concur on EPA's final determination regarding the partial deletion. Concurrent with a Notice of Intent in the *Federal Register*, a notice is published in a newspaper of record and is distributed to appropriate Federal, Tribal, State, and local government officials, and other interested parties. These notices announce a thirty (30) day public comment period on the deletion package, which commences on the date of publication of the notice in the Federal Register and the newspaper of record. If, after review of all public comments, EPA determines that the partial deletion from the NPL is appropriate, EPA will publish a final notice of partial deletion in the *Federal Register*. Site managers should explicitly state from the initiation of this scenario that EPA cannot participate in any activities associated with the deleted portion of the site.

Comfort/Status Letters

In order to minimize stakeholder liability concerns associated with a potentially reusable site, Regional staff may issue a comfort letter. These letters provide potential buyers with as much information as possible from which to draw their own conclusions of the potential risk of Superfund liability. Three types of letters can be issued to parties who purchase, develop or operate a restored property:

- C *No Current Federal Superfund Interest Letter* - a letter sent at a site that EPA deleted from the NPL or that EPA no longer includes on its list of potential Superfund sites;
- C *Federal Interest Letter* - a letter indicating the status of EPA's involvement, where EPA anticipates or has already begun a response at the site; and
- C *State Action Letter* - a letter stating that the corresponding state has assumed response action at the site.

By establishing early contact with potential stakeholders, defining realistic beneficial reuse options, and using the full range of redevelopment tools, site managers may be able to accommodate reasonably anticipated land uses at municipal landfills and other sites using containment remedies.

Limits to Betterment Activities

At sites with reuse potential, stakeholders may propose an action that is beyond the authority of the Agency. EPA may modify a remedial action if EPA finds that the proposed change or expansion is necessary and appropriate to the EPA-selected remedial action. In this case, any additional costs would be paid as part of the remedial action. If EPA finds that the proposed change or expansion is not necessary to the selected

remedial action, but would not conflict or be inconsistent with the EPA-selected remedy, EPA may agree to integrate the proposed change or expansion into the planned CERCLA remedial work if:

- C The state, PRP, or developer agrees to fund the entire additional cost associated with the change or expansion; and
- C The state, PRP, or developer agrees to assume the lead for supervising that component of the remedy, or if EPA determines that component cannot be conducted as a separate phase or activity, for supervising the remedial design and construction of the entire remedy.
- C If a state does not concur in a remedial action selected by EPA, and the state desires to have the remedial action conform to an ARAR that has been waived under § 300.430(f)(1)(ii)(C), a state may seek to have that remedial action so conform in accordance with the procedures set out in CERCLA section 121(f)(2).

The Raymark site is an example of a remedy that included an enhancement. EPA worked closely with the developer to incorporate redevelopment plans into the containment strategy for the site. The developer requested that a series of soil stabilization techniques be used, including the installation of steel pilings below the cap to support the planned retail shopping complex. EPA signed a PPA with the developer that ensured that the company paid for the installation of the steel pilings and other enhancements.

CONCLUSIONS

The Superfund Redevelopment Initiative, which is aimed at choosing cleanups consistent with reasonably anticipated reuse where possible, is a program that can yield positive economic, environmental, and social benefits for communities with Superfund sites. The keys to a successful reuse effort are: remedies that are protective for reasonably anticipated future land uses, institutional controls that impose necessary reuse limitations, early and active participation from all stakeholders, and appropriate enforcement tools for redevelopment.

The essential step to success is to incorporate the plan to reuse the site with the plan to clean up the site. With the municipal landfill presumptive remedy, it may be possible to accommodate ecological, recreational, or commercial/industrial reuses in the cleanup plan. Whatever the intended future use of the site, all landfill remedies must first be designed to protect the integrity of the cap. EPA must maintain an active role in reuse planning to ensure that reasonably anticipated future reuse options are consistent with the presumptive remedy or other containment design, and that institutional controls and O&M activities are managed properly. Additional keys to success require the early and active participation of all stakeholders, including EPA, the appropriate state and local authorities, any PRPs, and the site neighbors and surrounding community. EPA can help facilitate the reuse of a site, but cannot accomplish this goal on its own. Therefore, it is imperative that site managers take the appropriate steps to involve these stakeholders as early as possible in the process. Early discussions with stakeholders will help ensure that the interests of all involved and affected parties are properly represented. Also, if the need arises based on these discussions, it may be appropriate for EPA to use legal tools like PPAs and model comfort letters to clarify potential issues of liability. By following these steps, EPA believes that realistic land-use scenarios may be accommodated in cleanup and redevelopment of sites, where possible.

FOR FURTHER INFORMATION

- C Presumptive Remedy for CERCLA Municipal Landfill Sites. September 1993. 14 pp. (EPA) U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 540/F-93/035, OSWER-9355.0-49FS, PB93-963339. Washington, DC. Quick Reference Fact Sheet.
- C Presumptive Remedies: CERCLA Landfill Caps RI/FS Data Collection Guide. 1995. 8 pp. (EPA) U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 540/F-95/009, OSWER-9355.3-18FS, PB95-963412.
- C Presumptive Remedies and NCP Compliance. June 14, 1995. 12 pp. (EPA) U.S. Environmental Protection Agency, CERCLA Administrative Records Workgroup ORC Region IV, Solid Waste and Emergency Response Division. Washington, DC.
- C Rules of Thumb for Superfund Remedy Selection. 1997. 23 pp. (EPA) U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 540/R-97/013, OSWER 9355.0-69, PB97-963301. Washington, DC.
- C Land Use in the CERCLA Remedy Selection Process. 1995. 13 pp. (EPA) U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA 540/R-95/052, OSWER 9355.7-04, PB95-963234/HDM. Directive. Washington, DC.
- C Procedures for Partial Deletions at NPL Sites. 1996. 9 pp. (EPA) U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA 540/R-96/014, OERR Directive 9320.2-11, PB96-963222. Washington, DC.
- C Guidance on Settlements with Prospective Purchasers of Contaminated Property. 1995. 24 pp. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. PB96-105044. Washington, DC.
- C Policy on the Issuance of Comfort/Status Letters. PB97-123921. November, 1997.
- C Handbook of Tools for Managing Federal Superfund Liability Risks at Brownfields and Other Sites, November 1998, EPA330-B-98-001, Office of Enforcement and Compliance Assurance.