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# Landfill Presumptive Remedy Saves Time and Cost

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Since Superfund's inception in 1980, the removal and remedial programs have found that certain categories of sites have similar characteristics, such as types of contaminants present, past industrial use, or environmental media affected. Based on a wealth of information acquired from evaluating and cleaning up these sites, Superfund undertook the presumptive remedy initiative to develop remedies that are appropriate for specific site types and/or contaminants. One site category for which EPA developed a presumptive remedy is municipal landfills. This bulletin summarizes the results of implementing the containment presumptive remedy at three CERCLA municipal landfill sites. At each of the sites, both time and costs were saved in conducting the RI/FS. When compared to similar "control" sites, EPA estimates time savings ranging from 36 to 56 percent, and cost savings up to 60 percent. In addition to demonstrating significant time and cost savings, the pilots also indicate that municipal landfill sites are good candidate sites for implementing the presumptive remedy as an early action, such as a non-time-critical removal. The combination of this presumptive remedy with an early action resulted in significant savings at one pilot site.

## Introduction

EPA expects that the use of presumptive remedies will streamline removal actions, site studies, and cleanup actions while improving consistency, reducing costs, and increasing the speed with which hazardous waste sites are remediated. EPA has developed several presumptive remedies to date; a list of presumptive remedy directives is provided at the end of this document. The results of implementing the *containment presumptive remedy* at three CERCLA municipal landfill sites are discussed in this bulletin.

## The Containment Presumptive Remedy

EPA established containment as the presumptive remedy for municipal landfills in September 1993. The containment presumptive remedy includes the following components, as appropriate on a site-specific basis:

- Landfill cap;
- Source area ground-water control to contain plume;
- Leachate collection and treatment;
- Landfill gas collection and treatment;
- Institutional controls to supplement engineering controls.

The presumptive remedy does not address exposure pathways outside the source area (landfill), nor does it include long-term ground-water response actions.

## The Pilot Sites

Prior to establishing the presumptive remedy, EPA initiated a pilot project at three sites to assess the effectiveness of the containment remedy in streamlining the remedial investigation/feasibility study (RI/FS) process for municipal landfills. The pilots implemented the streamlining principles outlined in the document, "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites," February 1991, Directive No. EPA/540/P-91001 (hereafter referred to as the "1991 MLF RI/FS guidance"). This 1991 MLF RI/FS guidance provides the implementation framework of the containment presumptive remedy.

EPA found the containment remedy to be a very effective tool for streamlining the RI/FS at municipal landfills. This bulletin describes the pilot sites, the ways in which each RI/FS was streamlined, and the time and cost savings realized at each of the sites. See Attachment A at the end of this bulletin for brief site summaries.

## Who Can Use The Presumptive Remedy?

If you are the manager of a municipal landfill site, it is likely that **the presumptive remedy can help you save time and money on the RI/FS at your site.** Although the presumptive remedy is most beneficial when incorporated at the scoping stage of the RI/FS, if your site has progressed beyond that point, you may still be able to streamline your site characterization sampling strategy, baseline risk assessment, and/or feasibility study.

EPA piloted the containment remedy at the following municipal landfills beginning in the Spring of 1992:

- Albion-Sheridan Township Landfill, Michigan
- Lexington County Landfill, South Carolina
- BFI/Rockingham Landfill, Vermont

These sites were selected as pilots because they were in the scoping phase of the RI/FS at the time. The biggest savings in time and cost can be realized if streamlining is incorporated at the very beginning of the scoping phase of the RI/FS. All of these sites now have signed Records of Decision (RODs), with containment selected as part of the remedy at each of the sites.

EPA evaluated the impact of the containment remedy as a streamlining tool at the three pilot sites by estimating time and cost savings. The sites were evaluated in a paired analysis, comparing the pilot sites to the three “control” sites listed in Highlight 1. Remedy selection at the control sites was based on the results of conventional RI/FSs.

The factors considered in selecting the “control” sites included (listed in order of priority): (1) the state in which the landfill is located since State closure requirements often affect aspects of remedy selection; (2) the lead for the site (e.g., Fund-lead); and (3) the size of the landfill (in acres). Summary information on the pilot and control sites is provided in Highlight 1.

### Highlight 1 Pilot/Control Site Characteristics

PILOT SITES				CORRESPONDING CONTROL SITES			
Name	State	Lead	Size	Name	State	Lead	Size
Albion-Sheridan	MI	F	30	West KL	MI	F	87
BFI	VT	PRP	19	Parker	VT	PRP	19
Lexington Co.	SC	PRP	70	Cedar-town LF	GA	PRP	6.8

## Pilot Results

Two areas of the RI/FS process presented the greatest opportunity for streamlining at the pilot sites: 1) a phased approach to site characterization, and 2) streamlining the risk assessment.

## Phased Approach to Site Characterization

The containment presumptive remedy emphasizes the use of existing data to the degree possible, and discourages characterization of landfill contents since it is presumed that the landfill will be contained, unless information is available indicating the need to investigate and potentially remove or treat hot spots. In keeping with these principles, a **phased approach** to sampling is recommended.

The phased approach to site characterization is a site-specific strategy that frames the data collection effort within the context of determining whether a risk is present at a site rather than characterizing the nature and extent of all contamination in a landfill.<sup>1</sup> A site-specific determination is made as to the environmental medium most likely to present a risk based upon any existing data available, and sampling of that pathway is conducted first.

At many landfill sites, ground-water contamination is likely to present a significant risk, and thus trigger the need for action.<sup>2</sup> At the pilot sites, ground water was the first medium sampled, and at each of the pilot sites, ground-water contamination supported the need for a response action. In two cases, soil sampling of the landfill source area was never conducted; sampling was limited to determining risk from the ground water. At one site, the State conducted additional sampling of the landfill area.

If ground-water data had not clearly demonstrated a risk at the pilot sites, additional sampling would have been conducted (in sequence) to determine whether a risk was present from other media or exposure pathways, such as contaminated soil and/or landfill gas. At the pilot sites, additional sampling was not necessary to determine risk, and since containment of the landfill was presumed, sampling and analysis was not required for the purpose of site characterization.

## Streamlined Risk Assessment

For many landfill sites, it will be possible to streamline the risk assessment portion of the RI/FS. This is possible because the containment remedy addresses all migration pathways presented by the landfill source. The basis of the streamlined risk assessment process to be employed at MLFs is the conceptual site model (discussed in Section 2.5 of the 1991 RI/FS MLF guidance), which is used to identify all exposure pathways associated with the landfill source (i.e., direct contact with soil, exposure to contaminated ground water, contaminated

<sup>1</sup>This phased approach applies to the landfill source only. Contamination that has migrated away from the landfill source must be characterized, and the associated risk estimated.

<sup>2</sup>See OSWER Directive 9355.0-30, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," April 22, 1991, which states that if MCLs or non-zero MCLGs are exceeded, [a response] action generally is warranted.

leachate, and/or landfill gas). The exposure pathways are then compared to those addressed by the containment remedy, as follows:

- direct contact with soil and/or debris prevented by landfill cap;
- exposure to contaminated ground water prevented by ground-water control;
- exposure to contaminated leachate prevented by leachate collection and treatment; and
- exposure to landfill gas addressed by gas collection and treatment, as appropriate.

This comparison reveals that the containment remedy addresses all pathways associated with the landfill source. The phased approach can be implemented at landfill sites using the conceptual site model because it demonstrates that all exposure pathways are addressed by the containment remedy, and field sampling is therefore not required to characterize the nature and extent of contamination once it has been demonstrated that the site presents a risk and warrants action.

A streamlined risk evaluation was successfully conducted at the three pilot sites, with contaminated ground water presenting the justification for a response action. Sampling, analysis, and a conventional risk assessment were required to characterize contamination, if any, that had migrated away from the source areas.

### Quantitative Results

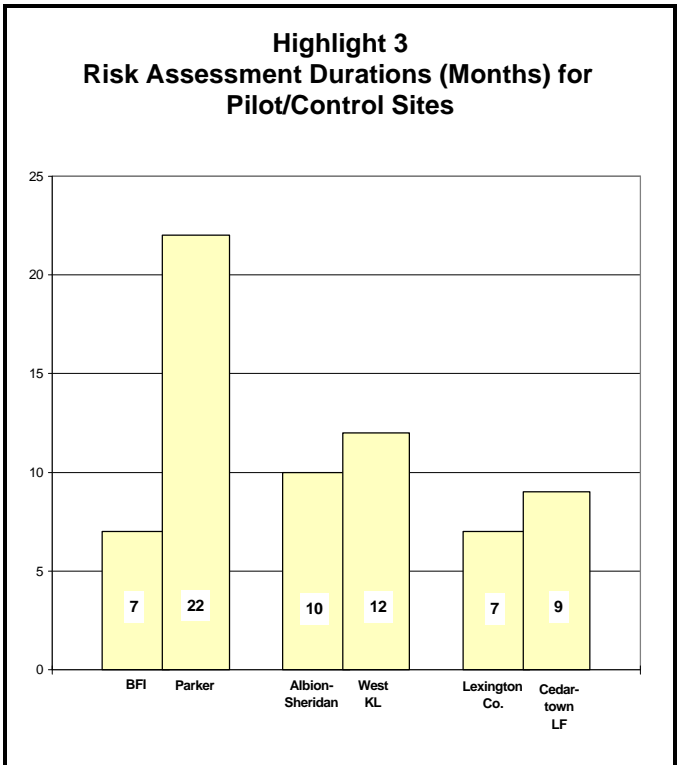
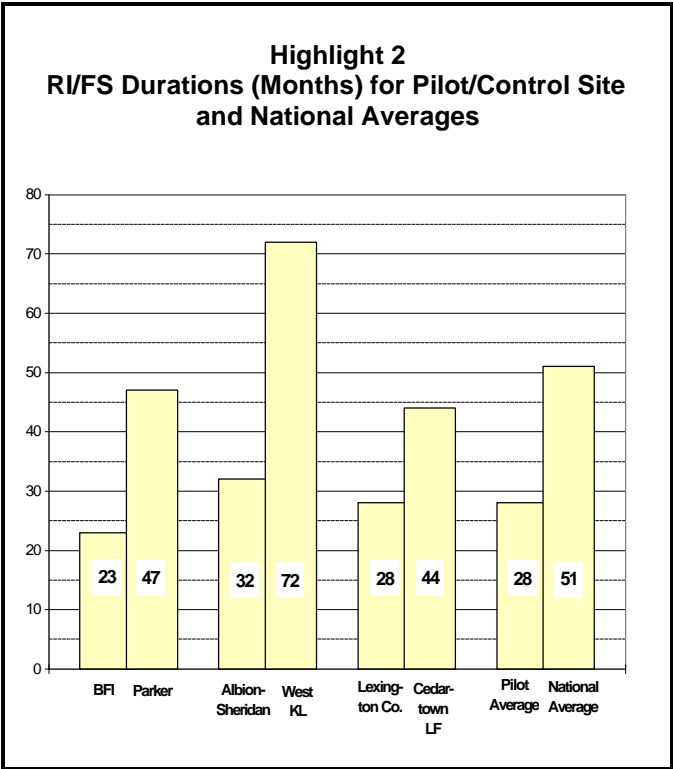
As illustrated in Highlight 2, the RI/FS durations for the pilot sites ranged from 23 to 32 months, compared to 44 to 72 months for the control sites. The average pilot RI/FS duration was 28 months, as compared to the national average of 51 months. The RI/FS durations for the pilot sites represent a time savings ranging from 16 to 40 months when compared to the control sites, and 23 months when compared to the national average. These results translate into an estimated time savings ranging from 36-56 percent when comparing the pilots to the control sites, and an estimated 45 percent when comparing the average pilot duration to the national average.

The figures for the BFI/Rockingham site include completion of an Engineering Evaluation/Cost Analysis (EE/CA) to support implementation of source control (i.e., cap, leachate and gas collection) as a non-time-critical removal action. The EE/CA was completed in 12 months, which is a subset of the 23 months indicated in Highlight 2. The 23 months was the time required to complete the RI/FS for the entire site, including ground-water contamination.

The pilot results for the BFI/Rockingham site are particularly noteworthy because the source control action was initiated just 12 months after the RI/FS start, and construction of the cap was completed in July 1995, just three years after the RI/FS start.

A savings in time was also realized as a result of the streamlined risk evaluations conducted at the pilot sites, as illustrated in Highlight 3. The time required to complete the risk assessments at the pilot sites ranged from 7 to 10 months, as compared to 9 to 22

months for the controls, which represents a savings ranging from 17 to 68 percent when compared to the control sites.



Cost savings were estimated in one of two ways for the pilot sites.

The RI/FS costs for Albion-Sheridan Landfill and Lexington County were compared to the national average RI/FS cost of \$1 million, resulting in an estimated 10 percent and 1 percent savings, respectively, for those sites. The cost savings estimate for the BFI/Rockingham site was developed by the PRP, and was based upon a comparison with their costs for RI/FSs conducted at other similar sites. A savings of 60 percent was estimated for the RI/FS, which included the source area and areas of migration, and an engineering evaluation/cost analysis (EE/CA) to support the non-time-critical removal action on the landfill cap.

## Conclusion

EPA found that the containment presumptive remedy resulted in a savings of time and costs at each of the pilot sites. The savings were the result of implementing a phased approach to site characterization and streamlining the risk assessment, both of which were possible because the landfill contents were contained.

The savings in time and costs were most significant at the BFI/Rockingham site, where the cap was completed three years after initiation of the RI/FS, and an estimated \$3 million was saved. This significant savings was the result of combining the containment presumptive remedy with an early action accomplished as a non-time-critical removal action. Based on these results, municipal landfill sites appear to be well suited to the combined application of these streamlining and acceleration tools.

## Next Steps

Since establishment of the presumptive remedy, EPA has tracked implementation at two additional landfill sites (demonstration sites): (1) Bennington Landfill, Vermont, and (2) Tomah Municipal Landfill, Wisconsin. EPA will summarize findings from the demonstration sites upon signature of their respective Records of Decision (RODs).

## Presumptive Remedy Directives

To date, EPA has issued the following presumptive remedy directives:

- (1) "Presumptive Remedies: Policy and Procedures," September 1993, Directive No. 9355.0-47FS;
- (2) "Conducting Remedial Investigations/Feasibilities Studies for CERCLA Municipal Landfill Sites," EPA/540/P-91/001, February 1991.
- (3) "Presumptive Remedy for CERCLA Municipal Landfill Sites," September 1993, Directive No. 9355.0-49FS;
- (4) "CERCLA Landfill Caps RI/FS Data Collection Guide," August 1995, Directive No. 9355.3-18FS;
- (5) "Site Characterization and Technology Selection for Volatile Organic Compounds in Soil/Sludge," September 1993, Directive No. 9355.4-048FS;
- (6) "Presumptive Remedies for Soils, Sediments, and Sludges at Wood Treater Sites," December 1995, Directive No. 9200.5-162.
- (7) "Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites," EPA/540/R-96/023, October 1996.

In addition, presumptive remedies directives for the following types of sites or contaminants are forthcoming:

- (1) PCBs
- (2) Manufactured gas plants
- (3) Grain storage sites
- (4) Metals in soils (in cooperation with the U.S. Department of Energy).

## Additional Information

For additional information on the pilot sites or the presumptive remedy for municipal landfills, please call Andrea McLaughlin, Office of Emergency and Remedial Response, 703-603-8793.

## Attachment A: Pilot Case Studies

### Albion-Sheridan Landfill

Anecdotal evidence indicated that some quantity of industrial wastes were disposed of at the 30-acre Albion-Sheridan Landfill, but the location, volume and identity of wastes were unknown. No data were available for the site at the beginning of the RI/FS. EPA implemented the streamlining principles of the 1991 MLF RI/FS guidance, and scoped a phased approach to characterization of the Albion-Sheridan site with the goal of implementing the containment remedy. The draft work plan was revised to incorporate the phased investigation, focusing first on ground-water contamination to establish whether there was a basis for a response action.

Ground-water contamination did support the need for action at the site, so it was not necessary to quantify additional exposure pathways for this purpose. The remainder of the risk assessment was streamlined by using a conceptual site model to demonstrate that the other potential pathways of concern (e.g. direct contact) would be addressed by the components of the presumptive remedy (e.g. landfill cap).

EPA conducted a geophysical survey of the site to identify potential drum storage areas. Based on the results of the geophysics, EPA concluded that while there were anomalies in the results, there were no areas that appeared to consist of large numbers of drummed waste, thereby warranting further investigation. Because the State had remaining concerns with EPA's approach to hot spots, the State conducted its own geophysical survey and dug test pits at 12 locations. At one location approximately 300-400 drums were uncovered, and EPA reiterated its agreement to send any drums of hazardous waste off-site for disposal. Of the 300-400 drums, the number containing hazardous waste is unknown at this time.

### Lexington County Landfill

Ground-water data were available for this 70-acre landfill prior to initiation of the RI, which indicated exceedences of MCLs, and therefore a basis for a response action. The strategy for the Lexington County Landfill RI was similar to the Albion-Sheridan Landfill, in that a phased approach was implemented. Sampling focused on further characterization of ground-water contamination, and the risk assessment was streamlined, focusing also on the ground-water pathway. Planned soil sampling and analysis to estimate direct contact threats was eliminated, and it was demonstrated (using a conceptual site model) that other potential pathways of concern would be addressed by components of the presumptive remedy.

A planned drum search of the 70-acre landfill was

eliminated based on the guidelines for hot spot characterization contained in the 1991 MLF RI/FS guidance. At Lexington County Landfill, as at Albion-Sheridan Landfill, it is likely that some industrial waste was disposed of at the site, but the location, quantity and identity of the wastes were unknown. Because there was no evidence to guide such a search, EPA decided that the best approach was to contain the landfill, accounting for uncertainties in the nature of the wastes during the design.

The selected remedy includes consolidation and capping of the waste areas, landfill gas collection and venting; extraction of contaminated groundwater/leachate with discharge to POTW; additional sampling of surface water and sediment to characterize any off-site contamination; and monitoring of ground water, surface water, sediment and landfill gas. Additionally, to address a plume, a ground-water pump and treat remedy was put in place.

### BFI/Rockingham

Extensive ground-water data were available for this site at the initiation of the RI, and the first step in implementation of the presumptive remedy was to evaluate the potential for using the data. The data were found to be useable to establish an initial basis for action, which allowed streamlining of the risk assessment and RI. Only confirmational ground-water sampling was conducted during the RI; characterization of the landfill surface soil and debris mass did not occur. Geotechnical information regarding settlement, cover quality, and stability was also collected. The knowledge that containment was the likely remedy allowed the RI to become primarily a design-related investigation. In addition, based on historical information, hot spots were not of concern at this site.

Levels of volatile organic compounds (VOCs) and certain metals clearly indicated that a ground-water risk was present. The existence of ground-water risk confirmed that a "No Action" decision was unlikely, and that a landfill cap would be a component of the source control action. The risk assessment was streamlined by quantifying the ground-water risk and qualitatively discussing the other pathways that would be addressed by the source control action. All pathways outside the landfill, which included off-site ground water and off-site soils, were fully quantified. An early action was conducted as a non-time-critical removal at this site in order to begin construction of the landfill cap. The combination of the presumptive remedy with the early action resulted in a significant time savings in the remedy selection and construction processes.



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