
FACT SHEET #3

FINAL REMEDY SELECTION FOR RESULTS-BASED RCRA CORRECTIVE ACTION



Congress, the general public, EPA, and State agencies believe the rate and pace of RCRA cleanups should be increased. Tim Fields, Assistant Administrator of the Office of Solid Waste and Emergency Response, recently indicated that Corrective Action was the RCRA program's highest priority. One of the efforts designed to improve Corrective Action progress is a new workshop titled "RCRA Corrective Action Workshop on Results-Based Project Management". This fact sheet, the third in the series supporting the Workshop, is intended to improve the pace of remedy evaluation and selection by clarifying EPA's guidance and highlighting areas of administrative flexibility. Notes and references are provided at the end of the fact sheet.

How can this fact sheet ⁽¹⁾ help you?

If you are involved with RCRA Corrective Action as an EPA or State regulator, member of the public, or representative of a facility, this fact sheet can help you understand:

- the difference between an "interim" and "final" remedy;
- the three performance standards that EPA believes all final remedies should achieve;
- how to identify the "best" remedy when one or more alternatives appear to be capable of achieving the three performance standards;
- EPA's expectations for how thorough the evaluation of remedial alternatives needs to be; and,
- the roles and responsibilities in evaluating and selecting a final remedy.

What are the primary differences between a final and interim remedy?

Interim Remedies

- ▶ Interim measures should control, minimize or eliminate threats to human health and the environment (HH&E) in the short term until the owner operator has implemented a final remedy.
- ▶ Interim measures can often be implemented quickly.
- ▶ Meeting all requirements for the interim measure does not mean a facility has completed all of their corrective action obligations.
- ▶ Interim measures should also, to the extent practicable, be consistent with anticipated final remedies.

Final Remedies

- ▶ Final remedies should provide long-term protection of HH&E by achieving three performance standards (described on next page).
- ▶ Final remedies typically go through a more rigorous evaluation than interim remedies.
- ▶ Completing a final remedy, including long-term monitoring as appropriate, means that the facility is done with corrective action for the part of the facility addressed by the final remedy.

Stakeholders should keep in mind that, currently, the two most important short-term goals of the RCRA Corrective Action program are to achieve two “environmental indicators.” These two indicators focus on ensuring that humans are not exposed to unacceptable levels of contamination, and that contaminated groundwater does not continue to migrate above levels of concern beyond its current furthest three-dimensional extent. As warranted, facilities should implement interim measures where necessary to achieve these indicators as soon as possible. For more information on environmental indicators, refer to <http://www.epa.gov/epaoswer/osw/cleanup.htm#indicators>.

What should final RCRA Corrective Action remedies accomplish?

EPA believes that final remedies selected for RCRA Corrective Action facilities should achieve the following **three performance standards**:

1. **Protect human health and the environment** based on reasonably anticipated land use(s), both now and in the future.

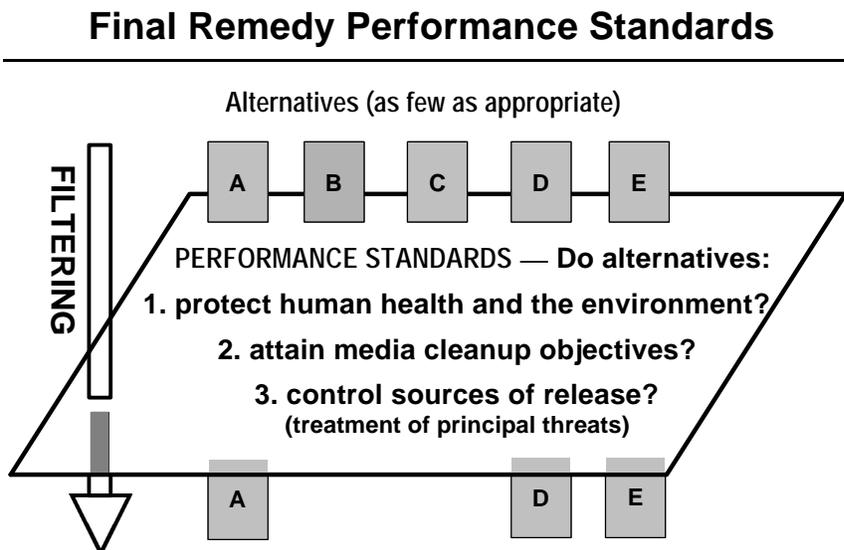
Protecting human health and the environment is the general mandate from the RCRA statute; therefore, it is appropriate to include this goal as the first performance standard for final RCRA Corrective Action remedies. This standard also serves to ensure remedies include protective activities (e.g., providing an alternative drinking water supply) that would not necessarily be needed to achieve the other two standards.

2. **Achieve media cleanup objectives** appropriate to the assumptions regarding current and reasonably anticipated land use(s) and current and potential beneficial uses of water resources. The cleanup objectives should address **media cleanup levels** (chemical concentrations), **points of compliance** (where cleanup levels should be achieved), and **remediation time frames** (time to implement the remedy and achieve cleanup levels at the point of compliance).

Note that for human health, EPA’s goal remains to reduce the threat from carcinogenic contaminants such that, for any medium, the excess risk of cancer to an individual exposed over a lifetime generally falls within a range from one in ten thousand to one in one million (i.e., 1×10^{-4} to 1×10^{-6}). Note also that EPA prefers cleanup levels at the more protective end of this risk range; however, cleanup levels determined on a site-specific basis that represent anywhere within the range could be acceptable. For toxicants associated with adverse effects other than cancer, groundwater cleanup levels should be established at concentrations to which human populations, including sensitive subgroups, could be exposed on a daily basis without appreciable risk of negative effect during a lifetime. Such levels are generally interpreted as equal to or below a Hazard Index of one.

3. **Remediate the sources of releases** so as to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment, and using treatment to address principal threat wastes², unless alternative approaches are approved by the overseeing regulator. In this context, “sources” includes both the location of the original release as well as locations where significant mass of contaminants may have migrated. Note that while EPA expects facilities to use treatment technologies to address principal threats, we also expect that containment technologies as well as institutional controls can be used to address wastes that pose relatively low long-term threats.

You could think of the final remedy performance standards as a threshold that needs to be crossed or a filter or screen (Figure 1) that needs to be passed through prior to considering an option further. For example, remedial alternatives B and C, as shown in the adjacent graphic, do not need to be considered further because it was obvious to decision-makers that they were not capable of achieving the three final remedy performance standards.



What other tools should I use to determine the best remedy for a particular situation?

When one or more alternatives appear to be capable of achieving the three final remedy performance standards (e.g., Alternatives A, D and E in the above graphic), EPA recommends that decision-makers use the seven attributes (called **Balancing/Evaluation Criteria**) listed below to help identify the “best” option.

1. **Long-Term Effectiveness:** Decision-makers should evaluate remedies based on the long-term reliability and effectiveness they afford, along with the degree of certainty that they will remain protective of human health and the environment. Additional considerations include: the magnitude of risks that will remain at a site from untreated hazardous wastes, and hazardous wastes and hazardous constituents, and treatment residuals; and the reliability of any containment systems and institutional controls. A remedial option should include a description of the approaches facilities will be used to assess long-term performance and effectiveness.
2. **Toxicity, Mobility, and Volume Reduction:** Decision-makers should evaluate remedies based on the degree to which they employ treatment, including treatment of principal threats, that reduces the toxicity, mobility or volume of hazardous wastes and hazardous constituents, considering, as appropriate: the treatment processes to be used and the amount of hazardous waste and hazardous constituents that will be treated; the degree to which treatment is irreversible; and the types of treatment residuals that will be produced.
3. **Short-term Effectiveness:** Decision-makers should evaluate remedies based on the short-term effectiveness and short-term risks that remedies pose, along with the amount of time it will take for remedy design, construction, and implementation.
4. **Implementability:** Decision-makers should evaluate remedies based on the ease or difficulty of remedy implementation, considering as appropriate: the technical feasibility of constructing, operating, and monitoring the remedy; the administrative feasibility of coordinating with and obtaining necessary approvals and permits from other agencies; and the availability of services and materials, including capacity and location of needed treatment, storage, and disposal services.

5. **Cost:** Decision-makers should evaluate remedies based on capital and operation and maintenance costs, and the net present value of the capital and operation and maintenance costs.
6. **Community Acceptance:** Decision-makers should evaluate remedies based on the degree to which they are acceptable to the interested community.
7. **State Acceptance:** Decision-makers should evaluate remedies should be evaluated based on the degree to which they are acceptable to the State in which the subject facility is located. This is particularly important where EPA, not the State, selects the remedy.

Figures 2 and 3 provide two graphical ways to illustrate and communicate how the decision maker may use the balancing/evaluation criteria to identify the “best” alternative. Figure 2 could be used when more than one alternative is capable of achieving the performance standards, i.e., the alternative that ranks highest under the greatest number of criteria will stand out as a superior solution relative to the others. Figure 3 could be used when you are evaluating just one alternative that was shown to meet the performance standards, i.e., a remedy could be selected based on whether it was found to be “acceptable” under each of the evaluation criteria.

**Figure 2:
Tool for Comparative Analysis of Multiple Alternatives**

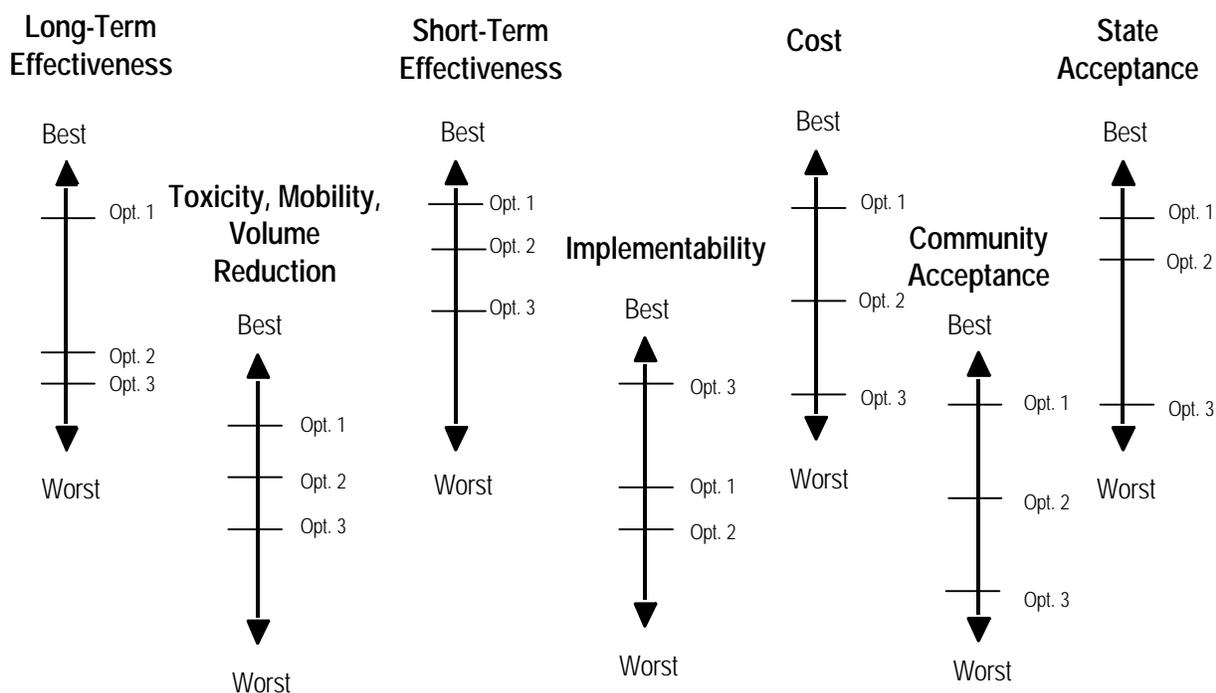
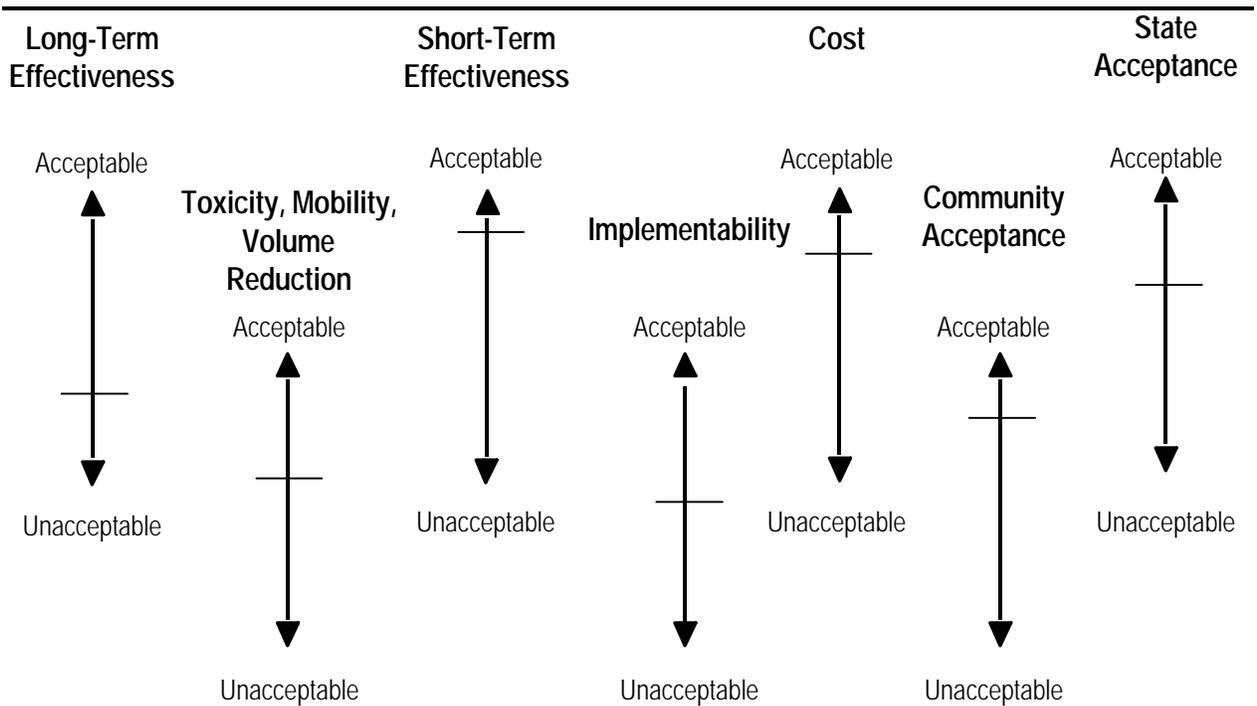


Figure 3
Approach for Analyzing Single Alternative



A

nother tool that may help decision-makers identify acceptable remedies is the list of EPA expectations for final remedies at RCRA Corrective Action sites (see March 1999 Corrective Action Workshop Fact Sheet #2 at [www._____](http://www.epa.gov/ra/caworkshop/factsheet2.html)). Although remedial expectations are not binding requirements, they can be very helpful during remedy selection because they reflect EPA's collective experience in using the remedy performance standards and evaluation/balancing criteria. They also outline the expectations the lead Agency reviewer will likely apply to a proposed remedial alternative. Remedies that are designed to fulfill these expectations typically will achieve the three final remedy performance standards and perform well with regard to the balancing/evaluation criteria. One of those expectations pertaining to contaminated groundwater is provided below.

**Expectation for Final Remedy Addressing Contaminated Groundwater
at RCRA Corrective Action Facilities**

EPA expects to return usable groundwaters to their maximum beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site. When restoration of the groundwater is not practicable, EPA expects to prevent or minimize further migration of the plume, prevent exposure to the contaminated groundwater and evaluate further risk reduction. EPA also expects to control or eliminate surface and subsurface sources of groundwater contamination.

How thorough of an assessment should you conduct when evaluating one or more remedial options?

There are **several general rules of thumb** that may help you answer this question. **First**, EPA believes that decision-makers should tailor the evaluation of remedial alternatives based on site-specific circumstances. For example, excavation of a relatively small amount of contaminated media followed by off-site treatment and disposal at a permitted facility would not typically warrant a detailed evaluation. **Second**, EPA expects owner/operators to evaluate only appropriate, implementable approaches, consistent with expected future land uses. For example, we would not typically expect an evaluation of an option involving excavation, incineration and off-site disposal of an entire 100-acre landfill. **Third**, decision-makers should only evaluate the number of alternatives necessary to demonstrate the preferred remedy is capable of achieving the three final remedy performance standards and that it was acceptable with respect to the balancing/evaluation criteria. EPA believes that there will be a significant number of facilities where evaluation of multiple alternatives is not necessary because a single approach is found to be acceptable. For example, at a facility where the owner/operator proposes to excavate all the contaminated soil for off-site recycling, treatment or disposal, it may not be necessary to evaluate other alternatives. Similarly, where there are straightforward remedial solutions (e.g., where standard engineering solutions have proven effective in similar situations) or where presumptive remedies (www.epa.gov/superfund/resources/presump) can be applied, it may not be necessary to evaluate more than one alternative. However, when only one alternative is proposed, the decision maker typically would make one of the following three decisions:

- (1) the alternative is acceptable and will be proposed as the preferred final remedy in the Statement of Basis (or equivalent);
- (2) the alternative could be acceptable with modifications; or
- (3) other alternatives should be presented to allow for a comparison and selection of the best option.

Do I have to develop a formal report (typically referred to as a Corrective Measures Study or CMS) to document the evaluation of remedial alternatives?

EPA believes that facilities should document their evaluation of remedial alternatives; however, the detail and format of that documentation could vary considerably depending on the site-specific situation. For example, a detailed letter could be sufficient to document a proposal involving small-scale excavation and off-site treatment/disposal. A complex site, however, involving a large-scale cleanup would likely warrant a more extensive explanation of a preferred approach along with a comparison to other plausible options. Regardless of the format, EPA believes that the documentation should include an explanation of how the remedy will (1) achieve the three final remedy performance standards, and (2) how well the remedy performs with regard to the balancing/evaluation criteria.

What are my responsibilities in evaluating and selecting final RCRA Corrective Action remedies?

Owner or Operator of a Facility

Your primary responsibility is to protect human health and the environment from contamination at your facility. EPA believes you should begin very early in Corrective Action to think about options to address environmental problems at your facility. For example, you should consider remedial options prior to and during site investigations to help focus resources on data needed to justify a recommended remedy. You should identify (and submit to the overseeing regulator) one or more remedial options that you believe are capable of achieving the final remedy performance standards, and recommend the best remedy (in your opinion) based on the balancing/evaluation criteria. You should implement the remedy selected by the overseeing agency and monitor performance to ensure that it is functioning as intended. And, very importantly, you should keep interested members of the public well informed of all Corrective Action activities taking place at your facility. EPA strongly believes that the public will more likely accept a facility's remedy recommendation if they have been involved early and throughout Corrective Action.

Lead Overseeing Regulator

Your primary responsibility is to serve the public by selecting a final remedy that you believe is capable of meeting the three final remedy performance standards. This responsibility starts with you encouraging the facility owner/operator to fulfill their responsibilities (discussed previously). You should keep in mind that there are a variety of ways to provide that encouragement. For example, requirements to investigate facilities and evaluate remedies are typically included in permits or enforcement orders. However, another option that has been successful at many facilities is simply "asking" the facility owner/operator to conduct and document certain Corrective Action related activities. Of course, you or the facility owner/operator should document, in writing, oral agreements to make sure decision-makers have the same understanding of work to be accomplished, major milestones, public involvement, and level of regulatory oversight. This strategy of informally asking the facility to perform work is most applicable to data collection and evaluations conducted prior to final remedy selection and implementation. Furthermore, such informal agreements typically would work only where there is a willing and motivated facility owner/operator with a good compliance record. For example, there may be many facilities that would like to complete Corrective Action for all or part of the facility to allow redevelopment; such facilities may be anxious to perform work and would rather not wait for an enforcement order or permit to initiate site investigations and evaluations of remedial alternatives. EPA believes the final remedy itself should be captured more formally in a permit or order. Certainly, many situations warrant a more enforceable agreement, but less formal agreements, where possible, have significantly reduced administrative burdens and time. Lastly, when you are relying on less formal approaches, you should make it clear to the facility owner/operator that you reserve the right to use more formal and enforceable approaches if necessary.

Other responsibilities associated with a final RCRA Corrective Action remedy include: conducting a review (as needed) of the facility's evaluation of remedial alternatives; determining whether the facility's remedy recommendation is acceptable with regard to the performance standards and remedy balancing/evaluation criteria; writing a "**statement of basis**" or equivalent that seeks public input on the rationale for a proposed final remedy; communicating to the public about the final decision in a "**final decision/response to comments document**" or equivalent; and, ensuring that the facility owner/operator is implementing the final remedy and documents that it is working as

intended. Some examples of key elements to include in the statement of basis and response to comments document are provided below and are presented in more detail in (Directive 9902.6, April 29, 1991).

EPA encourages regulators to recognize that they have a range of options for reviewing a facility's evaluation of remedial alternatives. For example, some regulators do not require the submission or regulatory approval of a Corrective Measures Study or equivalent; rather, they focus on defining clear cleanup objectives and methods to monitor performance, and give significant latitude to the facility owner/operator to identify a remedy that the facility believes can achieve the performance standards. Yet in other situations, regulators have been very active participants providing a detailed review of a formal evaluation of remedial alternatives submitted by the facility.

Recommended Elements for the Statement of Basis

Introduction

- ✓ facility name and location
- ✓ purpose of document
- ✓ importance of public input

Proposed Remedy

- ✓ describe proposed remedy

Facility Background

- ✓ site history
- ✓ summary of investigations
- ✓ summary of interim action

Environmental Problem

- ✓ describe contaminated media
- ✓ facility risks
- ✓ describe significant uncertainties

Summary of Alternative(s) and Proposed Remedy

- ✓ performance standards
- ✓ balancing/evaluation criteria

Public Participation

- ✓ history of public input
- ✓ upcoming public meetings
- ✓ location of file record

Recommended Elements for Final Decision/Response to Comments

Introduction

- ✓ facility name
- ✓ purpose of document

Selected Remedy

- ✓ describe selected remedy with respect to performance standards and balancing/evaluation criteria.
- ✓ describe remaining significant uncertainties and how they will be managed
- ✓ describe performance monitoring

Public Participation

- ✓ describe public participation activities

Public Comments and Agency Responses

- ✓ describe comments received from the public, other regulatory agencies, local officials, and the owner/operator of the facility
- ✓ provide Agency's responses to each of the comments received, including changes to the remedy based on the comments

Future Actions

- ✓ describe approximate schedule for significant activities

Provide declaration signed by a designated Agency official

Interested Member of the Public

Your role as an interested member of the public is vitally important in regard to final remedies at RCRA Corrective Action facilities for two primary reasons. First, it is you and the environment that you live in that the remedy should protect. Second, as described above, “community acceptance” is one of the balancing/evaluation criteria that is used to identify the best final remedy for a particular situation. Therefore, you should become involved! One of the best ways to become involved is to contact the facility owner/operator and the overseeing regulator and ask them to sponsor regular meetings with representatives from the community. EPA has found that the relationships fostered in such meetings often leads to remedies that are acceptable to the parties involved; this is especially true when the meetings are held early and often during the earliest stages of investigations and throughout the cleanup of the facility.

Where do I get more information?

For more information about the RCRA Corrective Action program and the Results-Based Site Management Workshop, visit the Corrective Action Internet home page at <http://www.epa.gov/epaoswer/hazwaste/ca/#wkshp>.

End Notes:

1. This document provides guidance to EPA and States on how best to implement RCRA Corrective Action. It also provides guidance to the public and the regulated community on how EPA intends to exercise its discretion in implementing its regulations. The document does not, however, substitute for EPA’s regulations, nor is it regulation itself. Thus, it cannot impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA may change this guidance in the future as appropriate.
2. EPA expects to use treatment to address the principal threats posed by a site whenever practicable and cost-effective. Contamination that represents principal threats for which treatment is most likely to be appropriate includes contamination that is highly toxic, highly mobile, or cannot be reliably contained, and that would present a significant risk to human health and the environment should exposure occur.

