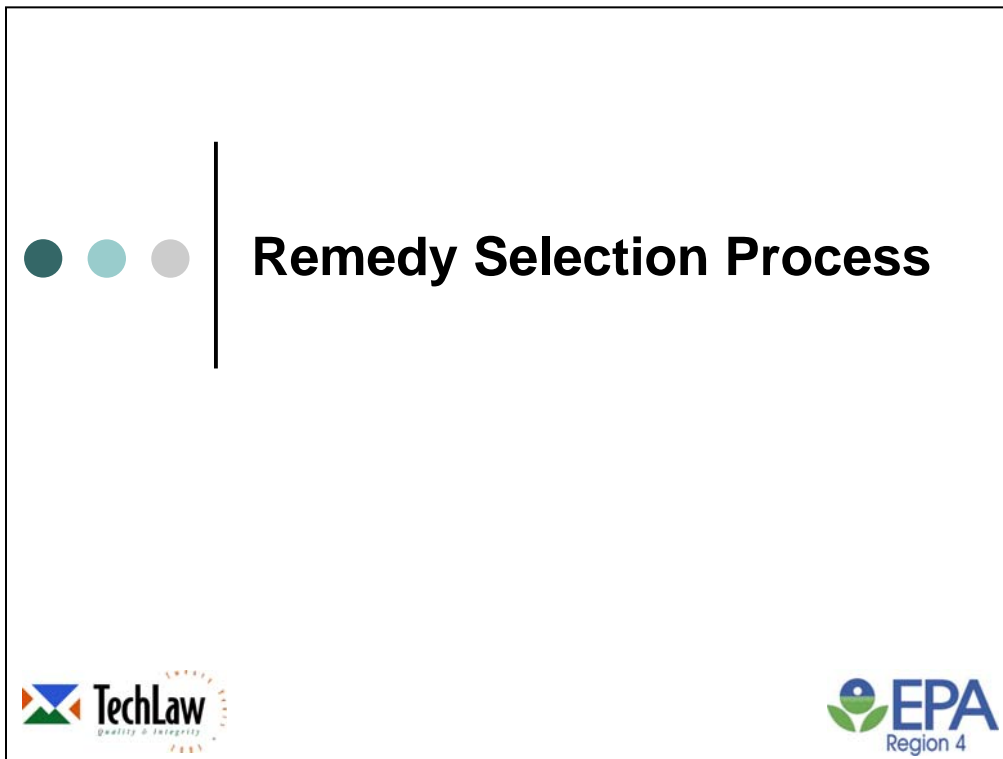


US EPA ARCHIVE DOCUMENT



The slide features a title 'Remedy Selection Process' in bold black text. To the left of the title is a vertical line with three colored circles (dark teal, light teal, grey) above it. In the bottom left corner is the TechLaw logo, which includes a stylized 'X' and the text 'TechLaw Quality & Integrity'. In the bottom right corner is the EPA Region 4 logo, featuring a green leaf and the text 'EPA Region 4'.

Title slide

● ● ● Interim Remedies

- Interim measures control, minimize or eliminate threats to human health and the environment in the short term until a final remedy is implemented
- Interim measures are often implemented quickly
- Interim measures do not relieve owners/operators of their corrective action requirements
- Interim measures should be consistent (to the extent practicable) with anticipated final remedies



Interim remedies are short term measures designed to control, minimize or eliminate threats to human health and the environment until the final remedy is implemented. They should be consistent with final remedies.



Final Remedies

- Final remedies provide long-term protection of human health and the environment by achieving three performance standards
- Final remedies are subjected to a more rigorous evaluation than interim remedies
- Completing a final remedy (including long-term monitoring, if necessary) means the facility is finished with corrective action (for the part of the facility addressed by the final remedy)



Final remedies provide long-term protection of human health and the environment by achieving the three performance standards.



Final Remedy Performance Standards

- Protect human health and the environment
- Achieve media cleanup objectives
- Remediate the sources of releases



Final remedies for RCRA Corrective Action facilities should be protective of human health and the environment, and maintain protection over time. In accomplishing this, all final remedies should achieve three performance standards:

- (1) Protect human health and the environment** - protecting human health and the environment is the general mandate from the RCRA statute. This standard ensures that remedies include protective activities.
- (2) Achieve media cleanup objectives** – cleanup objectives should be set for the anticipated land use(s), and current and potential beneficial uses of water resources. Cleanup objectives should address: (1) media cleanup levels (chemical concentrations), (2) points of compliance (where media cleanup levels should be achieved), and (3) remediation time frames (time to implement the remedy and achieve cleanup levels at the point of compliance).
- (3) Remediate the sources of releases** – contaminant sources should be remediated so as to eliminate or reduce further releases of hazardous wastes or constituents. EPA expects facilities to use treatment technologies to address principal threat wastes. Containment technologies along with institutional controls can be used to address wastes that pose relatively low long-term threats.

All remedial alternatives must satisfy these performance standards to be considered viable remedial options.



Balancing/Evaluation Criteria

- Long-term effectiveness
- Toxicity, mobility and volume reduction
- Short-term effectiveness
- Implementability
- Cost
- Community acceptance
- State acceptance



When several different remedial alternatives have been identified that satisfy the Final Remedy Performance Standards, they can be further evaluated using seven different balancing/evaluation criteria. These criteria aid in selecting the “best” option.

Selected final remedies should achieve the performance standards and perform well with regard to the balancing/evaluation criteria.



Expectations for Final Remedies

- Treat principal threat wastes
- Return ground water to maximum beneficial use
- Use engineering controls for wastes that can be contained or pose low long-term threats
- Use combinations of methods to achieve protection of human health and the environment



Another tool for evaluating appropriate remedies are the expectations for final remedies. These remedies are not binding requirements; instead, they reflect EPA's collective experience in using the remedy performance standards and evaluation/balancing criteria.

- (1) Principal threat wastes are those that are highly toxic, highly mobile, or cannot be reliably contained, and would present a significant risk to human health and the environment should exposure occur. EPA expects to use treatment for these wastes whenever practical and cost-effective.
- (2) All usable groundwater should be returned to its maximum beneficial use. If restoration of groundwater is not practicable, EPA expects to prevent or minimize further migration of the plume, and/or prevent exposure to contaminated groundwater. Sources of groundwater contamination should also be controlled or eliminated.
- (3) Engineering controls (e.g., containment) should be used for wastes which can be contained, pose relatively low long-term threats, or for which treatment is impracticable.
- (4) Combinations of methods (e.g., treatment, engineering and institutional controls) should be used, as appropriate, to achieve protection of human health and the environment.



Expectations for Final Remedies (continued)

- Use institutional controls along with engineering controls for short and long-term management of wastes
- Use innovative technologies when such technology offers comparable or superior performance, less adverse impacts, or lower costs
- Remediate contaminated soils to prevent or limit direct exposure of human and environmental receptors, and prevent transfer to other media



- (5) Institutional controls (e.g., water and land-use restrictions) should be used to supplement engineering controls for short and long-term management to prevent or limit exposure to hazardous wastes and/or constituents.
- (6) Innovative technologies should be considered when they offer the potential for comparable or superior treatment performance or implementability, less adverse impact, or lower cost for acceptable levels of performance when compared to more conventional technologies.
- (7) Contaminated soils should be remediated to prevent or limit direct exposure of human and environmental receptors, and prevent the transfer of contaminants from soils to other media.



CMS vs. Presumptive Remedies

- Evaluation of remedial alternatives should be documented
- Presumptive remedies can be used for RCRA sites where applicable
- Presumptive remedies are preferred technologies for common categories of sites. They streamline site investigations and speed up selection of cleanup actions



Facilities should document their evaluation of remedial alternatives. The detail and format of the document that describes the remedy selection process could vary considerably depending on the site-specific conditions at the facility. Small-scale remedies may be adequately described in a detailed letter, while large-scale remedies will typically require a Corrective Measures Study (CMS). In addition, most HSWA permits contain a condition requiring a CMS to be completed within a specified time period following notification by the Agency for the necessity of the CMS. Whatever documentation is used, it should include an explanation of how the remedy will: (1) achieve the Final Remedy Performance Standards, and (2) how well the remedy performs with regard to the balancing/evaluation criteria.

Presumptive remedies were originally developed for CERCLA sites, however, they can be used at RCRA Corrective Action facilities to focus investigations and simplify the evaluation of remedial alternatives and the remedy selection process.

Presumptive remedies are preferred technologies for common categories of sites (see next slide).

● ● ● Presumptive Remedies

- Five types of presumptive remedies
 - Municipal landfills (containment)
 - VOCs in soil (treatment)
 - Wood treater sites (containment and treatment)
 - Contaminated ground water (response strategy)
 - Metals in soil (principal threat: reclamation/recovery, immobilization) (low-level threat: containment)



Presumptive remedies were established for common categories of sites, not for specific remedial alternatives. There are five types of presumptive remedies: (1) containment for municipal landfills, (2) treatment for VOCs in soils, (3) containment and treatment for wood treater sites, (4) reclamation/recovery/immobilization for principal threat wastes, and containment for low-level threat wastes for metals in soil, and (5) a response strategy for contaminated groundwater.



Innovative Technologies

- Should be used when the technology offers the potential for comparable or superior treatment performance or implementability, fewer adverse impacts, or lower costs for acceptable levels of performance when compared to conventional technologies



The EPA “Results-based” approach to RCRA Corrective Action allows for the use of innovative technologies to incorporate many different solutions and approaches to site management. Descriptions of innovative technologies are available at the Clu-In website.

Responsibilities of the Regulator in Selecting Final Remedies

- Strive to engage the facility in corrective action activities that do not require permits or orders (e.g., data collection and evaluation activities)
- Select a remedy which meets the three final performance standards. The final remedy should be captured formally in a permit or order.



Depending upon the relationship between the regulator and the facility, investigative or remedial activities can many times be accomplished voluntarily, avoiding the necessity for permits or enforcement orders. However, any oral agreements should be documented in writing to ensure that all stakeholders have the same understanding of work to be accomplished, major milestones, public involvement, and level of regulatory oversight.

Final remedies should conform with the three final remedy performance standards. Furthermore, all final remedies should be documented formally in a permit or order.

Responsibilities of the Regulator in Selecting Final Remedies (continued)

- Prepare the “Statement of Basis” and “Final Decision/Response to Comments” documents, and submit these documents along with the permit modification for the final remedy for public review and comment
- Monitor the activities of the facility to ensure the final remedy is properly implemented and is working as proposed



The regulator should prepare a Statement of Basis that seeks public input on the rationale for a proposed final remedy. Elements to be presented in the Statement of Basis include: Introduction; Proposed Remedy; Facility Background; Environmental Problem; Summary of Alternative(s) and Proposed Remedy; and Public Participation. In addition, the Final Decision/Response to Comments document should present the final remedy to the public and any concerns that were considered during the decision process. Elements to be presented in the Final Decision/Response to Comments document include: Introduction; Selected Remedy; Public Participation; Public Comments and Agency Responses; Future Actions; and a declaration signed by a designated Agency official.

After the remedy has been implemented, the regulator should monitor the progress of the remedy to ensure that it is functioning as proposed.



Impact of Remedy Selection on Corrective Action Completion

- “Corrective Action Complete Without Controls” Determination
- “Corrective Action Complete With Controls” Determination
- “Corrective Action Complete” Determinations may apply to part or all of the facility



- (1) The selection of the final remedy may impact how corrective action is completed at the facility. At facilities where the remedy has been implemented successfully and no further activity or controls are necessary to protect human health and the environment, the Agency can issue a “Corrective Action Complete Without Controls Determination.” Under this scenario, no controls are necessary to maintain protection of human health and the environment, and the facility will be eligible for release from financial assurance, as no funds should be needed in the future for corrective action-related activities.
- (2) At facilities where the remedy has been implemented successfully and the site-specific media cleanup objectives have been met, but operation and maintenance or monitoring actions, or compliance with institutional controls are necessary, the Agency can issue a “Corrective Action Complete With Controls Determination.” Under this scenario, protection of human health and the environment will be achieved provided the necessary operation and maintenance actions are performed, and any institutional controls are maintained and complied with. Permits and orders will continue to be used as enforceable mechanisms to assure compliance, and financial assurance should be maintained for potential future corrective action-related activities.
- (3) “Corrective Action Complete” determinations can be made for part of the facility or the entire facility.



Introduction to “Principles of Environmental Restoration”

- DOE/DOD/EPA Approach (and training course)

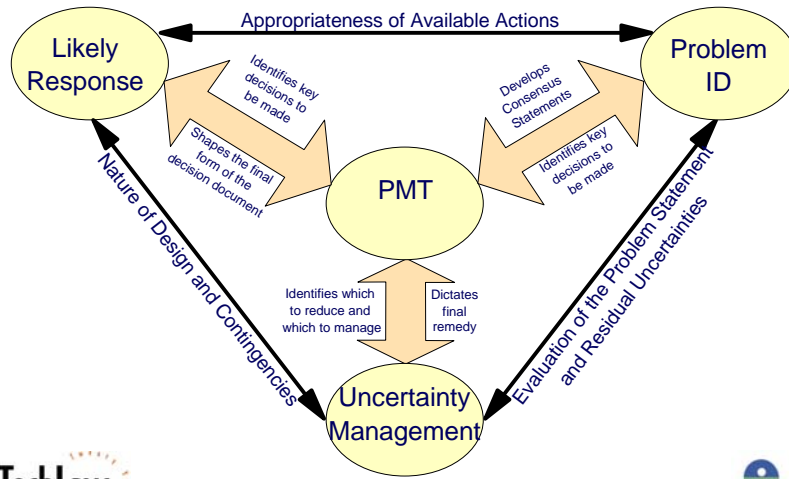
- Four Principles:
 - (1) Building an effective core team
 - (2) Problem identification and definition
 - (3) Early identification of likely response actions
 - (4) Managing Uncertainties



Principles of Environmental Restoration is a DOE/DOD/EPA approach (and training course) that emphasizes an integrated approach to environmental restoration. In particular, the approach identifies techniques for streamlining RCRA and CERCLA projects. The principles apply throughout the environmental restoration process - from scoping to implementation, with a focus on implementation. Furthermore, using these principles will better focus projects and lead to better recognition of streamlining opportunities by the project team.

The approach identifies four basic principles: (1) building an effective core team, (2) problem identification and definition, (3) early identification of likely response actions, and (4) managing uncertainties. The core team is the formal decision making body for environmental restoration projects, and defines the anticipated expectations of all deliverables. Problems are identified as a condition, posing real or potential unacceptable risk, or a condition that requires a response. Problems require a response, some action, either interim or final, taken to reduce or eliminate the potential for exposure. Principle 3 identifies response actions for problems. Early identification of likely response actions reduces risk, increases public confidence, and decreases costs by eliminating unnecessary activities. Principle 4 identifies the different types of uncertainty, and its impact on project decisions.

“Principles of Environmental Restoration” - Interactions Between the Four Principles



This slide shows the interaction between the four principles. Note that the core team (project management team – PMT) is at the center of the diagram. The success in implementing the other three principles is directly related to the effectiveness of the core team.

“Principles of Environmental Restoration” (continued)

- Focus on identifying likely response actions
- Prioritizing technologies
- Identifying response actions is an iterative process
- Response action design



The “Principles of Environmental Restoration” approach can make the remedy selection process easier and more efficient for regulators. In particular, the process advocates the early identification of likely response actions.

- (1) Once problems are identified/characterized, likely response actions should be identified. Regulators should develop a hierarchy of probable technologies, identify any fatal flaws with the technologies, and identify cost saving opportunities through innovations.
- (2) Technologies should be prioritized with regard to: presumptive remedies, characteristic uncertainties, cost-effectiveness, public acceptance, and uncertainties associated with the technologies.
- (3) Response actions should be identified iteratively (i.e., a continual refinement), throughout the scoping, characterization and assessment, remedy design, and remedy implementation processes.
- (4) Under many circumstances, response action design can be initiated early. This is particularly true if: a presumptive remedy exists, a phased approach is used, data needs can be met as easily during the design phase as during the characterization phase, uncertainties can be managed during the response, and/or the core team reaches consensus.

● ● ● Available Tools for Remedy Selection

- EPA Clu-In Website
<http://clu.in.org>
- RCRA Corrective Action Workshop on Results-Based Project Management Toolkit
- Innovative Remediation and Site Characterization Technologies Resources
<http://www.epa.gov/ncepi/>



Various resources are available for information regarding the remedy selection process. Three useful resources are included on this page.

● ● ● Available Tools for Remedy Selection (continued)

- Environmental Technology Verification Program
- TechDirect
<http://www.epa.gov/tio/techdrct/>
- EPA Reach It
<http://www.epareachit.org/>



Various resources are available for information regarding the remedy selection process. Three useful resources are included on this page.

● ● ● | **Available Tools for Remedy Selection¹⁹
(continued)**

- Principles of Environmental Restoration
<http://www.eh.doe.gov/oepa/workshop/restoration.html>

<http://aec.army.mil/usaec/cleanup/per-brief01.ppt#1>



Resources for “Principles of Environmental Restoration” are included on this page.