

**PROCEDURES FOR EVALUATION OF RESPONSE ACTION ALTERNATIVES
AND REMEDY SELECTION FOR REMEDIAL RESPONSE PROGRAM SITES**

PURPOSE: This policy describes the process and criteria used by the Division of Emergency and Remedial Response (DERR) in the analysis of response action alternatives for state authority Remedial Response Program sites. It defines the eight evaluation criteria identified in the National Contingency Plan and describes their application and influence during the analysis of alternatives and the process of remedy selection.

BACKGROUND: The Division of Emergency and Remedial Response (DERR) Remedial Response Program is responsible for administering, within Ohio, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended, 42 Section U.S.C. 9601 , et seq. ("CERCLA") and its counterpart set forth in Chapter 3734 of the Ohio Revised Code. Under Ohio law, site investigations and cleanups are compelled through enforcement actions.

DERR must ensure that appropriate response action alternatives are developed and evaluated for implementation at state-lead Remedial Response Program sites. When evaluating response action alternatives, DERR's Site Coordinators rely upon evaluation criteria developed by DERR to be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300). The NCP contains procedures and criteria for alternative evaluation and remedy selection at federal-lead National Priority List (NPL) sites. Consistency with the NCP and DERR policy is included among the requirements found in all Director's Findings and Orders issued or negotiated for the investigation and/or remediation of state-lead Remedial Response Program sites.

DERR's Site Coordinators must understand the intent and application of each of the evaluation criteria as it is their responsibility to coordinate the collection, evaluation and presentation of the information used by DERR to select remedial actions. As providers of some of that information, Ohio EPA staff from other divisions must also understand the role their standards and procedures play in DERR's remedy selection process. DERR's procedures require that selected remedies incorporate the requirements of all applicable or relevant and appropriate state and federal environmental laws, rules, standards and criteria. At the same time, the process of evaluating potential response action alternatives provides DERR with the necessary flexibility to select remedies which are both protective and implementable.

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PROCEDURE: The attached policy presents the procedures for evaluation of response action alternatives and remedy selection for state authority Remedial Response Program sites.

POLICY:

Introduction

This policy describes the process and criteria used by DERR in the analysis of response action alternatives for state-lead Remedial Response Program sites. It defines the eight evaluation criteria identified in the NCP and describes their application and influence during the analysis of alternatives and the process of remedy selection. Potential remedial action alternatives are individually assessed using each of the eight criteria and then the alternatives are compared to each other. The comparative alternative analysis identifies the key tradeoffs (relative advantages and disadvantages) among the alternatives with respect to the eight criteria. The purpose is to provide DERR with sufficient information to balance the tradeoffs associated with the alternatives, select an appropriate remedy for the site, and document satisfaction of applicable or relevant and appropriate federal and state environmental laws, rules, standards and criteria. The eight evaluation criteria are:

1. Overall protection of human health and the environment;
2. Compliance with applicable or relevant and appropriate laws, rules, standards and criteria;
3. Long term effectiveness and permanence;
4. Reduction of toxicity, mobility, and/or volume through treatment;
5. Short term effectiveness;
6. Implementability;
7. Cost; and
8. Community acceptance.

Response action alternatives generally consist of combinations of treatment technologies and engineering and institutional controls which are employed to address affected environmental media. All environmental media (air, surface/ground water, soil) must be considered. DERR Site Coordinators must determine if alternatives adequately protect human health and the environment, both short and long term, from unacceptable risks. They must also determine if alternatives comply with the requirements of all applicable or relevant and appropriate environmental laws, rules, standards and criteria. DERR Site Coordinators rely upon input from other Ohio EPA programs (DDAGW, DAPC, DHWM, DSIWM, DSW) when determining if media and site-specific requirements have been met. After receiving input from each involved Agency program, DERR Site Coordinators evaluate the long term effectiveness and permanence of each alternative, its degree of reduction of toxicity, mobility, or volume of contaminants, its

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implementability and its cost.

Whereas other Agency Divisions generally focus on one media, DERR is compelled to base its decisions on the cumulative effects of all contaminants in all media.

DERR places an emphasis on the selection of remedies that employ treatment technologies which permanently and significantly reduce the toxicity, mobility, or volume of hazardous constituents as a principal element. To accomplish these goals and to ensure long term effectiveness and permanence, selected remedies must also reduce to the maximum extent practicable the transfer of contaminants between environmental media. An example of media transfer includes volatilization of contaminants from water to air.

Treatment components of response action alternatives and the data needed to support their evaluation are identified during the scoping of the remedial investigation (RI). Treatability testing of promising or innovative treatment technologies is conducted whenever RI data alone will not support further evaluation. As data become available, technologies are screened based upon their effectiveness, implementability, and cost. Surviving technologies are incorporated into comprehensive response action alternatives which undergo further analysis based on the evaluation criteria discussed below.

As a result of the evaluation of all criteria, guidance, and site conditions, DERR may select remedies which are more protective of human health and the environment than may be required by any single state requirement. Conversely, remedies selected by DERR may require the waiver of a state requirement in order to be implementable. In all cases, DERR will develop an administrative record which supports the remedy selection based on its ability to best meet the eight evaluation criteria.

Procedures

Not all of the eight criteria carry the same relative weight in the evaluation of potential response action alternatives. A hierarchy is established in which the first listed criteria is considered the most "absolute" and the eighth the least absolute. The hierarchy is further established by separation of the eight criteria into three distinct categories. There are "threshold", "balancing" and "modifying" criteria.

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The first two criteria,

1. Overall protection of human health and the environment; and
2. Compliance with applicable or relevant and appropriate laws, rules, standards and criteria or justification for a waiver.

are together referred to as the "threshold" criteria. Threshold criteria incorporate specific requirements which must be satisfied by any alternative selected for implementation at a state-lead DERR site. Only those alternatives which at least meet these criteria pass "over the threshold" to be considered further in the remedy selection process. A given alternative can not become the selected remedy if it does not at least meet these criteria; at the same time, the remedy selection process does not stop simply because thresholds have been met.

The next five criteria,

3. Long term effectiveness and permanence;
4. Reduction of toxicity, mobility, and/or volume through treatment;
5. Short term effectiveness;
6. Implementability; and
7. Cost

are referred to as "primary balancing" criteria. NCP considerations which DERR has incorporated into these criteria include:

- a. the long term uncertainties associated with land disposal;
- b. the goals, objectives, and requirements of the Solid Waste Disposal Act;
- c. the persistence, toxicity and mobility of hazardous substances and their constituents, and their propensity to bioaccumulate;
- d. short and long term potential for adverse health effects through human exposure;
- e. long term maintenance costs;
- f. the potential for future remedial action costs if the remedial action alternative under consideration were to fail; and
- g. the potential threat to human health and the environment associated with excavation, transportation and redisposal, or containment.

Response action alternatives are evaluated individually for their ability to meet each of the balancing criteria. They are then compared to each other in order to identify alternative(s) which provide the best relative "balance." Upon completion of this step, DERR has available all of the "internal input" influencing remedy selection. Generally one or more alternatives under evaluation clearly stand out from the others under consideration. DERR selects a remedy and documents

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the selection process in what is referred to as the "Preferred Plan". The Preferred Plan is then public noticed and released for public comment.

The last criterion,

8. Community acceptance

is referred to as a "modifying" criterion. Alternatives which have thus far survived threshold screening and provide the best balance between the primary balancing criteria are further evaluated based on community acceptance. Following a public comment period of 30 days, DERR's preferred remedy is either altered to accommodate appropriate public comment or finalized "as is." DERR prepares a "Decision Document" which includes DERR's response to any public comments received and contains the division's remedial action plan for the site. (See Preparation and Issuance of Preferred Plans and Decision Documents, policy number DERR-00-RR-013).

A discussion of each of the eight criteria follows. Ohio EPA staff external to DERR should note in particular the discussion of the second threshold criterion "Compliance with Applicable or Relevant and Appropriate Laws, Rules, Standards and Criteria", as it is here that the requirements of federal and state environmental laws and regulations are incorporated into DERR's remedy selection process.

1. Overall Protection of Human Health and the Environment

The first of the threshold criteria reflects the NCP's mandate to select remedies that are protective of human health and the environment. The overall assessment of the protectiveness of a given alternative draws on the assessments conducted under other evaluation criteria, especially long term effectiveness and permanence, short term effectiveness, and compliance with applicable or relevant and appropriate laws, rules, standards and criteria. Although not all of the criteria drawn upon during the evaluation of overall protectiveness are threshold criteria, the intent that they be seriously considered in the decision making process is clearly evidenced by their incorporation into the first threshold criterion.

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2. Compliance with Applicable or Relevant and Appropriate Laws, Rules, Standards and Criteria

DERR requires that, for all remedial actions, the selected remedy attain or exceed the applicable standards and criteria contained in state and federal environmental and public health laws unless a waiver is justified. (See ARARs, policy number DERR-00-RR- 001). If Ohio has a standard or criteria which is more stringent than a comparable federal standard, then the remedy selected must comply with Ohio's more stringent standard.

Applicable standards and criteria are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a pollutant or contaminant, remedial action, location, or other circumstance at a DERR site. For example, if a cleanup alternative includes the construction of a hazardous waste landfill, RCRA standards governing the construction of a new hazardous waste facility will apply to the new site.

Relevant and appropriate standards and criteria are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under state or federal law that, while not "applicable" to a pollutant or contaminant, remedial action, location, or other circumstance at a DERR site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited. The appropriateness of the relevant standard or criteria is determined by the characteristics of the site and the remedial action, and the pollutants or contaminants present.

As with overall protection above, compliance with applicable or relevant and appropriate laws, rules, standards and criteria is a threshold criterion which the selected remedy must, at a minimum, comply with. For example, if the remediation of a DERR regulated site will result in a discharge of pollutants to waters of the state, water quality based effluent limitations (WQBELs) which comply with Ohio EPA's Water Quality Standards would be applicable standards. As such, selected remedies would be required to at least comply with WQBELs. Given that compliance with applicable or relevant and appropriate laws, rules, standards and criteria is a threshold criterion, the WQBELs cannot at this point be interpreted to be the standards that will be applied to the final selected remedial action; there are six criteria which still need to be evaluated. It should be noted that application of the other six evaluation criteria may result final discharge standards being employed at a site which are more stringent than the WQBELs identified as applicable or relevant and appropriate standards. However, alternatives which employ treatment technologies that are not capable of at least meeting the threshold criteria (WQBELs) would not be permitted to proceed through the remedy selection process.

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3. Long Term Effectiveness and Permanence

Long term effectiveness and permanence is the first of the five primary balancing criteria. While all of the balancing criteria must be considered together in order to evaluate their collective "best balance," the hierarchy of the eight criteria places a greater relative weight on long term effectiveness and permanence during the balancing process.

Long term effectiveness and permanence focuses on any residual risk which may remain at the site at the completion of the remedial action. Consideration is given to the degree of threat posed by the hazardous substances remaining at the site and the adequacy and reliability of any controls (engineering or institutional) used to manage them. Preference is given to remedies which are protective of human health and the environment, utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and that maintain protection over time. Following the individual evaluation of each candidate remedy, the response action alternatives are judged along a continuum with remedies offering greater or lesser degrees of long term effectiveness and permanence.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion is designed to evaluate response action alternatives in light of DERR's preference for the selection of remedies in which treatment which permanently and significantly reduces the toxicity, mobility or volume of the hazardous constituents is a principal element. Evaluation includes an examination of the magnitude, significance, and irreversibility of the reductions achieved by alternatives involving treatment. Reductions of 90-99 percent are considered to be significant. Factors considered include:

- a. The treatment or recycling processes employed and materials they will treat;
- b. The amount of hazardous substances that will be destroyed, treated or recycled;
- c. The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment or recycling and the specification of which reduction(s) are occurring;
- d. The degree to which the treatment is irreversible;
- e. The type and quantity of residuals which will remain following treatment, considering persistence, toxicity, mobility, and propensity to bioaccumulate;
- f. The degree to which treatment will reduce the inherent hazards posed by the principal threats at a site; and
- g. The degree to which the treatment processes employed reduce the transfer of contaminants between environmental media.

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Waste-specific treatability studies may need to be performed to acquire the data needed to evaluate treatment options. If treatment results in the transfer of hazardous constituents from one media to another (e.g., stripping of volatile organic compounds from sludges to air), treatment of the newly affected medium will often be required.

5. Short Term Effectiveness

Short term effectiveness evaluates the effects on human health and the environment of alternatives during the construction and implementation phase, and until the objectives of the remedial action have been met. Time required to meet remedial action objectives is also considered. Threats to site workers, the surrounding community, and the environment which may be created during implementation of the selected remedy are identified and evaluated.

6. Implementability

The ease or difficulty of implementing each alternative is evaluated. Factors considered include:

- a. technical feasibility - This relates to the technical difficulties and unknowns associated with the technologies and the likelihood that technical problems associated with implementation will lead to schedule delays. The probability of needing additional future response actions and their ease of implementation following construction of the remedy is also evaluated.
- b. administrative feasibility - This evaluates the activities needed to coordinate with other divisions and agencies (e.g., obtaining permits or rights-of-way for construction).
- c. availability of services and materials - This involves an evaluation of the availability of off-site treatment, storage and/or disposal capacity and services, and the availability of necessary equipment and specialists.

7. Cost

Costs are broken down into capital costs, annual operation and maintenance (O&M) costs, and the net present value of these costs. Capital costs include direct (construction) and indirect (nonconstruction and overhead) costs. To the extent that response costs are directly off-set by the receipt of revenue from recycling, such revenue should be factored into the cost calculations. O&M costs include all post construction costs necessary to maintain the effectiveness of the implemented remedy. Costs of future remedial actions are to be included when there is a reasonable expectation that a major component of the remedy may require replacement. Costs of the respective alternatives under evaluation are compared. DERR evaluates the cost-effectiveness of a given alternative during the remedy selection phase. Evaluation of cost- effectiveness considers the long term effectiveness and permanence

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afforded by the alternative, the extent to which the alternative reduces the toxicity, mobility, or volume of the hazardous constituents through treatment, the short term effectiveness of the alternative, and the alternative's cost. Overall effectiveness of an alternative is compared to the cost to ensure that the alternative is cost effective. The least expensive alternative which satisfies DERR's remedy selection criteria shall be deemed by DERR to be cost effective.

8. Community Acceptance

The evaluation of community acceptance of the proposed alternative cannot be performed until the end of the public comment period. Public meetings or other community relations activities may be conducted during the investigation and/or study of the site to address significant events. Based on public comment, it is determined which components of the proposed alternative interested persons in the community support, have reservations about, or oppose.