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OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

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**MEMORANDUM**

SUBJECT: Transmittal of final guidance entitled: "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents"

FROM: Stephen D. Luftig, Director Steve Luftig
Office of Emergency and Remedial Response

TO: Superfund National Policy Managers
Regions 1 - 10

The purpose of this memorandum is to transmit the guidance document entitled: "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents" for your immediate use. This guidance updates and clarifies our expectations for the content and procedures for developing decision documents in the Superfund remedy selection process. This guidance supersedes our July 1989 interim final guidance on the same subject (EPA 540-G-89-007) and four separate fact sheets that were based on that guidance and published in May 1990 (OSWER 9335.3-02FS-1 and 9335.3-02FS-2) and April 1991 (OSWER 9355.3-02FS-3 and 9355.3-02FS-4).

Thank you for the support your staff provided in reviewing and commenting on this product. If you have any questions, please contact Mike Goldstein at (703) 603-9045 (goldstein.mike@epa.gov) or Bruce Means at (703) 603-8815 (means.bruce@epa.gov). Additional copies of this guidance will soon be available from the Superfund Document Center at (703) 603-9232 and will also be available on the Internet at <<http://www.epa.gov/superfund/resources/remedy/rods/index.htm>>.

Attachment

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Environmental
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Solid Waste and
Emergency Response

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Superfund

# A GUIDE TO PREPARING SUPERFUND PROPOSED PLANS, RECORDS OF DECISION, AND OTHER REMEDY SELECTION DECISION DOCUMENTS

# NOTICE

This document provides guidance to EPA and State staff. It also provides guidance to the public and to the regulated community on how EPA intends to exercise its discretion in implementing its regulations. The guidance is designed to implement national policy on these issues. The document does not, however, substitute for statutes EPA administers nor their implementing regulations, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the specific circumstances. EPA may change this guidance in the future, as appropriate.

## ABSTRACT

This *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (also commonly referred to as the "ROD Guidance") has been developed to accomplish the following:

- Provide recommended formats and content for Superfund remedial action decision documents;
- Clarify roles and responsibilities of the U.S. Environmental Protection Agency (EPA), Federal facilities, States, and Indian Tribes in developing and issuing decision documents;
- Clarify roles and responsibilities of stakeholders in the remedy selection process; and
- Explain how to address changes made to proposed and selected remedies.

The decision documents addressed by this guidance are the Proposed Plan, the Record of Decision (ROD), the Explanation of Significant Differences (ESD), and the ROD Amendment. Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires the issuance of decision documents for remedial actions taken pursuant to Sections 104, 106, 120, and 122. Sections 300.430(f)(2), 300.430(f)(4) and 300.435(c)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establish the regulatory requirements for these decision documents. This guidance document provides additional guidelines and is based upon the Superfund statute and regulations.


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**?** Questions regarding this document should be directed to the Superfund Hotline at (800) 424-9346, (DC Area Local (703) 412-9810), or http://www.epa.gov/epaoswer/hotline/.

# Preface

This guidance document is being issued to enhance the clarity and completeness of Records of Decision (RODs) and related remedy selection decision documents. It has been revised to reflect the 1990 final National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and current EPA policies.

This guidance supersedes the following EPA guidance documents:

- *Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment: Interim Final* (EPA 540-G-89-007, July 1989 (pre-publication and October 1989);
- *A Guide to Developing Superfund Records of Decision* (OSWER 9335.3-02FS-1, May 1990);
- *A Guide to Developing Superfund Proposed Plans* (OSWER 9335.3-02FS-2, May 1990);
- *Guide to Developing Superfund No Action, Interim Action, and Contingency Remedy RODs* (OSWER 9355.3-02FS-3, April 1991); and
- *Guide to Addressing Pre-ROD and Post-ROD Changes* (OSWER 9355.3-02FS-4, April 1991).

NOTE: This guidance does not cover the remedy selection process itself. This process is addressed in a separate fact sheet entitled *A Guide to Selecting Superfund Remedial Actions* (OSWER 9355.0-27FS, April 1990). Other remedy selection policies are summarized in *Rules of Thumb for Superfund Remedy Selection* (EPA 540-R-97-013, August 1997).

**ACKNOWLEDGMENTS**

The development of this guidance document was a team effort led by the Office of Emergency and Remedial Response (OERR). Mike Goldstein served as project manager, technical editor and contributing writer. Betsy Shaw and Bruce Means served as management/policy mentors. Janine Dinan, Kenneth Lovelace, and Sheila Igoe provided significant contributions on technical and legal policy matters. Carolyn Kenmore and Sharon Frey contributed to project management. Leslie McVickar assisted in the resolution of comments received on the final review draft. John Weiss of Industrial Economics, Incorporated and Susan Heise of ISSI, Incorporated provided superior editorial and document production support. Finally, numerous Regional and OERR staff have provided careful review and thoughtful comments which have contributed to the overall quality of this document.

# Table of Contents

Appendices ..... vii
Highlights ..... viii
Acronyms Used in This Document ..... x

**1.0 INTRODUCTION ..... 1-1**

1.1 PURPOSE OF THIS GUIDANCE ..... 1-1
1.2 OVERVIEW OF SUPERFUND REMEDIAL RESPONSE PROCESS ..... 1-1
1.2.1 The Pre-Remedial Response Process ..... 1-3
1.2.2 Lead and Support Agencies in the Superfund Remedial Response Process ..... 1-3
1.2.3 Potentially Responsible Parties ..... 1-4
1.2.4 Remedial Investigation/Feasibility Study ..... 1-4
1.2.5 Proposed Plan ..... 1-5
1.2.6 Record of Decision ..... 1-5
1.2.7 Remedial Design ..... 1-6
1.2.8 Remedial Action ..... 1-6
1.3 OUTLINE OF THIS GUIDANCE ..... 1-6

**2.0 PROCESS FOR DEVELOPING THE PROPOSED PLAN ..... 2-1**

2.1 OVERVIEW ..... 2-1
2.2 ROLE OF LEAD AND SUPPORT AGENCIES ..... 2-1
2.2.1 Designation of Roles and Responsibilities ..... 2-1
2.2.2 Lead and Support Agency Responsibilities ..... 2-3
2.2.3 Management Review of Proposed Plan ..... 2-3
2.2.4 Support Agency Comment Period ..... 2-4
2.3 PROCEDURES FOR RESOLVING DISPUTES ..... 2-4
2.4 ROLE OF OTHER FEDERAL AGENCIES ..... 2-5
2.5 ROLE OF POTENTIALLY RESPONSIBLE PARTIES ..... 2-5
2.6 PUBLIC PARTICIPATION ..... 2-5
2.6.1 Newspaper Notification ..... 2-5
2.6.2 Public Comment Period ..... 2-6

**3.0 WRITING THE PROPOSED PLAN ..... 3-1**

3.1 PURPOSE OF THE PROPOSED PLAN ..... 3-1
3.2 REGULATORY REQUIREMENTS FOR THE CONTENT OF THE PROPOSED PLAN ..... 3-1
3.3 SECTION-BY-SECTION DESCRIPTION OF THE PROPOSED PLAN ..... 3-1
3.3.1 Introduction ..... 3-1
3.3.2 Site Background ..... 3-2
3.3.3 Site Characteristics ..... 3-3
3.3.4 Scope and Role of Operable Unit or Response Action ..... 3-3
3.3.5 Summary of Site Risks ..... 3-3
3.3.6 Remedial Action Objectives ..... 3-4
3.3.7 Summary of Remedial Alternatives ..... 3-5
3.3.8 Evaluation of Alternatives ..... 3-6
3.3.9 Preferred Alternative ..... 3-7
3.3.10 Community Participation ..... 3-10
3.4 FORMAT FOR THE PROPOSED PLAN ..... 3-10
3.5 PROPOSED PLAN FACT SHEET ..... 3-10
3.6 PROPOSED PLANS TO HEADQUARTERS ..... 3-11

**4.0 PRE-RECORD OF DECISION CHANGES ..... 4-1**

4.1 OVERVIEW ..... 4-1
4.2 IDENTIFYING TYPES OF PRE-RECORD OF DECISION CHANGES ..... 4-1
4.2.1 Minor Changes ..... 4-1
4.2.2 Significant Changes ..... 4-1
4.3 DOCUMENTING PRE-RECORD OF DECISION CHANGES ..... 4-2
4.3.1 Documenting Minor Changes ..... 4-2
4.3.2 Documenting Significant Changes ..... 4-2

**5.0 PROCESS FOR DEVELOPING THE RECORD OF DECISION ..... 5-1**

5.1 OVERVIEW ..... 5-1
5.1.1 State Preparation of ROD ..... 5-1
5.2 ROLE OF LEAD AND SUPPORT AGENCIES ..... 5-1
5.2.1 Lead Agency ..... 5-2
5.2.2 Support Agency ..... 5-2
5.3 DISPUTE RESOLUTION ..... 5-2
5.4 ROLE OF OTHER EPA AND STATE PROGRAM OFFICES ..... 5-4
5.5 ROLE OF OTHER FEDERAL AGENCIES ..... 5-4
5.6 ROLE OF POTENTIALLY RESPONSIBLE PARTIES ..... 5-4
5.7 ISSUING NOTICE OF ROD AVAILABILITY ..... 5-4

**6.0 WRITING THE RECORD OF DECISION ..... 6-1**

6.1 INTRODUCTION ..... 6-1
6.1.1 Purpose of the Record of Decision ..... 6-1
6.1.2 Regulatory Requirements for the Content of the Record of Decision ..... 6-1
6.1.3 Major Components of the Record of Decision ..... 6-2
6.2 SECTION-BY-SECTION DESCRIPTION OF THE DECLARATION ..... 6-3
6.2.1 Site Name and Location ..... 6-3
6.2.2 Statement of Basis and Purpose ..... 6-3
6.2.3 Assessment of the Site ..... 6-3
6.2.4 Description of the Selected Remedy ..... 6-3
6.2.5 Statutory Determinations ..... 6-4
6.2.6 ROD Data Certification Checklist ..... 6-4
6.2.7 Authorizing Signatures and Support Agency Acceptance of Remedy ..... 6-5
6.3 SECTION-BY-SECTION DESCRIPTION OF THE DECISION SUMMARY ..... 6-7
6.3.1 Site Name, Location, and Description ..... 6-7
6.3.2 Site History and Enforcement Activities ..... 6-7
6.3.3 Community Participation ..... 6-7
6.3.4 Scope and Role of Operable Unit or Response Action ..... 6-8
6.3.5 Site Characteristics ..... 6-10
6.3.6 Current and Potential Future Land and Resource Uses ..... 6-12
6.3.7 Summary of Site Risks ..... 6-12
6.3.7.1 Summary of Human Health Risk Assessment ..... 6-13
6.3.7.2 Summary of Ecological Risk Assessment ..... 6-16
6.3.8 Remedial Action Objectives ..... 6-26
6.3.9 Description of Alternatives ..... 6-26
6.3.10 Summary of Comparative Analysis of Alternatives ..... 6-29
6.3.11 Principal Threat Wastes ..... 6-40
6.3.12 Selected Remedy ..... 6-40
6.3.13 Statutory Determinations ..... 6-48
6.3.14 Documentation of Significant Changes ..... 6-53
6.4 KEY ELEMENTS OF THE RESPONSIVENESS SUMMARY ..... 6-57
6.5 RECORDS OF DECISION TO EPA HEADQUARTERS ..... 6-57

**7.0 DOCUMENTING POST-ROD CHANGES: MINOR CHANGES, EXPLANATIONS OF SIGNIFICANT DIFFERENCES, AND ROD AMENDMENTS ..... 7-1**

7.1 EVALUATING POST-RECORD OF DECISION INFORMATION ..... 7-1
7.2 TYPES OF POST-RECORD OF DECISION CHANGES ..... 7-1
7.3 DOCUMENTING POST-RECORD OF DECISION CHANGES ..... 7-2
7.3.1 Documenting Non-Significant (or Minor) Post-ROD Changes: Memo to the Site File ..... 7-2
7.3.2 Documenting Significant Post-ROD Changes: Explanation of Significant Differences ..... 7-2
7.3.3 Documenting Fundamental Post-ROD Changes: ROD Amendment ..... 7-5
7.4 HEADQUARTERS REVIEW AND FILING OF DECISION CHANGES ..... 7-6

**8.0 DOCUMENTING NO ACTION, INTERIM ACTION, AND CONTINGENCY REMEDY DECISIONS ..... 8-1**

8.1 DOCUMENTING NO ACTION DECISIONS ..... 8-1
8.2 DOCUMENTING INTERIM ACTION DECISIONS ..... 8-2
8.2.1 Interim Actions Versus Early Actions ..... 8-2
8.2.2 Interim Action Record of Decision Format4 ..... 8-3
8.3 DOCUMENTING CONTINGENCY REMEDY DECISIONS ..... 8-3

**9.0 DOCUMENTING SPECIFIC REMEDY SELECTION SITUATIONS ..... 9-1**

9.1 INTRODUCTION ..... 9-1
9.2 DOCUMENTING PRESUMPTIVE REMEDY DECISIONS ..... 9-1
9.2.1 Modifications to Remedy Selection Decision Documents ..... 9-1
9.2.2 Special Considerations for the Administrative Record File ..... 9-2
9.2.3 Additional Guidance ..... 9-2
9.3 DOCUMENTING RESPONSE ACTIONS THAT ADDRESS LEAD (Pb) IN SOIL ..... 9-3
9.3.1 Modifications to Remedy Selection Decision Documents ..... 9-3
9.3.2 Additional Guidance ..... 9-5
9.4 DOCUMENTING GROUND-WATER REMEDY DECISIONS ..... 9-5
9.4.1 Modifications to the Remedy Selection Decision Documents ..... 9-5
9.4.2 Additional Guidance ..... 9-7
9.5 DOCUMENTING TECHNICAL IMPRACTICABILITY (TI) WAIVERS ..... 9-8
9.5.1 Discussion of a TI Waiver in a Proposed Plan ..... 9-8
9.5.2 Discussion of a TI Waiver in a ROD or ROD Amendment ..... 9-8
9.5.3 Discussion of a TI Waiver in an Explanation of Significant Differences ..... 9-9
9.5.4 Additional Guidance ..... 9-9

# Appendices

**A SAMPLE PROPOSED PLAN ..... A-1**

**B DOCUMENTING SPECIAL GROUND-WATER REMEDY DECISIONS ..... B-1**

B.1 PHASED APPROACH ..... B-1
B.2 NONAQUEOUS PHASE LIQUIDS (NAPLS) ..... B-3
B.3 DEFERRAL TO THE DESIGN PHASE - SELECTION OF EX-SITU TREATMENT METHODS ..... B-3
B.4 DOCUMENTING REMEDIES USING MONITORED NATURAL ATTENUATION ..... B-4
B.5 ADDITIONAL INFORMATION FOR SPECIAL GROUND-WATER REMEDIES ..... B-6

**C CONSULTATION PROCEDURES FOR SUPERFUND RESPONSE DECISIONS (transmittal memo and fact sheet) ..... C-1**

**D RECORDS OF DECISION AND OTHER DECISION DOCUMENTS TO EPA HEADQUARTERS ..... D-1**

**E SOURCES OF INFORMATION ..... E-1**

# Highlights


**1.0 INTRODUCTION**

1-1: Superfund Remedial Response Process ..... 1-2

**2.0 PROCESS FOR DEVELOPING THE PROPOSED PLAN**

2-1: Preparation of The Proposed Plan by the Lead Agency ..... 2-2
2-2: Tips for Writing an Effective Public Notice ..... 2-7
2-3: Sample Newspaper Notification of Availability of Proposed Plan and Public Meeting ..... 2-8

**3.0 WRITING THE PROPOSED PLAN**

3-1: Major Sections of the Proposed Plan ..... 3-3
3-2: Standard Language Explaining Basis for Taking Action ..... 3-5
3-3: Tips on Writing Summary of Site Risks ..... 3-5
3-4: Tips on Writing Summary of Remedial Alternatives ..... 3-7
3-5: Nine Criteria for Remedial Alternatives Evaluation ..... 3-8
3-6: Tips For Preparing Nine Criteria Analysis ..... 3-9
3-7: Tips on Writing Preferred Alternative ..... 3-11

**4.0 PRE-RECORD OF DECISION CHANGES**

4-1: Pre-Record of Decision Changes ..... 4-3
4-2: Examples of Pre-Record of Decision Changes ..... 4-5

**5.0 PROCESS FOR DEVELOPING THE RECORD OF DECISION**

5-1: Lead Agency Responsibility in ROD Development Process ..... 5-3
5-2: Sample Newspaper Notification of Availability of the Record of Decision ..... 5-6

**6.0 WRITING THE RECORD OF DECISION**

6-1: Recommended Outline for Standard Record of Decision ..... 6-3
6-2: Standard Language for Statement of Basis and Purpose ..... 6-3
6-3: Standard Language for Assessment of the Site ..... 6-3
6-4: Standard Language for Statutory Determinations ..... 6-5
6-5: Standard Language for ROD Data Certification Checklist ..... 6-6
6-6: Notes on ROD Authorizing Signatures ..... 6-6
6-7: Example Language for Community Participation Activities ..... 6-8
6-8: Tips for Documenting Scope and Role Section for Sites with More than One Operable Unit ..... 6-9
6-9: Example Language for Scope and Role of Operable Unit Section ..... 6-9
6-10: Example Conceptual Site Model for Contaminated Soil ..... 6-11
6-11: Tips on Writing the “Site Characteristics” Section ..... 6-11
6-12: Standard Language - Basis for Action ..... 6-13
6-13: Example Language for the Introduction to the Human Health Risks Summary ..... 6-14
6-14: Tips on Writing the “Summary of Site Risks” Section ..... 6-14
6-15: Example Table Format - Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations ..... 6-18
6-16A: Example Table Format - Sample Cancer Toxicity Data Summary ..... 6-19
6-16B: Example Table Format - Sample Non-Cancer Toxicity Data Summary ..... 6-20
6-17: Example Language for Risk Characterization Summary ..... 6-21
6-18A: Example Table Format - Risk Characterization Summary - Carcinogens ..... 6-22
6-18B: Example Table Format - Risk Characterization Summary - Non-Carcinogens ..... 6-23
6-19: Example Table Format - Occurrence, Distribution, and Selection of Chemicals of Concern (COC) ..... 6-24
6-20: Example Table Format - Ecological Exposure Pathways of Concern ..... 6-24
6-21: Example Table Format - COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors ..... 6-25
6-22: Examples of Remedy Components for Each Alternative ..... 6-28

6-23: Tips on Presenting the Comparative Analysis of Alternatives ..... 6-29
6-24: Example Text Summary for the Comparative Analysis of Alternatives ..... 6-30
6-25: Example Comparative Analysis of Alternatives ..... 6-33
6-26: Key Definitions for Identifying Source Materials Constituting Principal Threats ..... 6-41
6-27: Tips on Writing the "Selected Remedy" Section ..... 6-42
6-28: Standard Cost Estimate Disclaimer Language ..... 6-42
6-29: Example Table Format - Cost Estimate Summary for the Selected Remedy ..... 6-43
6-30: Tips for Presenting Summary of Cost Estimate for Selected Remedy ..... 6-45
6-31: Example Expected Outcomes for Selected Remedy ..... 6-46
6-32: Example Table Format - Cleanup Levels for Chemicals of Concern ..... 6-47
6-33: Relationship of the Nine Criteria to the Statutory Findings ..... 6-49
6-34: Example Table Format - Description of ARARs for Selected Remedy ..... 6-50
6-35: Example Matrix of Cost and Effectiveness of Data for Hypothetical Site: Ground Water Control Options ..... 6-52
6-36: Determinations for Five-Year Reviews ..... 6-54
6-37: Example Language - Statutory Determinations Section ..... 6-55
6-38: Examples of Changes and Documentation Requirements ..... 6-58
6-39: Management Review Checklist: Twelve Questions to be Addressed by a ROD ..... 6-59

**7.0 DOCUMENTING POST-ROD CHANGES: MINOR CHANGES, EXPLANATIONS OF SIGNIFICANT DIFFERENCES, AND ROD AMENDMENTS**

7-1: Examples of Post-Record of Decision Changes ..... 7-3
7-2: Sample Outline and Checklist for ESDs and ROD Amendments ..... 7-7

**8.0 DOCUMENTING NO ACTION, INTERIM ACTION, AND CONTINGENCY REMEDY DECISIONS**

8-1: Recommended Outline for Standard Record of Decision* ..... 8-1
8-2: Examples of Situations Where No Action Decisions May Be Appropriate ..... 8-3
8-3: Examples of Possible Interim and Early Actions ..... 8-3
8-4: Documenting a No Action Decision: Action Not Necessary for Protection ..... 8-5
8-5: Documenting a No Action Decision: No CERCLA Authority to Take Action ..... 8-6
8-6: Documenting a No Action Decision: No Further Action Necessary ..... 8-7
8-7: Documenting an Interim Action Decision ..... 8-8
8-8: Documenting a Contingency Remedy Decision ..... 8-10

**9.0 DOCUMENTING SPECIFIC REMEDY SELECTION SITUATIONS**

9-1: Sample Language for Describing a Presumptive Remedy Approach ..... 9-3
9-2: Sample Language for Evaluation of Human Health Risks at Sites with Lead (Pb) Contamination ..... 9-5
9-3: Tips for Documenting Use of a Technical Impracticability Waiver ..... 9-9

**APPENDIX B DOCUMENTING SPECIAL GROUND-WATER REMEDY DECISIONS**

B-1: Example Language for Documenting Use of Phased Implementation for the Extraction Component of a Remedy at a DNAPL Site in the Selected Remedy Section of a ROD ..... B-2
B-2: Example Language for Selected Remedy Section of a ROD Deferring Selection of Treatment Component ..... B-5
B-3: Example Language for Documenting Use of Monitored Natural Attenuation in the Selected Remedy Section of the ROD ..... B-7

# Acronyms Used in This Document

| | |
|---|---|
| AA | Assistant Administrator |
| ACH | Automated Clearing House |
| ARAR | Applicable or Relevant and Appropriate Requirement |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BDAT | Best Demonstrated Available Technology |
| CA | Cooperative Agreement |
| CAA | Clean Air Act |
| CAG | Community Advisory Group |
| CDI | Chronic Daily Intake |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| CERCLIS | CERCLA Information System |
| CFR | Code of Federal Regulations |
| COC | Contaminant of Concern |
| CWA | Clean Water Act |
| DNAPL | Dense Non-Aqueous Phase Liquid |
| DOD | Department of Defense |
| DOE | Department of Energy |
| EJ | Environmental Justice |
| EPA | Environmental Protection Agency |
| ESD | Explanation of Significant Differences |
| FFA | Federal Facility Agreement |
| FR | Federal Register |
| FS | Feasibility Study |
| FWQC | Federal Water Quality Criteria |
| HI | Hazard Index |
| HQ | Hazard Quotient |
| HRS | Hazard Ranking System |
| IAG | Interagency Agreement |
| IRIS | Integrated Risk Information System |
| LDR | Land Disposal Restriction |
| MACT | Maximum Achievable Control Technology |
| MEP | Maximum Extent Practicable |
| MCL | Maximum Contaminant Level |
| MCLG | Maximum Contaminant Level Goal |
| MOU | Memorandum of Understanding |
| NAAQS | National Ambient Air Quality Standard |
| NAPL | Nonaqueous Phase Liquid |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| OERR | Office of Emergency and Remedial Response |
| O&M | Operations and Maintenance |
| ORC | Office of Regional Counsel |
| OSC | On-Scene Coordinator |
| OSRE | Office of Site Remediation and Enforcement |
| OSWER | Office of Solid Waste and Emergency Response |
| OU | Operable Unit |
| PA | Preliminary Assessment |
| PCOR | Preliminary Site Closeout Report |
| PRG | Preliminary Remediation Goal |
| POTW | Publicly Owned Treatment Works |
| PRP | Potentially Responsible Party |
| RA | Regional Administrator *or* Remedial Action |
| RAO | Remedial Action Objective |
| RCRA | Resource Conservation and Recovery Act |
| RD | Remedial Design |
| RfD | Reference Dose |
| RI | Remedial Investigation |
| RI/FS | Remedial Investigation/Feasibility Study |
| RME | Reasonable Maximum Exposure |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| SACM | Superfund Accelerated Cleanup Model |
| SARA | Superfund Amendments and Reauthorization Act of 1986 |
| SDWA | Safe Drinking Water Act |
| SF | Slope Factor |
| SI | Site Investigation |
| SMOA | Superfund Memorandum of Agreement |
| SSC | Superfund State Contract |
| SWDA | Solid Waste Disposal Act |
| TAG | Technical Assistance Grant |
| TBC | To Be Considered |
| TI | Technical Impracticability |
| TSCA | Toxic Substances Control Act |
| UCL | Upper Confidence Limit |
| VOC | Volatile Organic Compound |

# 1.0 INTRODUCTION

## 1.1 PURPOSE OF THIS GUIDANCE

This *Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (also commonly referred to as the "ROD Guidance") has been developed to accomplish the following:

- Provide recommended formats and content for Superfund remedial action decision documents.
- Clarify roles and responsibilities of the U.S. Environmental Protection Agency (EPA), Federal facilities, States, and Indian Tribes in developing and issuing decision documents.
- Clarify roles and responsibilities of stakeholders in the remedy selection process.
- Explain how to address changes made to proposed and selected remedies.

The decision documents addressed by this guidance are the Proposed Plan, the Record of Decision (ROD), the Explanation of Significant Differences (ESD), and the ROD Amendment. Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires the issuance of decision documents for remedial actions taken pursuant to §§104, 106, 120, and 122. Sections 300.430(f)(2), 300.430(f)(4) and 300.435(c)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establish the regulatory requirements for these decision documents. This guidance document provides additional guidelines and is based upon the Superfund statute and regulations.[1]

A primary purpose of the ROD guidance is to establish a recommended format for Proposed Plans, RODs, ESDs, and ROD Amendments. Because of the critical role of public participation in the remedy selection process, and the public's reliance on decision documents to understand what the lead government agency proposes and ultimately decides to do, clarity within and consistency across these documents are both important. Specifically, the use of these recommended formats should accomplish the following:

- Encourage consistency among EPA Regional Offices, States, and other Federal agencies implementing the Superfund program with respect to the organization, basic content, and level of detail of decision documents;
- Help ensure that all statutory and regulatory documentation requirements are met; and
- Promote clear and logical presentations of the rationales for remedy selection decisions based on site-specific information and supporting analysis.

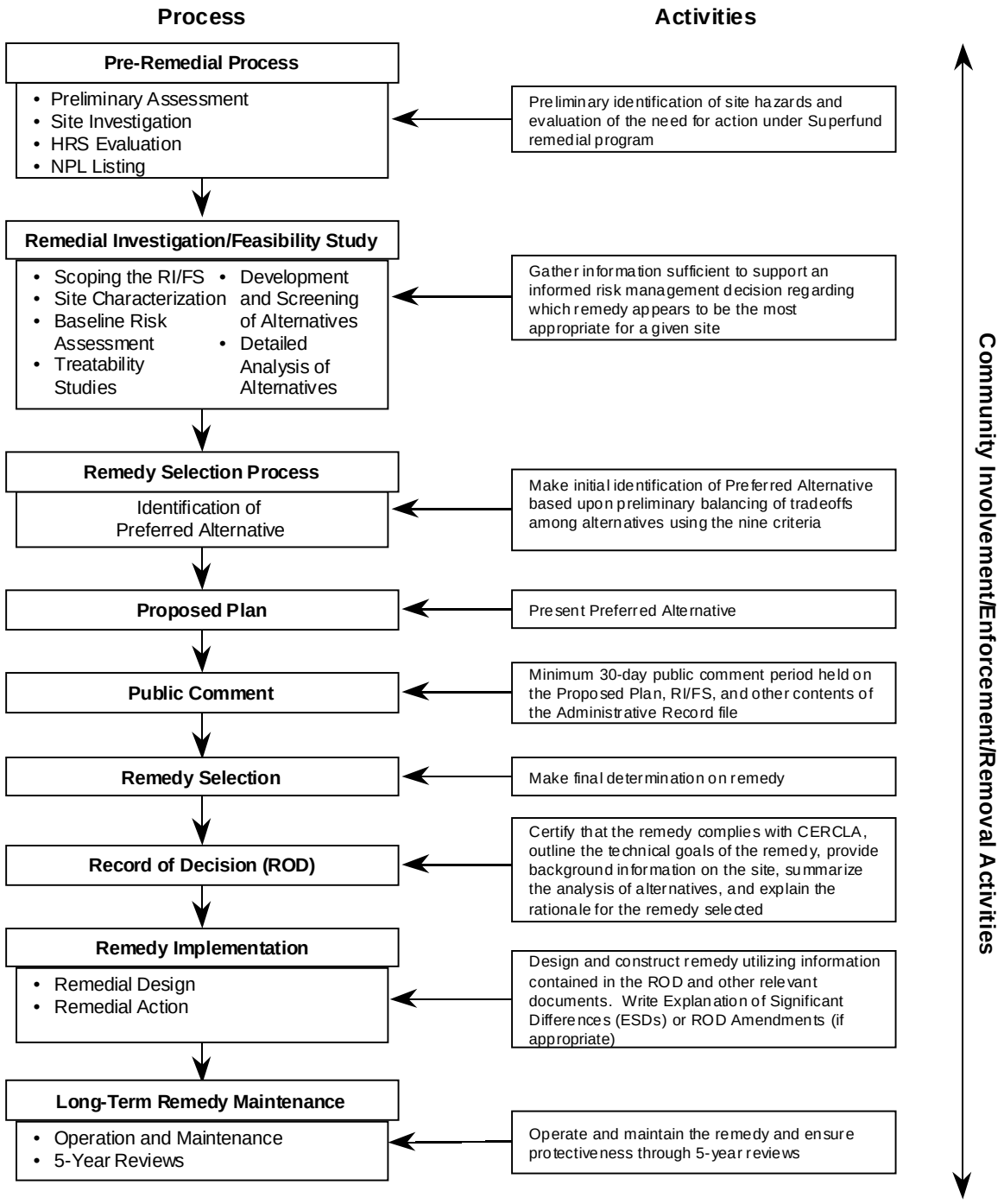
In addition to the emphasis on providing a recommended format to document remedial action decisions, this guidance specifies the roles and responsibilities of government entities in developing and issuing Superfund decision documents, and the role of the public and potentially responsible parties in the remedy selection process. Finally, this guidance addresses the statutory requirement in CERCLA §§117 (c) and (d) to document significant changes made during and after the remedy selection process, as further detailed in NCP §§300.430(f)(3)(ii) and 300.435.

## 1.2 OVERVIEW OF SUPERFUND REMEDIAL RESPONSE PROCESS

This section describes the relationship between the decision documents addressed in this guidance and the overall Superfund remedial response process. The Superfund remedial response process is shown in Highlight 1-1.

[1] References made to CERCLA, or "the Superfund statute," throughout this document should be interpreted as meaning CERCLA, as amended by SARA. The NCP, or the "Superfund regulations," can be found at Chapter 40, Part 300 in the Code of Federal Regulations (CFR).

## Highlight 1-1: Superfund Remedial Response Process



### 1.2.1 The Pre-Remedial Response Process

Historically, the pre-remedial response process has encompassed the identification, initial investigation, and listing of a site on the National Priorities List (NPL). This process is initiated with the Preliminary Assessment (PA). If the results of the PA indicate that further investigation is warranted, a Site Investigation (SI) is performed. If the SI concludes that further response is warranted, more information is gathered to "score" the site using the Hazard Ranking System (HRS). Those sites that score at or above the HRS cut-off score of 28.50 are eligible for the NPL. Generally, a full Remedial Investigation/Feasibility Study (RI/FS) is commenced shortly after a site is placed on the NPL.

However, with the fully implemented Superfund Accelerated Cleanup Model (SACM), all site assessment and initial investigative activities can take place in a continuous process combining appropriate elements of SIs, RI/FSs, removal assessments, and risk assessments. In this case, a final listing of a site on the NPL may occur after the RI/FS has been started or completed. In addition, response actions can be initiated throughout the site assessment and remedial response process through the use of "removal response authorities" or State-lead voluntary cleanup and Brownfields programs.[2] In some circumstances, threats posed by sites can be fully addressed without ever being placed on the NPL. For more information on SACM, see *Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) Under CERCLA and the NCP* (OSWER 9203.1-03, July 7, 1992), and five additional SACM fact sheets (OSWER 9203.1-05I, Volume 1, Numbers 1-5, December 1992).

### 1.2.2 Lead and Support Agencies in the Superfund Remedial Response Process

At or before the time a site is placed on the NPL, interagency negotiations are initiated to determine which government agency should act as the lead agency and which as support agency in the remedial process. These negotiations may include EPA, States, other Federal agencies (*e.g.*, Department of Defense (DOD), Department of Energy (DOE)), and Indian Nations or Tribes.[3] The State role in the remedial process is discussed in CERCLA §121(f)(1), which provides "for substantial and meaningful involvement of each State in the initiation, development, and selection of remedial response actions to be undertaken in that State." (See the NCP Part 300 Subpart F for regulatory provisions concerning state involvement. See also *Guidance on Lead Determinations for CERCLA Fund-financed Responses*, OSWER 9355.2-02, April 1992.)

The lead agency, which is represented by a Remedial Project Manager (RPM), has the primary responsibility for coordinating a response action. Either EPA, a State environmental agency, or another Federal agency can serve as the lead agency.[4] However, EPA retains final remedy selection authority for all "Fund-financed" actions, and for Federal facility-lead actions taken at NPL sites.[5] EPA also generally has the authority to concur on all enforcement actions taken under CERCLA §§106 and 122. Generally, the lead agency RPM is responsible for overseeing all technical, enforcement, and financial aspects of a remedial response.

The support agency, or agencies, play a review and concurrence role in the remedial process. When EPA acts as the lead agency, the State in which the site is located usually serves as the support agency. When a State is the lead agency, EPA usually serves as the support agency.[6]

[2] For a more complete discussion of removal response authorities, see NCP §300.415.

[3] For the purpose of this guidance document, the term "State" shall include the governing body of an Indian Nation or Tribe (see NCP §300.515(b), CERCLA §126 and Executive Order 13084, dated May 14, 1998), unless otherwise noted.

[4] At some sites, Federal agencies other than EPA act as lead agencies under CERCLA, pursuant to Executive Order 12580 (52 *FR* 2923, January 29, 1987).

[5] The following terms will be used throughout this guidance to designate which government entity serves as the lead agency in the Superfund remedial response process: "EPA-lead," "State-lead," and "Federal facility-lead." In addition, the following terms will be used throughout this guidance to refer to the source of cleanup monies: "Fund-financed" (*i.e.*, cleanup money from the Superfund trust fund), and "enforcement site" or "PRP-lead" (*i.e.*, cleanup money from enforcement action taken by lead agency).

[6] Because a State or Indian Tribe may be either the lead agency or the support agency for most remedial activities, this guidance often makes general reference to "lead" and "support" agency responsibilities, rather than "EPA," "State," or "Tribal" responsibilities. Specific responsibilities of these entities are noted where appropriate.

When EPA and/or a State are involved in remedial action, the lead and support agencies are identified in either a Superfund State Contract (SSC) or a Cooperative Agreement (CA). SSCs and CAs are site-specific agreements that establish Federal and State responsibilities for a CERCLA remedial action. When EPA leads the remedial action, the SSC is used to identify the roles and responsibilities of EPA and the State, and to document assurances by the State that are required under CERCLA. When the State leads the remedial action, the CA is used to identify the roles and responsibilities of the State and EPA, and to document assurances by the State that are required under CERCLA. The CA also provides the mechanism to transfer trust fund (*i.e.*, Superfund) monies to the State for the response activities.[7] In addition, the State and EPA may enter into a Superfund Memorandum of Agreement (SMOA), which is a general, non-site-specific agreement that defines the roles of, and interaction between, EPA and the State for conducting response actions.

A Federal agency other than EPA can also assume the roles and responsibilities of the lead agency. These responsibilities include coordinating and communicating with EPA and the State in their shared role as support agencies. At NPL sites, the division of authority and responsibility between the Federal agency as lead and the support agencies, particularly in preparing the Proposed Plan and the ROD, should be specified in an Interagency Agreement (IAG). IAGs must follow the requirements of CERCLA §120(e). This agreement should be reached by considering the process and activities outlined in this guidance, the CERCLA requirements, and the NCP. At NPL and non-NPL sites, Federal agency response actions are expected to be consistent with this and other EPA guidance, as specified in CERCLA §120(a).[8]

### 1.2.3 Potentially Responsible Parties

Under CERCLA §104, a person or entity potentially responsible for a release of hazardous substances, pollutants, or contaminants into the environment (*i.e.*, a Potentially Responsible Party (PRP)), may also be allowed to conduct certain response actions in accordance with CERCLA §122, if the lead agency determines that party is qualified and otherwise capable. For a PRP-lead RI/FS response action, either EPA or the State is the lead agency for overseeing the PRP's work and for developing the Proposed Plan and the ROD.[9] The lead agency determines whether the PRP, or the PRP's contractor, is qualified and capable of doing the work. PRPs may participate in the remedy selection process by submitting comments on the Proposed Plan or other information contained in the Administrative Record file during the formal public comment period held before the final selection of a remedy for a site. However, PRPs generally should not be permitted to write Proposed Plans, RODs or any amendments to those documents.

### 1.2.4 Remedial Investigation/Feasibility Study

At or before the time a site is listed on the NPL, the lead agency or PRP begins an RI/FS.[10] During an RI/FS, the lead agency gathers or oversees the gathering of information to support an informed decision regarding which remedy (if any) is most appropriate for a given site or an operable unit within a site. Interim or early actions can be taken throughout the RI/FS process to initiate risk reduction activities. It is recommended that all parties involved in the development of

[7] All funds committed and obligated to a State in a Cooperative Agreement are tracked with an account number. After the funds have been obligated, payments to the State are made through the Automated Clearing House (ACH) process.

[8] Generally, this guidance applies to other Federal agencies in the same manner and extent that it applies to EPA. If questions arise regarding the application of this guidance to remedial response actions at Federal facility sites, the Federal agency staff should consult their legal counsel as well as EPA. CERCLA requires that EPA concur with remedy selection decisions at Federal facility sites on the NPL. If EPA does not concur, EPA has the authority to select the remedy in lieu of the Federal facility.

[9] For detailed information pertaining to PRP oversight, refer to *Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies*, Volumes 1 and 2 (EPA 540-G-91-010a and b, July 1991).

[10] An RI/FS can be performed on the site as a whole, or for a particular portion of the site. The NCP defines an operable unit (OU) as a "discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure" (NCP §300.5). Hence, an operable unit can be a certain geographic portion of a site or can address an environmental medium at the site (*e.g.*, ground water, soil). Operable units may also be comprehensive but temporary remedies (*e.g.*, temporary caps across a site) that provide interim protection of human health and the environment before final remediation. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site.

the RI/FS engage in a joint scoping meeting prior to finalization of the RI/FS Work Plan. Increased efficiency and cost savings can be gained through coordination and mutual understanding of project expectations.

Usually, the RI and FS are conducted concurrently in an interactive, iterative manner. The data collected during the RI are used to develop remedial alternatives in the FS, and the alternatives identified in the FS determine the necessity of treatability studies or the collection of additional data in the RI. In general, the RI consists of the following actions:

- Determining the nature and extent of the contamination at the site or operable unit.
- Assessing risks to human health and the environment from this contamination.
- Conducting treatability tests to evaluate the potential performance and cost of the treatment technologies being considered for addressing these risks.

In characterizing the site, the lead agency or PRP identifies the source of contamination, potential routes of migration, and current and potential human and environmental receptors. A baseline risk assessment conducted during the RI estimates what risks the site poses now and would pose in the future if no cleanup action were taken. Thus, it provides the basis for taking action and identifies contaminants and the exposure pathways that need to be addressed by the remedial action. Treatability studies are bench, pilot, or full-scale tests of particular technologies on samples of actual site wastes. Such studies may be conducted to identify which technologies are suitable for addressing the waste to be treated.

A component of this investigation and planning process should be early and continuing consultation with the community. This consultation can elicit useful knowledge about the site (*e.g.*, current and reasonably anticipated future land uses and current and potential beneficial ground-water uses) as well as major public concerns that should be considered.

The FS involves the identification and detailed evaluation of potential remedial alternatives. This process begins with the formulation of viable alternatives, which involves defining remedial action objectives, general response actions, volumes or area of media to be addressed, and potentially applicable technologies. Following a preliminary screening of alternatives, a reasonable number of appropriate alternatives undergoes a detailed analysis using the nine evaluation criteria in the NCP. (For a discussion of this analysis, see Chapters 3 and 6.) The detailed analysis profiles individual alternatives against the criteria and compares them with each other to gauge their relative performance. Each alternative that makes it to this stage of the analysis, with the exception of the required "No Action" alternative, is expected to be protective of human health and the environment and compliant with Applicable or Relevant and Appropriate Requirements (ARARs) (unless a waiver is justified), both threshold requirements under CERCLA.[11]

### 1.2.5 Proposed Plan

The Preferred Alternative for a site is presented to the public in a Proposed Plan. The Proposed Plan briefly summarizes the alternatives studied in the detailed analysis phase of the RI/FS, highlighting the key factors that led to identifying the Preferred Alternative. The Proposed Plan, as well as the RI/FS and the other information that forms the basis for the lead agency's response selection, is made available for public comment in the Administrative Record file. The opportunity for a public meeting must also be provided at this stage.

### 1.2.6 Record of Decision

Following receipt of public comments and any final comments from the support agency, the lead agency selects and documents the remedy selection decision in a ROD. The ROD documents the remedial action plan for a site or operable unit and serves the following three basic functions:

- It certifies that the remedy selection process was carried out in accordance with CERCLA and, to the extent practicable, with the NCP.[12]

[11] ARARs include any Federal or State standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate to a CERCLA site or action.

[12] Section 121(a) of CERCLA provides that remedial actions should be carried out in accordance with §121 "and, to the extent practicable, the National Contingency Plan."

- It describes the technical parameters of the remedy, specifying the methods selected to protect human health and the environment including treatment, engineering, and institutional control components, as well as cleanup levels.

- It provides the public with a consolidated summary of information about the site and the chosen remedy, including the rationale behind the selection.

While the ROD should provide a comprehensive description of site conditions, the scope of the action, the Selected Remedy, cleanup levels, and the reason for selecting the remedy, it is only one part of the Administrative Record file, which contains the full details of site characterization, alternatives evaluation, and remedy selection.

### 1.2.7 Remedial Design

The ROD provides the framework for the transition into the next phase of the remedial process. Remedial Design (RD) is an engineering phase during which additional technical information and data identified are incorporated into technical drawings and specifications developed for the subsequent remedial action. These specifications are based upon the detailed description of the Selected Remedy and the cleanup criteria provided in the ROD.

### 1.2.8 Remedial Action

After completion of the RD, the Remedial Action (RA) begins. During RA, the implementation phase of site cleanup occurs. Upon completion of the remedial action for an operable unit, a remedial action report is prepared. Upon completion of remedial construction activities for the final operable unit at the site, a Preliminary Site Closeout Report (PCOR) is prepared which documents NPL site construction completion (pursuant to *Close Out Procedures for National Priority List Sites* (EPA 540-R-95-062, August 1995, update anticipated in FY99).

When all phases of remedial activity at a site have been completed and no further response is appropriate, the site may be eligible for deletion from, or recategorization on, the NPL. Completed cleanup results documented in a Remedial Action Report or Final Closeout Report (as detailed in the above referenced guidance) should be compared with the terms in the ROD to determine whether remedial action objectives and cleanup levels have been attained so that the site may be further evaluated for deletion from the NPL, pursuant to the requirements of NCP §300.425(e). CERCLA requires a review to be conducted at least every five years at sites where an action has been selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure (see Highlight 6-36 for more information on five year reviews). Changes to the remedy selected in the ROD that occur during the RD/RA process must be described in an Explanation of Significant Differences (ESD) or ROD Amendment pursuant to NCP §§300.435(c)(2) and 300.825(a).

## 1.3 OUTLINE OF THIS GUIDANCE

This guidance is organized as follows.

- Chapter 2 summarizes the roles and responsibilities of lead and support agencies in developing the Proposed Plan. It also highlights the requirements for the newspaper notification that announces the availability of the Proposed Plan and discusses the public comment process.

- Chapter 3 presents the purpose and regulatory requirements of the Proposed Plan. This chapter also contains a detailed checklist outlining the components of a Proposed Plan. This checklist may be used as a worksheet when writing or reviewing a Proposed Plan.

- Chapter 4 describes the general framework for categorizing minor and significant changes made to the Preferred Alternative before issuance of the ROD and discusses documentation and public information activities that may be necessary as a result of these changes.

- Chapter 5 summarizes the roles and responsibilities of lead and support agencies in developing the ROD. It also outlines how to issue the notice of ROD availability.

- Chapter 6 presents the purposed and regulatory requirements for the ROD, as well as a recommended format which discusses key elements and summary tables for each section. This chapter also contains a detailed checklist outlining the components of a ROD. This checklist may be used as a worksheet when writing or reviewing a ROD.

- Chapter 7 discusses the procedures to follow when changes occur to the Selected Remedy after a ROD is signed. A sample outline and checklist is presented for Explanations of Significant Differences (ESDs) and ROD Amendments.

- Chapter 8 presents the recommended ROD formats for three specific types of remedial action decisions: no action, interim action, and contingency remedy decisions.

- Chapter 9 presents information on documenting the following remedy selection situations: lead (Pb), presumptive remedies, and ground water.

- Appendix A provides an example Proposed Plan that satisfies the requirements and suggestions described in this guidance.

- Appendix B provides additional information on addressing the following ground-water issues: phased approach, non-aqueous phase liquids (NAPLs), deferral of design, and monitored natural attenuation.

- Appendix C contains a fact sheet and a transmittal memorandum which discuss consultation procedures for Superfund response decisions.

- Appendix D outlines the procedures for submitting final remedy selection decision documents to the Superfund Document Center at EPA Headquarters.

- Appendix E lists additional sources of information on the remedy selection process and other stages of the remedial process that might be helpful to a remedy selection decision document writer.

# 2.0 PROCESS FOR DEVELOPING THE PROPOSED PLAN

## 2.1 OVERVIEW

This chapter summarizes the roles and responsibilities of the lead and support agencies in developing the Proposed Plan. Personnel in the lead and support agencies should begin discussions on the alternatives analyzed in the FS as early as possible and attempt to reach an agreement on identifying a Preferred Alternative. These early discussions should help prevent delays in the later stages of the remedy selection process. PRPs conducting the RI/FS should identify to the lead agency which alternatives have been considered and screened from further consideration before the detailed analysis. The remaining alternatives should be analyzed in detail.

The results of this analysis provide the basis for the lead agency to identify a Preferred Alternative. Throughout the RI/FS process the lead agency should keep the community and others well-informed of site activities through meetings, information bulletins, and by regularly updating the Administrative Record file. The lead agency should also actively seek input from the community on the remedial alternatives being considered.

The general steps in preparing the Proposed Plan for public comment are summarized in Highlight 2-1. The sequence in which these steps are taken may vary somewhat among EPA Regional Offices and States.

The lead agency should begin drafting the Proposed Plan upon completion of the RI/FS Report (in some circumstances, a draft can be developed as the RI/FS is being finalized). If a PRP prepares the RI/FS, then the Proposed Plan should be drafted by the lead agency after the lead agency approves the RI/FS. The RI/FS Report should be sent to the support agency as soon as it is available, but no later than when the draft Proposed Plan is transmitted to the support agency for review and comment.

A Preferred Alternative is identified tentatively on the basis of the RI/FS Report and ongoing discussions between the lead and support agencies and the affected community and PRPs.[1] A formal briefing on the RI/FS and the Preferred Alternative should be made to lead agency management. After this meeting, a draft Proposed Plan is written and submitted to the support agency and lead agency management for review and comment.

The lead agency should prepare the final Proposed Plan taking into consideration the comments from the support agency and based on the results of the internal program and management review process. This final version should include either a summary of the support agency's agreement with the Plan or its dissenting comments.[2] Finally, the notice announcing the availability of the Proposed Plan, along with a brief abstract of its content, must be published in a major local newspaper. The Proposed Plan and any supporting analysis and information (including the RI/FS) must be made available in the Administrative Record file.

## 2.2 ROLE OF LEAD AND SUPPORT AGENCIES

For the remedy selection process to succeed, lead and support agencies should interact throughout the entire RI/FS and Proposed Plan process. The goal of this continued interaction is to reach agreement on the Proposed Plan and the RI/FS Report before the public comment period starts.

### *2.2.1 Designation of Roles and Responsibilities*

EPA and the State play specific roles throughout the remedial process. These roles should be defined in the SSC, SMOA, or CA.[3] State participation specifi-

[1] The Preferred Alternative must be identified by the lead agency itself. A technical support contractor hired to assist a government entity in performing its duties or a PRP can recommend, but can not identify, the Preferred Alternative.

[2] If the State is the lead agency and EPA does not approve the Proposed Plan, then the State may not issue the Plan unless the proposed action is a non-Fund financed State-lead enforcement action. (See NCP §300.515(e)(1) and Section 2.3 of this chapter for more detailed information.) If a Federal facility is the lead agency and EPA does not approve the Proposed Plan, then the Federal facility may not issue the Plan unless the proposed action is for a non-NPL site at the Federal facility.

[3] The SMOA is a non-binding agreement that outlines cooperative efforts between States and EPA Regions and defines the roles and responsibilities of each party in the conduct of a Superfund program in a State. For more information, see NCP §300.505 and *Interim Final Guidance on Preparing a Superfund Memorandum of Agreement (SMOA)* (OSWER 9375.0-01, May 1989, or its revised edition). The CA is a legal instrument between EPA and the State in which EPA may transfer money to the State to conduct response activities.

## Highlight 2-1: Preparation of The Proposed Plan by the Lead Agency

cally during the RI/FS and Proposed Plan process is important to the successful selection of the remedy and completion of the remedial process. First, the State must be given the opportunity to concur on the ROD; second, for Fund-financed remedial actions, certain State assurances including those for cost share and Operations and Maintenance (O&M) are required to conduct the RA. The SSC or CA should designate the lead and support agency for conducting the RI/FS, developing the Proposed Plan, and drafting the ROD. The SMOA, if applicable, should describe the general procedures for oversight and interaction between EPA and the State.

At Federal facility sites on the NPL, designation and coordination of roles and responsibilities among EPA, the State, and the lead Federal agency are also very important for the successful completion of the remedial process. At such sites, these roles are defined in an IAG. Where EPA may be involved at Federal facility sites not on the NPL, these roles may be established by way of memoranda of understanding (MOUs), letter agreements, etc. Generally, at Federal facility sites, the EPA and the State are co-regulators and the Federal agency which owns and/or operates the site is the lead agency.

### 2.2.2 Lead and Support Agency Responsibilities

NCP §300.430(f)(3)(i) requires the lead agency to do the following after preparation of the Proposed Plan and review by the support agency:

- Publish a notice of availability and brief analysis of the Proposed Plan in a major local newspaper.
- Make the Proposed Plan and supporting analysis and information available in the Administrative Record file.
- Provide a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments on the Proposed Plan and the material contained in the Administrative Record file.
- Provide the opportunity for a public meeting to be held during the public comment period.
- Keep a transcript of the public meeting held during the public comment period and make such transcript available to the public.
- Prepare a written summary of significant comments, criticisms, and new relevant information submitted during the public comment period and the lead agency response to each issue. This Responsiveness Summary must be made available with the ROD.

NCP §300.515 discusses the requirements for State involvement in the preparation and publication of the Proposed Plan.

The role of other program offices within EPA and State agencies is to provide specific comments on the alternatives analyzed in the RI/FS Report. EPA and the State should establish the appropriate procedures and time frames for these reviews. Other program offices should review the RI/FS Report at appropriate times during the process to ensure that alternatives in the detailed analysis phase of the RI/FS Report comply with substantive requirements of other laws that qualify as ARARs. For EPA, this may involve review by program offices with responsibility for implementing the Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), Clean Air Act (CAA) and Toxic Substances Control Act (TSCA) programs. If a draft Proposed Plan is available when the RI/FS Report is ready to be circulated, it should be circulated at the same time.

### 2.2.3 Management Review of Proposed Plan

The lead and support agencies should determine the appropriate level of managerial review for the draft Proposed Plan and, as appropriate, include this in the SMOA, SSC, or CA. The Regional Administrator and State Director (or their appropriate designees) should be briefed on the contents of both the RI/FS Report and Proposed Plan, as well as on any unresolved or potentially controversial issues, by their respective staffs before these documents are released to the public.

All draft Proposed Plans should be sent to the appropriate EPA headquarters regional coordinator for review pursuant to *Focus Areas for Headquarters OERR Support for Regional Decision Making* (OSWER 9200.1-17,

May 1996). Some remedy selection decisions will also be eligible for consultation with the National Remedy Review Board or another Cross-Regional review group. See Appendix C for a more complete discussion of Proposed Plan consultation procedures. For more information on the National Remedy Review Board, see http://www.epa.gov/superfund/ programs/nrrb/ index.htm.

### 2.2.4 Support Agency Comment Period

The support agency's comment period presents an important opportunity for the lead and support agencies to reach agreement on the Preferred Alternative.[4] The comment period begins when the support agency receives the Proposed Plan from the lead agency and lasts 5 to 10 working days. If a different review period is established in the SMOA, it should be followed. In the absence of a SMOA, the support agency has a minimum of 5 working days and a maximum of 10 working days to comment on the Proposed Plan (NCP §300.515(h)(3)).[5]

During the review period, the support agency should provide written comments on the Preferred Alternative and other components of the Proposed Plan. These comments should indicate one of the following:

- Agreement, with or without comments.
- Disagreement, with or without comments.
- No comment on the Proposed Plan at this time.

When the State is the support agency, it has the option of submitting its comments at the end of the public comment period.

EPA must respond to State comments on waivers from or disagreements about State ARARs, as well as on the Preferred Alternative, when making the RI/FS report and Proposed Plan available for public comment (NCP §300.515(d)(4)). The Proposed Plan must include a statement that the lead and support agencies have reached agreement, or where this is not the case, a statement explaining the concerns of the support agency with the lead agency's Proposed Plan (NCP §300.515(e)(1)). These comments and the lead agency's formal response to these comments must be included, in their entirety, in the Administrative Record file.

## 2.3 PROCEDURES FOR RESOLVING DISPUTES

If a dispute occurs between the lead and support agencies during any phase of the remedial process, the staffs of the agencies should attempt a timely resolution of the disputed issue. If staff resolution is not possible, the issue should be brought promptly to management's attention for resolution.[6]

The lead and support agencies should use the dispute resolution process specified in the SMOA or CA when appropriate. If other Federal agencies besides EPA are involved, the dispute resolution process specified in the IAG should be followed. Alternatively, the lead and support agencies could consider using the dispute resolution process recommended in the NCP Preamble to subpart F (55 *FR* 8781). The section entitled "State Involvement in Hazardous Substance Response" outlines a process that EPA Regional Offices and States should use to resolve disputes that arise during the RI/FS and remedy selection process. This approach encourages the lead and support agencies' RPMs to resolve any disputes promptly. If this cannot be accomplished, the dispute could be referred to their supervisors for further EPA/State consultation. This supervisory referral and resolution process should continue, if necessary, to the level of Director of the State agency and the Regional Administrator, respectively. If agreement still cannot be reached, the dispute should be referred to the Assistant Administrator of OSWER, who serves as final arbiter on remedy selection issues.

[4] For Fund-financed projects, EPA must approve the Proposed Plan even if the State is the lead agency (NCP §300.515(e)(1)). For State-lead, non-Fund financed enforcement sites where the State is using their own authorities rather than CERCLA, no EPA concurrence is required.

[5] The draft RI/FS Report could be given to the support agency before the Proposed Plan is ready for review. The review period for the draft RI/FS Report should last at least 15 working days, unless a different time period is established in the SMOA or CA or between the lead and support agencies. In the absence of a SMOA, the support agency has a minimum of 10 working days and a maximum of 15 working days to comment on the RI/FS (NCP §300.515(h)(3)).

[6] Potential EPA Regional and Headquarters resources to access neutral mediators should be explored, as appropriate.

Regardless of the process used, the result should be an equitable resolution of outstanding issues. There may be instances, however, in which a final resolution cannot be achieved. If this should occur, two alternatives exist for continuing effective action. First, if EPA is the lead agency (pursuant to CERCLA §§104, 106, or 122), the Region should use its discretion as to whether to proceed with publication of the Proposed Plan. Second, if the State is the lead agency (pursuant to §104), EPA must approve the Proposed Plan before it may be issued (NCP §300.515(e)(1)). In some cases, EPA could elect to become the lead agency for the Proposed Plan, public participation activities, and the ROD. (This applies only to Fund-financed, State-lead projects.) However, mutual acceptance of the Preferred Alternative (and, ultimately, of the selected remedy) by both EPA and the State is an important goal in order to effect timely cleanup at the site. In addition, State involvement during the RI/FS and Proposed Plan process is important to the successful selection of the remedy and completion of the remedial action.

## 2.4 ROLE OF OTHER FEDERAL AGENCIES

Executive Order 12580 (52 *FR* 2923 January 29, 1987) delegates the authority for carrying out the requirements of CERCLA §§117(a) and (c) to Federal agencies for those Federal facilities under their jurisdiction, custody, or control. A Federal agency, therefore, has the responsibility to issue the Proposed Plan. At a Federal facility on the NPL, the IAGs between a Federal agency, EPA, and, in many cases, the State, should establish the responsibilities for each party in preparing the Proposed Plan for Federal facility sites. Where the Federal agency is the lead agency, the responsibilities for preparing the Proposed Plan include those lead agency responsibilities specified in Chapters 2 and 3 of this guidance.

## 2.5 ROLE OF POTENTIALLY RESPONSIBLE PARTIES

In accordance with CERCLA §§104 and 122, EPA can provide PRPs with the opportunity to conduct the required response actions (*i.e.*, the RI/FS, remedial design, and remedial action). If the PRPs conduct the RI/FS (including the risk assessment), either EPA or the State will become the lead governmental agency for general oversight of the RI/FS. EPA or the State should prepare the Proposed Plan and the ROD, even if the PRP conducts the RI/FS (*i.e.*, the lead agency identifies the Preferred Alternative (see footnote #1 in this chapter)). At those sites for which the PRP conducts the RI/FS, the alternative preferred by the PRP should not be indicated in the RI/FS Report.[7]

PRPs may also participate in the remedy selection process by commenting on the Proposed Plan and on other publicly available information in the Administrative Record file during the formal public comment period. If comments are submitted by PRPs and members of the public prior to the formal public comment period, the lead agency should advise those parties that their concerns may not be addressed until the end of the formal comment period.

## 2.6 PUBLIC PARTICIPATION

The regulatory requirements for public participation in association with the Proposed Plan are listed in Section 2.2.2. Additional information concerning newspaper notification and the public comment period is provided below.

### *2.6.1 Newspaper Notification*

The announcement of the availability of the Proposed Plan and Administrative Record file should be made at least two weeks prior to the beginning of the public comment period so that the public has sufficient time to obtain and read the Proposed Plan. The lead agency's newspaper notification must include a brief abstract of the Proposed Plan, which describes the alternatives analyzed and identifies the Preferred Alternative (NCP §300.430(f)(3)(i)(A)). The notice should be published in a widely read section of the newspaper. The notification should be designed to attract attention and engage the reader and should be written in simple, non-technical language. Key elements of the notification are summarized below. Highlight 2-3 provides a sample newspaper notification.

The newspaper notification should consist of the following elements:

[7] For more information, see *Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies*, Volumes 1 and 2 (EPA 540-G-91-010a and b, July 1991).

- *Site name and location.* Gives proper site name and location.

- *Date and location of a public meeting.* If a public meeting is scheduled, it should be held at a reasonable time at or near the site. If one has not been scheduled, the notice should inform the public of the opportunity for a public meeting.

- *Identification of lead and support agencies.* Identifies which entities (*i.e.*, EPA, State agency, or other Federal agency) are serving as lead and support agencies.

- *Alternatives evaluated in the detailed analysis.* Lists remedial alternatives evaluated in the detailed analysis phase of the FS.

- *Identification of Preferred Alternative.* States briefly the major components of the Preferred Alternative.

- *Request for public comments.* The notice should emphasize that the lead agency is soliciting public comment on all alternatives evaluated in the detailed analysis phase of the FS, as well as on the Preferred Alternative. The request should include a clear statement that the Preferred Alternative is only a preliminary determination and that the Preferred Alternative could be modified since any of the other options presented could be selected as the remedy based upon public comment, new information, or a re-evaluation of existing information. The readers should be referred to the RI/FS Report and other contents of the Administrative Record file for further information on all remedial alternatives considered.

- *Public participation opportunities.* The notice informs the public of its role in the remedy selection process and provides the following:

  - Location of information repositories and Administrative Record file.

  - Methods by which the public may submit oral and written comments, including a contact person.

  - Dates of the public comment period.

  - Contact person for a Community Advisory Group (CAG), or Technical Advisory Grant (TAG) recipient, if applicable.

For further information on writing newspaper notification, please see EPA's Quick Reference Fact Sheet, *Publishing Effective Public Notices* (OSWER 9378.0FS, April 1997).

**Highlight 2-2: Tips for Writing an Effective Public Notice**

- Publish the notice about 10 days before the event. If budgets permit, publish the notice again 5 days before and 1 day before the event.
- Choose a location in the paper that is well-read (sports, TV, or local news section).
- Be specific about what the reader should do and how to do it.
- Keep the notice as short as possible and use simple, non-technical words.
- Remember, the appearance of the notice, as well as the message, is important. Make it visually appealing.

### 2.6.2 Public Comment Period

This section provides guidance on the procedures the lead agency should follow to satisfy the public participation requirements in NCP §300.430(f)(3).

The lead agency is charged with making the relevant documents, such as the Proposed Plan and the RI/FS Report, available to the public at the time the newspaper notification is made.[8] In addition, the lead agency must ensure that any information that forms the

[8] In addition to being published in the newspaper, the notice of the Proposed Plan should be sent directly to the citizens and PRPs via the community relations or enforcement mailing list for the site. (Although not a statutory or regulatory requirement, this may allow timely participation from citizens and PRPs outside the circulation area of the local newspaper.)

basis for selecting the response action is included as part of the Administrative Record file and is available to the public during the public comment period.

CERCLA §117(a)(2) also requires the lead agency to provide the public with a reasonable opportunity to submit written and oral comments on the Proposed Plan. NCP §300.430(f)(3)(i) requires the lead agency to allow the public a minimum of 30 days to comment on the information contained in the RI/FS Report and Proposed Plan (including any proposed waivers relating to ARARs). In addition, the lead agency must extend the comment period by a minimum of 30 additional days, upon timely request.

The lead agency must provide an opportunity for a public meeting to be held at or near the site during the comment period. A transcript of the meeting conducted during the public comment period must be made available to the public and should be included as part of the Administrative Record file (pursuant to NCP §300.430(f)(3)(i)(E)). The lead agency should also place the transcript in the information repository. Although the lead agency may respond to oral or written comments received during the RI/FS process and before the public comment period, it has no legal obligation to do so. To ensure that their comments are addressed, commenters may wish to resubmit their comments during the formal public comment period as well.

Further guidance on the public comment period and the lead agency's responsibilities can be found in *Incorporating Citizen Concerns into Superfund Decision-Making* (OSWER 9230.0-18, January 1991). For more information specific to procedures at Federal facility sites, refer to the *Restoration Advisory Board Implementation Guidelines* (U.S. EPA and DOD, September 27, 1994) and *Site-Specific Advisory Board Guidance* (Office of Environmental Management, DOE, October 1995).

**Highlight 2-3: Sample Newspaper Notification of Availability of Proposed Plan and Public Meeting**

# EPA Proposes Cleanup Plan for the EIO Industrial Site

# Proposed Plan Nameless, TN

**March 1, 1999**

The U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) will hold a Public Meeting to discuss the Remedial Investigation/Feasibility Study (RI/FS) Report and Proposed Plan for the cleanup of the EIO Industrial Site, Nameless, TN. The RI/FS Report discusses the risks posed by the site and presents an evaluation of cleanup options. The Proposed Plan identifies a preferred cleanup alternative for the public to comment on along with the other options considered.

EPA and TDEC evaluated the following options for addressing the contaminated soil and ground water at the site:

Soil
- No action
- In-situ soil vapor extraction and solidification, and capping
- Excavation, on-site thermal destruction, solidification, and capping

Ground Water
- No action
- Pump and treat by carbon adsorption and discharge to XYZ River
- Pump and treat by carbon adsorption followed by reinjection

Based on available information, the preferred option proposed for public comment at this time is to treat the contaminated soil at the site through in-situ vapor extraction, to solidify the soils, disposing them on site, and to pump and treat the ground water by carbon adsorption and discharge it to the XYZ River. Although this is the Preferred Alternative at the present time, EPA and TDEC welcome the public's comments on all of the alternatives listed above. The formal comment period ends on March 30. EPA and TDEC will choose the final remedy after the comment period ends and may select any one of the options after taking public comments into account.

**Copies of the RI/FS and Proposed Plan along with the rest of the Administrative Record file are available at:**

Nameless Public Library
619 South 20th Street
Nameless, TN 00000
(101) 999-1099
Hours: 9 a.m. to 9 p.m.
Monday through Saturday

U.S. EPA Records Center, Region 4
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104
(555) 555-5555
Hours: 8:30 a.m. to 5:00 p.m.
Monday through Friday

**Public Meeting**
**March 13, 1999 at 7:30 p.m.**
**Community Hall**
**237 Appleton Street, Nameless, TN.**

**For further information or to submit written comments, please contact:**

Joshua Doe
Community Relations Coordinator
U.S. Environmental Protection Agency
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104
(555) 555-5555

# 3.0 WRITING THE PROPOSED PLAN

This chapter presents a recommended structure for the Proposed Plan and is accompanied by an outline and checklist, which can be found at the end of the chapter. Appendix A contains a sample Proposed Plan which is meant to illustrate the appropriate level of detail for the recommended format presented in this chapter.

## 3.1 PURPOSE OF THE PROPOSED PLAN

The Proposed Plan is a document used to facilitate public involvement in the remedy selection process. The document presents the lead agency's preliminary recommendation concerning how best to address contamination at the site, presents alternatives that were evaluated, and explains the reasons the lead agency recommends the Preferred Alternative.

The lead agency solicits public comment on the Proposed Plan including all of the alternatives considered in the detailed analysis phase of the RI/FS, because the lead and support agencies may select a remedy other than the Preferred Alternative based on public comment. The final decision regarding the selected remedy is documented in the ROD after the lead agency has considered all comments from both the support agency and the public.

## 3.2 REGULATORY REQUIREMENTS FOR THE CONTENT OF THE PROPOSED PLAN

In the first step of the remedy selection process, the NCP directs the lead agency to identify a Preferred Alternative and present that alternative to the public in a Proposed Plan. The Proposed Plan must briefly describe the remedial alternatives analyzed, propose a preferred remedial action alternative, and summarize the information relied upon to select the Preferred Alternative (NCP §300.430(f)(2)). This section of the NCP also states that, at a minimum, the Proposed Plan must:

- Provide a brief summary description of the remedial alternatives evaluated in the detailed analysis;
- Identify and provide a discussion of the rationale that supports the Preferred Alternative;
- Provide a summary of any formal comments received from the support agency; and
- Provide a summary explanation of any proposed ARAR waiver.

In addition, the NCP requires that EPA must respond to State comments on waivers from, or disagreements about, State ARARs, as well as the Preferred Alternative, when making the Proposed Plan available for public comment (NCP §300.515(d)(4)).

## 3.3 SECTION-BY-SECTION DESCRIPTION OF THE PROPOSED PLAN

Highlight 3-1 shows the major sections of the Proposed Plan. Each section is described in a more complete manner below.

### *3.3.1 Introduction*

The introduction should state that the Proposed Plan is a document that the lead agency is required to issue to fulfill public participation requirements under CERCLA and the NCP. The primary purpose of the introduction is to inform and solicit the views of citizens on the Preferred Alternative.

This section should include the site name and location and identify the lead and support agencies for the remedial action. It should also state that the Proposed Plan is a document that the lead agency is required to issue to fulfill the requirements of CERCLA §117(a) and NCP §300.430(f)(2).

The public should be informed of the function of the Proposed Plan in the remedy selection process; specifically, its purposes are the following:

- Provide basic background information.
- Identify the Preferred Alternative for remedial action at a site or operable unit and explain the reasons for the preference.

- Describe the other remedial options considered.
- Solicit public review of and comment on all alternatives described.
- Provide information on how the public can be involved in the remedy selection process.

Other items that should be covered in the introduction include the following:

**Highlight 3-1: Major Sections of the Proposed Plan**

A. **Introduction** - Identifies site and describes the public participation process

B. **Site Background** - Provides facts about the site which provide the context for the subsequent sections of the Proposed Plan

C. **Site Characteristics** - Describes nature and extent of site contamination.

D. **Scope and Role** - Describes how the operable unit or response action fits into the overall site strategy

E. **Summary of Site Risks** - Summarizes the results of the baseline risk assessment, and the land use and ground-water use assumptions used in the analysis

F. **Remedial Action Objectives** - Describes what the proposed site cleanup is expected to accomplish

G. **Summary of Alternatives** - Describes the options for attaining the identified remedial action objectives

H. **Evaluation of Alternatives** - Explains the rationale for selecting the Preferred Alternative

I. **Preferred Alternative** - Describes the Preferred Alternative, summarizes support agency comments, and affirms that it is expected to fulfill statutory and regulatory requirements

J. **Community Participation** - Provides information on how the public can provide input to the remedy selection process

- Relationship of RI/FS to the Proposed Plan. A clear statement should be made that the Proposed Plan highlights key information from the RI/FS Report. The Plan should refer the reader to the RI/FS Report and Administrative Record file for more information regarding the remedial action.[1]
- Importance to the remedy selection process of public input on *all* alternatives and on the rationale for the Preferred Alternative. New information or arguments the lead agency learns during the public comment period could result in the selection of a final remedial action that differs from the Preferred Alternative.

### 3.3.2 Site Background

This section provides the foundation for the subsequent sections of the Proposed Plan. Answers to the following questions should help provide a complete background description:

- *What media are contaminated at the site?* Describe the media contaminated (*e.g.*, soil, air, ground or surface water).
- *What caused the current contamination at the site?* Provide a brief history of waste generation or disposal that led to current contamination problems.
- *Who has investigated site contamination, and with what results?* Describe history of Federal, State, and local site investigations.
- *What has been done to remediate the contamination?* Describe any previous response actions at the site (*e.g.*, removal, voluntary cleanup).
- *Are the parties responsible for site contamination involved in the cleanup?* Detail enforcement activities, such as the results of PRP searches or notices sent to PRPs, and whether they have conducted any of the studies upon which the Proposed Plan is based.

[1] Subpart I of the revised National Contingency Plan (40 CFR 300.800, *et seq.*) and the *Final Guidance on Administrative Records for Selection of CERCLA Response Actions* (OSWER 9833.3A-1, December 1990) provide detailed information on developing, maintaining, and providing access to the Administrative Record file for the selection of the CERCLA response action.

- *What previous efforts have been made by the lead agency to involve the public in matters related to site cleanup?* Describe major public participation activities, prior to the issuance of the Proposed Plan (*e.g.*, special community outreach related to environmental justice concerns, or identification of reasonably anticipated future land and groundwater uses).

### 3.3.3 Site Characteristics

- *What are the physical characteristics of the site?* Provide a brief description of site characteristics to help the public understand why the alternatives proposed are appropriate.

- *What roads, buildings, and land uses are present on the site?* Provide a site map containing this information.

- *What geographical or topographical factors had a major impact on remedy selection?* Examples include: current or potential drinking water sources affected or threatened by site contamination, wetlands on the site, or areas of major historical importance.

- *How much and what type of contamination is present?* Describe the nature and extent of contamination.

- *What are the source materials on the site that constitute principal threats?* Identify the location, volume and nature of mobile/high-toxicity/high-concentration source material (see Section 6.3.11)

### 3.3.4 Scope and Role of Operable Unit or Response Action

This section of the Proposed Plan should summarize the lead agency's overall strategy for remediating the site and describe how the action being considered in the Proposed Plan fits into that overall strategy.

If the response is being carried out in operable units, the purpose of each operable unit and their planned sequence should be described. Any prior or planned removal actions and interim or early remedial actions should also be discussed. Finally, how the operable unit or response action addresses source materials constituting principal threats should be identified as well. An example of this discussion follows:

> *"This is the second of three planned operable units for the site. The first operable unit provided the community with an alternate water supply to prevent ingestion of contaminated ground water. This second operable unit addresses remediation of the source materials, which include contaminated soil and sludges from former lagoon areas. These source materials constitute principal threat wastes at the site. The third and final operable unit will address the contaminated ground water."*

### 3.3.5 Summary of Site Risks

The human health and ecological risks posed by the site determine whether or not a remedial action is warranted. This section of the Proposed Plan should briefly summarize information in the baseline risk assessment to describe the nature and extent of the risks posed to human health and the environment by the contamination at the site. This discussion should be broken into the following two subsections: (1) human health risks, and (2) ecological risks.

Technical terms or concepts used in the baseline risk assessment that are likely to be unfamiliar to the public should be explained or defined if used in the Proposed Plan (*e.g.*, any numeric risk representations, such as cancer risks and hazard quotients, need to be accompanied by a "plain-English" explanation). Basic explanations of these concepts are provided in the examples contained in Section 6.3.7.

Generally, the risk summary in the Proposed Plan should be a narrative description rather than a tabular presentation. Risk tables are more appropriate for the level of detail needed in a ROD than for the Proposed Plan. The length of most risk descriptions in the Proposed Plan should be limited to no more than two or three paragraphs. For sites that are complex or for sites where there is heightened public interest, more risk assessment information may be needed in the Proposed Plan. A risk assessor should be consulted if a streamlined risk summary table is presented in the Proposed Plan to ensure that it is consistent with the summary tables in the risk assessment. See Section 6.3.7 for examples of site risk summary tables, recommended for a ROD, that could be used in an expanded risk section in the Proposed Plan.

Key information from the baseline risk assessment that should be covered in the Proposed Plan includes the following:

- *Major chemical(s) of concern (COCs)* in each medium. For an explanation of the term COC, see Chapter 6, footnote #7.

- *Land and ground-water use assumptions* (*i.e.*, the current and reasonably anticipated future land uses and the current and potential beneficial ground-water uses, and the basis for these assumptions (*e.g.*, community input)).

- *Potentially exposed populations in current and future risk scenarios* (*e.g.*, worker currently on-site, adults or children living on-site in the future).

- *Exposure pathways affecting each population group,* assuming reasonably anticipated future land and water uses (*e.g.*, volatilization of contaminants from soils, direct ingestion of potable ground water or surface water). Information about land and water use assumptions should help the public understand why certain exposure pathways were examined.

- *Summary of the human health risk characterization*, which should include the estimated carcinogenic and non-carcinogenic risks associated with exposure pathways for chemicals of concern that are driving the need to implement the Preferred Alternative.

- *Summary of the ecological risk characterization*, including: 1) the basis of environmental risks associated with specific media; 2) how these risks were determined (*e.g.*, based on the outcome of the ecological risk assessment and aquatic field studies, the polycyclic aromatic hydrocarbons in the sediments pose unacceptable risks to aquatic receptors); and 3) the potential risks to endangered species.

The Proposed Plan should clearly link the site risks to the basis for action (*e.g.*, the need to address contaminated soil which is: (1) a threat to residents who come into contact with it, and (2) a continuing source of ground-water contamination). For an explanation of the term "basis for action," see Chapter 6, footnote #11.

The risk section of the Proposed Plan should conclude with the standard statement in Highlight 3-2 (unless a "No Action" alternative is being proposed).

### 3.3.6 Remedial Action Objectives

The remedial action objectives (RAOs) describe what the proposed site cleanup is expected to accomplish. A brief description of the RAOs proposed for the site should follow the "Summary of Site Risks" section. RAOs may vary for different portions of the site (*e.g.*, returning ground water to drinking water use, and reducing contaminant concentrations in soil to below X ppm so that it is safe for the reasonably anticipated future land use at the site). Preliminary remediation goals (PRGs) (*i.e.*, proposed cleanup levels), and their basis

**Highlight 3-2: Standard Language Explaining Basis for Taking Action**

It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

*******

*If the site is contaminated with pollutants or contaminants (in accordance with the definitions contained in NCP §300.5), then the following standard language should be used:*

It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare."

*******

*If the response action will address both hazardous substances and pollutants or contaminants, a combination of the two examples of standard language may be necessary.*

**Highlight 3-3: Tips on Writing Summary of Site Risks**

- Define terms and concepts used in the risk discussion that are not likely to be understood by the public.
- Present the risk discussion in a narrative format. If tables are used, consult a risk assessor. Save complex risk tables for the ROD.
- Discuss only the major contaminants of concern that are driving the need for action at the site (unless necessary to justify a No Action decision).
- Link the site risks described in the baseline risk assessment to the need for taking action at the site (*i.e.*, use standard language in Highlight 3-2).

could also be discussed in this section if appropriate.[2] For an explanation of the term "RAO," see Section 6.3.8.

### 3.3.7 Summary of Remedial Alternatives

This section communicates to the public the lead agency's options for attaining the proposed remedial action objectives for the site. The *Summary of Remedial Alternatives* section should briefly describe the alternatives studied in the detailed analysis phase of the FS Report. The alternative that is recommended as the Preferred Alternative should be identified as such at the beginning of this section. Common elements of each alternative should be described at the beginning of the section, and the remainder should focus on those distinctions that make each alternative unique. This description should contain enough information about remedy components and distinguishing features so that the public can understand the conclusions drawn from the evaluation of alternatives. For example, if an alternative involves an ARAR waiver or will restrict potential land uses available following cleanup, these points should be stated in the alternative description, not mentioned for the first time in the evaluation of alternatives that follows.

Examples of remedy components include the following:

- *Any treatment technologies* employed and how they will reduce the intrinsic threats posed by the contamination (*e.g.*, toxicity, mobility)
- *Engineering controls* employed including temporary storage and permanent on-site waste containment.
- *Institutional controls* employed which will supplement any long-term engineering controls by providing notice of remaining contamination and/or restricting future activities that could result in exposure to residual contamination.

Technology terms used to describe remedy components that are likely to be unfamiliar to the public, such as "soil vapor extraction" or "treatment trains," should be explained in the remedial alternative description or in a glossary. Where possible, use general terms to describe cleanup technologies (*e.g.,* "biological treatment," "chemical extraction").

Distinguishing features will vary based on site-specific conditions and remedy specifications. These features may include:

- *Remedial action objectives to be achieved* (*e.g.*, one alternative might be aimed at treating highly contaminated soil while another is aimed at removing highly contaminated soil from the site).
- *Estimated quantities of material to be addressed* (*e.g.*, an alternative which will remediate discrete concentrated pockets of contaminants in soil will address fewer cubic yards of soil than an alternative which calls for remediation of all of the site's contaminated soil).
- *Implementation requirements* (*e.g.*, the need for an off-site disposal facility).

[2] PRGs are developed during the RI/FS and are based on ARARs and other readily available information, such as concentrations associated with $10^{-6}$ cancer risk or a hazard quotient equal to one for non-carcinogens calculated from EPA toxicity information. Initial PRGs may also be modified based on exposure, uncertainty, and technical feasibility factors. As data are gathered during the RI/FS, PRGs are refined into final contaminant-specific cleanup levels. Based on consideration of factors during the nine criteria analysis and using the PRG as a point of departure, the final cleanup level may reflect a different risk level within the acceptable risk range ($10^{-4}$ to $10^{-6}$ for carcinogens) than the originally identified PRG.

- *Key ARARs* (generally action- or location-specific ARARs) that differ from those that must be attained by other alternatives. For example, source control remedies at industrial facilities which involve placement of RCRA hazardous waste or site closure should discuss RCRA Land Disposal Restrictions (LDRs) and RCRA Subtitle C or D closure standards, respectively. Any proposed ARAR waivers must be discussed pursuant to NCP §300.430(f)(2)(iv). RCRA treatability and no migration variances should also be discussed.

- *Reasonably anticipated future land use.* Note which alternatives facilitate the reasonably anticipated future land uses. Time frames and the amount of the site available for the reasonably anticipated future land use may vary across alternatives and should be noted as well.

- *Expected outcomes.* Describe the expected outcomes of each alternative in terms of its compatibility with reasonably anticipated future land uses, potential future ground-water uses, and other benefits or impacts associated with alternative remediation approaches.

- *Use of presumptive remedies or innovative technologies.*

**Highlight 3-4: Tips on Writing Summary of Remedial Alternatives**

- Identify the Preferred Alternative at the beginning of its description.

- Include enough information in the description of alternatives about remedy components and distinguishing features of each alternative so that the public will understand the comparative analysis.

- Describe components common to a number of alternatives only once (*e.g.*, all alternatives, with the exception of the no action alternative, will attain PRGs).

- Include all three components of estimated cleanup costs — capital, annual O&M, and total present worth.

- *Estimated time to construct and implement the remedy until the Remedial Action Objectives are met.*

- *Estimated costs.* Cost must be separated into capital (construction), annual operations and maintenance (O&M), and total present worth. Long-term O&M costs can be a significant factor in determining which cleanup options are more or less expensive than others. A total present worth cost estimate for each alternative allows the public to compare different alternatives that have varying amounts of O&M costs. Use the same discount rate for all alternatives evaluated (current OSWER policy is 7%).

### 3.3.8 Evaluation of Alternatives

The Evaluation of Alternatives explains the lead agency's rationale for selecting the Preferred Alternative. The nine criteria used to evaluate the alternatives and compare them to one another in the detailed analysis in the FS should also be presented in the Proposed Plan. The rationale for selecting the Preferred Alternative should be presented in terms of its ability to appropriately balance the trade-offs with respect to the nine criteria. A glossary that defines each criterion may be used. A comprehensive analysis of each alternative in relation to each of the nine criteria need not be presented. The reader of the Proposed Plan should be directed to the comparative analysis contained in the RI/FS Report for a more detailed explanation. A table may be helpful in summarizing key information from the evaluation of alternatives, but should not substitute for a narrative discussion. If a table is used, the Proposed Plan should provide a narrative analysis of the information in the table.

The nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. A description of the purposes of the three groups follows:

- *Threshold criteria*, which are requirements that each alternative must meet in order to be eligible for selection.

- *Primary balancing criteria,* which are used to weigh major trade-offs among alternatives.

- *Modifying criteria*, which may be considered to the extent that information is available during the FS, but can be fully considered only after public comment is received on the Proposed Plan. In the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

Highlights 3-5 and 3-6 present information on the organization of the criteria and the major points that should be addressed under each criterion. Additional information on the nine criteria and detailed analysis of alternatives are provided in the NCP and the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final* (EPA 540-G-89-004, October 1988).

### 3.3.9 Preferred Alternative

This section of the Proposed Plan describes the Preferred Alternative, and notes what key RAOs it will achieve as well as how it addresses source materials constituting principal threats (this provides a basis for satisfying the statutory preference for treatment as a principal element of the remedy). This section should also note that the Preferred Alternative can change in response to public comment or new information. A statement explaining the rationale for recommending the Preferred Alternative over other alternatives based on the nine criteria analysis must be included. Where appropriate, include figure(s) illustrating the proposed treatment technologies.

The Preferred Alternative summary should be similar to the following:

> *Alternative 2B, In-situ Soil Vapor Extraction, Solidification, and Capping is the Preferred Alternative. This alternative is recommended because it will achieve substantial risk reduction by both treating the source materials constituting principal threats at the site and providing safe management of remaining material. This combination reduces risk sooner and costs less than the other alternatives.*

A statement summarizing the support agency's concurrence or nonconcurrence with the recommended alternative, if known, must be included in the Proposed Plan, preferably in this section. Conclude with a summary statement similar to the following:

> *Based on information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The (name of lead agency) expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.*

## Highlight 3-5: Nine Criteria for Remedial Alternatives Evaluation

### THRESHOLD CRITERIA

**1 Overall Protection of Human Health and the Environment**

- How the Alternative Provides Human Health and Environmental Protection

**2 Compliance with ARARs (Or justification of a Waiver)**

- Compliance with Chemical-Specific ARARs
- Compliance with Location-Specific ARARs
- Compliance with Action-Specific ARARs
- Compliance with Other Criteria, Advisories, and Guidance

### PRIMARY BALANCING CRITERIA

**3 Long-Term Effectiveness and Permanence**

- Magnitude of Residual Risk
- Adequacy and Reliability of Controls

**4 Reduction of Toxicity, Mobility, or Volume Through Treatment**

- Treatment Process Used and Materials Treated
- Amount of Hazardous Materials Destroyed or Treated
- Degree of Expected Reductions in Toxicity, Mobility, or Volume
- Degree to Which Treatment is Irreversible
- Type and Quantity of Residuals Remaining After Treatment

**5 Short-Term Effectiveness**

- Protection of Community During Remedial Actions
- Protection of Workers During Remedial Actions
- Environmental Impacts
- Time Until Remedial Action Objectives are Achieved

**6 Implementability**

- Ability to Construct and Operate the Technology
- Reliability of the Technology
- Ease of Undertaking Additional Remedial Actions, if Necessary
- Ability to Monitor Effectiveness of Remedy
- Ability to Obtain Approvals from Other Agencies
- Coordination with Other Agencies
- Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity
- Availability of Necessary Equipment and Specialists
- Availability of Prospective Technologies

**7 Cost**

- Estimated Capital Costs
- Estimated Annual Operation and Maintenance Costs
- Estimated Present Worth Costs

### MODIFYING CRITERIA[1]

**8 State Acceptance**

- Features of the Alternative the State Supports
- Features of the Alternative About Which the State has Reservations
- Elements of the Alternative the State Strongly Opposes

**9 Community Acceptance**

- Features of the Alternative the Community Supports
- Features of the Alternative About Which the Community has Reservations
- Elements of the Alternative the Community Strongly Opposes

[1]These criteria are fully assessed following comment on the RI/FS Report and the Proposed Plan, and are fully addressed in the ROD.

## Highlight 3-6: Tips For Preparing Nine Criteria Analysis

**Overall Protection of Human Health and the Environment**

In every FS, a "no action" alternative is developed as a baseline for comparative analysis purposes. In cases where the no action alternative is found not to meet this criterion, it can be ruled out for further consideration and, therefore, need not be discussed further in the nine criteria analysis.

**Compliance with ARARs**

For an alternative to pass into the detailed analysis stage of the RI/FS and thus become eligible for selection, it must comply with its ARARs or a waiver should be identified and the justification provided for invoking it. An alternative that cannot comply with ARARs, or for which a waiver cannot be justified, should be eliminated from consideration for further discussion as a potential alternative in the Proposed Plan or ROD.

**Long-Term Effectiveness and Permanence**

Long-term effectiveness and permanence of an alternative should be viewed along a continuum (*i.e.*, an alternative can offer a greater or lesser degree of long-term effectiveness and permanence). Alternatives that are more effective in the long-term are more permanent.

**Reduction of Toxicity, Mobility, or Volume Through Treatment**

Each characteristic (*i.e.*, toxicity reduction through treatment, mobility reduction through treatment, and volume reduction through treatment) should be analyzed independently and collectively to determine how effectively treatment is being employed by the remedial alternative. In addition, other elements should be considered such as the risks posed by residuals. A containment remedy does not reduce the toxicity, mobility, or volume of contaminants through treatment.

**Short-Term Effectiveness**

Short-term effectiveness considers the amount of time until the remedy effectively protects human health and the environment at the site. It also includes an evaluation of the adverse effects the remedy may pose to the community, workers, and the environment during implementation. Possible adverse effects should be evaluated in advance to determine mitigative steps to adequately minimize the impact on the community, workers, or environment and to minimize any risks that would remain at the site. Institutional controls and other active measures (*e.g.*, interim remedies and removal actions) can often mitigate short-term effects and, therefore, should be considered when analyzing the remedial alternative.

**Implementability**

This criterion considers the ease of implementing the remedy in terms of construction and operation, and the availability of services and materials required to implement the alternative. Technical considerations also include the reliability of the technology, the effect on future remedial action options, and monitoring at the site. It is important to consider and include variables such as the site's topography, location, and available space. Implementability is significant when evaluating treatment technologies that are dependent on resources such as facilities, equipment, professionals or experts, and especially technologies that have not been proven effective. In addition, administrative feasibility, which includes activities that need to be coordinated with other offices and agencies (*e.g.*, obtaining permits for off-site activities or rights-of-way for construction), should be addressed when analyzing this criterion.

**Cost**

The costs of remedies always should be qualified as estimates with an expected accuracy of +50% to -30%

**State/Support Agency Acceptance**

Where there are major support agency comments, they must be summarized under this criterion (see NCP §300.430(f)(2)). The lead agency's response to those comments also should be summarized here.

**Community Acceptance**

Because information available on the community acceptance criterion may be limited before the public comment period for the Proposed Plan and the RI/FS Report, the Proposed Plan should indicate that this factor will be fully evaluated in the ROD. However, the Proposed Plan should also provide a preliminary summary of communities' views, with special emphasis from those in the community directly impacted or affected. Proposed Plans should not speculate on community acceptance of the alternatives.

**Highlight 3-7: Tips on Writing Preferred Alternative**

- Clearly describe the decisive factors that form the basis of why the Preferred Alternative is recommended over the other alternatives.
- Mention any uncertainties or contingencies related to the Preferred Alternative.
- Emphasize that the Preferred Alternative is based on current information and that it could change in response to public comment or new information.

### *3.3.10 Community Participation*

Information on how the public can be involved in the remedy selection process should be presented in the Proposed Plan to fulfill the public participation requirements under NCP §300.430(f)(3). Depending on the format of the Proposed Plan, community participation information can be placed on the front page or in a separate section at the end of the Proposed Plan. The sample Proposed Plan in Appendix A illustrates the placement of community participation information on both the front page and at the end of the Plan. The following public participation information should be included in the Proposed Plan:

- Dates of the public comment period (*e.g.*, March 1 through March 30);
- Date, time, and location of the public meeting on the Proposed Plan (or an offer to hold a meeting upon request if one has not been scheduled);
- Locations of the Administrative Record file;
- Names, phone numbers, and addresses of the lead and support agency personnel (including an Internet address) who will receive comments on the Proposed Plan or who can supply additional information; and
- Name and contact number of local Community Advisory Group (CAG), if applicable.

In addition to the above information, a sheet on which the public can submit written comments can be provided in the Proposed Plan (see the last page of Appendix A for an example).

## 3.4 FORMAT FOR THE PROPOSED PLAN

The Proposed Plan should be written clearly and concisely, since it will likely be read by a broad public audience. The Plan should tell the story of the site so that those unfamiliar with the site will understand the contamination problems and the risks they pose.[3] The Plan should clearly describe why the lead agency is recommending the Preferred Alternative.

It is very important that the level of detail and content of the Proposed Plan be tailored to the needs and concerns of the individual community that lives around a Superfund site and the stakeholders involved in the Superfund remedy selection process (*e.g.*, PRPs). The lead agency should identify its intended audience prior to preparation of the Proposed Plan in order to optimize its effectiveness. Additional fact sheets may be necessary depending on site circumstances (see Section 3.5).

Appendix A contains an example of a Proposed Plan that follows the format and content recommended by this guidance document. This format is recommended for most sites as it affords the public and involved stakeholders the most complete and explicit rationale for the Preferred Alternative.

## 3.5 PROPOSED PLAN FACT SHEET

A shorter summary of the remedy selection process, with less technical information, may help to ensure that the widest possible audience is reached. Therefore, this guidance recommends the development of a Proposed Plan fact sheet whenever a more detailed Proposed Plan is prepared.

The front page of a fact sheet should be designed to attract the attention of lay readers. It should highlight the proposed remedy and encourage the reader to

[3] Illustrations of the site and technological processes being proposed, as well as tables and/or charts, should be utilized to maximize the public's understanding of site conditions, potential risks, alternatives being considered, and the Preferred Alternative.

submit comments. The fact sheet should then describe the risks posed by the site and the alternatives considered. The back page should reiterate how the public can obtain copies of the Proposed Plan and submit comments, and should note points of contact for questions and further information. An example of a Proposed Plan fact sheet is provided on the next page. This is an example of a fact sheet that could accompany the sample Proposed Plan found in Appendix A.

## 3.6 PROPOSED PLANS TO HEADQUARTERS

All draft Proposed Plans should be sent to the appropriate EPA headquarters regional coordinator for review pursuant to *Focus Areas for Headquarters OERR Support for Regional Decision Making* (OSWER 9200.1-17, May 1996). Some remedy selection decisions will also be eligible for consultation with the National Remedy Review Board or another Cross-Regional review group. See the Remedy Review Board web site (http://www.epa.gov/ superfund/programs/nrrb/index.htm) and Appendix C for a more information on Proposed Plan consultation procedures. Final Proposed Plans should be sent to EPA Headquarters consistent with the procedures described in Appendix D (Records of Decision and Other Decision Documents to EPA Headquarters).

# Invitation to Comment on the Proposed Cleanup of EIO Industrial Site, Nameless, TN

You have the chance to comment on the Proposed Plan for cleaning up the EIO Industrial Superfund site at a public meeting on March 13, 1999. The United States Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) want to hear your views about the plans for this toxic waste cleanup project. We have carefully studied the site and now believe that the following actions are the best way to protect your health and the environment.

- Dig up 7,500 cubic yards of contaminated soil. Heat the soil through a process called thermal desorption, which will separate out and collect dangerous toxins. These toxic materials will be sent to a licensed hazardous waste disposal facility. The cleaned soil will be returned to the area it came from and covered with soil and grass. This will cost $6.2 million and take 2 years to complete.
- Pump the more highly contaminated ground water to the surface. Run it through a special treatment system (involving air-strippers and carbon adsorption) to remove the dangerous chemicals. Discharge the clean water to the XYZ River. Keep watch on the remaining ground water to make certain it presents no further danger. This will cost $3.7 million and take 18 years to complete.

You may make comments at the public meeting. You also have until March 30, 1999, to supply written comments on the Proposed Plan or other material in the Administrative Record file. At the end of the comment period, EPA and TDEC will review the suggestions and make a final decision about the site cleanup. Your input on the Proposed Plan is an important part of the decision- making process. We want to hear from you and will pay serious attention to what you have to say.

## Tell Us What You Think

### Submit Written Comments

Public Comment Period:

**March 1 – March 30, 1999**

EPA will accept written comments on the Proposed Plan during the public comment period. You may submit your comments to:

Ms. RPM
U.S. EPA (Mail Code 4XXX)
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104

### Attend the Public Meeting

Public Meeting:

You are invited to a meeting sponsored by EPA to hear about the Proposed Plan for cleaning up the EIO Industrial site. At the meeting you will be able to state your views about the cleanup.

The meeting will be held:

**March 13, 1999**
**7:30 p.m.**
at
**Nameless Community Hall**
**237 Appleton Street**
**Nameless, TN**

### Locations of Administrative Record

Public Library
619 South 20th Street
Nameless, TN 00000
(101) 999-1099
Hours: Mon-Sat, 9 a.m. to 9 p.m.

U.S. EPA Records Center
Region 4
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104
(555) 555-5555
Hours: Mon-Fri, 8:30 a.m. to 5:00 p.m.

## SITE RISKS

During the 1980s, the EIO Industrial Company disposed of liquid industrial wastes at its factory located at 81 North Delaware Avenue in Nameless, Tennessee. EPA and TDEC have spent the last two years studying the property to determine what risks it poses to the health and welfare of the people who live or work near it. We found that there is some risk to people who come into contact with contaminated soil or ground water. While the chance of becoming sick as a result of exposure to the contaminants is small, it is serious enough to require that actions be taken to reduce the levels of chemicals present in the soil and ground water to safe levels. To provide more protection while the cleanup is being done, we have already put a fence around the site and connected 50 homes to the public water supply system.

## CLEANUP GOALS

- Reduce further contamination of surface and ground waters.
- Restore the ground water to standards established under the Safe Drinking Water Act.
- Reduce the risk posed by direct contact with contaminated soils.

## YOUR COMMENTS

We looked at a number of ways to meet the cleanup goals, which are described more completely in the Proposed Plan and Administrative Record file. EPA and TDEC believe that the Preferred Alternative identified on the previous page will protect your health and the environment and can be done without major nuisance to your community. However, before making a final decision, we want to hear what you think. We encourage you to find out more about the cleanup plan and make your views and concerns known on all the options that were considered. The cleanup plan that is finally chosen will be described in a Record of Decision. That document will include a summary of the comments received along with how those comments changed the decision that was reached.

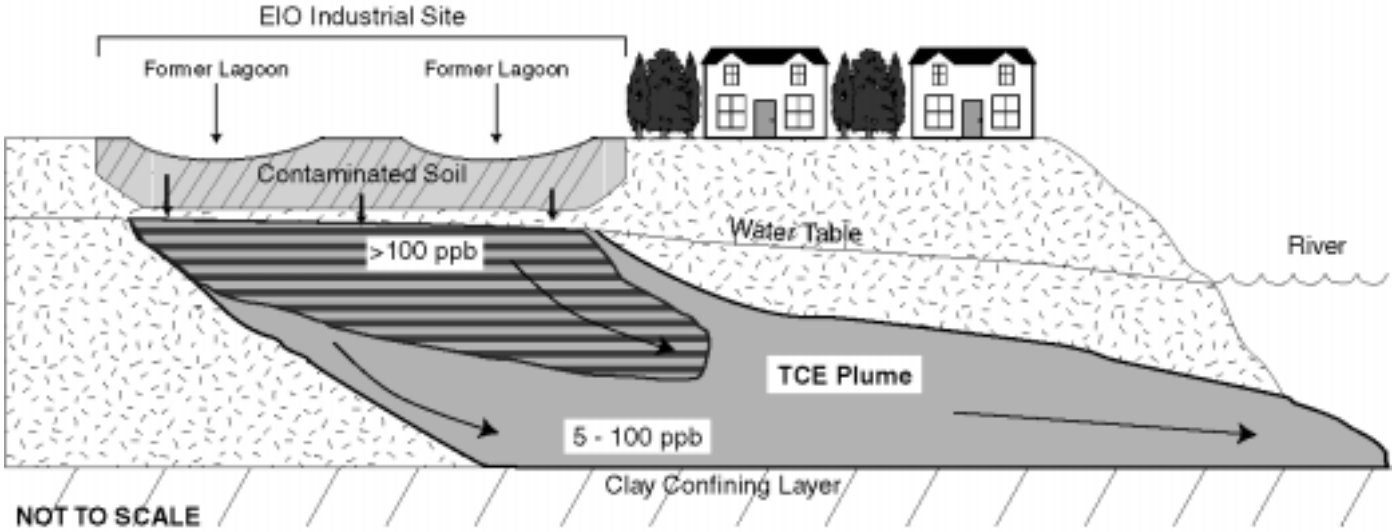
### FOR MORE INFORMATION . . .

You can see a copy of the Proposed Plan, which describes the cleanup alternatives we studied, and also get more information about the site by visiting the Administrative Record file which can be found at:

Public Library
619 South 20th Street
Nameless, TN 00000
Tel: 101-999-1099
Hours: Mon-Sat 9 a.m. to 9 p.m.

You can also stop by the EPA office that is on the site to see a copy of the Plan. That office is open to the public Mondays and Thursdays from 3 p.m. to 8 p.m. Finally, you can ask for a copy of the Proposed Plan to be sent to you by calling 1-800-333-3333.

Contaminant Location and Movement



# RECOMMENDED OUTLINE AND CHECKLIST FOR A PROPOSED PLAN

**See Chapter 3 of ROD Guidance for more information**

**A. Introduction**

- ☐ Site name and location.
- ☐ Lead and support agencies (*e.g.*, EPA, State, Federal facility).
- ☐ Purpose of document (*i.e.*, satisfy statutory and regulatory requirements for public participation). At a minimum, the Proposed Plan must:
  - Provide a brief summary description of the remedial alternatives evaluated in the detailed analysis;
  - Identify and provide a discussion of the rationale that supports the Preferred Alternative;
  - Provide a summary of any formal comments received from the support agency; and
  - Provide a summary explanation of any proposed ARAR waiver.
- ☐ Refer the public to the RI/FS Report and Administrative Record file for more information.

**B. Site Background**

- ☐ Contaminated media at the site (*e.g.*, soil, air, ground water, and surface water).
- ☐ History of waste generation or disposal that led to current problems.
- ☐ History of Federal State, and local site investigations.
- ☐ Description of removal or previous remedial actions conducted under CERCLA or other authorities.
- ☐ History of CERCLA enforcement activities at the site (*e.g.*, brief description of PRP searches or special notices issued, and whether PRPs have conducted any of the studies upon which the Proposed Plan is based).
- ☐ Description of major public participation activities initiated *prior* to the issuance of the Proposed Plan.

**C. Site Characteristics**

- ☐ Geographical or topographical factors that had a major impact on remedy selection (*e.g.*, resources affected or threatened by site contamination such as current or potential drinking water sources or wetlands).
- ☐ Nature and extent of contamination (*i.e.*, vertical and lateral extent of contaminated areas).
- ☐ A site map that shows location of roads, buildings, drinking water wells and other characteristics that are important to understanding why the remedial objectives and Preferred Alternative are appropriate for the site.
- ☐ Materials constituting principal threats (*e.g.*, location, volume and nature of mobile/high-toxicity/high-concentration source material).

**D. Scope and Role of Operable Unit (OU) or Response Action**

- ☐ Overall cleanup strategy for the site.
- ☐ Scope of problems addressed by the operable unit.
- ☐ Relationship of proposed action to removal or other operable units at the site (include purpose of each operable unit and sequence of the action in relation to other operable units or removals).
- ☐ How action addresses source materials constituting principal threats (*e.g.*, treatment technology will be used to permanently reduce the toxicity, mobility, and volume of these source materials).

[Note: Remedies which involve treatment of source materials constituting principal threat wastes likely will satisfy the statutory preference for treatment as a principal element, although this will not necessarily be true in all cases.]

**E. Summary of Site Risks**

- ☐ Key findings of the baseline risk assessment by describing the:
  - Major chemicals of concern (COCs) in each medium;
  - Land and ground-water use assumptions;
  - Potentially exposed populations in current and future risk scenarios (*e.g.*, worker currently on site, adult or children living on site in future);
  - Exposure pathways (routes of exposure) and how they relate to current or reasonably anticipated future land and ground-water use; and
  - Estimated cancer and non-cancer risks associated with exposure pathways for chemicals of concern that are driving the need for action.
- ☐ Conclusions of the ecological risk assessment (*e.g.*, the basis of environmental risks associated with specific media and how these risks were determined).
- ☐ Standard concluding statement that supports the need for taking action (unless it is a "no action" situation):

  *"It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment."*

**F. Remedial Action Objectives**

- ☐ Proposed Remedial Action Objectives (RAOs) and how they address site risks (*e.g.*, prevent contamination from reaching the ground water by treating the contaminated soils).
- ☐ Present and describe the basis for preliminary cleanup levels (which will become final remediation goals in the ROD) for *major* contaminants of concern (*e.g.*, preliminary remediation goal of 5 ppm for TCE is based on Federal MCL for drinking water).

**G. Summary of Remedial Alternatives**

- ☐ Narrative description of alternatives evaluated including remedy components and distinguishing features unique to each alternative.
- ☐ <u>Remedy components</u> should include:
  - Treatment technologies employed and a how they will reduce the intrinsic threat posed by the contamination;
  - Engineering controls including temporary storage and permanent on-site containment;
  - Institutional controls that will restrict future activities that might result in exposure to contamination (*e.g.*, easements and covenants); and
  - Monitoring requirements.
- ☐ <u>Distinguishing features</u> could include:
  - Remedial action objectives (RAOs) to be achieved by the alternative (*e.g.*, return surface water to recreational use);
  - Estimated quantities of material to be addressed by major components;
  - Implementation requirements (*e.g.*, the need for an off-site disposal facility);
  - Key ARARs, proposed ARAR waivers, and RCRA treatability and no migration variances;
  - Reasonably anticipated future land use and whether or not it will be achieved by the alternative;
  - Expected outcomes (*e.g.*, in terms of compatibility with reasonably anticipated future land uses);
  - Use of presumptive remedies or innovative technologies;
  - Estimated time to construct and implement the remedy until RAOs are met; and
  - Estimated costs, separated into capital (construction), annual operations and maintenance (O&M), and total present worth costs.

**H. Evaluation of Alternatives**

- ☐ Explanation of the nine evaluation criteria and how they are used to analyze the alternatives. A glossary that defines the criteria may be used.

**I. Preferred Alternative**

- ☐ Identification of the Preferred Alternative, the RAOs that it would achieve, and how it will address source materials constituting principal threats at the site.
- ☐ Statement that the Preferred Alternative can change in response to public comment or new information.
- ☐ A brief statement that describes the most decisive considerations from the nine criteria analysis that affected the selection of the Preferred Alternative (*e.g.*, completion of remedy sooner and at less cost than other alternatives).
- ☐ Any uncertainties or contingency measures.
- ☐ Expected outcomes of the Preferred Alternative, including risk reduction (how risk identified in baseline risk assessment will be addressed).
- ☐ The support agency's concurrence or non-concurrence with the Preferred Alternative, if known.
- ☐ Concluding summary statement by the lead agency at the end of this section similar to:

  *"Based on information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The (name of lead agency) expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element (or justify not meeting the preference)."*

**J. Community Participation**

- ☐ Dates of public comment period for the Proposed Plan (written to encourage public comments).
- ☐ Time and place for a public meeting(s) (already scheduled) or offer opportunity for meeting if one has not been scheduled.
- ☐ Locations of the Administrative Record file.
- ☐ Names, phone numbers and addresses of lead and support agency personnel who will receive comments or can supply additional information.
- ☐ Name and contact number of local Community Advisory Group (CAG), if applicable.

# 4.0 PRE-RECORD OF DECISION CHANGES

## 4.1 OVERVIEW

After the public comment period ends, a remedial alternative is selected as the remedy that will be documented in the ROD. The selection of the remedy is based on the analysis presented in the Proposed Plan and RI/FS Report, giving consideration to the comments received from the support agency and the public, as well as any other new and significant information received or generated during the public comment period. The lead agency may re-evaluate its Preferred Alternative in light of this information and may change a component of the preferred remedy or choose to select a remedy other than the Preferred Alternative in making the final remedy selection decision.

The NCP requires that certain steps be taken after publication of the Proposed Plan and before remedy selection in the ROD if new information is made available that significantly changes the basic features of the Preferred Alternative identified in the Proposed Plan. The lead agency must determine the following: 1) are the changes significant, and 2) could the changes have been reasonably anticipated based on the information presented to the public (NCP §300.430(f)(3)(ii)).

This chapter presents a general framework for determining if changes to the Preferred Alternative are "significant" or "minor." It also specifies documentation and communication activities that may be necessary to inform the public of these changes. The chapter discusses changes made before the ROD is signed; post-ROD changes are discussed in Chapter 7.

## 4.2 IDENTIFYING TYPES OF PRE-RECORD OF DECISION CHANGES

The lead agency has the discretion to make changes to the Preferred Alternative identified in the Proposed Plan based either on new information received from the public or support agency or on information generated by the lead agency itself during the remedial process. A site-specific determination of what constitutes a significant (as opposed to minor) change, and therefore the extent of documentation required, is made after taking into consideration the impact that the change may have on the Preferred Alternative's scope, performance, or cost.

### *4.2.1 Minor Changes*

Minor changes are those that have little or no impact on the overall scope, performance, or cost of the alternative originally presented in the Proposed Plan as the Preferred Alternative for the site or operable unit. Such changes typically will be clarifications, administrative changes, and minor technical or engineering changes that do not significantly alter the overall scope, performance, or cost of the alternative.

### *4.2.2 Significant Changes*

In contrast to minor changes, significant changes have a significant or fundamental effect on the scope, performance, and/or cost of the Preferred Alternative. Examples of these three factors include:

- *Scope*: Changes that substantially alter the type of treatment or containment technology, physical area of response, remediation goals, or type and volume of waste to be addressed.

- *Performance*: Changes in treatment technologies or processes that significantly alter the long-term effectiveness of the Preferred Alternative or that have significantly different short-term effects.

- *Cost*: Changes to any aspect of the Preferred Alternative that substantially alter the capital or O&M cost estimates for the alternative. Feasibility Study cost estimates are expected to provide an accuracy of +50 percent to -30 percent.

Significant changes generally involve either of the following:

- Selecting an RI/FS alternative other than the Preferred Alternative identified in the Proposed Plan as the remedy.

- Substantially modifying a component of the previously identified Preferred Alternative.

"Significant change" is not specifically defined in this guidance because what constitutes a significant change

will vary depending upon site circumstances and the manner in which the information was presented in the RI/FS Report and Proposed Plan. Highlight 4-1 summarizes the process for analyzing and documenting pre-ROD changes.

## 4.3 DOCUMENTING PRE-RECORD OF DECISION CHANGES

CERCLA §117(b) and NCP §300.430(f)(3)(ii) require that if significant pre-ROD changes that could be reasonably anticipated are made to the recommended remedy, these changes and the reason for the changes must be discussed in the ROD.

### 4.3.1 Documenting Minor Changes

Although the NCP does not require documentation of minor changes, such changes to the Proposed Plan should be discussed in the *Description of Alternatives* section of the ROD's *Decision Summary* and should be documented in the Administrative Record file. Minor changes should not be discussed in the *Documentation of Significant Changes* section of the ROD's *Decision Summary*.

### 4.3.2 Documenting Significant Changes

NCP §300.430(f)(3)(ii) states that after publication of the Proposed Plan and prior to the adoption of the Selected Remedy in the ROD, if new information is made available that significantly changes the basic features of the remedy with respect to scope, performance, or cost, such that the remedy significantly differs from the original proposal in the Proposed Plan and the supporting analysis and information, the lead agency must:

- Include a discussion in the ROD of the significant changes and reasons for such changes, if the lead agency determines such changes could be reasonably anticipated by the public based on the alternatives and other information available in the Proposed Plan or the supporting analysis and information in the Administrative Record file; or

- Seek additional public comment on a revised Proposed Plan, when the lead agency determines the change could not have been reasonably anticipated by the public based on the information available in the Proposed Plan or the supporting analysis and information in the Administrative Record file. The lead agency must, prior to adoption of the Selected Remedy in the ROD, issue a revised Proposed Plan, which must include a discussion of the significant changes and the reasons for such changes.

***Scenario 1: Significant Changes That Could Have Been Reasonably Anticipated Based on the Information Available to the Public***

A significant change that could be reasonably anticipated based on information available to the public in the Proposed Plan or the supporting analysis and information in the Administrative Record file must be discussed in the ROD (*i.e.*, documented at the end of the ROD's *Decision Summary* in the *Documentation of Significant Changes* section). Additional public notice or comment on this type of change is not required, but may be advisable on a site-by-site basis. Examples of significant changes that may be considered "reasonably anticipated" include the following:

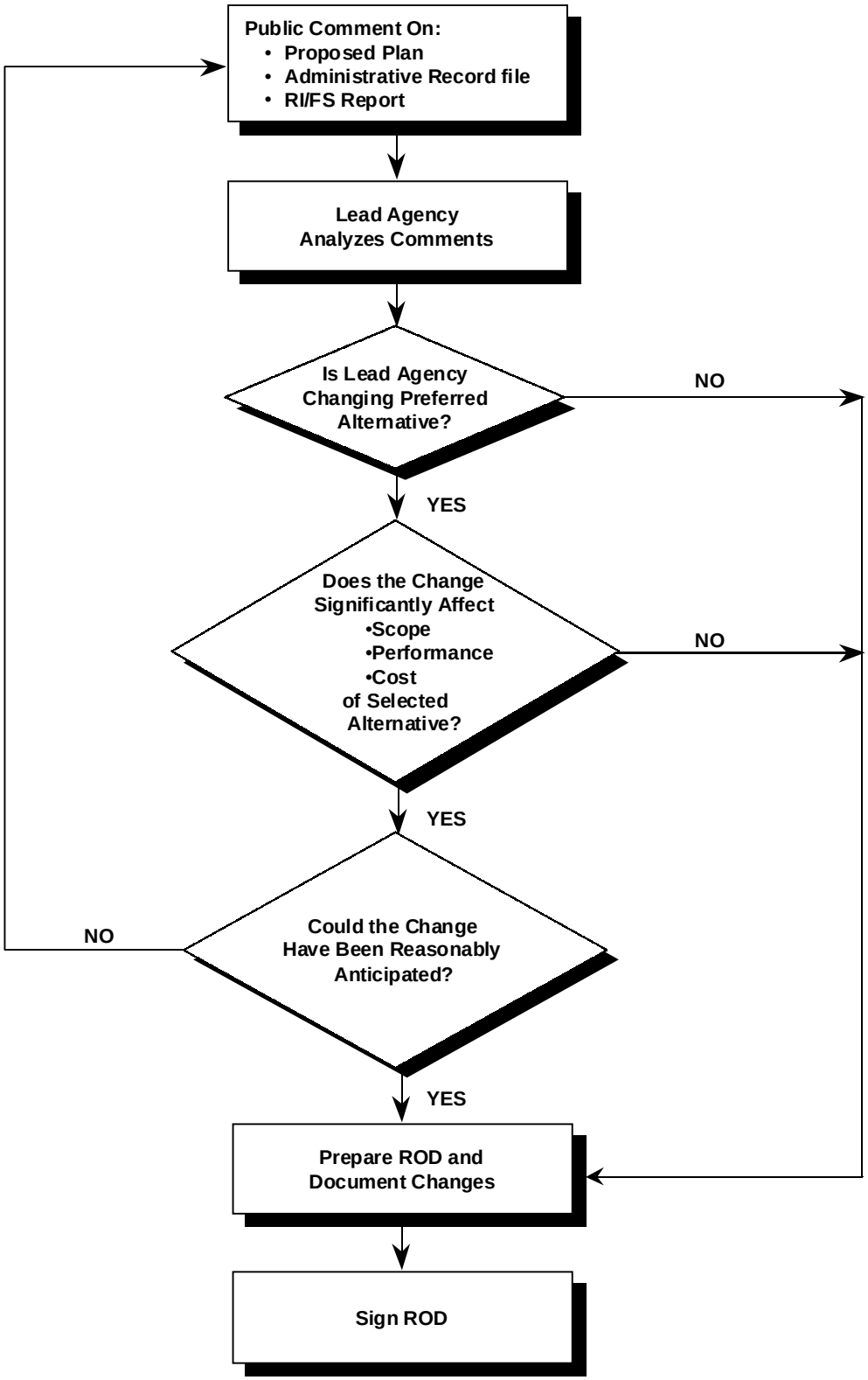
- ***Changing a Component of the Preferred Alternative***

In response to comments, the lead agency makes a significant change to a component of the Preferred Alternative that could have been reasonably anticipated by the public based on information in the RI/FS and Proposed Plan (*e.g.*, a change in the Preferred Alternative's cost, timing, level of performance, or ARARs).

- ***Selecting a Different Alternative***

More than one acceptable alternative is identified in the Proposed Plan, and the lead agency subsequently determines that an alternative other than the Preferred Alternative provides the most appropriate balance of trade-offs among the alternatives with respect to the nine evaluation criteria. Because the public had been apprised previously that the alternative (or any other alternative in the detailed analysis) might be selected as the remedy, the public had adequate opportunity to review and comment on it, and thus the change can be documented in the ROD without additional public comment.

## Highlight 4-1: Pre-Record of Decision Changes



- ***Combining Components of Alternatives***

In response to comments received during the public comment period and consistent with options presented in the Proposed Plan, the final remedial alternative combines one component of the Preferred Alternative (*e.g.*, a ground-water component) with a component of another alternative that was evaluated in the FS (*e.g.*, additional source control measures).

### *Scenario 2: Significant Changes That Could Not Have Been Reasonably Anticipated Based on the Information Available to the Public*

In those limited situations in which the significant change could not have been reasonably anticipated by the public based on information in the Proposed Plan and Administrative Record file, a revised Proposed Plan that presents the new Preferred Alternative must be issued for public comment (NCP §300.430(f)(3)(ii)(B)). The revised Proposed Plan must be prepared in accordance with both CERCLA §117 and the NCP. Appropriate supporting material that provides the necessary engineering, cost, and risk information for the new alternative, and that discusses how the new alternative compares to the other alternatives with respect to the nine evaluation criteria should be provided in the revised Proposed Plan. It may be appropriate to provide this information as a supplement to the RI/FS Report, but it should be summarized for the public in the Proposed Plan.

In addition, the significant changes to the initial Proposed Plan should be documented at the end of the ROD's *Decision Summary* in the *Documentation of Significant Changes* section. This description should identify the changes to the Preferred Alternative and the reason for the changes. Examples of significant changes that could not be considered "reasonably anticipated" include the following:

- ***Identification of a New Preferred Alternative Not Previously Considered***

The lead agency determines that an alternative not presented in the Proposed Plan or detailed analysis phase of the RI/FS Report should be selected as the remedy. The new Preferred Alternative is not a combination of different components of the alternatives considered. The lead agency must issue a revised Proposed Plan that presents the new Preferred Alternative and provides appropriate supporting information for public comment.

- ***Significant Change to a Component of the Preferred Alternative***

Part of the remedy must be altered, resulting in fundamental changes to the remedy. Such changes require additional public comment if they will significantly change the basic features of the remedy (*e.g.*, a change in the remedy that results in a significant increase in the volume of waste managed, the physical scope of the action, the institutional controls required to maintain the integrity of the remedy, or the estimated cost of the action).

Use of an ARAR waiver may require a revised Proposed Plan if not discussed in the original Proposed Plan. The NCP specifies that ARAR waivers must be discussed in a Proposed Plan so that the public will have an opportunity to comment on the use of the waiver and the alternative cleanup levels proposed (NCP §300.430(f)(2)(iv)).

Highlight 4-2 presents examples of minor changes, as well as significant changes that could and could not have been reasonably anticipated by the public. Guidance on how to document significant pre-ROD changes in the ROD is presented in Section 6.3.14.

## Highlight 4-2: Examples of Pre-Record of Decision Changes

***(NOTE: Examples are not meant to present strict thresholds for changes in cost, volume, or time.)***

**Minor Changes**

- It was determined that a remedy will require an estimated 10 ground water extraction wells, rather than six wells, as estimated originally in the Proposed Plan, to achieve remedial action objectives within the estimated time period.

- The volume of material to be excavated and treated is actually 120,000 cubic yards, rather than the 110,000 cubic yards, as estimated originally in the Proposed Plan.

- Based on information received during the public comment period, the lead agency determined that the capital cost estimate in the Proposed Plan was about 10 percent too low; the revised estimated capital cost of the remedy is $5,100,000. The lead agency also identified factors that would extend the implementation time frame from 15 to 20 months. These changes do not significantly alter the scope, performance, or cost of the remedy.

**Significant Changes That Could Be Reasonably Anticipated**

- The Proposed Plan for a site recommends one alternative to address contaminated soils and another to remediate the ground water from among several sets of alternatives. The lead agency chooses to retain the Preferred Alternative for the ground-water component of the remedy, but selects a different soil remediation alternative from among those presented as acceptable options in the Proposed Plan.

**Significant Changes That Could Not Be Reasonably Anticipated**

- Low temperature thermal desorption, which was NOT presented in the Proposed Plan or the detailed analysis section of the FS, is the preferred remedy for the site, because new information was received indicating that low temperature thermal desorption could be used effectively at the site. This new remedy, however, is quite different in scope and performance from any other alternative considered in detail in either the Proposed Plan or RI/FS Report. Because the public has not had an adequate opportunity to comment on the technical, environmental, and human health aspects of the remedy or to evaluate and compare its performance in terms of the nine evaluation criteria, a revised Proposed Plan must be prepared and a new public comment period should be held on the new recommended remedy before a remedy is selected in the ROD.

# 5.0 PROCESS FOR DEVELOPING THE RECORD OF DECISION

This chapter describes the roles and responsibilities of the lead and support agencies in developing the ROD. Procedures to facilitate timely preparation, review, and final approval of the ROD are presented in this chapter, as well as dispute resolution procedures and the role of other Federal agencies in cleanup activities at Federal facilities.

## 5.1 OVERVIEW

As with the Proposed Plan, the lead agency has the responsibility for preparing the ROD and coordinating with the support agency and other lead agency program offices to seek or attain (as appropriate) concurrence on the Selected Remedy. Typically, the lead agency that prepares the RI/FS Report and the Proposed Plan will prepare the ROD, although this may vary from site to site. In many cases, EPA is the lead agency and prepares the ROD; however, the State can prepare the ROD for concurrence and adoption by EPA when the State is designated the lead agency in the CA. States may sign the ROD without EPA concurrence for a non-Fund-financed State-lead enforcement response action (*i.e.*, actions taken under State law). Federal agencies must prepare RODs for Federal facility sites on the NPL, consistent with the terms of their IAGs and CERCLA §120. At NPL sites, RODs are generally signed jointly by EPA and the other Federal agency. At a Federal facility NPL site where the lead federal agency and EPA are not able to agree on the remedial approach, EPA selects the remedial action for that Federal facility site (*i.e.*, EPA concurrence is required for RODs at NPL sites on Federal facilities).

Although the roles of EPA and the State vary from site to site, EPA retains the final authority for remedy selection for all responses which are Federally funded or are to be carried out by a PRP pursuant to a CERCLA enforcement action.

### *5.1.1 State Preparation of ROD*

For cases where the State is the lead agency or is using CERCLA enforcement authority, and it is a Fund-financed remedial action, the State must recommend a remedy for EPA concurrence and adoption. Through the annual planning process, EPA and the State should designate those sites for which the State should prepare the ROD (NCP §300.515(h)(1)).

EPA intends to implement judiciously the process of State preparation of RODs, generally giving the State the lead only when both of the following conditions are met:

- The circumstances at a particular site warrant less EPA involvement and more State involvement.
- The State has demonstrated its ability to conduct remedial actions in an effective and responsible manner.

When the State is the lead agency for developing the RI/FS at a Fund-financed site, the State should prepare the Proposed Plan, and if EPA concurs, the State should publish the notice of availability, prepare the Responsiveness Summary, and develop the ROD. When the State prepares the ROD, the State must obtain EPA concurrence to receive Superfund monies or to use CERCLA authority for remedial action. If EPA concurs, then the ROD can be signed jointly by both agencies and EPA funding can be provided. In such cases, EPA retains final authority over remedy selection even though the State prepared the ROD.[1]

## 5.2 ROLE OF LEAD AND SUPPORT AGENCIES

The responsibilities outlined below for the lead and support agency apply to EPA, a State, an Indian tribe, or another Federal agency, except where specifically noted.

[1] Not every remedial activity taken at sites is conducted under CERCLA §§104, 106, or 122. NCP §430.515(e)(2)(ii) notes that EPA concurrence is not required when a State selects a remedy at a non-Fund-financed State-lead enforcement site. Further guidance on State-lead enforcement actions is available in *Questions and Answers About the State Role in Remedy Selection at Non-Fund- Financed Enforcement Sites* (OSWER 9831.9, April 1991).

### 5.2.1 Lead Agency

The NCP states that the lead agency must reassess its initial determination that the Preferred Alternative provides the best balance of trade-offs, now factoring in any new information or points of view expressed by the State (or support agency) and community during the public comment period. The lead agency must consider State (or support agency) and community comments regarding the lead agency's evaluation of alternatives with respect to the other criteria. These comments may prompt the lead agency to modify aspects of the Preferred Alternative or decide that another alternative provides a more appropriate balance. The lead agency must make the final remedy selection decision and document that decision in the ROD (NCP §300.430(f)(4)(i)). In addition, the lead agency must publish a notice of availability of the ROD in a major local newspaper of general circulation and must make the ROD available for public inspection and copying at or near the facility at issue prior to commencement of any remedial action (NCP §300.430(f)(6)).[2]

Generally the lead agency performs the following steps during the ROD development process (see Highlight 5-1):

- Preparing the draft ROD;[3]
- Briefing lead agency upper management on the ROD;
- Submitting the draft ROD to other lead agency program offices and to the support agency for review and comment (see Consultation Procedures outlined in Appendix C);
- Reviewing and responding to comments and revising the ROD, if necessary;
- Briefing the Regional Administrator or delegated decision-maker (and, if necessary, the appropriate Headquarters manager or the Assistant Administrator of OSWER) as well as the designated personnel in the support agency;
- Submitting the ROD to the Regional Administrator or the Assistant Administrator of OSWER, if necessary, for signature (if a State or a Federal agency is the lead agency, both the lead agency and EPA should generally sign the ROD, except when it is a non-Fund-financed State-lead enforcement site); and
- Publishing the notice of ROD availability.

### 5.2.2 Support Agency

The lead agency must provide the support agency with an opportunity to review and comment on the ROD (NCP §300.515(h)(3)). The support agency should have an adequate opportunity to review the draft ROD before it is adopted. Unless otherwise specified in the SMOA or CA, 10 to 15 working days must be established in the support agency's schedule for review of the draft ROD pursuant to NCP §300.515(h)(3).

When a State is the support agency, its concurrence on a ROD is not a prerequisite to EPA's selecting a remedy, (*i.e.*, signing a ROD), nor is EPA's concurrence a prerequisite to a State's selecting a remedy at a non-Fund-financed State-lead site under State law (NCP §300.515(e)(2)(ii)).

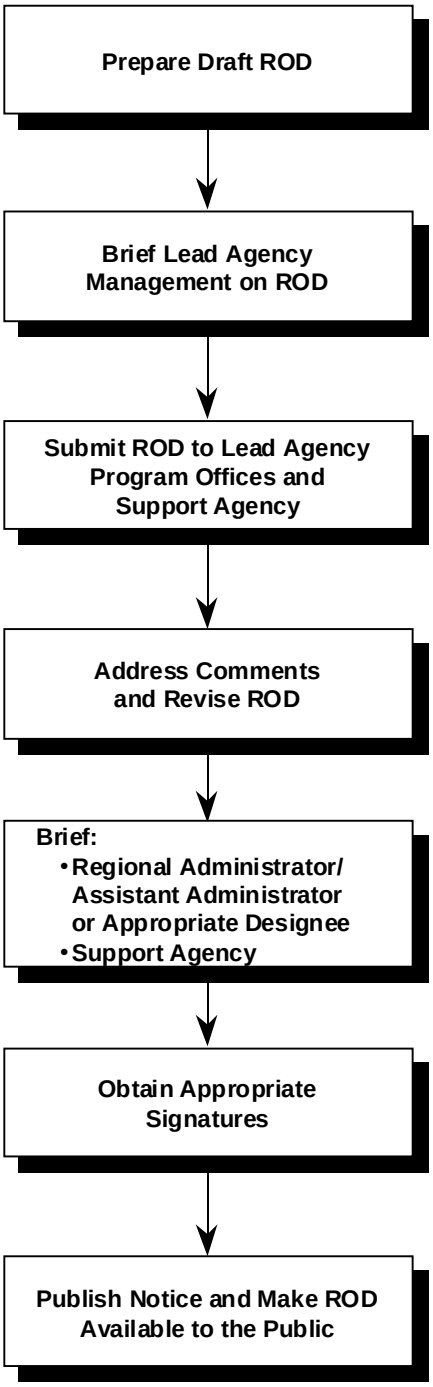
## 5.3 DISPUTE RESOLUTION

Continuous interaction between the lead and support agencies throughout the remedy selection process should ensure final agreement on the Selected Remedy in a timely manner. In some instances, however, outstanding issues may arise between the lead and support agencies. The preamble to Subpart F of the NCP (55 *FR* 8781), "State Involvement in Hazardous Substance Response," recommends/suggests a dispute resolution process that EPA and the State could use. Chapter 2 of this guidance discusses the dispute resolution pro-

[2] It is highly recommended that more active public involvement and State involvement activities be performed over and above the mandatory process specified in the NCP. These activities should be tailored to the specific needs of community. Active community and State agency involvement in the remedy selection process will help achieve EPA's general policy of implementing remedies that will achieve the reasonably anticipated future land uses and the potential beneficial ground-water uses where possible.

[3] The remedy must be selected by the lead agency itself. A technical support contractor hired to assist a government entity in performing its duties or a PRP can not select the remedy. Moreover, any party other than the lead agency generally should not draft those sections of the ROD that relate to the remedy selection rationale (*e.g.*, the Statutory Determinations section).

**Highlight 5-1: Lead Agency Responsibility in ROD Development Process**



cess presented in Subpart F of the NCP. Those resolution procedures may be used if none are specified in the SMOA or IAG.

## 5.4 ROLE OF OTHER EPA AND STATE PROGRAM OFFICES

Each agency should establish appropriate procedures and time frames for intra-agency review of RODs. An agency may need to coordinate with a number of program offices to ensure that technical and legal aspects of the ROD are defensible. When EPA is the lead agency, State agency participation during the RI/FS and Proposed Plan process is important to the successful selection of the remedy and its completion. In addition, concurrence from EPA's Office of Regional Counsel, and, as appropriate, EPA Headquarters, should be sought before the ROD is presented to the Regional Administrator (or Assistant Administrator, if the ROD has not been delegated to the Regional Administrator) for signature. Regional and State legal counsel should be involved early in the remedy selection process to help identify ARARs, ensure that all enforcement-sensitive issues are presented properly, and to ensure that the ROD is legally defensible.

## 5.5 ROLE OF OTHER FEDERAL AGENCIES

Executive Order 12580 delegates the authority for carrying out CERCLA §§117(a) and (c) to Federal agencies with Federal facilities under their jurisdiction, custody or control. A Federal agency, therefore, must issue the Proposed Plan. The IAG among the lead Federal agency, EPA and, in many cases, the State establishes the responsibilities of each party for ROD preparation and review.

For sites under its jurisdiction, custody or control, a Federal agency has the lead responsibility for preparing the draft ROD in accordance with Chapter 6 and, when appropriate, Chapter 8 of this guidance, and for carrying out the lead agency responsibilities specified in this chapter. At NPL sites the Federal agency should prepare the draft ROD, taking into consideration new information and comments received during the public comment period, and Federal facilities should submit the draft ROD to EPA (and, where designated in the IAG, the State) for EPA's written approval. The Regional or OSWER Assistant Administrator's signature (or the signature of the person to whom this authority has been delegated) constitutes final EPA "adoption" of the ROD.

The Federal agency should publish a notice of availability pursuant to CERCLA §117(d) and make the ROD available to the public before beginning the response action. At a limited number of NPL sites, the Federal agency and EPA will not be able to agree on the remedial approach for a site. If the parties are unable to agree on the draft, even after a dispute resolution process, EPA should select the remedial action for the Federal or State facility.

## 5.6 ROLE OF POTENTIALLY RESPONSIBLE PARTIES

Even when the PRP conducts the RI/FS, the lead agency, as designated by the SSC or CA, should write the ROD (see footnote #3). If the PRPs are not conducting the RI/FS, they should be kept informed of response activities through the community relations process and the Administrative Record file, and, where appropriate, through general or special notice letters. The lead agency could negotiate with the PRPs concerning RD/RA while the ROD is being written. These negotiations should be separate from the remedy selection process. Generally, documents that result from these negotiations are part of the Administrative Record file where they relate to, and will be considered in, the lead agency's selection of the remedy.

## 5.7 ISSUING NOTICE OF ROD AVAILABILITY

The ROD should be added to the Administrative Record file after it is signed. In addition, the lead agency must publish a notice of the availability of the ROD in a local newspaper. NCP §300.430(f)(6) states:

> *"After the ROD is signed, the lead agency shall: (i) Publish a notice of the availability of the ROD in a major local newspaper of general circulation; and (ii) Make the ROD available for public inspection and copying at or near the facility at issue prior to the commencement of any remedial action."*

The public notice of availability of the ROD should be brief and factual. It need not be as extensive as the newspaper notification of availability of the RI/FS and

Proposed Plan, as described in Chapter 2. The notice should use a display advertisement format and should be published in a widely read section of the newspaper.

The ROD newspaper notification should include the following:

- Site name and notice of availability of the ROD.
- The date on which the ROD was signed.
- A brief summary of the major elements of the Selected Remedy.
- Details on the location and hours of availability of the Administrative Record file and/or the information repository.
- The name and telephone number of the individual(s) to contact for further information about the site and the remedy selected.

The lead agency may find it appropriate to provide information in the newspaper notification about support agency concurrence or nonconcurrence on the ROD. A ROD notice for a Federal facility, should specify that the ROD has been prepared by the relevant Federal agency and approved by EPA. Highlight 5-2 is an example of a newspaper notification, announcing the availability of the ROD.

**Highlight 5-2: Sample Newspaper Notification of Availability of the Record of Decision**

# Record of Decision Now Available for EIO Superfund Site

The U.S. Environmental Protection Agency announces a Record of Decision (ROD) for the EIO Superfund Site. The ROD documents EPA's cleanup plan, including treatment and disposal of both contaminated soil and ground water.

**Copies of the ROD are available at:**

Nameless Public Library
619 South 20th Street
Nameless, TN 00000
(101) 999-1099
Hours: Monday through Saturday
9 a.m. to 9 p.m.

U.S. EPA Records Center, Region 4
61 Forsyth Street, S.W
Atlanta, GA 30303-3104
(555) 555-5555
Hours: Monday through Friday
8:30 a.m. to 5:00 p.m.

The Administrative Record file for the site, which includes the ROD plus all documents that formed the basis for EPA's selection of the clean-up remedy, is available for public review at the locations listed above.

**For more information regarding the site, contact:**

Joshua Doe
Community Relations Coordinator
U.S. Environmental Protection Agency
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104
(555) 555-5555

Toll Free (800) 333-3333 between 8:30 a.m. and 5:00 p.m., Monday through Friday, excluding Federal holidays.

# 6.0 WRITING THE RECORD OF DECISION

## 6.1 INTRODUCTION

This chapter presents a recommended structure for preparing a ROD and is accompanied by an outline and checklist, which can be found at the end of the chapter. Sample language and summary tables are also provided to illustrate how information should be presented in the ROD and the suggested level of detail. This recommended structure can be modified, where appropriate, on a site-specific basis. However, it is recommended that RODs be consistent with the general format and content presented in this chapter. Since RODs serve as the primary data source for all parties interested in site cleanup, a consistent format enhances the predictability of where to find site information in the document.

This chapter applies specifically to decision documents prepared for final response actions that are planned either for a site or an operable unit. Chapter 8 outlines the modifications to the standard format (as outlined in this chapter) that should be made when documenting "no action," "interim action," or "contingency" response decisions. Other specific cases that may require modifications to this standard format are discussed in Chapter 9.

### 6.1.1 Purpose of the Record of Decision

The ROD documents the selected remedial action for a site or operable unit. It is prepared by the lead agency in consultation with the support agency. The ROD serves as:

- A legal document in that it certifies that the remedy selection process was carried out in accordance with CERCLA and, to the extent practicable, in accordance with the NCP.[1]

- A substantive summary of the technical rationale and background information contained in the Administrative Record file (*e.g.*, RI/FS including the baseline risk assessment).

- A technical document that provides information necessary for determining the conceptual engineering components, and which outlines the remedial action objectives and cleanup levels for the Selected Remedy.

- A key communication tool for the public that explains the contamination problems the remedy seeks to address and the rationale for its selection.

### 6.1.2 Regulatory Requirements for the Content of the Record of Decision

The NCP directs the lead agency to produce a ROD documenting all facts, analyses of facts, and site-specific policy determinations considered in the course of selecting a remedial action, and how the nine remedy selection criteria were used to select the remedy (NCP §300.430(f)(5)(i)).

The ROD also describes the following statutory requirements as they relate to the scope and objectives of the remedial action (NCP §300.430(f)(5)(ii)).

- How the selected remedy is protective of human health and the environment, explaining how the remedy eliminates, reduces, or controls exposures to human and environmental receptors.

- The federal and state requirements that are applicable or relevant and appropriate to the site that the remedy will attain.

- The applicable or relevant and appropriate requirements of other federal and state laws that the remedy will not meet, the waiver invoked, and the justification for invoking the waiver.

- How the remedy is cost-effective, (*i.e.*, explaining how the remedy provides overall effectiveness proportional to its costs).

- How the remedy utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

[1] Section 121(a) of CERCLA provides that remedial actions should be carried out in accordance with §121 "and, to the extent practicable, the National Contingency Plan."

- Whether the preference for remedies employing treatment that permanently and significantly reduces the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants as a principal element is, or is not, satisfied by the selected remedy. If this preference is not satisfied, the ROD must explain why a remedial action involving such reductions in toxicity, mobility, or volume was not selected.

As stated in NCP §300.430(f)(5)(iii), the ROD also must:

- Indicate the remediation goals (*i.e.*, cleanup levels) that the remedy is expected to achieve. Remediation goals shall establish acceptable exposure levels that are protective of human health and the environment.

- Discuss significant changes and the response to public comments received on the Proposed Plan.

- Describe whether hazardous substances, pollutants, or contaminants will remain at the site above levels that allow for unlimited use and unrestricted exposure such that a five-year review will be required.

- When appropriate, provide a commitment for further analysis and selection of long-term response measures within an appropriate time frame.

### 6.1.3 Major Components of the Record of Decision

The three basic components of the ROD (see Highlight 6-1) are as follows:

- *The Declaration* functions as an abstract and data certification sheet for the key information in the ROD and is the formal authorizing signature page for the ROD.

- *The Decision Summary* provides an overview of the site characteristics, alternatives evaluated, and the analysis of those options. It also identifies the Selected Remedy and explains how the remedy fulfills statutory and regulatory requirements.

- *The Responsiveness Summary* serves the dual purposes of: (1) presenting stakeholder concerns about the site and preferences regarding the remedial alternatives; and (2) explaining how those concerns were addressed and the preferences were factored into the remedy selection process.

**Highlight 6-1: Recommended Outline for Standard Record of Decision***

**PART 1: DECLARATION**
- Site Name and Location
- Statement of Basis and Purpose
- Assessment of Site
- Description of Selected Remedy
- Statutory Determinations
- ROD Data Certification Checklist
- Authorizing Signatures

**PART 2: DECISION SUMMARY**
- Site Name, Location, and Brief Description
- Site History and Enforcement Activities
- Community Participation
- Scope and Role of Operable Unit or Response Action
- Site Characteristics
- Current and Potential Future Site and Resource Uses
- Summary of Site Risks
- Remedial Action Objectives
- Description of Alternatives
- Comparative Analysis of Alternatives
- Principal Threat Waste
- Selected Remedy
- Statutory Determinations
- Documentation of Significant Changes

**PART 3: RESPONSIVENESS SUMMARY**
- Stakeholder Comments and Lead Agency Responses
- Technical and Legal Issues

* See the expanded outline/checklist at the end of Chapter 6.

## 6.2 SECTION-BY-SECTION DESCRIPTION OF THE DECLARATION

The *Declaration* functions as an abstract and data certification sheet for the key information in the ROD and is the formal authorizing signature page for the ROD.

### 6.2.1 Site Name and Location

The proper site name (as it is listed on the NPL) and the town or county, Indian Reservation or Tribe, and State in which the site is located should be included in the *Declaration*. The National Superfund Database (*e.g.*, CERCLIS) identification number should also be provided. If the site is divided into operable units to facilitate site management, the name and number of the operable units addressed by the ROD should be provided.

### 6.2.2 Statement of Basis and Purpose

The lead agency must explain the factual and legal basis for selecting a particular remedy. The ROD serves as this statement of basis and purpose, and the *Declaration* formally certifies this information. In addition, this section of the *Declaration* should state that the information supporting the lead and support agencies' decisions on the Selected Remedy is contained in the Administrative Record file.

This section should also specify whether the State concurs or does not concur with the Selected Remedy. Highlight 6-2 provides standard language for the statement of basis and purpose.

**Highlight 6-2: Standard Language for Statement of Basis and Purpose**

This decision document presents the Selected Remedy for the (site name), in (location), which was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the NCP. This decision is based on the Administrative Record file for this site.

The State/Commonwealth of _____ concurs/does not concur) with the Selected Remedy.

### 6.2.3 Assessment of the Site

The *Declaration* should include a statement that identifies the existence of a release or substantial threat of release of hazardous substances into the environment and that states that the response action selected in the ROD is necessary to protect public health or welfare or the environment (CERCLA §104(a)). Standard language for this section is presented in Highlight 6-3 and should be included in all RODs where a response action is planned.[2]

### 6.2.4 Description of the Selected Remedy

The Selected Remedy should be identified and briefly described in terms of the following:

- A brief explanation of the overall site cleanup strategy. If the action is one of several oper-

**Highlight 6-3: Standard Language for Assessment of the Site**

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

*******

*If the site is contaminated with only pollutants or contaminants (in accordance with the definitions contained in NCP §300.5), then the following standard language should be used:*

The response action selected in this Record of Decision is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

*******

*If the response action will address both hazardous substances and pollutants or contaminants, a combination of the two examples of standard language may be necessary.*

[2] When a No Action decision is made, the following language is recommended "The lead agency has determined that no action is necessary to protect public health or welfare or the environment."

able units, briefly explain how this action fits into the overall site management plan. Include the intended sequence and timing of the operable units and identify the selected performance standards.

- A brief description of how the selected response action addresses source materials constituting principal threats at the site (See Section 6.3.11 and Highlight 6-26 for definitions and examples of principal threat wastes).

- A brief description, in bullet form, of the major components of the Selected Remedy. This discussion should include the treatment technologies and/or engineering controls that will be used, as well as any institutional controls that will be used and the entities responsible for implementing and enforcing them (*e.g.*, land use zoning restrictions enforced by town planning board).[3]

### 6.2.5 Statutory Determinations

The ROD Declaration shall conclude with the finding that the Selected Remedy satisfies the statutory requirements of CERCLA. This can be accomplished by making confirmatory statements that the Selected Remedy attains the mandates of CERCLA §121, and, to the extent practicable, the NCP. Specifically, the remedy must do the following: (1) Be protective of human health and the environment; (2) Comply with ARARs (or justify a waiver); (3) Be cost-effective; (4) Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; (5) Satisfy the preference for treatment as a principal element of the remedy which permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants.[4]

In addition, this section of the *Declaration* must also discuss the applicability of the five-year review. NCP §300.430(f)(4)(ii) requires a five-year review if the remedial action results in hazardous substances, pollutants or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure. This review evaluates whether such a remedy is protective of human health and the environment and is required no less often than every five years after the date of such remedy.

Standard language is provided in Highlight 6-4. This standard language is provided in three main parts. Part 1 affirms that the Selected Remedy satisfies CERCLA §121 requirements. Part 2 indicates whether or not the remedy satisfies the statutory preference for treatment as a principal element. Part 3 indicates whether or not a five-year review is applicable.

### 6.2.6 ROD Data Certification Checklist

The *Declaration* should also contain a data certification checklist which certifies that the ROD contains certain key remedy selection information (see Highlight 6-5). This data certification checklist fulfills a commitment made by EPA to the General Accounting Office to ensure that RODs contain certain key remedy selection information. If the ROD Outline/Checklist recommended in this guidance document is used when preparing the ROD (including the information summary tables provided in this Chapter), the information on the ROD Data Certification Checklist will be captured in the document. References to page numbers where the information can be found in the body of the

[3] Engineering controls are physical barriers to exposure and do not include institutional controls, which are non-engineering methods intended to affect human activities in such a way as to prevent or reduce exposure to hazardous substances (*e.g.*, deed restrictions such as easements and covenants, deed notices, land use restrictions such as zoning and local permitting, ground-water use restrictions, and public health advisories).

[4] If the remedy does not meet the statutory preference for treatment, then the *Statutory Determinations* section of the *Declaration* must include a statement to this effect and summarize the rationale for choosing a remedy that does not contain treatment as a principal element (NCP §300.430(f)(5)(ii)(F)). This rationale could be based on: 1) the specific factors used to determine that the treatment is impracticable, such as technical infeasibility, inadequate short-term protection of human health and the environment, unavailability of necessary capacity, equipment, or specialists, or extraordinarily high costs; and 2) the fact that no source materials constituting principal threats will be addressed within the scope of this action. In addition, a brief statement asserting that past or future operable units have met or will meet the statutory preference for treatment should be included, when appropriate.

**Highlight 6-4: Standard Language for Statutory Determinations**

***Part 1: Statutory Requirements***

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

***Part 2: Statutory Preference for Treatment***

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

**OR**

The remedy in this OU does not satisfy the statutory preference for treatment as a principal element of the remedy for the following reasons . . ..

***Part 3: Five-Year Review Requirements***

Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this remedial action.*

**OR**

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

* *If no statutory five-year review is required, but a policy five-year review is recommended pursuant to EPA five-year review guidance, the following standard language should be included in the declaration:* Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, but it will take more than five years to attain remedial action objectives and cleanup levels, a policy review may be conducted within five years of construction completion for the site to ensure that the remedy is, or will be, protective of human health and the environment.

document can also be added so that the checklist serves as a "roadmap" to key information in the ROD.

If these data elements are not included in the ROD, an explanation should be provided in the Declaration as well. This information may also be required for data entry into WasteLan (or the current Superfund electronic database). This guidance recommends the inclusion of this data verification form in the *Declaration*.[5]

### 6.2.7 Authorizing Signatures and Support Agency Acceptance of Remedy

The *Declaration* also serves as the formal authorizing signature page for the ROD. All CERCLA-funded or -authorized RODs are signed and dated by the Regional Administrator or the Assistant Administrator of OSWER at EPA Headquarters (or by those to whom this signature authority has been delegated). Where EPA is the lead agency, the support agency must also be given the opportunity to concur/nonconcur with the remedy selected in the ROD, and if appropriate, co-sign the ROD with EPA. Where a Federal agency other than EPA (*e.g.,* DOE or DOD) is the lead agency at an NPL site, that agency should co-sign the ROD with EPA as well. (See Highlight 6-6 and Chapter 5 for a more complete discussion of lead/support agency interactions in developing the ROD.)

[5] An alternative to including this information in the Declaration is to develop a one-page data certification sheet for the Waste Management Division Director's signature to be attached to the ROD and included in the Administrative Record file.

## Highlight 6-5: Standard Language for ROD Data Certification Checklist

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern and their respective concentrations.
- Baseline risk represented by the chemicals of concern.
- Cleanup levels established for chemicals of concern and the basis for these levels.
- How source materials constituting principal threats are addressed.
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD.
- Potential land and ground-water use that will be available at the site as a result of the Selected Remedy.
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.
- Key factor(s) that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

[Note: Add references to page numbers, if appropriate.]

## Highlight 6-6: Notes on ROD Authorizing Signatures

When a State regulatory agency is the lead agency for developing and preparing the ROD for a Fund-financed or CERCLA enforcement-lead site, the director of the State regulatory agency or Chairman of the Indian Tribe or Nation should co-sign the ROD with EPA. In these cases, EPA must concur and adopt the ROD before a State can proceed with a Fund-financed remedial action (NCP Section 300.515(e)(2)(ii)) or use CERCLA authority to achieve a PRP-lead remedial action. When the State is the support agency, the State's signature on the ROD is optional (i.e., the SMOA may or may not provide for such a signature). At a minimum, a letter from the State specifying concurrence or nonconcurrence should always be included in the Administrative Record file.

Where a Federal agency other than EPA (e.g., DOE or DOD) is the lead agency at an NPL site, that agency should co-sign the ROD with EPA as well.

Although the goal of the interactions between the lead and support agencies is to reach mutual agreement on the ROD, there may be limited instances in which this is not achieved. In such an event, the procedures for selecting and implementing the remedy depend on who has the lead responsibility for the ROD. If EPA has the lead, and the State does not concur with the Selected Remedy, then EPA has the discretionary authority to sign the ROD and continue with the remedy using Fund monies or enforcement authority through the remedial design stage. EPA cannot proceed with a remedial action without the State's cost-share for Fund-financed remedial actions. However, where PRPs are conducting the RA, the RA can proceed.

If the State is the lead for an action using Fund monies or based on CERCLA enforcement authorities and EPA does not concur with the Selected Remedy, EPA can assume the lead for the ROD and proceed with an EPA-Selected Remedy (through the RD stage for Fund-financed remedial actions). In either case, all non-privileged information pertaining to the disagreement should be included in the Administrative Record file. Where the State has been designated as the lead agency for a non-Fund-financed State-lead enforcement response action (i.e., actions taken under State law) at an NPL site, the State may select a remedy without EPA's concurrence.

It should be noted that EPA retains the authority to sign RODs at NPL sites owned/operated by Federal agencies.

(See Chapter 5 for a more complete discussion of lead/support agency interactions in developing the ROD.)

## 6.3 SECTION-BY-SECTION DESCRIPTION OF THE DECISION SUMMARY

The *Decision Summary* provides an overview of the site characteristics, alternatives evaluated, and the analysis of those options. It also identifies the Selected Remedy and explains how the remedy fulfills statutory and regulatory requirements.

Although some of the information in the *Decision Summary* is similar to that in the *Declaration*, this section discusses the topics in greater detail and provides the rationale for those "summary declarations." The appropriate level of detail for the *Decision Summary* will depend on the complexity of the situation being addressed.

The *Decision Summary* should **provide a substantive summary** of information that is already available in the Administrative Record file for a site, particularly the RI/FS Report. However, when information is unavailable or is not satisfactorily addressed in the Administrative Record file, the discussion in the *Decision Summary* may need to be more thorough. The final section, which identifies and describes the Selected Remedy and explains how it satisfies the statutory and regulatory requirements, is information unique to the ROD that will not be contained elsewhere in the Administrative Record file, and thus should be presented in as much detail as possible given the information available at the time of the remedy selection decision.

### 6.3.1 Site Name, Location, and Description

This section should briefly describe basic information about the site. This section should include the following:

- Name and location.
- National Superfund electronic database identification number (*e.g.*, CERCLIS III, WasteLan).
- Lead and support agency (*e.g.*, EPA, State, Federal facility).
- Source of cleanup monies (*e.g.*, Superfund trust fund, enforcement/PRP settlement).
- Site type (*e.g.*, landfill, industrial facility).
- Brief site description (*i.e.*, one-paragraph abstract).

### 6.3.2 Site History and Enforcement Activities

This section should provide background information on the following:

- Activities that have led to the current problems, such as manufacturing or disposal of hazardous substances (*e.g.*, an important piece of information may be whether a site was in operation before or after the effective date of key RCRA regulations, such as those of November 19, 1980, or July 26, 1982).
- Federal, State, and local site investigations and removal, or remedial actions conducted to date under CERCLA, and under other environmental authorities (*e.g.,* RCRA, CWA, CAA, or State authorities). History of any cited violations under Federal or State environmental regulations or statutes.
- History of CERCLA enforcement activities (*e.g.*, RI/FS notice letter dates, results of RI/FS negotiations, whether special notice letters have been issued to PRPs (specific names need not be mentioned), and/or status of past or pending lawsuits pertaining to site cleanup).

### 6.3.3 Community Participation

This section should briefly note how the public participation requirements in CERCLA and the NCP were met in the remedy selection process. NCP Section 300.430(f)(3) establishes a number of public participation activities that the lead agency must conduct throughout this process (as described in Section 2.6).

The lead agency should also describe any other major public participation activities (*e.g.*, community relations plans, special activities related to environmental justice concerns). Efforts to solicit views on the assumptions about reasonably anticipated future land use and potential beneficial uses of ground water should also be described in this section of the *Decision Summary*.

A detailed summary of community responses to the Selected Remedy should not be included in this section of the *Decision Summary*; rather it should be addressed under the community acceptance criterion in the *Comparative Analysis of Alternatives* section. In addition, specific comments should be responded to in the *Responsiveness Summary*. Highlight 6-7 is an example of the length and type of information recommended for this section.

**Highlight 6-7: Example Language for Community Participation Activities**

The RI/FS Report and Proposed Plan for the EIO Industrial Site in Nameless, Tennessee, were made available to the public in March 1999. They can be found in the Administrative Record file and the information repository maintained at the EPA Docket Room in Region 4 and at the Nameless Public Library. The notice of the availability of these two documents was published in the Nameless Advocate on March 1, 1999. A public comment period was held from March 1 to March 30, 1999. An extension to the public comment period was requested. As a result, it was extended to April 30, 1999. In addition, a public meeting was held on March 13, 1999 to present the Proposed Plan to a broader community audience than those that had already been involved at the site. At this meeting, representatives from EPA and the Tennessee Department of Environment and Conservation answered questions about problems at the site and the remedial alternatives. EPA also used this meeting to solicit a wider cross-section of community input on the reasonably anticipated future land use and potential beneficial ground-water uses at the site. EPA's response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision.

### 6.3.4 Scope and Role of Operable Unit or Response Action

Due to the fact that many Superfund sites are complex and have multiple contamination problems or areas, they are generally divided into several operable units for the purposes of managing the site-wide response action.[6] When a ROD is written for an operable unit, and not an entire site, it is important to convey the scope and role of the operable unit within the overall site management plan. This section of the decision summary should discuss how the operable unit or response action addressed by the ROD fits into the overall site strategy. This discussion should describe the overall site cleanup strategy, including:

- The planned sequence of actions
- The scope of problems those actions will address.
- The authorities under which each action will be/has been implemented (*e.g.*, removal, remedial, State).

Highlight 6-8 provides tips for documenting the *Scope and Role* section for sites with more than one operable unit. Highlight 6-9 provides example language for describing the scope and role of an OU or response action.

[6] The NCP defines an operable unit (OU) as "a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site" (NCP Section 300.5).

### Highlight 6-8: Tips for Documenting Scope and Role Section for Sites with More than One Operable Unit

- Clearly present an Overall Site Cleanup Plan in bullet format, and highlight or boldface the specific activities addressed by this ROD.
- Describe how past or planned removal actions fit into the overall site cleanup strategy.
- Organize the list into categories (e.g., past response, activities proposed in this ROD, future response plans).
- For Federal facility sites, the relationship between CERCLA and other remediation activities at the facility or base should be discussed (e.g., RCRA corrective action, long-term waste management).
- For interim RODs, state that the operable unit response action will be consistent with the final action selected for the site.

### Highlight 6-9: Example Language for Scope and Role of Operable Unit Section

As with many Superfund sites, the problems at the [site name] Site are complex. As a result, EPA has organized the work into two operable units (OUs):

- Operable Unit 1: Contamination of the on-site soils
- Operable Unit 2: Contamination of the ground-water aquifer

EPA has already selected the remedy for Operable Unit 1 in a ROD signed on October 22, 1997. Operable Unit 1 will treat soils contaminated with high concentrations of Volatile Organic Compounds (VOCs) through a combination of a treatment technology (thermal desorption) and containment of residuals from that treatment unit. This action is in the remedial design stage. Actual construction is planned to begin in Fall 2000.

The second operable unit, the subject of this ROD, addresses the contamination of the ground-water aquifer. Ingestion of water extracted from this aquifer poses a current and potential risk to human health because EPA's acceptable risk range is exceeded and concentrations of contaminants are greater than the maximum contaminant levels for drinking water (as specified in the Safe Drinking Water Act). This second operable unit presents the final response action for this site and addresses a principal threat at the site through the removal and treatment of Non-Aqueous Phase Liquid (NAPL) source material in the aquifer.

### 6.3.5 Site Characteristics

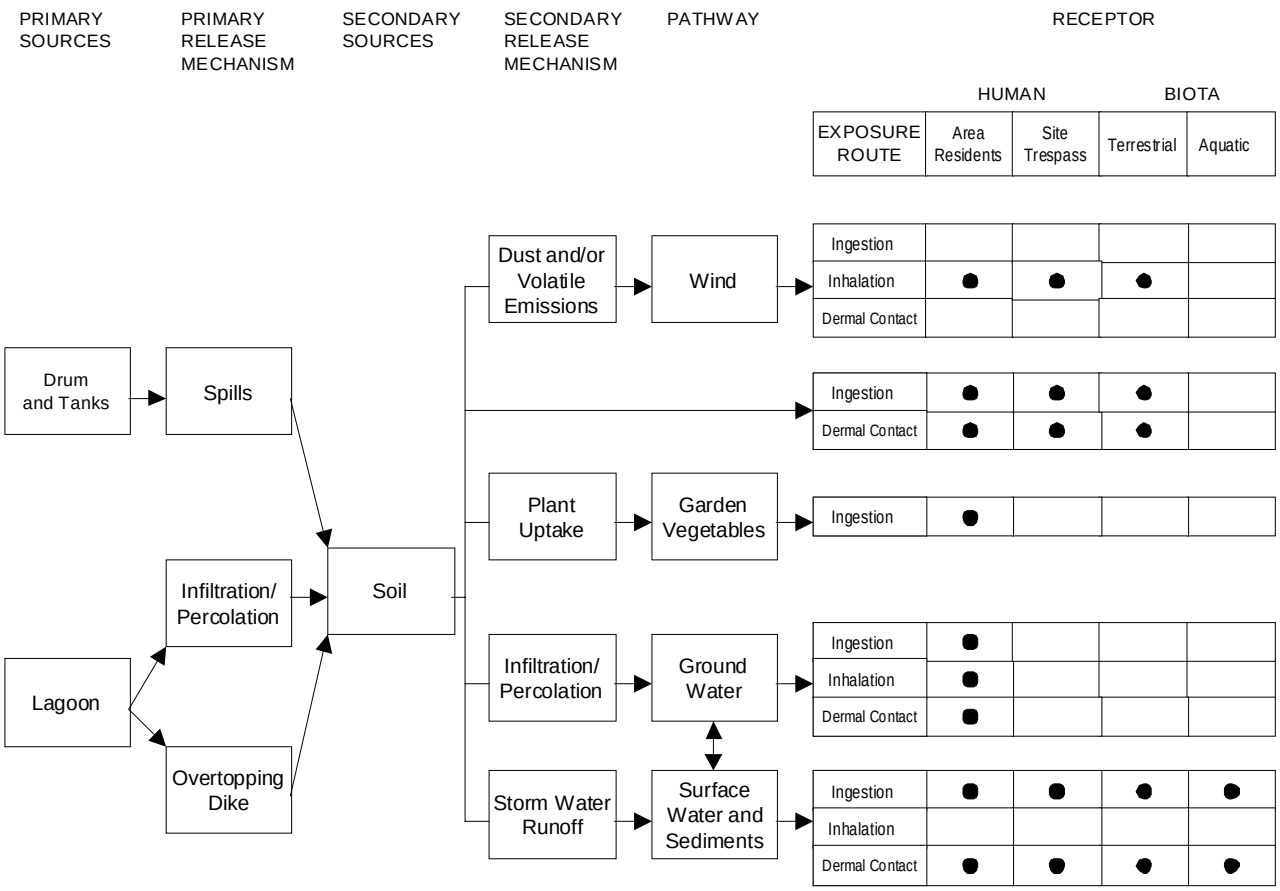
This section of the ROD should present a brief yet comprehensive overview of the site. The use of maps that highlight the location of sources and distribution of the detected contaminants and COCs is recommended.[7] In general, this section should satisfy the following:

- Describe the Conceptual Site Model (CSM)[8] on which the risk assessment and response action are based (see Highlight 6-10).
- Provide an overview of the site, including the following:
  - Size of site (*e.g.*, acres).
  - Geographical and topographical information (*e.g.*, surface waters, flood plains, wetlands).
- Surface and subsurface features (*e.g.*, number and volume of tanks, lagoons, structures, and drums on the site).
  - Areas of archaeological or historical importance.
- Describe the sampling strategy (*e.g.,* which media were investigated, what sampling approach was used, over what area, when was the sampling performed).
- Describe known or suspected sources of contamination.
- Describe types of contamination and the affected media (summarize in a table if appropriate), including the following:
  - Types and characteristics of COCs (*e.g.*, toxic, mobile, carcinogenic, non-carcinogenic).
  - Quantity/volume of waste.
  - Concentrations of COCs in each medium.
  - RCRA hazardous wastes and affected media.
- Describe location of contamination and known or potential routes of migration, including the following:
  - Lateral and vertical extent of contamination.
  - Current and potential future surface and subsurface routes of human or environmental exposure.
  - Likelihood for migration of COCs.
  - Human and ecological populations that could be affected.
- For sites with ground-water contamination, describe the following:
  - Aquifer(s) affected or threatened by site contamination, types of geologic materials, approximate depths, whether aquifer is confined or unconfined.
  - Surface and subsurface features (*e.g.*, number and volume of tanks, lagoons, structures, and drums at the site).
  - Ground-water flow directions within each aquifer and between aquifers and ground-water discharge locations (*e.g.*, surface waters, wetlands, other aquifers).

[7] Chemicals of Potential Concern (COPCs): Those chemicals that are identified as a potential threat to human health or the environment and are evaluated further in the baseline risk assessment. Chemicals of Concern (COCs): A subset of the COPCs that are identified in the RI/FS as needing to be addressed by the response action proposed in the ROD.

[8] Conceptual Site Model (CSM): A three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. The CSM documents current and potential future site conditions and is supported by maps, cross sections, and site diagrams that illustrate what is known about human and environmental exposure through contaminant release and migration to potential receptors. The CSM is initially developed during the scoping phase of the RI/FS and should be modified as additional information becomes available. A graphical depiction of the CSM may be appropriate to include in the ROD as it provides a good presentation of the overall site conditions and basis for taking an action, and can be referenced when discussing the overall site management strategy and the specific remedial action objectives addressed by the Selected Remedy. Highlight 6-10 shows a sample CSM for contaminated soil. For additional information, refer to *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final* (EPA 540-G-89-004, October 1988) and *Soil Screening Guidance: User's Guide* (EPA 540-R-96-018, July 1996).

**Highlight 6-10: Example Conceptual Site Model for Contaminated Soil**




- Interconnection between surface contamination (*e.g.*, soils, surface water/sediments) and ground-water contamination.
- Confirmed or suspected presence and location of NAPLs.
- If ground-water models were used to define the fate and transport of COCs, identify the model used and major model assumptions.

- Note other site-specific factors that may affect response actions at the site.

Highlight 6-11 provides tips for documenting site characteristics in the ROD.

**Highlight 6-11: Tips on Writing the "Site Characteristics" Section**

- Use a simplified graphical depiction of the Conceptual Site Model (e.g., Highlight 6-10) to illustrate threats posed by the site.
- If the response action can be broken into distinct components (e.g., ground water, source control) or areas (e.g., Area A, Area B), clearly define this up front, and use the same terminology throughout the rest of the document.
- Use tables and figures to summarize and delineate types and extent of contamination, affected media, location of contamination, and potential routes of exposure.

### 6.3.6 Current and Potential Future Land and Resource Uses

This section of the ROD should discuss the **current and reasonably anticipated future land uses** and **current and potential beneficial ground-water uses** at the site, and discuss the basis for future use assumptions. It is important that this section precede the summary of the risk assessment as it forms the basis for reasonable exposure assessment assumptions and risk characterization conclusions. This section should include the following:

Land Uses:

- Current on-site land uses.
- Current adjacent/surrounding land uses.
- Reasonably anticipated future land uses, with expected time frames for such uses, and basis for future use assumptions (*e.g.*, zoning maps, nearby development, 20-year development plans, dialogue with local land use planning officials and citizens).

Ground and Surface Water Uses:

- Current ground/surface water uses on the site and in its vicinity.
- Potential beneficial ground/surface water uses (*e.g.*, potential drinking water, irrigation, recreational) and basis for future use assumptions (*e.g.*, Comprehensive State Ground Water Protection Plan (CSGWPP), promulgated State classification, EPA ground-water classification guidelines).
- If beneficial use is as a potential drinking water source, identify the approximate time frame of projected future drinking water use (*e.g.*, ground-water aquifer not currently used as a drinking water source but expected to be utilized in 30–50 years).
- Location of anticipated use in relation to location and anticipated migration of contamination.

The basis for assumptions about the reasonably anticipated future land use and potential beneficial use of ground water should be presented clearly in the ROD. The role that the community, and other site stakeholders, played in assisting the lead agency to develop these assumptions should be explained as well.

For additional information, please refer to *Land Use in the CERCLA Remedy Selection Process* (EPA 540-R-95-052, May 1995), *The Role of CSGWPPs in EPA Remediation Programs* (EPA 540-F-95-084, April 4, 1997), and *Rules of Thumb for Superfund Remedy Selection* (EPA 540-R-97-013, August 1997).

### 6.3.7 Summary of Site Risks

The *Summary of Site Risks* section of the ROD should: (1) state the basis for taking action at the site; (2) provide a brief summary of the relevant portions of the human health risk assessment for the site or operable unit; and (3) provide a brief summary of the ecological risk assessment.[9] This section should focus on the information that is driving the need for the specific response action described in the ROD. It is not necessarily a summary of the entire baseline risk assessment developed for the site as a whole. For example, the ROD should primarily discuss the Chemicals of Concern (COCs) identified in the risk assessment that are driving the need for a remedial action, not necessarily all of the Chemicals of Potential Concern (COPCs) originally identified in the risk assessment process.[10] These COCs are referred to as "risk drivers" in the *Risk Assessment Guidance for Superfund: Volume 1 Human Health Evaluation Manual, Part D* (EPA 540-R-97-033, January 1998), hereafter referred to as "*RAGS Part D*." In addition, the summary of the exposure assessment should focus on those exposure pathways and scenarios driving action at the site, not necessarily ALL of the exposure pathways and scenarios evaluated for the entire site. References to the Conceptual Site Model presented in the *Summary of Site Characteristics* section should be used to support the presentation of the risk assessment information as well.

[9] If an ecological risk assessment has not been performed, an explanation for when this will be performed or a justification for not performing it needs to be provided.

[10] In some circumstances (e.g. No Action RODs) a discussion of the contaminants detected that are not COCs and of exposures that do not exceed EPA's acceptable risk range is warranted.

The information presented in the *Summary of Site Risks* must support the decision to take the remedial action. **A clear statement regarding the basis for action at the site should be made at the conclusion of the risk assessment section of the ROD.**[11] See Highlight 6-12 for standard language.

**Highlight 6-12: Standard Language - Basis for Action**

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

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*If the site is contaminated with only pollutants or contaminants (in accordance with the definitions contained in NCP §300.5), then the following standard language should be used:*

The response action selected in this Record of Decision is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

*******

*If the response action will address both hazardous substances and pollutants or contaminants, a combination of the two examples of standard language may be necessary.*

[11] Basis for Action: A response action is generally warranted if one or more of the following conditions is met: (1) the cumulative excess carcinogenic risk to an individual exceeds $10^{-4}$ (using reasonable maximum exposure (RME) assumptions for either the current or reasonably anticipated future land use or current or potential beneficial use of ground/surface water); (2) the non-carcinogenic hazard index is greater than one (using RME assumptions for either the current or reasonably anticipated future land use or current or potential use of ground/surface water); (3) site contaminants cause adverse environmental impacts; or (4) chemical-specific standards or other measures that define acceptable risk levels are exceeded and exposure to contaminants above these acceptable levels is predicted for the RME. Examples include drinking water standards that are exceeded in ground water when that ground water is a current or potential source of drinking water or water quality standards that are exceeded in surface waters that support the designated uses of these waters (*e.g.*, support aquatic life). For more information, see *Role of the Baseline Risk Assessment in Superfund Remedy Selection* (OSWER 9355.0-30, April 22, 1991).

The information necessary to write the *Summary of Site Risks* section of the *Decision Summary* should be available in the risk assessment chapter of the RI/FS report, or in a stand-alone human health or ecological risk assessment report. Appropriate sections of these reports should be cited as necessary.

### 6.3.7.1 Summary of Human Health Risk Assessment

A summary of the relevant information developed in the risk assessment should be presented in the ROD. A mixture of (1) text format (*e.g.*, for describing the toxicity assessment) and (2) table format (*e.g.*, for presenting COCs and risk values) should be used to summarize and communicate the results of the human health risk assessment. It is strongly recommended that the format for the tables presented in this section be used to summarize appropriate risk assessment information in the ROD. The information in these tables was drawn from the standardized tables in *RAGS Part D*. This guidance was developed and approved by a cross-Regional team of EPA risk assessors to standardize the planning, reporting, and review of Superfund risk assessments. The risk assessment information presented in the ROD should be a **relevant subset** of the information presented in the *RAGS Part D* standardized risk tables. This information will also be built into WasteLan (or the current national Superfund electronic database). Use of risk tables does not substitute for a text discussion of this information as well. See sample text provided in accompanying highlights.

The discussion of risks in this section of the ROD should parallel the major sections of the risk assessment: (1) Identification of Chemicals of Concern; (2) Exposure Assessment; (3) Toxicity Assessment; and (4) Risk Characterization (including the uncertainty analysis). Information should be presented so that the Selected Remedy will be supported and individuals unfamiliar with the site can understand the basis for undertaking remedial action. **The primary focus of this summary should be on those exposure pathways and chemicals found to pose actual or potential threats to human health.** Highlight 6-13 contains example language that can be used as an introduction for this section.

**Highlight 6-13: Example Language for the Introduction to the Human Health Risks Summary**

The baseline risk assessment estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for this site.

### *Section 1: Identification of Chemicals of Concern*

Information on chemicals of concern should include summaries of the following:

- COCs in each medium (*e.g.*, TCE in ground water, benzo(a)pyrene, dieldrin, and 4,4'-DDT in soil).
- The range of detected concentrations (minimum and maximum) and the frequency of detection for each COC in each medium investigated.
- Data quality as discussed in the data usability section of the risk assessment. For example, *RAGS Part D* suggests including a Data Usability Worksheet in the risk assessment to present this information.
- The exposure point concentration used to estimate the risk for each COC and the type of statistical measure it represents. Generally, the 95 percent upper confidence limit (UCL) on the arithmetic mean concentration for a chemical is used as the exposure point concentration. However, for sites with limited amounts of data or extreme variability in the data, the highest concentration (*i.e.,* the maximum value) is used commonly as a default exposure point concentration in the risk assessment. For further information, refer to *Supplemental Guidance to RAGS: Calculating the Concentration Term* (OSWER 9285.7-08I, Volume 1, Number 1, May 1992).

Highlight 6-15 presents the preferred table format for summarizing the COCs, their associated concentrations in each medium, and their frequency of detection. This table should be recreated in the ROD as many times as needed for each medium if addressed by the ROD. The information for this table can be found in Standard Table 3.1 of *RAGS Part D*. In addition to the summary table, the discussion should also include language summarizing the extent of contamination at the site; example language is provided in Highlight 6-15.

### *Section 2: Exposure Assessment*

The exposure pathways that were quantitatively evaluated in the risk assessment should be summarized in the ROD. The appropriate section in the Human Health Risk Assessment should be referenced in this section. The information for this section can be found in Standard Table 1 of *RAGS Part D*.

The text should include a brief discussion of the following information:

- A reference to the Conceptual Site Model for the site and how it was used to determine reasonable exposure scenarios and pathways of concern. Include a brief discussion of scenarios and pathways that may have been considered, but not quantitatively addressed (*i.e.*, were considered but were not considered to be signifi-

**Highlight 6-14: Tips on Writing the "Summary of Site Risks" Section**

- Use the tables presented in this section to summarize the relevant information from the risk assessment.
- Explain the technical information presented in the tables in plain English that a layperson can understand. The guidance recommends attaching the explanation to the table itself.
- This section should primarily summarize the information from the baseline risk assessment relevant to the action proposed in the ROD.
- Clearly state the **basis for action** at the conclusion of the risk assessment section.

cant or realistic). Copies of the Standard Table 1 from *RAGS Part D* that includes all of the scenarios and pathways considered in the risk assessment may be useful to include as an appendix to the ROD as well.

- The potentially exposed populations in current and future scenarios (*e.g.*, worker currently working on-site, adults and children living on-site in the future).

- Any sensitive subpopulations (highly exposed and/or more susceptible) that may be exposed (*e.g.*, farm families, children, subsistence fishermen).

- The routes by which each population group or subpopulation group could reasonably be exposed to site contaminants (*e.g.*, ingestion of contaminated ground water for adults and children, inhalation of volatile contaminants for workers).

Major assumptions about exposure frequency, duration, and other exposure factors that were included in the exposure assessment (*e.g.*, exposure frequency (days/year), exposure duration (years), and body surface area ($cm^2$) for dermal exposure) could be included in an appendix.

### *Section 3: Toxicity Assessment*

This section should summarize the salient points of the toxicity assessment section of the risk assessment. The information for this section can be found in Standard Tables 5 and 6 of risk assessments applying the *RAGS Part D* guidance.

The following information should be summarized in text format:

- A brief summary of the carcinogenic and non-carcinogenic toxicity data used to calculate the risk of each COC, differentiating between toxicity data for chronic, subchronic, and acute exposures.

- The source of the toxicity information (*e.g.*, Integrated Risk Information System (IRIS), Health Effects Assessment Summary Tables (HEAST), or provisional values provided by Superfund Technical Support Center in Cincinnati).

- Primary target organs and health effects of concern for non-carcinogenic COCs.[12] Example text for summarizing the toxicity assessment is provided with Highlights 6-16A and 6-16B.

### *Section 4: Risk Characterization*

The risk characterization summarizes and combines outputs of the exposure and toxicity assessments to characterize baseline risks, both in quantitative expressions and qualitative statements (see Highlight 6-17 for introductory language for the Risk Characterization section). The summary of this section should include the following for all current and future land use scenarios that present unacceptable risks.

- Quantified carcinogenic risks for each COC in each exposure medium for each relevant exposure pathway.

- Combined carcinogenic risks reflecting total exposure to COCs in a given medium and pathway of exposure.

- Potential for non-carcinogenic impacts as quantified by the hazard quotient for each COC in each exposure medium for each exposure pathway, as appropriate.

- Potential for combined non-carcinogenic effects in each medium and pathway of exposure as expressed by hazard indices, which reflect the potential additive effects of COCs that affect the same target organ or system.

[12] The number and types of toxicity studies available varies from one chemical to another. Thus, EPA provides a qualitative analysis of the data supporting its toxicity criteria. For carcinogens, EPA provides a "weight of evidence" classification. Carcinogen guidelines recently proposed by EPA may replace this classification with other qualitative descriptions. For non-carcinogens, a high, medium, or low "level of confidence" is assigned. If particular values for a COC are unavailable in the acceptable references, this should be indicated, and the term "not available" should be used in subsequent tables to show that an evaluation was performed but information was not available. This information should be provided in the ROD as risk managers need to consider the impact of missing toxicity data in the decision making process.

- Combined carcinogenic risks and/or hazard indices for those exposure pathways to which the same individual or subpopulation could reasonably be exposed (*e.g.*, the carcinogenic risk to children living at a residence who may be exposed to contaminated soil and local ground water is $2.85 \times 10^{-2}$).

- Any qualitative descriptions of risk (*e.g.* special threats to pregnant women or hazards for which risk information can not be quantified.)[13]

- Brief explanation of the meaning of both the quantitative risk characterization and qualitative statements.

- Tabular summary of the carcinogenic risks and non-carcinogenic impacts by exposure pathway and by COCs per pathway. Highlights 6-16A and 6-16B present the preferred table format and sample language. Information for these tables can be found in Standard Table 10 of *RAGS Part D*.

The risk characterization should also include a brief discussion of the significant sources of uncertainty inherent in the risk assessment; indicating whether the uncertainties are expected to underestimate or overestimate the potential risk. The discussion may include the following:

- Uncertainty due to the number of samples collected or their location. Explain any concerns with data usability as a result of the QA/QC that was performed on the sampling/analysis data. For further information on evaluating data quality, refer to *Guidance for Data Usability in Risk Assessment, Parts A and B, Final* (OSWER 9285.7-09A and B, April and May 1992).

- Uncertainty due to the use of environmental fate and transport models.

- Uncertainty due to the use of default exposure assumptions in lieu of site-specific data for exposure factors.

- Uncertainty associated with available toxicity criteria or concerns regarding the lack of toxicity criteria to address potential exposure pathways.

Please note that in the examples provided in Highlights 6-18A and 6-18B, it is appropriate to sum the carcinogenic risks and hazard quotients (HQs). The summation of carcinogenic risks is appropriate because the same receptor (i.e,. child resident) is likely to be exposed to soil and ground water. Also, the summation of HQs is appropriate because 4,4'-DDT and dieldrin affected the same target organ (*i.e.,* the liver). However, it is not always appropriate to sum cancer risks and HQs, and questions should be directed to regional risk assessors. For written guidance on summing cancer risks or HQs, please refer to *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A, Interim Final* (OSWER 9285.7-01B, December 1989) and the *Soil Screening Guidance: User's Guide* (EPA 540-R-96-018, April 1996).

#### 6.3.7.2 Summary of Ecological Risk Assessment

The *Summary of Site Risks* section of the ROD should also address risks to potential ecological receptors. If this ROD addresses the final OU for the site and does not address ecological risks posed by the site, an explanation should be provided that explains when and how ecological risks were assessed and addressed or a justification should be provided for why no investigation was performed.

Procedures for addressing ecological risks are not as standardized as they are for human health risk assessment. Specific procedures and level of effort for an ecological risk assessment vary significantly depending on site-specific factors. If a significant level of effort has been put into an ecological risk assessment, the ROD should cover this information at an appropriate level of detail.

Similar to the human health risk assessment summary, the major sections of the ecological risk assessment should be summarized in the ROD as well. The

[13] For sites where lead (Pb) is a COC, the *Summary of Site Risks* section of the ROD should document the use of models and the site-specific assumptions that were made to determine cleanup levels for lead in soil. (See Chapter 9, section 9.3, for more information on documenting remedy decisions at sites with lead contamination.)

major sections of ecological risk assessment usually include 1) Identification of Chemicals of Concern, 2) Exposure Assessment, 3) Ecological Effects Assessment, and 4) Ecological Risk Characterization. However, depending upon the type of assessment conducted, the sections of the ecological risk assessment may vary. Ecological risk data should be presented in the ROD in tabular form when sufficient data are available. RODs should include the following details to the extent they were discussed in the ecological assessment:

### *Section 1: Identification of Chemicals of Concern*

- Summary of toxicity data used to screen COPCs as well as the background concentration for each chemical.
- COPCs in each medium (*e.g.*, TCE in ground water released to wetlands, and benzo(a)pyrene, 4,4'-DDT, and dieldrin in soil).
- The range of detected concentrations (minimum and maximum) and the frequency of detection for each COPC in each medium investigated.
- The mean concentrations (arithmetic mean) of the COPCs as well as the 95% upper confidence limit concentrations.
- The ecological Hazard Quotient and the contaminant of concern flag (Yes or No) for each COPC.
- Data quality, as discussed in the data usability section of the ecological risk assessment. For further information on evaluating data quality, refer to *Guidance for Data Usability in Risk Assessment, Parts A and B, Final* (OSWER 9285.7-09A and B, April and May 1992).
- Highlight 6-19 presents the preferred tabular format for summarizing the ecological COCs and their associated concentrations in each medium.

### *Section 2: Exposure Assessment*

- Description of the ecological setting (*e.g.*, wetland, upland valley) on and near the site, including aquatic and terrestrial habitats, habitat maps, and related field survey information. Any ecologically sensitive areas should be identified.
- Description of the key species that are or could be exposed. Federal or State designated rare, endangered, or threatened species should be identified.
- Complete exposure pathways for receptor populations, communities, or selected species. Exposure point concentrations for each chemical within each relevant exposure pathway for a given population at risk.
- Monitoring or modeling data and assumptions used to characterize exposure point concentrations.
- Summary of any field studies conducted to establish exposures (*e.g.*, biomarkers, tissue analyses, food chain models).

A combination of text and tables is recommended for presenting this information. Highlight 6-20 presents the preferred tabular summary for the ecological exposure assessment.

### *Section 3: Ecological Effects Assessment*

- Summary of any toxicity tests or field studies used to evaluate adverse ecological effects (*e.g.*, macroinvertebrate studies, aquatic, soil and/or sediment toxicity tests).
- A description of the assessment and measurement endpoints chosen for the assessment.

### *Section 4: Ecological Risk Characterization*

- Brief summary of the environmental risks associated with the relevant media, the basis of these risks, how these risks were determined (*e.g.*, comparison of predicted exposure and toxicity, field studies), and COC concentrations that are expected to be protective of the ecological receptors. Highlight 6-21 presents the preferred tabular format for summarizing the protective levels for ecological receptors.

## Highlight 6-15: Example Table Format

### Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

**Scenario Timeframe:** Current
**Medium:** Soil
**Exposure Medium:** Soil

| Exposure Point | Chemical of Concern | Concentration Detected | | Units | Frequency of Detection | Exposure Point Concentration | Exposure Point Concentration Units | Statistical Measure |
|---|---|---|---|---|---|---|---|---|
| | | Min | Max | | | | | |
| Soil On-site - Direct Contact | Benzo(a) pyrene | 100 | 430 | ppm | 20/24 | 300 | ppm | 95% UCL |
| | 4,4'-DDT | 20 | 350 | ppm | 8/24 | 350 | ppm | MAX |
| | Dieldrin | 15 | 60 | ppm | 15/24 | 40 | ppm | 95% UCL |

**Key**

ppm: Parts per million
95% UCL: 95% Upper Confidence Limit
MAX: Maximum Concentration

### Example Language Describing Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in soil (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the exposure point concentration (EPC), and how the EPC was derived. The table indicates that benzo(a)pyrene [B(a)P] is the most frequently detected COC in soil at the site. The 95%UCL on the arithmetic mean was used as the exposure point concentration for B(a)P and dieldrin. However, due to the limited amount of sample data available for 4,4'-DDT, the maximum concentration was used as the default exposure point concentration.

**NOTE: In a ROD, this table would be expanded to include all Exposure Points that have significant routes of exposure for the soil. Additional versions of this table format would be presented to include other Media (e.g., Ground Water) or other Exposure Media (e.g., Dust) with significant routes of exposure.**

## Highlight 6-16A: Example Table Format

## Sample Cancer Toxicity Data Summary

**Pathway: Ingestion, Dermal**

| Chemical of Concern | Oral Cancer Slope Factor | Dermal Cancer Slope Factor | Slope Factor Units | Weight of Evidence/Cancer Guideline Description | Source | Date (MM/DD/YYYY) |
|---|---|---|---|---|---|---|
| Benzo(a) pyrene | 7.3 | 7.3 | (mg/kg)/day | B2 | IRIS | 1998 |
| 4,4'-DDT | 0.34 | 0.34 | (mg/kg)/day | B2 | IRIS | 1998 |
| Dieldrin | 16 | 16 | (mg/kg)/day | B2 | IRIS | 1998 |
| TCE | 0.011 | 0.011 | (mg/kg)/day | B2 | IRIS | 1998 |

**Pathway: Inhalation**

| Chemical of Concern | Unit Risk | Units | Inhalation Cancer Slope Factor | Units | Weight of Evidence/Cancer Guideline Description | Source | Date (MM/DD/YYYY) |
|---|---|---|---|---|---|---|---|
| Benzo(a)pyrene | — | — | — | — | B2 | IRIS | 1998 |
| 4,4'-DDT | $9.7 \times 10^{-5}$ | $\mu g/m^3$ | — | — | B2 | IRIS | 1998 |
| Dieldrin | $4.6 \times 10^{-3}$ | $\mu g/m^3$ | — | — | B2 | IRIS | 1998 |
| TCE | — | — | — | — | B2 | IRIS | 1998 |

**Pathway: External (Radiation)[1]**

| Chemical of Concern | Cancer Slope or Conversion Factor | Exposure Route | Units | Weight of Evidence/Cancer Guideline Description | Source | Date (MM/DD/YYYY) |
|---|---|---|---|---|---|---|
| — | — | — | — | — | — | — |
| — | — | — | — | — | — | — |

**Key**

— : No information available

IRIS: Integrated Risk Information System, U.S. EPA

1- This pathway would be used in the event that one of the contaminants of concern was a radionuclide. If there are no radionuclides associated with a particular site, then this column can be deleted.

**EPA Group:**

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

### Example Language Describing Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of concern in both soil and ground water. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site. Therefore, the same values presented above were used as the dermal carcinogenic slope factors for these contaminants.

Two of the COCs are also considered carcinogenic via the inhalation route. Dieldrin and 4,4'-DDT have inhalation unit risk factors of $4.6 \times 10^{-3}$ $\mu g/m^3$ and $9.7 \times 10^{-5}$ $\mu g/m^3$, respectively (Source: IRIS, USEPA 1998). TCE (found in the ground water) and benzo(a)pyrene lack sufficient toxicity information via the inhalation route to support the development of specific inhalation carcinogenic toxicity criteria.

## Highlight 6-16B: Example Table Format

## Sample Non-Cancer Toxicity Data Summary

**Pathway: Ingestion, Dermal**

| Chemical of Concern | Chronic/ Subchronic | Oral RfD Value | Oral RfD Units | Dermal RfD | Dermal RfD Units | Primary Target Organ | Combined Uncertainty/ Modifying Factors | Sources of RfD: Target Organ | Dates of RfD: Target Organ (MM/DD/YYYY) |
|---|---|---|---|---|---|---|---|---|---|
| Benzo(a) pyrene | — | — | — | — | — | — | — | — | — |
| 4,4'-DDT | Chronic | $5.0 \times 10^{-4}$ | mg/kg-day | $5.0 \times 10^{-4}$ | mg/kg-day | Liver | — | IRIS | 1998 |
| Dieldrin | Chronic | $5.0 \times 10^{-5}$ | mg/kg-day | $5.0 \times 10^{-5}$ | mg/kg-day | Liver | — | IRIS | 1998 |
| TCE | — | — | — | — | — | — | — | — | — |

**Pathway: Inhalation**

| Chemical of Concern | Chronic/ Subchronic | Inhalation RfC | Inhalation RfC Units | Inhalation RfD | Inhalation RfD Units | Primary Target Organ | Combined Uncertainty/ Modifying Factors | Sources of RfC:RfD: Target Organ | Dates (MM/DD/YYYY) |
|---|---|---|---|---|---|---|---|---|---|
| Benzo(a) pyrene | — | — | — | — | — | — | — | — | — |
| 4,4'-DDT | — | — | — | — | — | — | — | — | — |
| Dieldrin | — | — | — | — | — | — | — | — | — |
| TCE | — | — | — | — | — | — | — | — | — |

**Key**

—: No information available
IRIS: Integrated Risk Information System, U.S. EPA

**Example Language Describing Summary of Toxicity Assessment**

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in both soil and ground water. Two of the COCs have toxicity data indicating their potential for adverse non-carcinogenic health effects in humans. The chronic toxicity data available for both 4,4'-DDT and dieldrin for oral exposures, have been used to develop oral reference doses (RfDs). The oral RfDs for 4,4'-DDT and dieldrin are $5.0 \times 10^{-4}$mg/kg/day, and $5.0 \times 10^{-5}$ mg/kg/day, respectively (Source: IRIS, USEPA, 1998). The available toxicity data, from both chronic and subchronic animal studies, indicate that both dieldrin and 4,4'-DDT primarily affect the liver. Reference doses are not available for benzo(a)pyrene or TCE, neither are dermal RfDs or inhalation RfCs for any of the contaminants. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from the oral RfDs applying an adjustment factor as appropriate. However, for dieldrin and 4,4'-DDT no adjustment is necessary, and the oral RfDs discussed were used as the dermal RfDs for these contaminants. At this time, inhalation reference concentrations are not available for any of the COCs.

## Highlight 6-17: Example Language for Risk Characterization Summary

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

where: risk = a unitless probability (e.g., $2 \times 10^{-5}$) of an individual's developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)-1.

These risks are probabilities that usually are expressed in scientific notation (e.g., $1 \times 10^{-6}$). An excess lifetime cancer risk of $1 \times 10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is $10^{-4}$ to $10^{-6}$.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI > 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:
CDI = Chronic daily intake
RfD = reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

## Highlight 6-18A: Example Table Format

## Risk Characterization Summary - Carcinogens

**Scenario Timeframe:** Current
**Receptor Population:** Resident
**Receptor Age:** Child

| Medium | Exposure Medium | Exposure Point | Chemical of Concern | Carcinogenic Risk | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | External (Radiation)[1] | Exposure Routes Total |
| Soil | Soil | Soil On-site-Direct Contact | Benzo (a) pyrene | $1.2 \times 10^{-2}$ | N/A | $3.3 \times 10^{-6}$ | — | $1.2 \times 10^{-2}$ |
| | | Soil On-site-Direct Contact | 4,4'-DDT | $6.5 \times 10^{-4}$ | N/A | $4.5 \times 10^{-7}$ | — | $6.5 \times 10^{-4}$ |
| | | Soil On-site-Direct Contact | Dieldrin | $3.5 \times 10^{-3}$ | N/A | $4.8 \times 10^{-6}$ | — | $3.5 \times 10^{-3}$ |
| | Dust | Soil On-site-Inhalation of Soil as Dust | Benzo (a) pyrene | N/A | — | N/A | — | — |
| | | Soil On-site-Inhalation of Soil as Dust | 4,4'-DDT | N/A | $9.7 \times 10^{-4}$ | N/A | — | $9.7 \times 10^{-4}$ |
| | | Soil On-site-Inhalation of Soil as Dust | Dieldrin | N/A | $8.5 \times 10^{-3}$ | N/A | — | $8.5 \times 10^{-3}$ |
| | | | | | | | **Soil risk total=** | **$2.6 \times 10^{-2}$** |
| Ground Water | Ground Water | Aquifer X - Tap Water | TCE | $2.5 \times 10^{-3}$ | — | $1.4 \times 10^{-7}$ | — | $2.5 \times 10^{-3}$ |
| | | | | | | | **Ground-water risk total=** | **$2.5 \times 10^{-3}$** |
| | | | | | | | **Total Risk =** | **$2.9 \times 10^{-2}$** |

**Key**

— : Toxicity criteria are not available to quantitatively address this route of exposure.
N/A: Route of exposure is not applicable to this medium.

1--This column would be used in the event that one of the contaminants of concern was a radionuclide. If there are no radionuclides associated with a particular site, then this column can be deleted.

### Example Language Describing Risk Characterization

Highlight 6-18A provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child's exposure to soil and ground water, as well as the toxicity of the COCs (benzo (a) pyrene, 4,4'-DDT, dieldrin, and TCE). The total risk from direct exposure to contaminated soil and ground water at this site to a current child resident is estimated to be $2.85 \times 10^{-2}$. The COCs contributing most to this risk level are benzo (a) pyrene and dieldrin in soil and TCE in ground water. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 3 in 100 of developing cancer as a result of site-related exposure to the COCs.
**NOTE: Additional versions of this table format would be presented to include other Receptors with significant exposure (Scenario Timeframe, Receptor Population, Receptor Age).**

## Highlight 6-18B: Example Table Format

## Risk Characterization Summary - Non-Carcinogens

**Scenario Timeframe:** Current
**Receptor Population:** Resident
**Receptor Age:** Child

| Medium | Exposure Medium | Exposure Point | Chemical of Concern | Primary Target Organ | Non-Carcinogenic Hazard Quotient | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Soil | Soil | Soil On-site-Direct Contact | Benzo (a) pyrene | Liver | — | N/A | — | — |
| | | Soil On-site-Direct Contact | 4,4'-DDT | Liver | 3.8 | N/A | $1.5 \times 10^{-2}$ | 3.9 |
| | | Soil On-site-Direct Contact | Dieldrin | Liver | 4.4 | N/A | $2.7 \times 10^{-4}$ | 4.4 |
| | | | | | | | **Soil Hazard Index Total =** | **8.3** |
| Ground Water | Ground Water | Aquifer X - Tap Water | TCE | — | — | — | — | — |
| | | | | | | | **Ground-Water Hazard Index Total =** | **—** |
| | | | | | | | **Receptor Hazard Index =** | **8.3** |
| | | | | | | | **Liver Hazard Index =** | **8.3** |

**Key**

— : Toxicity criteria are not available to quantitatively address this route of exposure.
N/A: Route of exposure is not applicable to this medium.

### Example Language Describing Risk Characterization

Highlight 6-18B provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse noncancer effects. The estimated HI of 8.3 indicates that the potential for adverse noncancer effects could occur from exposure to contaminated soil containing 4,4'-DDT, dieldrin and benzo(a)pyrene. The noncancer risk from exposure to contaminated ground water could not be evaluated due to the lack of noncarcinogenic toxicity criteria for TCE.

**NOTE: Additional versions of this table format would be presented to include other Receptors with significant exposure ( Scenario Timeframe (e.g., chronic versus subchronic exposures), Receptor Population, Receptor Age)**

## Highlight 6-19: Example Table Format

## Occurrence, Distribution, and Selection of Chemicals of Concern (COC)

**Exposure Medium:** Sediment

| Chemical of Potential Concern | Minimum Conc.[1] (ppm) | Maximum Conc.[1] (ppm) | Mean Conc. (ppm) | 95 % UCL of the Mean [2] (ppm) | Background Conc. (ppm) | Screening Toxicity Value (ppm) | Screening Toxicity Value Source [3] | HQ Value [4] | COC Flag (Y or N) |
|---|---|---|---|---|---|---|---|---|---|
| Aluminum | 2419 | 12,800 | 9808 | 10,400 | 3010 | N/A | N/A | N/A | Y |
| Arsenic | 3 | 69 | 12 | 21 | 3 | 6 | ONT, LEL | 11.5 | Y |
| Dieldrin | 0.01 | 0.01 | 0.01 | 0.01 | N/A | 0.052 | EPA SQC | 0.19 | N |
| Lead | 29 | 82 | 50 | 56 | 28 | 47 | NOAA ER-L | 1.75 | Y |
| Methoxychlor | 0.01 | 0.01 | 0.01 | 0.01 | N/A | 0.019 | EPA SQB | 0.53 | N |

**Key**
Conc. = Concentration
N/A = Not Applicable

**Notes**
[1] Minimum/ maximum detected concentration above the sample quantitation limit (SQL).
[2] The 95% Upper Confidence Limit (UCL) represents the RME concentration.
[3] Ont LEL = Ontario Lowest Effects Level: Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. D. Persaud, R. Jaagumagi, and A. Hayton. Ontario Ministry of the Environment, Ontario, August 1993.
NOAA ER-L = National Oceanic and Atmospheric Administration Effects Range- Low.
SQC= Sediment Quality Criteria.
[4] Hazard Quotient (HQ) is defined as Maximum Concentration/ Screening Toxicity Value.

## Highlight 6-20: Example Table Format

## Ecological Exposure Pathways of Concern

| Exposure Medium | Sensitive Environment Flag (Y or N) | Receptor | Endangered/ Threatened Species Flag (Y or N) | Exposure Routes | Assessment Endpoints | Measurement Endpoints |
|---|---|---|---|---|---|---|
| Sediment | N | Benthic organisms | N | Ingestion, respiration, and direct contact with chemicals in sediment | Benthic invertebrate community species diversity and abundance | - Toxicity of soil to *Hyallela*<br>- Species diversity index |
| Surface Water | N | Fish | N | Ingestion, respiration, and direct contact with chemicals in surface water | Maintenance of an abundant and productive game fish population | - Toxicity of surface water to *Pimephales promelas*<br>- Species diversity index |
| Soil | N | Terrestrial invertebrates | N | Ingestion and direct contact with chemicals in wetland soils | Survival of terrestrial invertebrate community | - Toxicity of sediments to *Lumbricus terrestris* |
| | | Terrestrial plants | Y | Uptake of chemicals via root systems | Maintenance/ enhancement of native wetland vegetation | - Species diversity index<br>- Survival of seedings |
| Surface Water (Vernal pools) | Y | Aquatic invertebrates | N | Ingestion, respiration, and direct contact with chemicals in surface water | Maintenance of a balanced, indigenous aquatic invertebrate community | - Species diversity index |

## Highlight 6-21: Example Table Format

## COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors

| Habitat Type/ Name | Exposure Medium | COC | Protective Level [1] | Units | Basis[2] | Assessment Endpoint |
|---|---|---|---|---|---|---|
| Small Freshwater Stream/ West Branch Maple Creek | Sediment | Arsenic | 6 | mg/kg | Site-Specific LOAEL | Benthic invertebrate community species diversity and abundance |
| | | Lead | 15 | mg/kg | Significant difference in Benthic Diversity Index between the site and the reference site | |
| | | Total PCBs | 0.03-0.05 | mg/kg | LOAEL and NOAEL | |
| | Surface Water | Aluminum | 123 | ug/l | NOAEL | Maintenance of an abundant and productive game fish population |
| | | Arsenic | 208 | ug/l | Mean of values between LOAEL and NOAEL | |
| | | Total PCBs | 0.1 | ug/l | Bioaccumulation factor modeling | |

**Notes**

[1] A range of levels may be provided.

[2] Provide Basis of Selection:
Mean of values between lowest observed adverse effect level (LOAEL) and no observed adverse effect level (NOAEL).

Bioaccumulation factor modeling.

LOAEL and NOAEL.

Significant difference in Benthic Diversity Index between site and reference site.

### 6.3.8 Remedial Action Objectives

A discussion of the *remedial action objectives (RAOs)* for the specific response action described in the ROD should be presented prior to the discussion of cleanup alternatives and remedy selection rationale.[14] RAOs provide a general description of what the cleanup will accomplish (*e.g.*, restoration of ground water to drinking water levels). These goals typically serve as the design basis for many of the remedial alternatives which will be presented in the next section. Presenting RAOs prior to the discussion of remedial alternatives provides the reader of the ROD with a basis for evaluating the cleanup options for the site and an understanding of how the risks identified in the previous section will be addressed by the response action. A clear statement of the RAOs also facilitates the five-year review determination of protectiveness of human health and the environment.

This section should include a discussion of the following:

- Clear statement of the specific RAOs for the operable unit or site (*e.g.*, treatment of contaminated soils above health-based action levels, restoration of ground-water plume to drinking water levels, and containment of DNAPL source areas). See Chapter 9 for additional information on documenting RAOs for OUs that address contaminated ground water.
- Basis and rationale for RAOs (*e.g.*, current and reasonably anticipated future land use and potential beneficial ground-water use).
- How the RAOs address risks identified in the risk assessment (*e.g.*, how will the risks driving the need for action be addressed by the response action?)

[14] If specific RAOs vary across alternatives, these differences should be described in general terms in this section and in more specific terms in the *Description of Alternatives section.*

### 6.3.9 Description of Alternatives

The objective of this section is to provide a brief explanation of the remedial alternatives developed for the site.

The description of each alternative in this section should contain enough information so that the comparative analysis of alternatives (the next section of the ROD) can focus on the differences or similarities among alternatives with respect to the nine evaluation criteria.

This discussion should be organized in three sections:

#### *Description of Remedy Components*

Provide a bulleted list of the major components of each alternative as they logically occur in the remediation process. This list should include the following:

- Treatment technologies and materials they will address (*e.g.*, source materials constituting principal threats).[15]
- Containment components of remedy (*e.g.*, engineering controls, cap, hydraulic barriers) and materials they will address (*e.g.*, low concentration source materials, treatment residuals).[16]

[15] Describe technologies in general terms that permit a number of "technological approaches" to be applied within a "technology category" (*e.g.,* use terms such as "ex-situ bioremediation" rather than "composting" or "soil slurry reactors"). This provides more flexibility to the design engineer and minimizes unnecessary ESDs and ROD Amendments. However, if the public's perception of the remedy is affected by the technology description, it may be appropriate to clarify which specific technology is being proposed (*e.g.,* use terms such as "incineration" and "thermal desorption" rather than "thermal treatment").

[16] "Engineering controls" are physical barriers to exposure and do not include "institutional controls," which are non-engineering methods intended to affect human activities in such a way as to prevent or reduce exposure to hazardous substances (*e.g.*, deed restrictions such as easements and covenants, deed notices, land use restrictions such as zoning and local permitting, ground-water use restrictions, and public health advisories).

- Institutional controls (and the entity responsible for implementing and maintaining them).[17]
- Operations and Maintenance (O&M) activities required to maintain integrity of remedy (*e.g.*, cap maintenance).
- Monitoring requirements.

Highlight 6-22 provides examples of the details that should be described for each alternative.

### *Common Elements and Distinguishing Features of Each Alternative*

Describe common elements and distinguishing features unique to each response option. Examples of these elements include:

- Key ARARs (or ARAR waivers) associated with each alternative (*e.g.*, action- and/or location-specific ARARs, including the control of air, emissions from ground-water treatment units, manifesting of hazardous waste, and regulating solid waste landfills).[18]
- Long-term reliability of remedy (potential for remedy failure/replacement costs).
- Quantity of untreated waste and treatment residuals to be disposed off-site or managed on-site in a containment system and degree of hazard (*e.g.*, concentrations) remaining in such material.[19]
- Estimated time for design and construction (*i.e.*, implementation time frame).
- Estimated time to reach remediation goals (*i.e.*, time of operation, period of performance).
- Estimated capital, annual O&M, and total present worth costs; discount rate (current OSWER policy is 7%): and the number of years over which the remedy cost estimate is projected.
- Uses of presumptive remedies and/or innovative technologies.

*Expected Outcomes of Each Alternative*

- Available uses of land upon achieving cleanup levels. Note time frame to achieve available use (*e.g.*, commercial or light industrial use available in 3 years when cleanup levels are achieved).
- Available uses of ground water upon achieving cleanup levels. Note time frame to achieve available use (*e.g.*, restricted use for industrial purposes in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 100 years).
- Other impacts or benefits associated with each alternative.

[17] The term "deed restrictions" commonly appears in RODs, consent decrees, and other EPA materials (including the NCP). However, it is not a traditional real property term and does not have a precise legal meaning. The term "deed restrictions" should be understood as simply a catchall term for proprietary controls (such as easements and covenants) that are legally enforceable against subsequent property owners. Therefore, it is important to make sure that all those involved in evaluating remedies using proprietary controls understand that to establish legally enforceable restrictions, rather than merely informational notices (such as a deed notice), a conveyance or contract of some kind will likely be required. Where clarity of intent is important (such as in a ROD), a more precise term , such as easement or covenant, should generally be used (*Institutional Controls: A Reference Manual* (March 1998 draft)).

[18] Key ARARs that drive the remedial action objectives and response options should also be discussed. Key ARARs are generally considered to be those ARARs that provide a basis for developing an alternative (*e.g.*, cleanup levels such as state non-degradation standards for ground-water resources) or ARARs that help distinguish between alternatives. One approach to covering key ARARs in this section is to provide a table which cites the ARAR, identifies the alternative to which it applies, and clarifies how it will be applied at the site. The ROD must describe all ARARs for the selected remedy (NCP Section 300.430(f)(5)(ii)(B) and (C)). Therefore, a more extensive table of ARARs that apply to the Selected Remedy should be presented in the Statutory Determinations (see section 6.3.13 and Highlight 6-34).

[19] Off-site transfers of CERCLA wastes, residuals from CERCLA wastes treated on site, or wastewater containing CERCLA waste, should be compliant with the Off-Site Rule at 58 FR 49200, September 22, 1993, and 40 CFR Part 300.440. Regarding the off-site disposal of wastes, note that CERCLA §121(b)(1) states: "The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available." NCP §300.430(f)(1)(ii)(E) also states: "The balancing shall also consider the preference for treatment as a principal element and the bias against off-site land disposal of untreated waste."

## Highlight 6-22: Examples of Remedy Components for Each Alternative

**Remedies Involving Soils and Surficial Contamination:**

- **Treatment Components**
  - Treatment technologies (e.g., thermal destruction) to be used.
  - Type and estimated volume of waste treated (e.g., soils with high concentrations of VOCs composing the principal threat waste at the site).
  - Primary treatment levels (e.g., Best Demonstrated Available Technology, percentage, or order of magnitude of reductions expected) and basis (e.g., ARARs, risk-based levels) for selection of treatment level.
  - Type and estimated volume of emissions/residuals expected.
  - Any risks associated with emissions/residuals.
- **Containment (or Storage) Components**
  - Type of storage (e.g., landfill, tank, surface impoundment, containers).
  - Type of closure to be implemented (e.g., RCRA Subtitle C clean closure, landfill closure, Subtitle D solid waste closure).
  - Type and quantity of waste to be stored (e.g., treatment residuals, non-principal threat source material).
  - Type and quantity of untreated waste and/or treatment residuals to be disposed of off-site or managed on-site in a containment system (e.g., cap, RCRA Minimum Technology Unit).
- **Institutional Control Components**
  - Specific controls proposed (e.g., deed restrictions such as easements and covenants, deed notices, land use restrictions such as zoning and local permitting, ground-water use restrictions, and public health advisories).
  - Entities responsible for implementing and maintaining controls (e.g.,property owner, town zoning authority, State health agency)

**Remedies Involving Ground-Water Contamination:**

- **Ground-Water Extraction and Treatment Components**
  - Ground-water extraction method.
  - Whether ground water will be extracted over entire plume or portions of plume (e.g., hot spots)
  - Location for discharging treated ground water.
  - Technologies for treating extracted ground water.
  - Additional treatment and/or management for treatment residuals.
  - Other methods/technologies that will be used for aquifer remediation in addition to primary extraction and treatment components (e.g., air sparging, in-situ bioremediation, monitored natural attenuation).
  - Phased implementation stages of the remedy that will be used to optimize the remedy for site conditions and increase cost-effectiveness.
  - Remedy refinements that may be needed during the life of the remedy (e.g., adjusting the number of extraction wells, adjusting the pumping rate, pulsed pumping of some wells, etc.).
  - If applicable, provisions for ground-water monitoring once the system is shut off to ensure clean-up levels are maintained.
- **Ground-Water or Source Containment Components**
  - Containment technologies (e.g., subsurface barriers, hydraulic control).
  - Areas to be contained aerially and vertically.
  - Alternate performance standards.
  - Areas of ground-water plume to be contained.
  - Geologic stratum (if any) that will serve as a bottom for the containment system.
- **Monitored Natural Attenuation**
  - Portions of the plume that will be treated using natural attenuation.
  - Evidence that natural attenuation is likely to attain cleanup levels (or other remedial objectives) for the specific conditions of the site.
  - Contingency actions that will be used if natural attenuation can not attain aquifer cleanup levels.
  - Institutional controls that will restrict the use of ground water until cleanup levels are attained.
- **Institutional Control Components**
  - Specific controls proposed (e.g., deed restrictions such as easements and covenants, deed notices, land use restrictions such as zoning and local permitting, ground-water use restrictions, and public health advisories).
  - Entities responsible for implementing and maintaining controls (e.g.,property owner, town zoning authority, State health agency)

### 6.3.10 Summary of Comparative Analysis of Alternatives

The NCP provides that the ROD must explain how the nine criteria were used to select the remedy (NCP §300.430(f)(5)(i)). Thus, this section of the ROD should summarize the comparative analysis of alternatives presented in the detailed analysis section of the RI/FS Report. The major objective is to evaluate the relative performance of the alternatives with respect to the nine evaluation criteria so that the advantages and disadvantages of each are clearly understood. The most effective way of organizing this analysis is to present a series of paragraphs headed by each criterion. Each criterion should be described, and then the comparison of alternatives should be presented in decreasing order from the most to least advantageous. An example of this discussion can be found in Highlight 6-24. Highlight 3-6 (in Chapter 3) presents tips for discussing the nine criteria as well.

A summary table is also an effective way to communicate the salient points made from the text discussion. An example of a summary table that captures the entire Comparative Analysis can be found in Highlight 6-25.

**Highlight 6-23: Tips on Presenting the Comparative Analysis of Alternatives**

- First, develop a clear and descriptive summary of each of the nine criteria.
- Second, explain how each of the alternatives compare to each other relative to each criterion.
- Third, summarize the discussion of each criterion by presenting each of the alternatives in decreasing order from the most to least advantageous.
- Consider using a summary table to complement the text summary of the comparative analysis of alternative.
- Avoid a symbolic ranking method without an accompanying narrative, such as "+" for "best" alternative and a "-" for the lower-ranking alternative.

## Highlight 6-24: Example Text Summary for the Comparative Analysis of Alternatives

**Overall Protection of Human Health and the Environment**

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

All of the alternatives, except the no-action alternative, are protective of human health and the environment by eliminating, reducing, or controlling risks posed by the site through treatment of soil contaminants, engineering controls, and/or institutional controls. Alternative 2 would provide adequate protection from exposure due to direct contact or soil ingestion. However, perpetual cap maintenance would be required to ensure total protectiveness. Any breach in the cap would potentially expose individuals to existing levels of contamination and allow leachate to contaminate the ground water. Alternative 3 would provide additional protection from possible exposure with the reduction of volatile organic concentrations by soil vapor extraction. Alternative 4 would provide greater protection than Alternative 3 due to the additional benefits of soil stabilization. Alternative 5 would provide the greatest degree of protection due to the total destruction of organic contaminants during the incineration process .

Alternatives 2 through 5 would provide adequate protection from exposure to ground-water contamination by providing an alternate water supply to area users. The protection from exposure to contaminated ground water afforded by Alternative 2 would be dependant on the enforcement of institutional controls. Alternative 2 would also allow currently uncontaminated areas to become contaminated as the plume migrates and dissipates, potentially exposing users currently outside the limits of the plume. Alternatives 3, 4, and 5 would provide adequate control of plume migration through pumping. The protection against future ground-water contamination increases as additional soil treatment processes decrease the potential for leachate generation.

**Compliance with Applicable or Relevant and Appropriate Requirements**

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as “ARARs,” unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for a invoking waiver.

All alternatives, except the no action alternative, had common ARARs associated with the construction of a cap onsite and the drinking water standards for ground water. The use of soil vapor extraction would require consideration of emission standards for volatile organics. Alternative 5, which includes incineration, would be required to meet the performance standards of incinerators set in 40 CFR 264. Acquisition of permits would not be necessary for on-site treatment operations. A permit would be necessary for any surface discharge of treated water.

All alternatives will attain their respective Federal and State ARARs. However, drinking water standards will not be met through Alternative 2, natural attenuation, for approximately 100 years. These standards may be meet by the pump and treat alternatives in 25-40 years.

**Long-Term Effectiveness and Permanence**

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Each alternative, except the No Action alternative, provides some degree of long-term protection. The alternatives increase in effectiveness of assuring protection against potential exposure and leachate generation as additional treatment components are included. The effectiveness and permanence of Alternative 2 is dependent entirely upon the adequacy of maintenance. Contaminated soil would remain as a potential source of ground-water contamination. Alternative 3 provides a greater degree of long-term effectiveness and permanence with the removal of contaminants from both soil and ground water though treatment. Alternative 3 also removes volatile organics as a potential source of ground-water contamination. However, metals-contaminated soil may remain unaddressed without treatment. (Continued)

## Highlight 6-24: Example Text Summary for the Comparative Analysis of Alternatives (continued)

**Long-Term Effectiveness and Permanence (continued)**

Alternative 4 is more effective than Alternative 3 because it would also stabilize the lead contamination in soil. Alternative 5 provides the greatest long-term effectiveness and permanence of all the options because volatile organic compounds are destroyed in the incineration process. Ash from the incineration process is not expected to be hazardous. However, management of the ash on-site would not fully eliminate the potential for exposure to lead in the long-term.

The provision of an alternate water supply to prevent exposure of current ground-water users to contaminants is protective of human health for the duration that the alternative water supply exists. The effectiveness of monitored natural attenuation to control exposure of future users and reduce ground-water contamination at this site is highly questionable because of the uncertainties associated with attenuation and the enforceability of institutional controls. Alternatives 3, 4, and 5 are equally effective and permanent in restoring ground-water quality by attaining drinking water standards in a reasonable time frame.

Reviews at least every five years, as required, would be necessary to evaluate the effectiveness of any of these alternatives because hazardous substances would remain on-site in concentrations above health-based levels.

**Reduction of Toxicity, Mobility, or Volume Through Treatment**

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternatives 1 and 2 do not include treatment as a component of the remedy. Therefore, these alternatives would not reduce the toxicity, mobility, or volume of contamination at the site.

Alternative 3 includes treatment of volatile organics in both soil and ground water as components of the remedy. Volatile organic contamination would be reduced by 99.9% in approximately 20,000 cubic yards of soil. This reduction is irreversible because the volatile organics would be removed from the soil by the extraction process and the organics would be destroyed in the carbon regeneration process. However, an additional 25,000 cubic yards of lead-contaminated soil on-site would remain untreated. Alternative 4 provides a greater degree of treatment by including the stabilization of the lead-contaminated soil. Stabilization would reduce the mobility of lead by approximately 40% while increasing the volume of stabilized material 20%.

Alternative 5 would provide the greatest reduction in the toxicity and volume of contaminated soil through the permanent destruction of volatile organics. Ash from the incinerator is not expected to be hazardous and would therefore not impact ground water.

Alternatives 3, 4, and 5 would provide comparable reductions in the mobility, volume, and toxicity of ground-water contamination at the site. Volatile organic concentrations in ground water would be reduced to drinking water standards through treatment of ground water by air stripping. The organics would eventually be destroyed by the carbon regeneration. The potential for recontamination of the ground water decreases from Alternative 3 to Alternative 5 as the degree of source treatment increases.

**Short-Term Effectiveness**

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative 2 would be completed in approximately one year. During this time, construction activities associated with installation of the alternate water supply would take place in the community. However, no exposure to hazardous substance would occur in the community during installation of the water supply. The source control components of Alternatives 3 and 4 would require up to six years to complete, depending on the time necessary for the soil vapor extraction to reach cleanup levels. Source control would be achieved in three years with Alternative 5.

Alternative 1, No Action, would not be an effective alternative because current risks from direct contact would continue to exist; current ground-water users would be exposed to contamination within one to three years. There would be potential risks to construction workers during excavation and treatment of soils and construction of the cap in Alternatives 2 though 5, primarily associated with equipment movement and exposure to contaminated dust and volatile organic emissions. However, air monitoring, on-site and at the site boundary, and engineering controls would control the potential for exposure. Workers would be required to wear appropriate levels of protection to avoid exposure during excavation and treatment activities.

Air emissions from the ground-water treatment process (air stripping) and the incinerator would be addressed by engineering controls to ensure that the emissions meet applicable Federal or State air emission standards, mitigating any adverse on- or off-site impacts.

## Highlight 6-24: Example Text Summary for the Comparative Analysis of Alternatives (continued)

**Implementability**

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Construction of the cap and installation of the alternate water supply in Alternative 2 is relatively straightforward. Materials and equipment necessary for cap construction are readily available. Installation of the water supply would require coordination with local authorities for the construction of water lines within existing right-of-ways. However, the ability to impose institutional controls to restrict ground-water use is uncertain because of the nature of county zoning laws.

All of the treatment alternatives are easily implemented. All materials and services needed for implementation are readily, commercially available. The site logistics of implementation increase in difficulty as more treatment components are added in each alternative. Incineration would require more available area on-site for equipment setup and stockpiling of soil and ash. However, logistical considerations would be addressed in design of the overall site remedy.

The components necessary for the ground-water remedy are also readily available and would not require any special engineering modification prior to use at the site. Operation and maintenance of the air strippers would include cleaning and replacement of well components, regeneration of activated carbon, and maintenance of blower equipment.

**Cost**

The estimated present worth costs for the alternatives, not including the No Action alternative, range from $4.8 million for Alternative 2 to $16.0 million for Alternative 5. The cost of each alternative increases as the degree of soil treatment increases. Cost summaries can be found in Table ___.

**State/Support Agency Acceptance**

The State has expressed its support for Alternatives 3, 4, and 5. The State does not believe that Alternative 1 provides adequate protection of human health and the environment. The State does not support Alternative 2 because it does not use treatment as a permanent solution.

**Community Acceptance**

During the public comment period, the community expressed its support for either Alternative 3 or 4. The community did not consider Alternatives 1 and 2 to be adequately protective and opposed the use of incineration technology.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

## Highlight 6-25: EXAMPLE COMPARATIVE ANALYSIS OF ALTERNATIVES

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **OVERALL PROTECTIVENESS** | | | | | |
| **Human Health Protection** | | | | | |
| • Direct Contact/ Soil Ingestion | No reduction in risk. | Cap reduces direct contact risk and soil ingestion risk to less than $1 \times 10^{-6}$. | Cap and vapor extraction reduce direct contact/soil ingestion risk to less than $1 \times 10^{-6}$. | Cap, stabilization, vapor extraction reduce direct contact/soil ingestion risk to less than $1 \times 10^{-6}$. | Cap, stabilization, incineration reduce direct contact/soil ingestion risk to less than $1 \times 10^{-6}$. |
| • Ground Water Ingestion for Current Users | No reduction in risk. | Alternate water supply provides protection against risk from ground water ingestion. | Greater degree of leachate protection than Alt. 2 from removal of volatile organics in soil. Controls migration of plume to unaffected current users. | Increased protection of ground water from stabilization of metals, in addition to removal of organics and cap. | Highest degree of ground-water protection due to destruction of organics in source. |
| • Ground Water Ingestion for Potential Future Users | No reduction in risk. Increases risk to new users as plume moves to uncontaminated areas. | Requires future users to hook up to alternate water supply. COC levels in aquifer estimated to achieve MCLs by natural attenuation in 100 years. | Area beyond existing plume available for use. Plume migration controlled by pumping. COC levels in aquifer estimated to achieve MCLs by pump and treat in 25-40 years. | Same as Alternative 3. | Same as Alternative 3. |
| **Environmental Protection** | Allows continued contamination of the ground water. | Migration of COCs by runoff and leaching is eliminated by use of cap. Continued migration of existing contaminated ground water is allowed. | Contaminant concentrations are reduced by soil vapor extraction. Migration of low level threat eliminated by the cap. Migration of contaminated ground water is controlled by pumping. | Contaminant concentrations reduced by soil vapor extraction. Migration of remaining soil contaminants decreased by soil stabilization and cap. Migration of contaminated ground water is controlled by pumping. | Highest degree of protection due to destruction of organic contaminants by incineration. Potential for migration to ground water is minimized by stabilization and cap. Ground-water contaminant migration controlled by pumping. |

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **COMPLIANCE WITH ARARs** | | | | | |
| **Chemical-Specific ARARs** | Ground water will always exceed MCLs. | Would meet MCLs at the waste boundary in over 100 years. | Would meet MCLs at the waste boundary in 25-40 years. | Same as Alternative 3. | Same as Alternative 3. |
| **Location-Specific ARARs** | No location-specific ARARs. | No location-specific ARARs. | No location-specific ARARs. | No location-specific ARARs. | No location-specific ARARs. |
| **Action-Specific ARARs** | No action-specific ARARs. | Will meet RCRA minimum technology requirements for caps. | Will meet air release standards from the vapor extraction & air stripper; NPDES discharge requirements; RCRA minimum technology requirements for caps. | Same as Alternative 3. | Will meet performance and air release standards for incinerators & air strippers; NPDES discharge requirements; RCRA minimum technology requirements for caps. |
| **Other Criteria and Guidance** | Would allow ingestion of ground water exceeding MCLs. Would not protect against Pb levels above 600 mg/kg in soil. | Protects against soil ingestion to $1 \times 10^{-6}$ level. Alternate water supply and institutional controls protect against ground-water ingestion at levels greater than MCLs. Covers soil with Pb above 600 mg/kg. | Same as Alternative 2. | Same as Alternative 2. | Same as Alternative 2. |
| **LONG-TERM EFFECTIVENESS AND PERMANENCE** | | | | | |
| **Magnitude of Residual Risk** | | | | | |
| • Direct Contact/Soil Ingestion | Source has not been addressed. Existing risk will remain. | Risk reduced as long as cap is maintained. Risk from potential exposure to lead from cap failure remains. | Risk from exposure to organics minimized through vapor extraction and cap. Minimal hazard remains from exposure to lead if cap fails. | Risk from exposure to both organics and lead minimized due to treatment. Decreased potential for leaching into ground water. | Risk from exposure to organics eliminated through incineration, minimized by stabilization of lead in remaining soil. |
| • Ground Water Ingestion for Current Users | Risk remains as plume continues to affect users. Ability for natural attenuation and dilution questionable since source is not removed. | Risk eliminated by providing alternate water supply. Some risk would remain for over 100 years if the ground water is used. | Current risk eliminated by providing alternate water supply. Future risk reduced by achieving MCLs in 25-40 years. | Same as Alternative 3. | Same as Alternative 3. |
| • Ground Water Ingestion for Potential Future Users | Risk from exposure increases to currently unaffected ground-water users increases as area of contamination increases. Ability for natural attenuation and dilution questionable since source is not removed. | Institutional controls used to control use of contaminated ground water. Ability to enforce controls is questionable. Unauthorized use of ground water would increase risk to user. | Risk minimized by extracting ground water and controlling plume migration. Drinking water quality restored in 25-40 years with source control. | Same as Alternative 3. | Same as Alternative 3. |

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **Adequacy and Reliability of Controls** | No controls over remaining contamination. No reliability. | Risk to current users from ground-water exposure controlled by alternate water supply. Soil/clay cap controls contaminated soil. Institutional controls are limited in effectiveness due to enforceability. | Cap controls migration of and exposure to contaminated soil. Ground water extraction controls ground-water plume. Both are adequate. | Same as Alternative 3. | Similar to Alternative 3. Incinerator ash disposed in municipal landfill not hazardous. If high metals concentrations are present, incinerator ash would be disposed in RCRA landfill. |
| | | Reliability of cap can be high if maintained. Failure to maintain cap can increase potential for direct contact and future ground-water contamination. | Reliability of vapor extraction high. Cap reliable if maintained. Ground-water pump and treat is reliable. | Reliability of stabilization with cap high, as are vapor extraction and ground- water pump and treat. | Incineration very reliable because material is destroyed. Stabilization with cap and ground-water pump and treat are reliable. |
| | Contaminants would remain on-site above health-based levels. | TCE and lead soil would remain on-site above health-based levels. | Lead-contaminated soil would remain on-site above health-based levels. | Fixed lead residuals would remain on-site above health-based levels. | Fixed lead residuals would remain on-site above health-based levels. |

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT** | | | | | |
| **Treatment Process Used** | None. | None. | Vapor extraction of soil and ground-water air stripping. | Vapor extraction, soil stabilization, and ground-water air stripping. | Incineration, soil stabilization, and ground-water air stripping. |
| **Amount Destroyed or Treated** | None. | None. | 90% of volatiles in soil and 95% of volatiles in ground water removed and destroyed by carbon regeneration. | Same as Alternative 3 plus 25,000 cy of contaminated soil is stabilized (30,000 cy after stabilization). | Comparable to Alternative 4. |
| **Reduction of Toxicity, Mobility, or Volume** | None. | None. | Reduced volume and toxicity of contaminated ground water. Toxicity of soil contamination reduced. | Greater reduction of mobility of contaminants (40%) while volume increased 20% due to stabilization. Toxicity of soil contamination reduced 95%. Reduced volume and toxicity of contaminated ground water. | Greatest reduction in volume of contaminated soil (20,000 cy) and reduction in toxicity due to incineration. Mobility of lead is reduced. Reduced volume and toxicity of contaminated ground water. |
| **Irreversible Treatment** | None. | None. | Vapor extraction and air stripping are irreversible with regeneration of carbon used for air stream treatment. Some potential for continued ground-water contamination from leachate generation. | Stabilization will provide better protection against likelihood of leachate generation over Alternative 3. Other benefits similar to Alternative 3. | Completely irreversible with incineration. Air stripping with subsequent gaseous carbon treatment and regeneration is irreversible. |
| **Type and Quantity of Residuals Remaining After Treatment** | Contaminated soil remains. | None. | Contaminated soil remains in Area 1. Carbon used in air stripping requires regeneration. | No detectable residuals remain. 30,000 cy of fixed soils remain in Area 1. | Incinerated soil (20,000 cy) and fixed soils (30,000 cy) remain. Incinerated soil expected to be non-hazardous. Carbon from air strippers requires regeneration. |

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **SHORT-TERM EFFECTIVENESS** | | | | | |
| **Community Protection** | Continued risk to community through no action. Contaminated water may reach the residents within 1-3 years. | Controllable, minor increase in dust production during cap installation. Contaminated soils remain undisturbed. | Soil would remain uncovered during vapor extraction for 3-5 years. Controllable, minor increase in dust production during cap installation. | Similar to Alternative 3. Controllable, minor increase in dust production during cap installation. | Soil would remain uncovered during incineration (about 1 year). Dust and odors released during excavation and stabilization would require controls. |
| **Worker Protection** | No risk to workers. | Protection required against dermal contact and inhalation of contaminated dust during cap construction. | Protection required against dermal contact, vapor or dust inhalation during construction and operation of vapor extraction system and air stripper. | Protection required against dermal contact, vapor, or dust inhalation during construction and operation of vapor extraction system, stabilization, and air stripper. | Protection required against dermal contact and inhalation of volatiles and particulates as a result of excavation, fixing, and incinerating TCE soil. |
| **Environmental Impacts** | Continued impact from existing conditions. | Migration of contaminants from runoff eliminated. Would be some migration of contaminant plume as part of attenuation process. | Vapor extraction may produce odors although it will meet emission standards. Would be aquifer draw-down during ground water extraction. | See Alternative 3. Stabilization may also affect air quality and produce odors. | Incineration may impact air quality, produce odors, although it will meet emission standards. |
| **Time Until Action is Complete** | Not applicable. | Cap installed in 6 months. Risk from ground water reduced within 3 months due to alternate water supply. | Soil vapor extraction complete in 3-5 years. Capping complete in 6 months. Ground-water remedial action complete in 25-40 years. | Stabilization and capping completed in 9 months. Soil vapor extraction complete in 3-5 years. Ground-water action complete in 25-40 years. | Incineration complete in 2 years. Stabilization and capping complete in 9 months. Ground-water action complete in 25-40 years. |

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **IMPLEMENTABILITY** | | | | | |
| **Ability to Construct and Operate** | No construction or operation. | Easy to construct. Would require materials handling of about 50,000 cy of soil and clay. | More extensive than Alternate 2. Straightforward construction and operation of treatment systems, in addition to cap. Cap construction would require materials handling of 25,000 cy of soil and clay. | More extensive than Alternative 3 due to stabilization. Logistics of three treatment processes requires more effort. Otherwise similar to Alternative 3. | Incineration is complex to operate, requires large area on-site. Otherwise similar to Alternative 3. |
| **Ease of Doing More Action if Needed** | May require ROD amendment future problems arise. | Easy to extend cap. Could implement ground-water treatment if necessary. Future installation of treatment system may require cap intrusion. | Easy to extend ground-water extraction system, vapor extraction system, and cap. Would not require intrusion into cap to extend treatment systems. | Fairly complete alternative. Can increase volume of or modify all technologies easily, if needed. | Complete alternative. Can most easily handle varying volumes or concentrations. |
| **Ability to Monitor Effectiveness** | No monitoring. Failure to detect contamination means potential ingestion of contaminated ground water. | Monitoring and maintenance inspections will give notice of failure before significant exposure occurs. | Treatment systems are easily monitored to determine effectiveness. Effectiveness of cap evaluated by inspection. | Same as Alternative 2. | Same as Alternative 2. |
| **Ability to Obtain Approvals and Coordinate with Other Agencies** | No approval necessary. | Same as Alternative 1. | More extensive approvals needed. Demonstrate compliance with air standards. Process for NPDES permit required. | Same as Alternative 3. | Most extensive. Need to demonstrate compliance with technical content of incinerator permit. Otherwise same as Alternative 3. |
| **Availability of Equipment, Specialists, and Materials** | None required. | No special equipment, material, or specialists required. Cap materials available within 20 miles. | Personnel to operate vapor extraction system are readily available. Cap materials available within 20 miles. | See Alternative 3. | Need mobile incinerator and trained operators. Need treatment plant operators. Closest source of incinerator is 500 miles from site. |
| **Availability of Technologies** | None required. | Cap technology readily available. | Vapor extraction well developed and commercially available. Will require pilot testing. | Vapor extraction and stabilization technologies well developed and commercially available. Will require pilot testing. | Incineration and stabilization technologies well developed and commercially available. Will require pilot testing. |
| **COST** | | | | | |
| **Capital Cost** | $0 | $4,200,000 | $3,300,000 | $6,200,000 | $13,000,000 |
| **Annual O&M Cost** | 0 | 60,000 | 440,000 | 460,000 | 1,700,000 |
| **Present Worth Cost** | 0 | 4,800,000 | 7,300,000 | 10,200,000 | 16,000,000 |

| Criteria | Alternative 1<br>No Action | Alternative 2<br>Cap, Alternate Water Supply, Natural Attenuation of Ground Water | Alternative 3<br>In-situ Soil Vapor Extraction, Cap, Ground Water Pump and Treat | Alternative 4<br>In-situ Soil Vapor Extraction, In-situ Soil Stabilization, Cap, Ground Water Pump and Treat | Alternative 5<br>In-situ Soil Stabilization, Cap, Incineration, Ground Water Pump and Treat |
|---|---|---|---|---|---|
| **STATE ACCEPTANCE** | Not Acceptable. Not protective of human health and environment. | Not Acceptable. Not a permanent solution. | Acceptable. | Acceptable. | Acceptable. |
| **COMMUNITY ACCEPTANCE** | Not Acceptable. | Not Acceptable. | Acceptable. | Acceptable. | Not Acceptable. Community opposed to Incineration. |

### 6.3.11 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. [20] The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. Remedies which involve treatment of principal threat wastes likely will satisfy the statutory preference for treatment as a principal element, although this will not necessarily be true in all cases. This section of the *Decision Summary* should discuss the source materials constituting principal threats at the site and discuss how the alternatives will address them. [For definitions and examples, see Highlight 6-26 and *A Guide to Principal Threat and Low Level Threat Wastes, OSWER 9380.3-06FS, November 1991*.]

[20] The reasonably anticipated future land use at a site is significant in defining principal threat waste areas. Pursuant to the NCP and the 1995 land use guidance, current land use and reasonably anticipated future land use should be considered in identifying realistic exposure scenarios for estimating site risks. When the baseline risks associated with the reasonably anticipated future land use trigger action, the definition of principal threat wastes may be determined by the reasonably anticipated future land use scenario as well. For example, soil contamination that could be considered a principal threat under a residential exposure scenario might not be considered a principal threat under a non-residential exposure scenario. Although no "threshold level" of risk has been established to identify principal threat waste, a general rule of thumb is to consider as a principal threat those source materials with toxicity and mobility characteristics that combine to pose a potential risk several orders of magnitude greater than the risk level that is acceptable for the current or reasonably anticipated future land use, given realistic exposure scenarios (*Rules of Thumb for Superfund Remedy Selection*, EPA 540-R-97-013, August 1997).

### 6.3.12 Selected Remedy

This section expands upon the details of the Selected Remedy from that which was provided in the *Description of Alternatives* section of the ROD. This section should provide the appropriate level of detail about the engineering details and estimated costs for the Selected Remedy so that the design engineer has enough information to initiate the design phase of the response action. This will minimize the likelihood of unanticipated changes to the scope and intent of the Selected Remedy. This discussion should be organized in four sections: (1) Summary of the Rationale for the Selected Remedy (2) Description of the Selected Remedy, (3) Summary of Estimated Remedy Costs, and (4) Expected Outcomes of Selected Remedy.

#### *1) Summary of the Rationale for the Selected Remedy*

This section provides a concise discussion of the principal factors upon which the remedy selection decision is based. While a number of these reasons may be reiterated in the statutory determinations (Section 6.3.13), or be based on one or more of those determinations, a discussion of the key rationale for remedy selection is a logical outgrowth of the previous summary discussion of the comparison of alternatives, and can serve as a bridge to the expanded discussion of the selected remedy and statutory determinations.

The decisive factors that led to selecting the remedy should be described (*i.e*, a description of how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria).

#### *2) Description of the Selected Remedy*

This section should expand on the description of the Selected Remedy from that which was provided in the *Description of Alternatives* (Section 6.3.9). Take the bulleted list of the major remedy components and expand, where appropriate, to an increased level of detail (*i.e.*, the level of detail one would provide to a subsequent Remedial Project Manager or PRP to implement the Remedial Design for the project).[21] While perhaps

[21] This section of the ROD should mention that the remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in the ROD will be documented using a technical memorandum in the Administrative Record, an ESD, or ROD amendment (in accordance with the procedures described in Chapter 7).

**Highlight 6-26 : Key Definitions for Identifying Source Materials Constituting Principal Threats**

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

Wastes that generally will be considered to constitute principal threats include, but are not limited to, the following:

- **Liquid source material** - waste contained in drums, lagoons or tanks, free product in the subsurface (i.e., NAPLs) containing contaminants of concern (generally excluding ground water).
- **Mobile source material** - surface soil or subsurface soil containing high concentrations of chemicals of concern that are (or potentially are) mobile due to wind entrainment, volatilization (e.g., VOCs), surface runoff, or subsurface transport.
- **Highly-toxic source material** - buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or soils containing significant concentrations of highly toxic materials.

Wastes that generally will not constitute principal threats include, but are not limited to, the following:

- **Non-mobile contaminated source material of low to moderate toxicity** - surface soil containing chemicals of concern that generally are relatively immobile in air or ground water (i.e., non-liquid, low volatility, low leachability contaminants such as high molecular weight compounds) in the specific environmental setting.
- **Low toxicity source material** - soil and subsurface soil concentrations not greatly above reference dose levels or that present an excess cancer risk near the acceptable risk range were exposure to occur.

*Source: A Guide to Principal Threat and Low Level Threat Wastes (OSWER 9380.3-06FS, November 1991).*

more detailed, the description of remedial components provided in this section should nonetheless be consistent with initial descriptions of the alternative provided earlier in the ROD.

One specific area of the Selected Remedy that should be expanded upon is the description of the institutional control components of the remedy. Describe the institutional controls as explicitly as possible. Include performance goals (*e.g.,* restrict access to land), the means of implementing the controls (*i.e.,* conveyance), and the implementing entity (*e.g.*, private party or governmental entity). If a separate institutional controls implementation document has been developed (*e.g.,* Institutional Controls Plan), this document should be summarized in this section of the ROD as well (*Institutional Controls: A Reference Manual*, March 1998 draft).

### *3) Summary of the Estimated Remedy Costs*

One aspect of the Selected Remedy that should be described in detail is the cost estimate for implementing the Selected Remedy. This subsection should present a more detailed estimated cost breakdown than that provided in the *Description of Alternatives* section. Although this information may also be available in the Feasibility Study, a much broader public audience is interested in what is being spent on Superfund cleanups. RODS serve as the primary data source for a host of internal and external parties interested in analyzing the costs of Superfund cleanups. Because all RODs are available to the public and are easier to obtain than large documents from the Administrative Record file for a site, it is important to present the estimated costs of the cleanup plan in as much detail as possible in the ROD.

### Highlight 6-27: Tips on Writing the "Selected Remedy" Section

- Expand on the bullet list of major remedy components presented in the Description of Alternatives to give a design engineer enough information to correctly interpret the technical intent of the ROD.
- Present a clear and well annotated cost estimate summary table. The detailed cost information for the Selected Remedy is generally presented in the FS. This summary table, or the relevant information, can be copied and incorporated into a summary table similar to the one presented in Highlight 6-29.
- Present the basis and rationale for cleanup levels in a table and explain in the text where and how they will be applied during the response action.

This generally can be accomplished by presenting a one to two-page cost estimate summary table (in the same level of detail as provided in the FS). This engineering-oriented "activity-based" estimate should be determined from the major construction and annual O&M activities anticipated to implement each major component of the Selected Remedy. This estimate should include estimated capital, annual O&M, and total present worth costs; discount rate; and the number of years over which the remedy cost estimate is projected. For example, if the Selected Remedy is comprised of a soil and ground-water component, major construction and annual O&M activities and their associated unit and total cost estimates should be clearly presented in a tabular format. If more information is available, this section should NOT merely present lump sum capital, annual O&M, and total present worth cost estimates for the entire remedy. The presentation of the cost estimate should make basic assumptions clear (*i.e.*, discount rate and duration of O&M) and identify sources of uncertainty in capital and annual O&M cost estimates. An example of an "activity-based estimate" is contained in Highlight 6-29. Highlight 6-28 provides standard cost estimate disclaimer language to acknowledge the uncertainty associated with cost estimates. Tips for developing this table are provided in Highlight 6-30.[22]

Additional guidance for remedy cost estimating is provided in the *Remedy Cost Estimating Procedures Manual: A Guide to Developing and Documenting Remedial Alternative Cost Estimates During the Feasibility Study* (EPA 540-R-98-045, December 4, 1998 Final Review Draft).

### Highlight 6-28: Standard Cost Estimate Disclaimer Language

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

[22] For response actions where a combination of several alternatives evaluated in the FS become the basis for the Selected Remedy, and hence a detailed cost estimate is not contained in the FS background materials, the services of the Army Corps of Engineers or a RACs technical support contractor should be obtained to construct a more detailed cost estimate for inclusion in the ROD.

## Highlight 6-29: Example Table Format - Cost Estimate Summary for the Selected Remedy

***Capital Costs for Remedy Component 1***

| Description | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|
| 1. Mobilization/Demobilization | -- | LS | -- | $11,925 |
| 2. Site Preparation | | | | |
| Decommission Utilities | -- | LS | -- | |
| Perform Site Survey | 3 | Day | $910.00 | $2,730 |
| Install Temporary Construction Fencing | 3,000 | LF | $5.65 | $16,950 |
| Remove & Replace Existing Monitoring Wells | 11 | Well | $3,500.00 | $38,500 |
| 3. Structural Demolition and Disposal | | | | |
| Building Demolition | -- | LS | -- | $195,314 |
| Dispose of Drums w/Contaminated Materials | 374 | Drum | $136.00 | $50,864 |
| Recycle misc. Items (tires, auto tanks, pipes, etc.) | 25 | Ton | $75.00 | $1,875 |
| 4. Storage Tank Removal & Reclamation | 8 | Tank | $6,750.00 | $54,000 |
| 5. Water Control | | | | |
| Construct Dewatering Pad | 2,500 | SY | $45.17 | $112,925 |
| Install Diversion Ditches and Berms | 1,650 | LF | $3.64 | $6,006 |
| 6. Consolidation of Solids | | | | |
| Temporarily Relocate Residents | 160 | Person | $410.00 | $65,600 |
| Excavation of Contaminated Soil | 14,300 | CY | $15.12 | $216,216 |
| Hydraulic Dredging of Lagoon Sediment | 3,300 | CY | $3.00 | $9,900 |
| Dewater w/Plate-Frame Filter Press | 3,300 | CY | $38.75 | $127,875 |
| Hauling | 14,300 | CY | $2.25 | $32,175 |
| Backfill Excavations w/Clean Fill | 19,400 | CY | $4.69 | $90,986 |
| Clean Topsoil & Hydro-seed | 14,300 | CY | $16.00 | $228,800 |
| 7. Soil Disposal (Off-Site Landfill) | 19,400 | CY | $250.00 | $4,850 |
| 8. Safety Monitoring and Sampling | | | | |
| Soil Sampling and Analysis (1 sample/lot) | 80 | Lot | $850.00 | $68,000 |
| Health and Safety Expenditures (30 people @ $60/person/day) | 90 | Day | $1,800.00 | $162,000 |
| 9. Wastewater Treatment | 350,000 | Gallon | $0.45 | $157,500 |
| NAPL Disposal | 10,000 | Gallon | $4.00 | $40,000 |
| 10. Facility Cover | | | | |
| Place 2-foot Topsoil Layer | 33,700 | CY | $16.00 | $539,200 |
| Recontour/ Shape & Grade ACC Facility | 50,550 | SY | $0.53 | $26,792 |
| Hydroseed | 450,000 | SF | $0.06 | $27,000 |
| Subtotal | | | | $7,134,633 |
| Contingency Allowances (15%) | | | | $1,070,195 |
| Project Management and Support (10%) | | | | $713,463 |
| ***Total Capital Cost*** | | | | $8,918,291 |

**Highlight 6-29: Example Table Format - Cost Estimate Summary for the Selected Remedy (continued)**

***Annual Operation and Maintenance Costs for Remedy Component 1***

| Description | Quantity | Unit | Unit Cost |
|---|---|---|---|
| 1. Water Monitoring | | | |
| Sampling | 15 | Year | $7,470.00 |
| Laboratory Analysis | 15 | Year | $11,240.00 |
| 2. Site Inspections/ Cover Maintenance | 15 | Year | $400.00 |
| Subtotal | | | $19,110.00 |
| Contingency Allowances (25%) | | | $4,777.50 |
| Project Management and Support (15%) | | | $2,866.50 |
| | | **Total Annual O& M Cost** | **$26,754.00** |

**Summary of Present Worth Analysis**

| Year | Capital Cost | Annual O&M Cost | Total Cost | Discount Factor (7%) | Present Worth |
|---|---|---|---|---|---|
| 0 | $8,918,291 | | $8,918,291 | 1.000 | $8,918,291 |
| 1 | | $26,754 | $26,754 | 0.935 | $25,015 |
| 2 | | $26,754 | $26,754 | 0.873 | $23,356 |
| 3 | | $26,754 | $26,754 | 0.816 | $21,831 |
| 4 | | $26,754 | $26,754 | 0.763 | $20,413 |
| 5 | | $26,754 | $26,754 | 0.713 | $19,076 |
| 6 | | $26,754 | $26,754 | 0.666 | $17,818 |
| 7 | | $26,754 | $26,754 | 0.623 | $16,668 |
| 8 | | $26,754 | $26,754 | 0.582 | $15,571 |
| 9 | | $26,754 | $26,754 | 0.544 | $14,554 |
| 10 | | $26,754 | $26,754 | 0.508 | $13,591 |
| 11 | | $26,754 | $26,754 | 0.475 | $12,708 |
| 12 | | $26,754 | $26,754 | 0.444 | $11,879 |
| 13 | | $26,754 | $26,754 | 0.415 | $11,103 |
| 14 | | $26,754 | $26,754 | 0.388 | $10,381 |
| 15 | | $26,754 | $26,754 | 0.362 | $9,685 |
| TOTALS | $8,918,291 | $401,310 | $9,319,601 | | $9,161,940 |

***Total Present Worth Cost*** $9,161,940

**Notes**

Unit costs are for illustration only and should not be used for cost estimating purposes.

Capital cost estimates are not discounted because the construction work will be performed in the first year. O&M costs are reported as present worth estimates given a 7% discount rate for a 15 year duration. Cost estimates are based on soil volume estimates which may be refined when remedy is designed. Cost estimates are within +50 to -30% accuracy expectation. Project management and support should account for the cost of the RD and the administrative/project management costs for the RD/RA and O&M.

LS= Lump Sum
LF= Linear Foot
SY= Square Yard
CY= Cubic Yard

**Highlight 6-30: Tips for Presenting Summary of Cost Estimate for Selected Remedy**

- Present a summary table of the major capital and annual O&M cost elements for the Selected Remedy. This 1-2 page table should present the major construction and O&M activities required to implement each remedy component along with their associated unit and total costs. See Highlight 6-29 for an example of this format.
- Present the major cost elements in a logically organized sequence, itemized to a level of detail that is appropriate for the Selected Remedy. For example: project design, management and support, site work/preparation, sampling and analysis, treatment system costs, containment system costs, post-treatment/containment costs, annual O&M costs for treatment/containment system, and annual O&M costs for institutional controls/monitoring/ five-year reviews (cost elements should be itemized below these levels if possible).
- Use footnotes to this summary table to define terminology, major assumptions, and sources of information used in developing the cost estimate.
- Identify the discount rate used for calculating total present worth costs (current OSWER policy is 7%).
- Identify the time frame over which O&M expenditures are anticipated (i.e., O&M duration or period of performance).
- If O&M activities are expected to exceed 30 years, and the cost estimate does not forecast beyond that time period, explain how the cost estimate accounts for long-term O&M costs (e.g., replacement costs are assumed as part of O&M estimate, capital costs should be recalculated after 30 years, data obtained from remedial action and 5-year reviews will be utilized to refine long-term O&M cost estimates).
- Identify major sources of uncertainty and potential cost drivers for the reader so that the information is not misinterpreted. If a sensitivity analysis was performed on the cost estimate, summarize the results.
- Qualify all cost information reported in RODs as estimates, with an accuracy expectation of +50 to -30%. These estimates are refined as the remedy is designed and implemented. Even after the remedial action is constructed, the total project cost should still be reported as an estimate due to the uncertainty associated with annual O&M expenditures.

### *4) Expected Outcomes of the Selected Remedy*

This section should present the expected outcomes of the Selected Remedy in terms of resulting land and ground-water uses and risk reduction achieved as a result of the response action. The discussion should describe the following for each portion or media of the site (if applicable). Highlight 6-31 gives an example of the type of information that would be included in this section of the ROD.

- Available uses of land upon achieving cleanup levels. Note time frame to achieve available use (*e.g.*, commercial or light industrial use available in three years when cleanup levels are achieved);
- Available uses of ground water upon achieving cleanup levels. Note time frame to achieve available use (*e.g.*, restricted use for industrial purposes in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 100 years);
- Final cleanup levels for each medium (*i.e.*, contaminant-specific remediation goals), basis for cleanup levels, and risk at cleanup levels (if appropriate).[23] See Highlight 6-32 for example table format and language (NCP §300.430(f)(5)(iii)(A));
- Anticipated socio-economic and community revitalization impacts, where such information

[23] Cleanup Levels: Final cleanup levels establish acceptable contaminant-specific exposure levels that are protective of human health and the environment. They are not formally determined until the site remedy is ready to be selected and are established in the ROD. In the ROD, it is preferable to use the term "remediation level" or "cleanup level" rather than "remediation goal" in order to make clear that the Selected Remedy establishes binding requirements (*Risk Assessment Guidance for Superfund, Volume I. Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), Interim Final* (EPA 540-R-92-003, December 1991).

**Highlight 6-31: Example Expected Outcomes for Selected Remedy**

| | **Site Area A: Permanent Waste Management Area** | **Site Area B: Restricted Use** | **Site Area C: Unrestricted Use** |
|---|---|---|---|
| **Site Scenario** | Exposure controlled through use of engineering and institutional controls ONLY | Exposure controlled through use of treatment, followed by containment, and/or institutional controls | Exposure controlled through use of treatment and off-site disposal of residuals (*i.e.*, nothing left on-site above health-based levels) |
| **Summarize in Expected Outcomes Section of ROD** | • Available uses of land and time frame (*e.g.*, long-term waste management)<br>• Available uses of ground water and time frame (*e.g.*, restricted use in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 50-70 years)<br>• Anticipated socio-economic and community revitalization impacts<br>• Anticipated environmental and ecological benefits | • Available uses of land and time frame (*e.g.*, commercial or light industrial use available in three years)<br>• Available uses of ground water and time frame (*e.g.*, restricted use for industrial purposes in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 50-70 years)<br>• Cleanup levels, basis, and residual risk (table)<br>• Anticipated socio-economic and community (*e.g.*, job creation and tax revenues) revitalization impacts<br>• Anticipated environmental and ecological benefits (*e.g.*, wetlands restoration) | • Available uses of land and time frame (*e.g.*, residential redevelopment available in five years)<br>• Available uses of ground water use and time frame (*e.g.*, unrestricted drinking water use available in 10 years)<br>• Cleanup levels, basis, and residual risk (table)<br>• Anticipated socio-economic and community revitalization impacts (*e.g.*, increased property values and removal of urban blight)<br>• Anticipated environmental and ecological benefits (*e.g.*, sensitive habitat restored) |

## Highlight 6-32: Example Table Format - Cleanup Levels for Chemicals of Concern

**Media**: Soil
**Site Area:** Waste Area B
**Available Use:** Residential
**Controls to Ensure Restricted Use (if applicable):** N/A

| Chemical of Concern[1] | Cleanup Level[2] | Basis for Cleanup Level[3] | Risk At Cleanup Level[4] |
|---|---|---|---|
| Benzo(a)pyrene | 0.026 mg/kg (ppm) | Risk Assessment | Cancer risk = $1 \times 10^{-6}$ |
| 4,4'-DDT | 0.012 mg/kg (ppm) | Risk Assessment | Cancer risk = $1 \times 10^{-6}$ |
| Dieldrin | 0.54 mg/kg (ppm) | Risk Assessment | Cancer risk = $1 \times 10^{-6}$ |

**Notes**

1 Identify Chemicals of Concern from risk assessment.
2 Provide units of measure.
3 Examples include: Compliance with Federal or State ARARs (*e.g.*, MCLs or non-zero MCLGs), health or ecological risk-based levels, and background levels. If health or ecological risk-based levels are identified as the basis, provide the cancer or noncancer risk level (*e.g.*, $1 \times 10^{-6}$ or HQ = 1) that the cleanup level will achieve.
4 Specify the carcinogenic and/or non-carcinogenic risk associated with the cleanup level. Present the exposure scenario(s) upon which cleanup levels are based in a footnote to this table (*e.g.*, cleanup levels and residual risk information presented in this table are based on the risk associated with exposure to soil contamination through volatilization and inhalation by future on-site residents (lifetime)).

### Example Language Describing Cleanup Levels for Chemicals of Concern

The purpose of this response action is to control risks posed by direct contact with soil and ground water and to minimize migration of contaminants to ground water. The results of the baseline risk assessment indicate that existing conditions at the site pose an excess lifetime cancer risk of $2.6 \times 10^{-2}$ from direct contact with contaminated soils and $2.5 \times 10^{-3}$ from ingestion of contaminated ground water. This risk relates to the benzo(a)pyrene, DDT, and dieldrin concentrations in soil and ground water. This remedy shall address all soils contaminated with benzo(a)pyrene in excess of 0.026 mg/kg, DDT in excess of 0.012 mg/kg and dieldrin in excess of 0.54 mg/kg, which each would correspond to an excess lifetime cancer risk of $10^{-6}$. Since no Federal or State ARARs exist for soil, the action levels for soil were determined through a site-specific risk analysis. These soil cleanup levels shall also be protective at the $10^{-6}$ excess cancer risk level for each chemical of concern. Treatment shall be monitored to ensure that cleanup levels are achieved. The site is expected to be available for unrestricted residential land use as a result of the remedy.

is readily available and sufficiently documented (*e.g.*, increased property values, reduced water supply costs, jobs created, increased tax revenues due to redevelopment, environmental justice concerns addressed, enhanced human uses of ecological resources); and

- Anticipated environmental and ecological benefits, where such information is readily available and sufficiently documented (*e.g.*, restoration of sensitive ecosystems, protection of endangered species, protection of wildlife populations, wetlands restoration).

### 6.3.13 Statutory Determinations

The purpose of this section is to provide a brief, site-specific description of how the Selected Remedy satisfies the statutory requirements of CERCLA §121 (as required by NCP §300.430(f)(5)(ii)) and explain the five-year review requirements for the Selected Remedy. Highlight 6-33 illustrates the relationship between the nine evaluation criteria and the statutory requirements.

#### *1) Protection of Human Health and the Environment*

This discussion must describe how the Selected Remedy will adequately protect human health and the environment through treatment, engineering controls, and/or institutional controls (NCP §300.430(f)(5)(ii)). Specifically, the remedy should be described in terms of how the existing or potential risks posed by the site or operable unit through each pathway will be eliminated, reduced, or controlled by the response action. This discussion should also indicate that exposure levels will be reduced to protective ARAR levels or to within EPA's generally acceptable risk range of $10^{-4}$ to $10^{-6}$ for carcinogenic risk and below the HI of 1 for noncarcinogens. Finally, this discussion should reflect that the implementation of the Selected Remedy will not pose unacceptable short-term risks or cross-media impacts. If the site presents ecological risks, then there should be a brief discussion of how the remedy provides adequate protection of the environment. See also *Risk Assessment Guidance for Superfund. Volume 1. Human Health Evaluation Manual (Part C, Risk Evaluation of Remedial Alternatives), Interim Final* (EPA 540-R-92-004, December 1991).

#### *2) Compliance with Applicable or Relevant and Appropriate Requirements*[24]

NCP §§300.430(f)(5)(ii)(B) and (C) require that a ROD:

- Describe the Federal and State ARARs that the remedy will attain; and
- Describe the Federal and State ARARs that the remedy will not meet, the waiver invoked, and the justification for invoking the waiver.

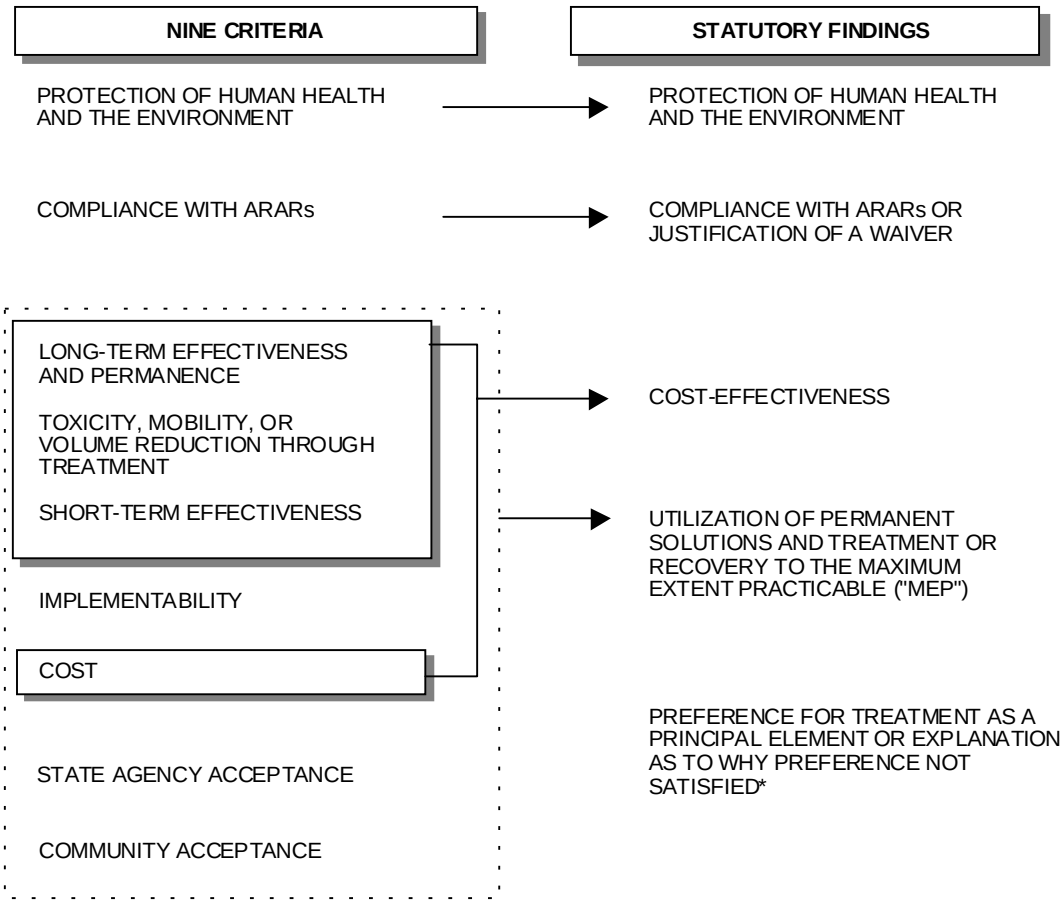
The ARARs that the Selected Remedy will attain should be listed and briefly described. Provide the regulatory citation in an appropriate level of detail. Some remedies may require a more lengthy discussion of a statute or regulation. A tabular summary should be used if appropriate. See Highlight 6-34 for an example.

This section should also describe other available information that does not constitute an ARAR (*e.g.*, advisories, criteria, and guidance) that should be considered in the analysis if it helps to ensure protectiveness or is otherwise appropriate for use in a specific alternative. Such information is commonly referred to as TBCs (To Be Considered). Use of a TBC should be justified for the record.[25]

[24] Applicable or Relevant and Appropriate Requirements (ARARs) include substantive provisions of any promulgated Federal or more stringent State environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements for a CERCLA site or action. These requirements may include regulations promulgated under the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), the Clean Water Act (CWA), and other Federal or State environmental laws. *Applicable requirements* are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. *Relevant and appropriate requirements* are requirements that, while not legally "applicable" to circumstances at a particular CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited. (See the NCP at 40 CFR 300.5 for definitions.) Additional guidance on ARARs is provided in *CERCLA Compliance with Other Laws Manual: Parts I and II* (EPA 540-G-89-006, August 1988 and 540-G-89-009, August 1989), and the NCP preamble at 55 FR 8741-8766.

[25] Include policies or support documents for the TBC in the Administrative Record file, or incorporate by reference. If the validity of TBCs is challenged, justify the use in the Responsiveness Summary (see Section 6.4).

**Highlight 6-33: Relationship of the Nine Criteria to the Statutory Findings**




* Remedies which involve treatment of source materials constituting principal threat wastes likely will satisfy the statutory preference for treatment as a principal element, although this will not necessarily be true in all cases.

**Highlight 6-34: Example Table Format - Description of ARARs for Selected Remedy**

| Authority | Medium [1] | Requirement | Status[2] | Synopsis of Requirement [3] | Action to be Taken to Attain Requirement [4] |
|---|---|---|---|---|---|
| Federal Regulatory Requirement | Ground Water | Federal Safe Drinking Water Maximum Contaminant Levels (MCLs) | Relevant and Appropriate | MCLs have been regulated for a number of common organic and inorganic contaminants. These levels regulate the concentrations of contaminants in public drinking water supplies and are considered relevant and appropriate for ground-water aquifers potentially used for drinking water. | The selected remedy will comply with these regulations through source control measures and monitored natural attenuation. |
| State Regulatory Requirement | Soil | State Hazardous Waste Management Rules | Applicable | These rules set forth the State's definitions and criteria for establishing whether waste materials are hazardous and subject to associated hazardous waste regulations. These rules identify requirements for hazardous waste generators and land disposal restrictions. | The selected remedy will comply with these requirements by identifying and properly disposing of hazardous wastes through capping the landfill with a RCRA C cap. |
| Federal Regulatory Requirement | Wetland | Protection of Wetlands, Executive Order 11990, 40 CFR Part 6 | TBC | These requirements regulate actions that occur in wetlands and may be applicable to actions that may adversely affect wetlands. | The selected remedy will cause an unavoidable loss of wetlands. The requirements will be met through compensatory wetland mitigation. |

Notes

[1] Identify medium (*e.g.*, soil, ground water, air, or hazardous waste).

[2] Identify status of requirement (*e.g.*, applicable, relevant and appropriate, or to be considered (TBC)).

[3] Provide a brief synopsis of each requirement.

[4] Provide a brief description of action to be taken to attain requirement.

### *3) Cost-Effectiveness*

This discussion explains how the Selected Remedy meets the statutory requirement that all Superfund remedies be cost-effective. A cost-effective remedy in the Superfund program is one whose *"costs are proportional to its overall effectiveness"* (NCP §300.430(f)(1)(ii)(D)). The "overall effectiveness" of a remedial alternative is determined by evaluating the following three of the five balancing criteria used in the detailed analysis of alternatives: (1) Long-term effectiveness and permanence; (2) Reduction in toxicity, mobility and volume (TMV) through treatment; and, (3) Short-term effectiveness.

"*Overall effectiveness is then compared to cost"* to determine whether a remedy is cost-effective (NCP §300.430(f)(1)(ii)(D)).

Additional guidance for making cost-effectiveness determinations is found in the preamble to the NCP, which states that decision makers should compare *"the cost to effectiveness of each alternative individually and . . . the cost and effectiveness of alternatives in relation to one another"* (55 *FR* 8728).

**It is important to note that more than one cleanup alternative can be cost-effective, and the Superfund program does not mandate the selection of the most cost-effective cleanup alternative.** In addition, the most cost-effective remedy is not necessarily the remedy that provides the best balance of tradeoffs with respect to the remedy selection criteria nor is it necessarily the least-costly alternative that is both protective of human health and the environment and ARAR-compliant. Rather, cost-effectiveness is concerned with the reasonableness of the relationship between the effectiveness afforded by each alternative and its costs compared to other available options.

A tabular format, or cost-effectiveness matrix, can be used to summarize this determination. An example can be found in Highlight 6-35. Each row of the matrix provides detailed information needed to evaluate the cost-effectiveness of a single remedial alternative. Each column of the matrix provides detailed information about the alternatives under consideration relative to a single element of cost-effectiveness. To facilitate cost-effectiveness comparisons, the alternatives should be listed from top to bottom in order of increasing cost. The cost-effectiveness summary at the base of the matrix is the summary of incremental differences between remedial alternatives with respect to each of the effectiveness criteria.

### *4) Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP)*

This discussion describes the rationale for the remedy selected, explaining how the remedy provides the best balance of trade-offs among the alternatives with respect to the balancing criteria set out in NCP §300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanence and treatment can be practicably utilized at this site. NCP §300.430(f)(1)(ii)(E) provides that the balancing shall emphasize the factors of "long-term effectiveness" and "reduction of toxicity, mobility or volume through treatment," and shall consider the preference for treatment and bias against off-site disposal. The modifying criteria should also be considered in making this determination. This subsection should discuss why the selected remedy is believed to best satisfy the statutory mandates based on the evaluation criteria, compared with the other alternatives, and why it is the most appropriate solution for the site. This part of the Decision Summary needs to identify the one protective, ARAR-compliant, and cost-effective alternative that the lead agency has concluded utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for that site (*i.e.*, provides the best balance of trade-offs). The discussion in this subsection should be organized as follows:

- Explain how the Selected Remedy represents the maximum extent to which permanent solutions and treatment are practicable at this site by describing how the Selected Remedy affords the "best balance of tradeoffs" as compared to the other options.

- Highlight trade-offs among alternatives related to the five balancing and two modifying criteria, which should be discussed in the following order: (1) long-term effectiveness and permanence, (2) reduction of toxicity, mobility, or volume through treatment, (3) short-term effectiveness, (4) implementability, (5) cost, (6) State acceptance, and (7) community acceptance. Discuss which of the criteria were most decisive in the selection decision. [NOTE: To

## HIGHLIGHT 6-35: Example Matrix of Cost and Effectiveness Data for Hypothetical Site: Ground Water Control Options

**RELEVANT CONSIDERATIONS FOR COST-EFFECTIVENESS DETERMINATION:** (Site characteristics relate to cost-effectiveness criteria)

- Contaminant plume contains approximately 4.3 million cubic feet of ground water (100 acre feet)
- Municipal well field serving 10,000 people is located one mile downgradient from site.
- Baseline individual cancer risk for future on-site residents using ground water = $4 \times 10^{-4}$

| Alternative (check box if cost-effective) | Present Worth Cost | Incremental Cost | Long-Term Effectiveness and Permanence | Reduction of TMV Through Treatment | Short-Term Effectiveness |
|---|---|---|---|---|---|
| 1) No Action ☐ | $15,000 | -------- | ● No reduction in long-term risk to human health and the environment<br>● Baseline individual cancer risk = $4 \times 10^{-4}$ | ● No reduction of toxicity<br>● No reduction of mobility<br>● No reduction of volume | ● No short-term risk to workers<br>● No short-term risk to community<br>● No short-term impact on environment<br>● More than 500 years before remedial goals achieved through natural attenuation |
| 2) Limited Action, including institutional controls and ground-water monitoring ☐ | $500,000 | + $485,000 | ◦◦ No reduction in long-term risk to human health and the environment<br>◦◦ Residual individual cancer risk = $4 \times 10^{-4}$ | ◦◦ No reduction of toxicity<br>◦◦ No reduction of mobility<br>◦◦ No reduction of volume | ● 2 months to implement<br>◦◦ No short-term risk to workers<br>◦◦ No short-term risk to community<br>◦◦ No short-term impact on environment<br>◦◦ More than 500 years before remedial goals achieved through natural attenuation |
| 3) Application of "innovative" ground-water treatment technology ☑ | $3,000,000 | + $2,500,000 | ◦ Residual risk = $3 \times 10^{-4}$<br>◦ Potential for remedy failure due to application of innovative technology | ◦ Reduction in toxicity<br>◦ Reduction in mobility<br>◦ Treatment of entire volume of contaminated ground water | ◦ 6 months to implement<br>◦◦ No additional short-term risk to workers<br>◦◦ No additional short-term risk to community<br>◦◦ No additional short-term impact on environment<br>◦ Potential to achieve remedial goals in approximately 15 years |
| 4) "Standard" extraction and treatment ☑ | $6,000,000 | + $3,000,000 | ◦◦ Residual risk = $3 \times 10^{-4}$<br>◦ Low potential for remedy failure | ◦◦ No additional reduction in toxicity<br>◦◦ No additional reduction in mobility<br>◦◦ No additional reduction in volume | ◦ 3 months to implement<br>◦◦ No additional short-term risk to workers<br>◦◦ No additional short-term risk to community<br>◦◦ No additional short-term impact on environment<br>◦ Remedial goals achieved in approximately 30 years |

**COST-EFFECTIVENESS SUMMARY:** *(Summary of individual cost-effectiveness evaluations and relative cost-effectiveness determinations)*

- Alternatives 1 and 2 are not considered to be cost-effective.
- While Alternatives 3 and 4 are considered to be cost-effective, Alternative 3 provides a potentially greater return on investment.

Key:
● = Baseline characteristic
◦ = More "effective" compared to previous alternative
◦ = Less "effective" compared to previous alternative
◦◦ = No change compared to previous alternative

the extent the alternatives are comparable with respect to a particular criterion (*e.g.*, all options provide similar degrees of long-term effectiveness), that criterion would not be a decisive factor in the selection process].

When "containment" is found to provide the "best balance of tradeoffs" with respect to the other alternatives evaluated, the extent of treatment found to be practicable may be "no treatment." Long-term effectiveness is achieved through monitored engineering controls. Where the Selected Remedy does not employ any treatment or resource recovery technologies, the explanation of the rationale used in the decision under this statutory finding must include the reasons for finding treatment to be impracticable.

### *5) Preference for Treatment as a Principal Element*

In addition to the four statutory mandates discussed previously, the statutory preference for treatment as a principal element shall also be addressed. In writing the ROD, the rationale for whether or not the preference for treatment is satisfied should consider whether or not the Selected Remedy uses treatment to address the principal threats posed by the site. This discussion should summarize the source materials constituting principal threats and the treatment methods used to reduce their toxicity, mobility, or volume.[26] If the Selected Remedy does not satisfy the statutory preference for treatment as a principal element, this discussion must explain why it does not do so.

### *6) Five-Year Review Requirements*

NCP §300.430(f)(4)(ii) requires a five-year review if the remedial action results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. This review evaluates whether a remedy currently is, or will be, protective of human health and the environment. The ROD must state whether a five-year review is required pursuant to CERCLA §121(c) and NCP §300.430(f)(5)(iii)(C). It is also EPA's policy to conduct five-year reviews under certain circumstances. This section of the Decision Summary should also discuss whether the site may be subject to any reviews as a matter of policy. Standard language is provided for the Declaration in Section 6.2.5. Highlight 6-36 describes the different types of five-year reviews. Highlight 6-37 provides an example of the *Statutory Determinations* section. [27]

## 6.3.14 Documentation of Significant Changes

To fulfill CERCLA §117(b) and NCP §§300.430(f)(5)(iii)(B) and 300.430(f)(3)(ii)(A), the ROD must document and discuss the reasons for any significant changes made to the Selected Remedy. Changes described in this section must be limited to those that could have been reasonably anticipated by the public from the time the Proposed Plan and RI/FS Report were released for public comment to the final selection of the remedy. (See Chapter 4 for a complete discussion on pre-ROD significant changes.) Changes that could not have been anticipated require additional public comment (see Chapter 7 for details).

Documentation of significant changes that could have been reasonably anticipated by the public can be accomplished in one of two ways, depending upon the nature of the changes: (1) If the Selected Remedy involves significant change to a feature of the Preferred Alternative proposed to the public, the documentation should appear at the end of the ROD after the *Statutory Determinations* section; or (2) if the significant change entails changing from the Preferred Alternative discussed in the Proposed Plan to a different alternative, this should be documented in a section prior to the description of alternatives.

Wherever this documentation is placed, this section of the ROD should identify the Preferred Alternative from the Proposed Plan, should indicate the significant changes made, and should provide a rationale for the

[26] In evaluating this statutory preference, the site manager needs to decide whether treatment selected in the ROD constitutes treatment as a major component of the remedy for that site. Remedies which involve treatment of principal threat wastes likely will satisfy the statutory preference for treatment as a principal element, although this will not necessarily be true in all cases (*e.g.*, when principal threat wastes that are treated represent only a small fraction of the wastes managed through containment). Ground-water treatment remedies also may satisfy the statutory preference, even though contaminated ground water is not considered a principal threat waste and even though principal threat source material may not be treated (*A Guide to Principal Threat and Low Level Threat Wastes* (OSWER 9380.3-06FS, November 1991)).

[27] For Federal facility sites, Executive Order 12580 delegates the responsibility for conducting five-year reviews, in certain instances, to other Federal agencies, and directs that these activities be conducted consistent with CERCLA §120. CERCLA §120(a)(2) provides that the reviews be carried out consistent with the guidelines, rules, regulations, and criteria established by the EPA Administrator.

## Highlight 6-36: Determinations for Five-Year Reviews

The purpose of this Section is to explain determinations for five-year reviews. The NCP states that the ROD must describe whether a five-year review is required (i.e., a "statutory review"). The ROD should also discuss whether the site is likely to undergo any discretionary policy reviews (i.e., a "policy review"). The structure and content of the five-year review is the same for both statutory and policy reviews.

**Statutory Reviews**

Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(C) provide the statutory and legal bases for conducting five-year reviews. If there are any hazardous substances, pollutants, or contaminants remaining at the site above levels that would allow for unlimited use and unrestricted exposure, EPA shall conduct a review of such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

EPA will conduct a statutory review of any site at which a post-SARA remedy, upon attainment of remedial action objectives and cleanup levels, will not allow for unlimited use and unrestricted exposure (i.e., where contaminants will remain on-site following remediation at concentrations above health-based levels). For example, sites at which the selected remedy ensures protectiveness through capping or institutional controls would require a statutory review. These reviews are triggered by the initiation of the remedial action. For statutory reviews, initiation of remedial action should be determined by the "actual RA on-site construction" date. See five-year review guidance for policy on timing of reviews at sites with multiple operable units.

**Policy Reviews**

Policy reviews are generally triggered by construction completion. Policy reviews should be conducted at sites where: (1) a post-SARA remedial action will allow for unlimited use and unrestricted exposure after completion of the remedial action, but where attainment of remedial action objectives and cleanup levels will take longer than five years to complete; (2) pre-SARA sites at which the remedy, upon attainment of the remedial action objectives and cleanup levels, will not allow unlimited use and unrestricted exposure; and (3) NPL removal-only sites, where hazardous substances, pollutants, or contaminants are left on-site above levels that allow unlimited use and unrestricted exposure and where no remedial action has taken place. Remedies that include pump and treat systems, bioremediation, or soil vapor extraction will usually take more than five years to complete, and thus should have a policy review.

**Discontinuation of Five-Year Reviews**

Statutory five-year reviews may be discontinued when no hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. These reviews should be discontinued only when a five-year review report documents that the contaminants of concern are reported at acceptable levels based on an appropriate period of monitoring. Post-SARA policy five-year reviews should generally only be discontinued under the same circumstances as statutory reviews. Other policy reviews should generally only be discontinued for sites with a pre-SARA remedy or at removal-only NPL sites after at least one review is completed.

**For More Information**

For more detailed information regarding five-year reviews see: Structure and Components of Five-Year Reviews (OSWER Directive 9355.7-02, May 23, 1991); Fact sheet: Structure and Components of Five-Year Reviews (OSWER Directive 9355.7-02FS1, August 1991); Supplemental Five-Year Review Guidance (OSWER Directive 9355.7-02A, July 26, 1994); and Second Supplemental Five-Year Review Guidance (OSWER Directive 9355.7-03A , December 21, 1995). An updated and consolidated version of EPA guidance on this subject is currently available as a review draft under the title "Comprehensive Five-Year Review Guidance," (OSWER Directive 9355.7-03, April 1999). Completion is anticipated in FY00, but in advance of that date, the draft is available to EPA employees at: http://intranet.epa.gov/ oerrinet/review/index.htm.

## Highlight 6-37: Example Language - Statutory Determinations Section

**Statutory Determinations**

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

**Protection of Human Health and the Environment**

The Selected Remedy, Alternative 4, will protect human health and the environment through the treatment of TCE- contaminated soil by soil vapor extraction and stabilization of lead-contaminated soil followed by capping. By pumping and treating contaminated ground water, the Selected Remedy will also prevent the existing plume from migrating to current ground-water users and remove contamination to Federal drinking water standards.

Soil vapor extraction, stabilization, and capping the contaminated soil will eliminate the threat of exposure to the most mobile chemical of potential concern via direct contact with or ingestion of contaminated soil. The Selected Remedy will also minimize the potential for leachate generation and recontamination of ground water. The current cancer risks associated with these exposure pathways is $2.6 \times 10^{-2}$. The Selected Remedy will reduce the cancer risks from exposure to $1 \times 10^{-6}$ and the Hazard Index to less than 1.0. This level falls at the lower end of EPA's target risk range of $10^{-4}$ to $10^{-6}$. There are no short-term threats associated with the Selected Remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

**Compliance with Applicable or Relevant and Appropriate Requirements**

The Selected Remedy of ex-situ bioremediation and capping of contaminated soils, and of pumping and treating the ground water by carbon adsorption comply with all ARARs. The ARARs are presented below and in more detail in Table ___.

Chemical, Location, and Action-Specific ARARs include the following:

- Safe Drinking Water Act MCLs (40 CFR Part 141), which specify acceptable concentration levels in ground-water that serves as a potential drinking water aquifer.
- Clean Water Act FWQC (40 CFR Part 403).
- RCRA Subtitle D requirements for landfill closure (40 CFR 264.111, Subpart G), which specify a cap with a permeability less than or equal to the permeability of any bottom liner or natural subsoils present at the site.
- 40 CFR 264.117(a)(1) Subpart G Post-Closure and Monitoring requirements for 30 years.
- Clean Air Act requirements for emissions from air stripping units.

[Note: Any State ARARs need to be listed here as well.]

**Other Criteria, Advisories, or Guidance To Be Considered (TBCs) for This Remedial Action**

In implementing the Selected Remedy, EPA and the State have agreed to consider a number of non-binding criteria that are TBCs. These include the guidance on designing RCRA caps, Draft RCRA Guidance Document, Landfill Design, Liner Systems and Final Cover, issued June 1982. The guidance on designing RCRA caps includes specifications to be followed in constructing and maintaining a RCRA cap.

## Highlight 6-37: Example Language - Statutory Determinations Section (continued)

**Cost-Effectiveness**

In the lead agency's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

The estimated present worth cost of the Selected Remedy is $10,200,000. Although Alternative 3 is $2,900,000 less expensive, lead contamination is not addressed, and therefore the remedy is cost-effective. EPA believes that the Selected Remedy's additional cost for stabilization provides a significant increase in protection of human health and the environment and is cost-effective. EPA also believes that the Selected Remedy's combination of soil vapor extraction and capping will provide an overall level of protection comparable to Alternative 5 (incineration and capping) at a significantly lower cost.

**Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable**

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance.

The Selected Remedy treats the source materials constituting principal threats at the site, achieving significant reductions in TCE concentrations in soil and ground water and stabilizing lead contamination in soil. The Selected Remedy satisfies the criteria for long-term effectiveness by removing TCE contamination from soil. Stabilization of lead contaminated soil and capping will effectively reduce the mobility of and potential for direct contact with contaminants remaining on-site. The Selected Remedy does not present short-term risks different from the other treatment alternatives. There are no special implementability issues that sets the Selected Remedy apart from any of the other alternatives evaluated, other than the requirement for a test burn in the incineration alternative.

**Preference for Treatment as a Principal Element**

By treating the contaminated soils by soil vapor extraction and stabilization, the Selected Remedy addresses principal threats posed by the site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

**Five-Year Review Requirements**

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

changes (*e.g.*, arguments or new information provided in public comments).

Highlight 6-38 includes examples of the following three types of discussions that generally could be included in this section of the ROD

- A case in which no significant changes are made.
- A case in which a significant change is made that could have been reasonably anticipated based on information originally presented in the Proposed Plan, the RI/FS Report, or elsewhere in the Administrative Record file. The only procedural requirement is to discuss the change in this section of the ROD.
- A case in which a significant change is made that could not have been reasonably anticipated based on information in the RI/FS Report, the Proposed Plan, or elsewhere in the Administrative Record file.

## 6.4 KEY ELEMENTS OF THE RESPONSIVENESS SUMMARY

The *Responsiveness Summary*, the third component of the ROD, summarizes information about the views of the public and support agency regarding both the remedial alternatives and general concerns about the site submitted during the public comment period. It also documents in the record how public comments were integrated into the decision-making process.

To serve these purposes, the *Responsiveness Summary* should be a concise and complete summary of significant comments received from the public, including PRPs, during the public comment period required by CERCLA §117 and NCP §§300.430(f)(3)(i)(F) and 300.430(f)(5)(iii)(B). *Superfund Responsiveness Summaries (Superfund Management Review: Recommendation Number 43E)* (OSWER 9230.0-06, June 1990) provides a framework for creating responsiveness summaries that can thoroughly address the complicated legal and technical issues, and still be responsive to local communities. Based on this directive, responsiveness summaries should be organized in two sections:

- Stakeholder Issues and Lead Agency Responses: Summarize and respond concisely to major issues raised by stakeholders (*e.g.*, community groups, support agencies, businesses, municipalities, PRPs).
- Technical and Legal Issues: Expand on technical and legal issues, if necessary.

Whenever possible, the response to a "yes" or "no" question should begin with a "yes" or "no" before providing a detailed explanation; or, if this is not possible, then a statement to that effect should be made at the beginning of that answer. Responses should be clear, accurate, and written by the RPM and/or the Community Relations Coordinator with review and concurrence by the Office of Regional Counsel (ORC). A *Responsiveness Summary* should reflect a genuine attempt to address citizen's questions and concerns, and not simply re-assert the correctness of EPA's determination. At the same time, the summary will be a critical document in the defense of the lead agency's actions. For this reason, the summary should fully and completely express the lead agency's policy, technical, and legal rationales. To ensure that commitments made in the *Responsiveness Summary* are addressed during implementation of the Remedial Action and to meet the requirements of NCP §300.430(f)(5)(iii)(B), they must also be addressed in the *Description of the Remedial Alternatives* section of the ROD.

When general policy matters are discussed in the *Responsiveness Summary*, they should be brought to management's attention early in the ROD review process. If the lead agency determines that a point-by-point response to a set of comments is warranted, a separate comment/response document should be prepared. In this situation, a summary of these comments with the lead agency's response should be included in the Summary as well.

Guidance on preparing Responsiveness Summaries is available in *Community Relations in Superfund: A Handbook* (EPA 540-R-92-009 January 1992) and in *Community Relations During Enforcement Activities and Development of the Administrative Record* (OSWER 9836.0-1A, November 1988). These documents detail the process of preparing the Summary and include a sample Responsiveness Summary.

## 6.5 RECORDS OF DECISION TO EPA HEADQUARTERS

After the ROD is issued, a copy should be sent to EPA Headquarters as soon as possible. For guidance on submitting RODs to EPA Headquarters, please see Appendix D, Records of Decision and Other Decision Documents to Headquarters.

## Highlight 6-38: Examples of Changes and Documentation Requirements

**Example One: No Significant Changes**

The Proposed Plan for the EIO Site was released for public comment in March 1999. The Proposed Plan identified Alternative S2, ex situ bioremediation and capping, as the Preferred Alternative for soil remediation. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

**Example Two: Significant Change Requiring Only Documentation in the ROD**

The Proposed Plan was released for public comment in March 1999. It identified Alternative G2, pump and treat through carbon adsorption with discharge to XYZ River, as the Preferred Alternative for ground-water remediation. Alternative G3 involving discharge to a POTW, was also considered. During the public comment period, new information indicated that health and environmental levels could not be met by the carbon adsorption treatment. In addition, it was discovered that the POTW in Nameless does have the capacity to handle the additional wastewater from the EIO Site. Therefore, EPA and the State decided to select discharge to the POTW rather than discharge to the XYZ River.

**Example Three: Significant Change Requiring a New Public Comment Period**

A Proposed Plan for the EIO Site was released for public comment in March 1999. The Plan identified Alternative S2, ex situ bioremediation and capping, as the Preferred Alternative for remediation. During the public comment period, the results of remedial activities at another site with contamination problems similar to those at the EIO Site indicated that an alternative treatment technology, low temperature thermal desorption (LTTD), could be used successfully on chemical(s) of potential concern similar to those at the EIO Site. Based on a comparison of the LTTD alternative to the other alternatives using the nine evaluation criteria, it was determined that LTTD represents the best balance of tradeoffs of all the options. The nine criteria analysis indicated that while LTTD was comparable to ex-situ bioremediation, fewer short-term risks would be associated with the low temperature thermal desorption alternative than with the ex-situ bioremediation alternative. The information supporting this determination is available in the Administrative Record file.

As a result of this new information, EPA decided to propose LTTD as the new Preferred Alternative for soil remediation at the EIO Site. The Tennessee Department of Environment and Conservation concurred with this decision. In compliance with statutory requirements for ensuring the public has the opportunity to comment on major remedy selection decisions, a new Proposed Plan was prepared presenting low temperature thermal desorption as the Preferred Alternative. The second Plan was made available to the public in July 1999. No significant comments were received during the second public comment period, and no significant changes were made to the proposed remedy.

## Highlight 6-39: Management Review Checklist: Twelve Questions to be Addressed by a ROD

1. **Treatment/Containment**: Does the ROD identify the source materials constituting principal threats (e.g., liquid waste contained in drums, mobile source materials, highly toxic source materials)? If principal threat wastes are not going to be treated, does the ROD explicitly state why not? Is the amount of material to be treated or contained estimated for each component of the Selected Remedy? Does the ROD adequately address the statutory preference for treatment as a principal element?

2. **Remedial Action Objectives**: Does the ROD clearly state the objectives of the remedial action?

   a. Examples of remedial action objectives for ground water remedies include the following:
      - To restore the aquifer to drinking water quality in 30 years.
      - To prevent any exposure to the contaminated ground water by implementing institutional controls.
      - To prevent the contaminated plume from reaching an uncontaminated aquifer.
      - To stop the plume migration off-site.

   b. Examples of remedial action objectives for source control remedies include the following:
      - To clean the site up to levels that allow for unrestricted use.
      - To clean the site to levels that allow only for recreational or industrial use.
      - To contain the waste in place and use institutional/engineering controls to prevent any site use other than as a waste management unit.
      - To remove as much contamination as possible in order to improve the effectiveness and efficiency of the ground-water remedy.

3. **Land and Ground-water Uses**: Does the ROD identify: (1) current land use, (2) reasonably anticipated future land use, (3) current ground-water use, and (4) potential future ground-water use? Are they the same as those used in estimating the baseline risks?

4. **Human Health Risks**: Does the ROD clearly present the cancer and non-cancer baseline risks for each chemical of concern (COC) to which there may be exposure and the total aggregate risk based on the reasonably anticipated future land use and/or potential future ground-water use?

5. **Ecological Risks**: Does the ROD include a discussion of whether or not there are ecological risks from site releases? If there are unacceptable ecological risks, is the basis for this determination clear and does the ROD explain how the remedy will achieve protection of ecological resources?

6. **Chemicals of Concern**: Does the Selected Remedy address all Chemicals of Concern posing unacceptable risk according to the risk assessment section of the ROD (i.e., explain how the Selected Remedy will achieve protection of human health and the environment)?

7. **Remedy Selection Rationale**: Does the ROD clearly describe why the Selected Remedy is preferred over the other alternatives (i.e., describe how the Selected Remedy provides the best “balance of tradeoffs” with respect to the balancing and modifying criteria)?

8. **Cleanup Levels**: Are the Chemical of Concern cleanup levels, their basis (i.e., human- or ecological-risk or ARAR), the risk at each Chemical of Concern cleanup level (if applicable), and the medium addressed, described for each component of the Selected Remedy?

9. **Institutional Controls**: If the Selected Remedy includes institutional controls, does the ROD describe the specific types of controls and the entity that will be responsible for implementing them and maintaining their effectiveness?

10. **Description of Selected Remedy**: Is the Selected Remedy described consistently (e.g., same technology components, contaminants and medium addressed) in the following three sections of the ROD: (1) Declaration, (2) Description of Alternatives, and (3) Selected Remedy?

11. **Summary of Remedy Cost Estimate**: Are all of the following estimated for the Selected Remedy: (1) capital costs; (2) annual operations and maintenance (O&M) costs; (3) duration of O&M cost estimate; (4) discount rate (%); (5) total discounted O&M costs (should take into account annual O&M costs, duration, and discount rate); and (6) Total Present Worth cost (sum of estimated capital costs and discounted O&M costs)?

12. **Remedy Changes**: If the ROD, ROD Amendment, or ESD addresses a change in a previously Selected Remedy, does the decision document give the reasons for the change?

# RECOMMENDED OUTLINE AND CHECKLIST FOR A RECORD OF DECISION

**[See Highlight 6-39 for Management Review Checklist: Twelve Questions to be Addressed by a ROD]**

**PART 1: THE DECLARATION**

The Declaration functions as the abstract and formal authorizing signature page for the ROD.

**A. Site Name and Location**

**B. Statement of Basis and Purpose**

- ☐ Certify the factual and legal basis for the Selected Remedy [see Highlight 6-2 for standard language].

**C. Assessment of Site**

- ☐ Certify that the site poses a threat to public health, welfare, or the environment [see Highlight 6-3 for standard language].

**D. Description of Selected Remedy**

- ☐ Describe the major components of the Selected Remedy in a bullet fashion.
- ☐ Describe the scope and role of this operable unit within the overall site management strategy.
- ☐ Describe how this operable unit addresses principal threats and other contamination at the site (*i.e.*, what is being treated, what is being contained, and what is the rationale for each).

**E. Statutory Determinations**

- ☐ Describe how the Selected Remedy satisfies the statutory requirements of CERCLA §121 and the regulatory requirements of the NCP.
- ☐ Discuss the applicability of the five-year review requirements [see Highlight 6-4 for standard language].

**F. Data Certification Checklist**

The Declaration should certify that the following information is included in the ROD (or provide a brief explanation for why this information is not included):

- ☐ Chemicals of concern (COCs) and their respective concentrations.
- ☐ Baseline risk represented by the chemicals of concern.
- ☐ Cleanup levels established for chemicals of concern and the basis for these levels.
- ☐ How source materials constituting principal threats will be addressed.
- ☐ Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD.
- ☐ Potential land and ground water use that will be available at the site as a result of the Selected Remedy.
- ☐ Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.
- ☐ Key factor(s) that led to selecting the remedy (*i.e.*, describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

**G. Authorizing Signatures**

[See Highlight 6-6 for notes on ROD authorizing signatures.]

**PART 2: THE DECISION SUMMARY**

The Decision Summary identifies the Selected Remedy, explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

**A. Site Name, Location, and Brief Description**

- ☐ Name and location.
- ☐ National Superfund database identification number (*e.g.*, CERCLIS).
- ☐ Lead and support agencies (*e.g.*, EPA, State, Federal facility).
- ☐ Source of cleanup monies (*e.g.*, Fund-financed, PRP-financed).
- ☐ Site type (*e.g.*, landfill, industrial facility).
- ☐ Brief site description.

**B. Site History and Enforcement Activities**

- ☐ History of site activities that led to the current problems.

- ☐ History of Federal, State, and local site investigations and removal and remedial actions conducted under CERCLA or other authorities.
- ☐ History of CERCLA enforcement activities at the site (*e.g.*, results of PRP searches, issuances of special notices to PRPs).

**C. Community Participation**

- ☐ Describe how the public participation requirements in CERCLA and the NCP were met in the remedy selection process (*e.g.*, community relations plans, fact sheets, public notices, public meetings, public comment periods, Technical Assistance Grant, Community Advisory Group).
- ☐ Describe other community outreach and involvement efforts [see Highlight 6-7 for an example].
- ☐ Describe efforts to solicit views on the reasonably anticipated future land uses and potential future beneficial uses of ground water.

**D. Scope and Role of Operable Unit or Response Action**

- ☐ The planned sequence of actions.
- ☐ The scope of problems those actions will address.
- ☐ The authorities under which each action will be/has been implemented (*e.g.*, removal, remedial, State).

[See Highlights 6-8 and 6-9 for tips on writing the Scope and Role section when there is more than one operable unit, and for an example.]

**E. Site Characteristics**

(Include maps, a site plan, or other graphical presentations, as appropriate.)

- ☐ Describe the Conceptual Site Model (CSM) on which the risk assessment and response action are based [see Highlight 6-10 for an example].
- ☐ Provide an overview of the site, including the following:
  - Size of site (*e.g.*, acres).
  - Geographical and topographical information (*e.g.*, surface waters, flood plains, wetlands).
  - Surface and subsurface features (*e.g.*, number and volume of tanks, lagoons, structures, and drums on the site).
  - Areas of archaeological or historical importance.
- ☐ Describe the sampling strategy (*e.g.* which media were investigated, what sampling approach was used, over what area, when was the sampling performed).
- ☐ Describe known or suspected sources of contamination.
- ☐ Describe types of contamination and the affected media, including the following:
  - Types and characteristics of COCs (*e.g.*, toxic, mobile, carcinogenic, non-carcinogenic).
  - Quantity/volume of waste that needs to be addressed.
  - Concentrations of COCs in each medium.
  - RCRA hazardous wastes and affected media.
- ☐ Describe location of contamination and known or potential routes of migration, including the following:
  - Lateral and vertical extent of contamination.
  - Current and potential future surface and subsurface routes of human or environmental exposure.
  - Likelihood for migration of COCs from current location or to other media.
  - Human and ecological populations that could be affected.
- ☐ For sites with ground-water contamination, describe the following:
  - Aquifer(s) affected or threatened by site contamination, types of geologic materials, approximate depths, whether aquifer is confined or unconfined.
  - Ground-water flow directions within each aquifer and between aquifers and ground-water discharge locations (*e.g.*, surface waters, wetlands, other aquifers).
  - Interconnection between surface contamination (*e.g.*, soils, sediments/surface water) and ground-water contamination.
  - Confirmed or suspected presence and location of non-aqueous phase liquids.
  - If ground-water models were used to define the fate and transport of COCs, identify the model used and major model assumptions.
- ☐ Note other site-specific factors that may affect response actions at the site.

**F. Current and Potential Future Land and Water Uses**

Land Uses

- ☐ Current on-site land uses.
- ☐ Current adjacent/surrounding land uses.
- ☐ Reasonably anticipated future land uses and basis for future use assumptions (*e.g.*, zoning maps, nearby development, 20-year development plans, dialogue with local land use planning officials and citizens, reuse assessment).

Ground-Water and Surface Water Uses

- ☐ Current ground-water and surface water uses.
- ☐ Potential beneficial ground-water and surface water uses (*e.g.*, potential drinking water, irrigation) and basis for future use assumptions (*e.g.*, Comprehensive State Ground Water Protection Plan, promulgated State classification, EPA ground-water classification guidelines).
- ☐ If beneficial use is potential drinking water source, identify the approximate time frame of projected future drinking water use (*e.g.*, ground-water aquifer not currently used as a drinking water source but expected to be utilized in 30 - 50 years).
- ☐ Location of anticipate use in relation to location and anticipated migration of contamination.

**G. Summary of Site Risks**

- ☐ For human health risks:
  - Identify the concentrations of COCs in each medium [see Highlight 6-15 for example table format].
  - Summarize the results of the exposure assessment.
  - Summarize the results of the toxicity assessment for the COCs [see Highlights 6-16A and 6-16B for example table formats].
  - Summarize the risk characterization for both current and potential future land use scenarios and identify major assumptions and sources of uncertainty [see Highlight 6-17 for example language and Highlights 6-18A and 6-18B for example table formats].
- ☐ For ecological risks:
  - Identify the concentrations of COCs in each medium [see Highlight 6-19 for an example table format].
  - Summarize the results of the exposure assessment [see Highlight 6-20 for an example table format].
  - Summarize the results of the ecological effects assessment.
  - Summarize the results of the ecological risk characterization and identify major assumptions and sources of uncertainty [see Highlight 6-21 for an example table format].
- ☐ Clearly present the basis for taking the response action at the conclusion of this section [see standard language in Highlight 6-12].

**H. Remedial Action Objectives**

- ☐ Present a clear statement of the specific RAOs for the operable unit or site (*e.g.*, treatment of contaminated soils above health-based action levels, restoration of ground-water plume to drinking water levels, and containment of DNAPL source areas) and reference a list or table of the individual performance standards.
- ☐ Discuss the basis and rationale for RAOs (*e.g.*, current and reasonably anticipated future land use and potential beneficial ground-water use).
- ☐ Explain how the RAOs address risks identified in the risk assessment (*e.g.*, how will the risks driving the need for action be addressed by the response action?).

**I. Description of Alternatives**

The objective of this section is to provide a brief understanding of the remedial alternatives developed for the site.

Remedy Components

Provide a bulleted list of the major components of each alternative, including but not limited to:

- ☐ Treatment technologies and materials they will be used to address (*e.g.*, principal threats).
- ☐ Containment components of remedy (*e.g.*, engineering controls, cap, hydraulic barriers) and materials they will be used to address (*e.g.*, low concentration source materials, treatment residuals).
- ☐ Institutional controls (and entity responsible for implementing and maintaining them).
- ☐ Operations and Maintenance (O&M) activities required to maintain the integrity of the remedy (*e.g.*, cap maintenance).
- ☐ Monitoring requirements.

[See Highlight 6-22 for examples of remedy components.]

Common Elements and Distinguishing Features of Each Alternative

Describe common elements and distinguishing features unique to each response option. Examples of these elements include:

- ☐ Key ARARs (or ARAR waivers) associated with each alternative (*e.g.*, action- and/or location-specific ARARs, including the control of air, emissions from ground-water treatment units, manifesting of hazardous waste, and regulating solid waste landfills).
- ☐ Long-term reliability of remedy (potential for remedy failure/replacement costs).
- ☐ Quantity of untreated waste and treatment residuals to be disposed off-site or managed on-site in a containment system and degree of residual contamination remaining in such waste.
- ☐ Estimated time required for design and construction (*i.e.*, implementation time frame).
- ☐ Estimated time to reach cleanup levels (*i.e.*, time of operation, period of performance).
- ☐ Estimated capital, annual O&M, and total present worth costs, discount rate, and the number of years over which the remedy cost estimate is projected.
- ☐ Describe uses of presumptive remedies and/or innovative technologies.

Expected Outcomes of Each Alternative

- ☐ Available land uses upon achieving performance standards. Note time frame to achieve performance standards (*e.g.*, commercial or light industrial use available in three years when cleanup levels are achieved).
- ☐ Available ground water uses upon achieving performance standards . Note time frame to achieve performance standards (*e.g.*, restricted use for industrial purposes in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 50-70 years).
- ☐ Other impacts or benefits associated with each alternative.

**J. Comparative Analysis of Alternatives**

- ☐ Compare the relative performance of each alternative against the others with respect to the nine evaluation criteria (summarize in a table if appropriate).

[See Highlight 6-23 for tips on presenting the comparative analysis of alternatives, Highlight 6-24 for example text, and Highlight 6-25 for an example table format.]

**K. Principal Threat Wastes**

- ☐ Identify the source materials constituting principal threats at the site and discuss how the alternatives will address them.

Note: The *Statutory Determinations* section of the ROD should explain whether or not the Selected Remedy satisfies the statutory preference for remedies employing treatment that reduces toxicity, mobility, or volume as a principal element. By indicating whether the principal threats will be addressed by the alternatives, this section of the *Decision Summary* should provide the basis for that statutory determination.

[See Highlight 6-26 for key definitions.]

**L. Selected Remedy**

Summary of the Rationale for the Selected Remedy

- ☐ Provide a concise discussion of the key factors for remedy selection.

Detailed Description of the Selected Remedy

- ☐ Expand on the description of the Selected Remedy from that which was provided in the *Description of Alternatives* section and provide a brief overview of the RAO's and performance standards.

[See Highlight 6-27 for tips on writing the "Selected Remedy" section]

Cost Estimate for the Selected Remedy

- ☐ Present a detailed, activity-based breakdown of the estimated costs associated with implementing and maintaining the remedy (include estimated capital, annual O&M, and total present worth costs discount rate and the number of years over which the remedy cost estimate is projected).

[See Highlight 6-28 for standard language, Highlight 6-29 for an example table format, and Highlight 6-30 for tips on presenting the cost estimate summary.]

Estimated Outcomes of Selected Remedy

- ☐ Available land use(s) upon achieving cleanup levels. Note time frame to achieve available use (*e.g.*, commercial or light industrial use available in 3 years when cleanup levels are achieved).
- ☐ Available ground-water use(s) upon achieving cleanup levels. Note time frame to achieve available use (*e.g.*, restricted use for industrial purposes in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 50-70 years).
- ☐ Final cleanup levels for each medium (*i.e.*, contaminant specific cleanup levels), basis for cleanup levels, and risk at cleanup levels (if appropriate)

[see Highlight 6-32 for an example table format].

- ☐ Anticipated socio-economic and community revitalization impacts (*e.g.*, increased property values, reduced water supply costs, jobs created, increased tax revenues due to redevelopment, environmental justice concerns addressed, enhanced human uses of ecological resources).
- ☐ Anticipated environmental and ecological benefits (*e.g.*, restoration of sensitive ecosystems, protection of endangered species, protection of wildlife populations, wetlands restoration).

[See Highlight 6-31 for examples of expected outcomes.]

**M. Statutory Determinations**

- ☐ Explain how the remedy satisfies the requirements of §121 of CERCLA to:
  - Protect human health and the environment.
  - Comply with ARARs, or justify a waiver [see Highlight 6-34 for an example table format].
  - Be cost-effective [see Highlight 6-35 for an example matrix].
  - Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable (*i.e.*, explain why the Selected Remedy represents the best option).
  - Satisfy the preference for treatment as a principal element, or justify not meeting this preference [see Highlight 6-33 for an illustration of the relationship between statutory determinations and the nine criteria].
- ☐ Explain five-year review requirements for the Selected Remedy [see Highlight 6-36 for information regarding five-year reviews].

[See Highlight 6-37 for example language for the statutory determinations section.]

**N. Documentation of Significant Changes from Preferred Alternative of Proposed Plan**

If there are significant changes in the Selected Remedy from the Preferred Alternative:

- ☐ Discuss the Preferred Alternative originally presented in the Proposed Plan.
- ☐ Describe the significant changes in the Selected Remedy.
- ☐ Explain the rationale for the changes and how they could have been reasonably anticipated based on information presented in the Proposed Plan or the Administrative Record file.

[See Highlight 6-38 for examples of changes and documentation requirements.]

**PART 3: RESPONSIVENESS SUMMARY**

*The Responsiveness Summary* serves the dual purposes of: (1) presenting stakeholder concerns about the site and preferences regarding the remedial alternatives; and (2) explaining how those concerns were addressed and the preferences were factored into the remedy selection process. This discussion should cross-reference sections of the *Decision Summary* that demonstrate how issues raised by the community have been addressed.

**A. Stakeholder Issues and Lead Agency Responses**

- ☐ Summarize and respond concisely to issues raised by stakeholders.

**B. Technical and Legal Issues**

- ☐ Expand on technical and legal issues, if necessary.

# 7.0 DOCUMENTING POST-ROD CHANGES: MINOR CHANGES, EXPLANATIONS OF SIGNIFICANT DIFFERENCES, AND ROD AMENDMENTS[1]

## 7.1 EVALUATING POST-RECORD OF DECISION INFORMATION

After a ROD is signed, new information may be received or generated that could affect the implementation of the remedy selected in the ROD, or could prompt the reassessment of that remedy.[1] The information could be identified at any time during, immediately prior to, or after the implementation of the remedy. Where information is submitted by a PRP, the public, or the support agency after a ROD is signed, the lead agency must consider and respond to this information and place such comments and responses in the Administrative Record file when *all* of the following criteria are met (per NCP §300.825(c)):

- Comments contain significant information;
- The new information is not contained elsewhere in the Administrative Record file;
- The new information could not have been submitted during the public comment period; and
- The new information substantially supports the need to significantly alter the response action.

The lead agency also may evaluate whether a remedy change is warranted on its own merits, even where the requirements of NCP §300.825(c) are not triggered.[2]

[1] It is EPA's policy to encourage appropriate remedy changes in response to advances in remediation science and technology (*Superfund Reforms: Updating Remedy Decisions,* (EPA 540-F-96-026, September 1996).

[2] Responding to post-ROD comments submitted by PRPs, the public, or the support agency may only require a general overview of the comments and a simple EPA response if no change to the remedy is involved or the change is minor (see *Answers to Comments Submitted After the Superfund ROD Is Signed*, EPA memorandum, October 11, 1995, http://es.epa.gov/oeca/osre/951011. html). However, a formal public comment period may be conducted depending upon whether the change is significant or fundamental (for definitions of these types of changes see Section 7.2).

## 7.2 TYPES OF POST-RECORD OF DECISION CHANGES

The lead agency's categorization of a post-ROD change to the Selected Remedy is a site-specific determination and must consider the following as set out in NCP §300.435(c)(2).

- *Scope.* Does the change alter the scope of the remedy (*e.g.*, type of treatment or containment technology, the physical area of the response, remediation goals to be achieved, type and volume of wastes to be addressed)?
- *Performance.* Would the change alter the performance (*e.g.*, treatment levels to be attained, long-term reliability of the remedy)?
- *Cost.* Are there significant changes in costs from estimates in the ROD, taking into account the recognized uncertainties associated with the hazardous waste engineering process selected? (Feasibility Study cost estimates are expected to provide an accuracy of +50 percent to -30 percent.)

Based on this evaluation, and depending on the extent or scope of modification being considered, the lead agency must make a determination as to the type of change involved (*i.e.*, nonsignificant or minor, significant, or fundamental change). Remedy changes should fall along a continuum from minor to fundamental. Similarly, an aggregate of nonsignificant or significant changes could result in a fundamental change.

Post-ROD changes fit into one of the three following categories:

- *Nonsignificant or Minor Changes* usually arise during design and construction, when modifications are made to the functional specifications of the remedy to address issues such as performance optimization, new technical informa-

tion, support agency/community concerns and/or cost minimization (*e.g.*, value engineering process). Such changes may affect things such as the type or cost of materials, equipment, facilities, services, and supplies used to implement the remedy. The change will not have a significant impact on the scope, performance or cost of the remedy.

- *Significant Changes* generally involve a change to a component of a remedy that does not fundamentally alter the overall cleanup approach.
- *Fundamental Changes* involve an appreciable change or changes in the scope, performance, and/or cost or may be a number of significant changes that together have the effect of a fundamentalchange. An example of a fundamental change is one that results in a reconsideration of the overall waste management approach selected in the original ROD.

Highlight 7-1 provides examples of post-ROD changes. (See also NCP preamble, 55 *FR* 8772 for more information.) Please note that the examples presented in Highlight 7-1 are not meant to present strict thresholds for changes in cost, volume, or time.

## 7.3 DOCUMENTING POST-RECORD OF DECISION CHANGES

The type of documentation required for a post-ROD change depends on the nature of the change. Changes that significantly or fundamentally affect the remedy selected in the ROD will require more explanation and/or opportunity for public comment than those that do not. Each type of post-ROD change is associated with one of three documentation procedures: (1) a memo or note to the post-ROD file for an insignificant or minor change; (2) an explanation of significant differences (ESD) for a significant change, and (3) a ROD amendment for a fundamental change. Sample outlines for ESDs and ROD Amendments are provided in Highlight 7-2.

### 7.3.1 Documenting Non-Significant (or Minor) Post-ROD Changes: Memo to the Site File

Any non-significant or minor changes should be recorded in the post-ROD site file (*e.g.*, the RD/RA case file). If the lead agency chooses, non-significant changes can also be documented for the public in a Remedial Design Fact Sheet. Although not legally required, a written statement describing the change is generally recommended (See "*Answers to Comments Submitted After the Superfund ROD is Signed*," EPA memorandum, October 11, 1995, http://es.epa.gov/oeca/osre/951011. html).

### 7.3.2 Documenting Significant Post-ROD Changes: Explanation of Significant Differences

When documenting significant changes made to a remedy, the lead agency must comply with CERCLA §117(c) and NCP §§300.435(c)(2)(i) and 300.825(a)(2). An ESD must describe to the public the nature of the significant changes, summarize the information that led to making the changes, and affirm that the revised remedy complies with the NCP and the statutory requirements of CERCLA.

To describe the nature of the significant changes, it is suggested that a side-by-side comparison of the original and proposed remedy components be used to clearly display the significant differences.

The ESD should provide additional information on changes that have resulted in the remedy as a result of the change (*e.g.*, changes in the cleanup cost estimate or remediation time frame). Generally, a new nine-criteria analysis is not required; however, the ESD should include a statement that the ROD remains protective and continues to meet ARARs (NCP §§300.430(f)(1)(ii)(B)(1) and (2)).[3] It is also generally appropriate to prepare an ESD document when the lead agency decides to exercise a contingency remedy that was previously described in the ROD (see Section 8.3).

While the ESD is being prepared and made available to the public, the lead agency may proceed with the pre-design, design, construction, or operation activities associated with the remedy. The lead agency

[3] An ESD does not generally reopen consideration of ARARs for the remedy since an ESD does not fundamentally change the remedy. However, if an ESD results in the addition of any new components to the remedy, any ARARs that apply to the change that the ESD describes must be discussed and met or waived. For example, if any ARARs apply to an ESD change which adds stabilization of residuals to a thermal treatment remedy, they must be discussed in the ESD and met or waived.

## Highlight 7-1: Examples of Post-Record of Decision Changes

***(NOTE: Examples are not meant to present strict thresholds for changes in cost, volume, or time.)***

**Minor Changes**

- **Small Increase in Volume:** Remedial design testing shows that the volume of soil requiring treatment is 75,000 cubic yards rather than the 60,000 estimated in the ROD, but the estimated cost of the overall remedy will only increase by a small percentage.

- **Disposal Location:** During remedial design, it is discovered that it is not feasible to construct the on-site landfill (which is part of the Selected Remedy) in the location specified in the ROD. However, another similar location at the site is suitable for a landfill, and this location is chosen.

- **Ground-Water Monitoring:** The Selected Remedy calls for long-term pump and treat of contaminated ground water with monitoring on a quarterly basis. After a period of time, a determination is made that no significant change in data quality or monitoring effectiveness will occur if monitoring contaminant levels in the ground water is less frequent. Ground-water monitoring is changed to semi-annual sampling.

**Significant Changes**

- **Large Increase in Volume/ Cost Increase:** Sampling during the remedial design phase indicates the need to significantly increase the volume of contaminated waste material to be incinerated in order to meet selected cleanup levels, thereby substantially increasing the estimated cost of the remedy.

- **Disposal Location:** The lead agency determines that it is not feasible to construct an on-site landfill for treated waste in accordance with the remedy selected in the ROD. The treated wastes must be sent to an off-site landfill. Although the overall management approach for the treated waste (landfill disposal) will remain the same, the costs and implementation time will increase significantly.

- **Contingency Remedy:** As part of an active ground-water pump and treat system, contaminant concentrations decrease to an asymptotic level which is close to attainment of the cleanup level. Investigation shows that adding additional wells to pump and treat ground water will not improve the performance of the remedy in attaining the cleanup level. The ROD included contingency language that the pump and treat remedy would continue operating until contaminant levels were reduced by at least 90%. At such time, monitored natural attenuation would be relied upon to attain the cleanup levels specified in the ROD (if performance monitoring data indicated that this would be an effective method of achieving the final cleanup levels). A decision is made to implement the contingency, thus changing the remedy from pump and treat to monitored natural attenuation. This represents a significant change in achieving the cleanup levels at the site.

- **New ARAR Promulgated (Impacts on Cleanup Levels and Other Parameters):** The lead agency determines that the attainment of a newly promulgated requirement is necessary, based on new scientific evidence, because the existing ARAR is no longer protective. Although this new requirement will significantly change the remedy (*i.e.*, cleanup level, timing, volume, or cost), it will not fundamentally alter the remedy specified in the ROD (*i.e.*, the selected technology will not change) and it will not impact the level of protection (*i.e.*, risk reduction) that the remedy will provide.

- **Land Use:** During remedial design, the local zoning board decides to change the current land use from residential to commercial. Although this new requirement will significantly change features of the remedy (*i.e.*, determination of principal or low level threats, reasonable risk scenarios, appropriate cleanup levels), it will not fundamentally alter the remedy specified in the ROD (*e.g.*, the selected technology will not change).

- **Secondary Technology:** The lead agency decides to use a biological treatment method instead of air stripping (which was specified in the ROD) for ex-situ treatment of extracted ground water. The basic pump and treat approach remains unaltered and the cleanup level specified in the ROD will be met by the alternate technology; the change is significant, but not fundamental. [See *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites* (EPA 540-R-96-023, October 1996).]

## Highlight 7-1: Examples of Post-Record of Decision Changes (continued)

- **Institutional Controls:** During a five-year review, the lead agency reviews institutional control measures implemented at the site and determines that additional measures, that differ significantly from what was described in the ROD, are necessary to be protective (*e.g.*, need for an easement to replace a deed notice).

- **Change in ARARs:** At a five-year review, it is determined that a cleanup level is not consistent with an updated State cleanup standard, and thus is not protective and needs to be modified. This change will not cause a fundamental change in the volume of waste to be remediated.

**Fundamental Changes**

- **Change Primary Treatment Method:** The in-situ soil washing remedy selected in the ROD proves to be infeasible to implement after testing during remedial design. A decision is made to fundamentally change the remedy to excavate and thermally treat the waste.

- **Change Primary Treatment Method with Cost Increase:** Additional information obtained during remedial design testing demonstrates that the Selected Remedy for ground water, monitored natural attenuation, will not meet cleanup levels, as had been originally predicted in the RI/FS. The lead agency decides to fundamentally change the remedy from monitored natural attenuation to pump and treat. The estimated cost of the cleanup increases significantly.

- **Change Primary Treatment Method with Cost Decrease:** Pump and treat is the Selected Remedy for ground water. Prior to construction of a pump and treat system, interested parties collect and present ground-water information to the lead agency showing that contaminant concentrations are decreasing due to natural processes (*e.g.*, biodegradation, dilution, adsorption, dispersion). Modeling indicates that monitored natural attenuation will achieve cleanup levels in a time frame comparable to pump and treat at substantially less cost.

- **Change from Containment to Treatment with Cost Increase:** At a five-year review for a small industrial site, tests indicate that the containment remedy will not be protective and now a more active response approach (*e.g.*, treatment) is necessary. A new remedy must be selected that will meet protectiveness requirements, resulting in unanticipated costs for the site.

- **Technical Impracticability Waiver:** While implementing an active pump and treat remedy, the presence of DNAPL is discovered. A determination is made to invoke a Technical Impracticability Waiver of the ARAR because treatment of the DNAPL zone is impracticable from an engineering perspective. Rather than treat the source material (DNAPL) a decision is made to implement a containment approach (*e.g.*, slurry wall) for the DNAPL zone. Pump and treat will continue outside the containment zone. As a result, the scope, performance, and cost of the original remedy is fundamentally changed.

- **Community Preference:** The original remedy selected in the ROD was on-site incineration of contaminated soils with estimated costs of $50 million. The community opposes the building of an incinerator and requests that an alternate remedy be selected. New information received after the ROD was signed demonstrates that thermal desorption can meet the cleanup goals in a reasonable time frame for less cost with no loss in protection. This change is based on the community's preference for an alternative to the original Selected Remedy.

- **Volume Decrease Changes Primary Treatment Method:** The Selected Remedy called for treatment by lead recovery and recycling of lead contaminated materials. Additional investigation in design showed the volume of waste to be smaller than originally presumed. The decrease in volume made recycling uneconomical. The amended remedy calls for treatment and containment such that waste is stabilized and consolidated in a lined and capped on-site containment facility. The scope of the new remedy is more efficient, is cost-effective, and is supported by the State and the community.

should consult with the support agency, as appropriate, before issuing an ESD (NCP §300.435(c)(2)). Although not specifically required by CERCLA §121(f) and NCP §300.435(c)(2)(i), it is also recommended that the lead agency provide the support agency the opportunity to comment, and summarize the support agency's comments in the ESD. The lead agency also must publish a notice of availability and a brief description of the ESD in a major local newspaper of general circulation (as required by NCP §300.435(c)(2)(i)(B)). The ESD must be made available to the public by placing it in the Administrative Record file and information repository (NCP §§300.435(c)(2)(i)(A) and 300.825(a)(2)). A formal public comment periodis *not* required when issuing an ESD.

In some cases, an additional public comment period or public meeting may be held voluntarily on a planned ESD (NCP §300.825(b)). This may be useful where there is considerable public or PRP interest in the matter. The Office of Emergency and Remedial Response (OERR) recommends issuing the ESD in a fact sheet format as outlined in Highlight 7-2. The Regional Administrator (or their designee) must sign an ESD. In such cases it may be appropriate to delay implementation of the remedy relating to the ESD to allow a consideration of possible concerns.

### 7.3.3 Documenting Fundamental Post-ROD Changes: ROD Amendment

When a fundamental change is made to the basic features of the remedy selected in a ROD with respect to scope, performance, or cost, the lead agency is required to develop and document the change consistent with the ROD process (NCP §§300.435(c)(2)(ii)(A) through (H)). This entails the issuance of a revised Proposed Plan that highlights the proposed changes. An amended ROD that documents the change follows the Proposed Plan. The portion of the ROD being amended is evaluated using the nine criteria, focusing on those central to the rationale for the Selected Remedy.

In general, the introductory sections of the ROD do not need to be readdressed in the ROD Amendment but may be referenced from the previous ROD. The focus of the amendment should be to document the rationale for the amendment and provide assurances that the proposed remedy satisfies the statutory requirements. This is accomplished through an evaluation, utilizing the nine criteria, of the portion of the remedy being changed.

To describe the nature of the changes, it is suggested that a side-by-side comparison of the original and proposed remedy components be used to clearly display the differences.

The information included in a ROD Amendment is a function of the type of change made and the rationale for that change. If the amended ROD addresses the entire response action for the site or a series of operable units (*e.g.*, soil, surface water, ground water), only the portion of the remedy that is being changed (*e.g.*,ground water) requires an amendment. For the portion of the ROD being amended, a new nine-criteria analysis, including a new ARARs analysis, will be necessary (see NCP §300.430(f)(1)(ii)(B)(2)). Portions of the analysis in the original ROD can be cross-referenced, where appropriate. RD/RA activities being conducted on other portions of the site or at operable units not proposed for changes may continue during the amendment process.

When fundamental changes are proposed to the ROD, the lead agency must conduct the public participation and documentation procedures specified in NCP §§300.435(c)(2)(ii) and 300.825(a)(2). This would include issuing a revised Proposed Plan that highlights the proposed changes. The format should follow that of the Proposed Plan described in Chapter 3. The final decision to amend is not made until after consideration of public comment (NCP §300.435(c)(2)(ii)).

If a fundamental change is made after a consent decree has been entered at an enforcement-lead site, the decree may need to be modified to conform to the amended ROD, and perhaps involve the Department of Justice or the Court. RPMs should check with their Regional Counsel on how this may be accomplished.

ROD Amendments, like RODs, must be signed by the Regional Administrator (or their designee). A recommended outline and checklist can be found in Highlight 7-2.

## 7.4 HEADQUARTERS REVIEW AND FILING OF DECISION CHANGES

Draft ESDs and ROD Amendments (including revised Proposed Plans) should be submitted to EPA Headquarters for review and comment pursuant to *Focus Areas for Headquarters OERR Support for Regional Decision Making* (OSWER 9200.1-17, May 22, 1996). In the event that the remedy change meets the criteria for review by the National Remedy Review Board, the appropriate consultation procedures should be followed. For more information on the National Remedy Review Board, see http://www.epa. gov/superfund/programs/nrrb/index.htm. See also Appendix C, *Consolidated Guide to ConsultationProcedures for Superfund Response Decisions* (EPA 540-F-97-009, May 1997).

A copy of a signed final ESD or ROD Amendment should be submitted within 30 days of signature to the following Headquarters office:

ROD Clearinghouse
Superfund Document Center
U.S. EPA Mail Code 5202G
401 M Street, SW
Washington, DC 20460

Please refer to Appendix D for guidance on submitting decision documents to EPA Headquarters.

## Highlight 7-2: Sample Outline and Checklist for ESDs and ROD Amendments

| Component | Explanation of Significant Differences | ROD Amendment |
|---|---|---|
| **Introduction to the Site and Statement of Purpose** | • Site name and location.<br>• Identification of lead and support agencies.<br>• Citation of CERCLA §117(c) and NCP §300.435(c)(2)(I).<br>• Include date of ROD signature.<br>• Summary of circumstances that led to the need for an ESD.<br>• Statement that ESD will become part of Administrative Record file (NCP 300.825(a)(2)).<br>• Address of location where the file is available and hours of availability. | • Site name and location.<br>• Identification of lead and support agencies<br>• Citation of CERCLA §117 and NCP §300.435(c)(2)(ii).<br>• Include date of original ROD signature.<br>• Summary of circumstances that led to the need for a ROD Amendment.<br>• Statement that ROD Amendment will become part of Administrative Record file (NCP 300.825(a)(2)).<br>• Address of location where the file is available and hours of availability. |
| **Site History, Contamination, and Selected Remedy** | • Brief summary of contamination problems and site history.<br>• Present the Selected Remedy, as originally described in the ROD. | • Brief summary of contamination problems and site history.<br>• Present the Selected Remedy, as originally described in the ROD. |
| **Basis for the Document** | • Summarize information that prompted and supports significant differences from the Selected Remedy, including the results of the treatability studies or other information developed or provided during the remedial design process.<br>• Reference any information in the Administrative Record file that supports the need for the change. | • Summarize the information that prompted and supports fundamentally changing the remedy selected in the ROD, including the results of treatability studies or other information developed or provided during the remedial design process that supports the amendment.<br>• Reference any information in the Administrative Record file that supports the need for the amendment. |
| **Description of Significant Differences or New Alternatives** | • Describe the significant differences between the remedy as presented in the ROD and the action now proposed, highlighting scope, performance, and cost.<br>• Describe any changes in Expected Outcomes that will result from the ESD (e.g., change in time to achieve cleanup objectives). | • Describe original Selected Remedy and new proposed remedy in the same manner as in a standard ROD, highlighting the following:<br>  • Treatment components.<br>  • Containment or storage components.<br>  • Institutional Control components.<br>  • Key ARARs.<br>• Explain how the change will affect the Remedial Action Objectives for the site.<br>• Describe any changes in Expected Outcomes that will result from the ROD Amendment (e.g., change in land use, change in cleanup levels). |
| **Evaluation of Alternatives** | Not Applicable to ESDs. | • Use the nine criteria to compare the original and the new proposed remedies. |
| **Support Agency Comments** | • Include a summary of support agency comments on the ESD. | • Include a summary of support agency comments on the ROD Amendment. |
| **Statutory Determinations** | • State that the modified remedy satisfies CERCLA §121. | • State that the modified remedy satisfies CERCLA §121. |
| **Public Participation Compliance** | • Document that the public participation requirements set out in NCP §300.435(c)(2)(i) have been met. | • Document that the public participation requirements set out in NCP §300.435(c)(2)(ii) have been met. |

# 8.0 DOCUMENTING NO ACTION, INTERIM ACTION, AND CONTINGENCY REMEDY DECISIONS

This chapter discusses the essential components of RODs that are prepared to document three specific types of remedial action decisions: no action, interim action, and contingency remedies. In preparing one of these three types of RODs, RPMs should modify the recommended format of the "standard ROD" for final response actions (see Highlight 8-1 and the checklist at the end of Chapter 6) as indicated in this chapter. In the examples provided here, for each type of ROD, sections of the standard ROD that should be eliminated have been crossed out (*e.g.*, ~~Statutory Determinations~~), and remaining sections should be modified according to the directions provided. All other sections should be prepared as in a standard ROD (see Chapter 6 for complete descriptions).

## 8.1 DOCUMENTING NO ACTION DECISIONS

The lead agency may determine that no action (*i.e.*, no treatment, engineering controls, or institutional controls[1]) is warranted under the following general sets of circumstances:

- When the site or a specific problem or area of the site (*i.e.*, an operable unit) poses no current or potential threat to human health or the environment;
- When CERCLA does not provide the authority to take remedial action; or
- When a previous response(s) has eliminated the need for further remedial response.

Examples of potential situations where no action decisions may be appropriate are provided in Highlight 8-2. Highlights 8-4, 8-5, and 8-6 outline ROD formats for situations where a no action ROD may be warranted.

**Highlight 8-1: Recommended Outline for Standard Record of Decision***

**PART 1: DECLARATION**
- Site Name and Location
- Statement of Basis and Purpose
- Assessment of Site
- Description of Selected Remedy
- Statutory Determinations
- ROD Data Certification Checklist
- Authorizing Signatures

**PART 2: DECISION SUMMARY**
- Site Name, Location, and Brief Description
- Site History and Enforcement Activities
- Community Participation
- Scope and Role of Operable Unit or Response Action
- Site Characteristics
- Current and Potential Future Site and Resource Uses
- Summary of Site Risks
- Remedial Action Objectives
- Description of Alternatives
- Comparative Analysis of Alternatives
- Principal Threat Waste
- Selected Remedy
- Statutory Determinations
- Documentation of Significant Changes

**PART 3: RESPONSIVENESS SUMMARY**
- Stakeholder Comments and Lead Agency Responses
- Technical and Legal Issues

* See Chapter 6 for an expanded outline/ checklist.

[1] An alternative may include monitoring only and still be considered "no action." However, monitored natural attenuation is not a "no action" decision. See Appendix B for a detailed discussion of this distinction and for monitored natural attention documentation recommendations.

**Highlight 8-2: Examples of Situations Where No Action Decisions May Be Appropriate**

**Example 1:**
- Where the baseline risk assessment concludes that current or potential future site conditions pose no unacceptable risks to human health or to the environment (section 8.1.1).

**Example 2:**
- Where a release involves only a pure petroleum product that is exempt from the definitions of hazardous substances, pollutants, and contaminants under CERCLA §101 (section 8.1.2).

**Example 3:**
- Where a previous removal or remedial action eliminates existing and potential risks to human health and the environment so that no further action is necessary (section 8.1.3).

## 8.2 DOCUMENTING INTERIM ACTION DECISIONS

During scoping, or at other points in the RI/FS, the lead agency may determine that an interim remedial action is appropriate.[2] An interim action is limited in scope and only addresses areas/media that also will be addressed by a final site/operable unit ROD. Reasons for taking an interim action could include the need to:

- Take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed; or
- Institute temporary measures to stabilize the site or operable unit and/or prevent further migration of contaminants or further environmental degradation.

Interim actions either are implemented for separate operable units or may be a component of a final ROD for other portions of the site. In either case, an interim action must be followed by a final ROD, which must satisfy all of the following:

- Provide long-term protection of human health and the environment;
- Comply with ARARs;
- Fully address the principal threats posed by the site or operable unit; and
- Address the statutory preference for treatment that reduces the toxicity, mobility, or volume of wastes.

The basic format presented in this section will be the same for all interim actions. However, the detailed information required within each section of the ROD may vary, depending on whether the action addresses ground water or source materials.

### *8.2.1 Interim Actions Versus Early Actions*

Interim remedial actions should not be confused with "early remedial actions." "Early" in this case is simply a description of when the action is taken in the Superfund process.[3] Thus, an early action is one that is taken before the RI/FS for the site or operable unit has been completed. Hence, early actions may be either interim or final. An example of an early interim action would be to provide a temporary alternative water supply and seal wells that are pumping from a contaminated aquifer, whereas an early final action might involve the complete removal of drums and a limited amount of surrounding contaminated soil that, without early attention, could result in contamination to currently uncontaminated areas. More detailed examples of early interim and early final actions are described in Highlight 8-3.

When an interim action is taken early in the process to mitigate immediate threats, it is likely that no formal RI/FS Report will be available yet. Although preparation of an RI/FS Report is not required for an interim action, there must be documentation that supports the rationale for the action to fulfill the NCP's Administrative Record requirements. The ROD serves this pur-

[2] A removal action also may be appropriate to address immediate risks at an NPL site. See *Interim Guidance on Addressing Immediate Threats at NPL Sites* (OSWER 9200.2-03, January 1990).

[3] For more EPA guidance on early actions, see *Early Action and Long-Term Action Under the Superfund Accelerated Cleanup Model (SACM)* (OSWER 9203.1-05I, Vol. 1, No. 2, September 1992).

**Highlight 8-3: Examples of Possible Interim and Early Actions**

**Interim Actions**

- Installing and operating extraction wells in an aquifer to restrict migration of a contaminated ground-water plume with the intention of later installing additional wells (or taking other action) to address the contamination in a final action.
- Providing a temporary alternate source of drinking water with the intention of later, in a subsequent action, remediating the source of contamination and/or the aquifer.
- Constructing a temporary cap to control or reduce exposures until subsequent action is taken.
- Relocating contaminated material from one area of a site (*e.g.*, residential yards) to another area of the site for temporary storage until a decision on how best to manage site wastes is made.

**Early Actions**

- **Early interim action.** Any of the interim actions discussed above, if taken before the completion of the RI/FS for site or OU, would constitute an early action.
- **Early final action.** Before the RI/FS is completed, drums are removed from the site along with surrounding contaminated soil that, without early attention, could result in contamination of currently uncontaminated areas. [This action, although taken early, is final because the removed drums and soil were taken off-site for final disposal.]

pose. A summary of site data collected during field investigations should be sufficient to document a problem in need of response. In addition, a short analysis of remedial alternatives considered, those rejected, and the basis for the evaluation (as is done in a focused FS) should be summarized to support the selected action.

### *8.2.2 Interim Action Record of Decision Format*[4]

The interim action ROD should be tailored to the limited scope and purpose of the interim action. The format for an interim action ROD is outlined in Highlight 8-7.

## 8.3 DOCUMENTING CONTINGENCY REMEDY DECISIONS

The lead agency, in consultation with the support agency, may decide to incorporate a contingency remedy in the ROD. A contingency ROD may be appropriate when there is significant uncertainty about the ability of remedial options to achieve cleanup levels (*e.g.*, cleanup of an aquifer to MCLs or non-zero MCLGs). For example, a contingency ROD may be appropriate when the performance of a treatment technology (or a demonstrated technology being used on a waste for which performance data are not available) appears to be the most promising option, but additional testing will be needed during remedial design to verify the technology's performance capabilities; in this case, a more "proven approach" could be identified as a contingency remedy.[5] The ROD should specify under what circumstances the contingency remedy would be implemented. Be as specific as possible with the criteria that the lead agency will use to decide to implement the contingency option as opposed to the selected remedy (*e.g.*, failure to achieve desired performance levels). The process by which the contingency will be invoked should be discussed as well. Generally, an ESD will be required to invoke a contingency. However, if the con-

[4] In some cases, RODs will include both interim actions and a final action; such RODs should clearly specify which components of the action are interim and which are final. For any final action components, the ROD should include the information and documentation required for the "standard ROD" (see Chapter 6). For example, where a ROD includes a final source control measure and a temporary alternate water supply, the ROD must provide the documentation required in the "standard format" for the final source control action, as well as addressing in the streamlined manner above, the rationale and justification for the interim water supply action. In this example, it would be necessary to address the contaminated ground water in a final action ROD at a later time.

[5] The use of contingency remedies should be considered carefully. Treatability studies and/or field investigations necessary to evaluate a technology's applicability to the site should be completed during the RI/FS. More detailed testing necessary to establish design parameters and performance requirements may be performed during remedial design.

tingency remedy or the criteria for its selection are not well-documented in the ROD, a ROD amendment may be required to invoke this cleanup option at a later point in time.

The recommended format for contingency remedy RODs is outlined in Highlight 8-8.

## Highlight 8-4: Documenting a No Action Decision: Action Not Necessary for Protection

*Part 1: The Declaration*

- **Site Name and Location**
- **Statement of Basis and Purpose**
- ~~**Assessment of Site**~~
- **Description of Selected Remedy:** The lead agency should state that no CERCLA action is necessary for the site or operable unit, although it may authorize monitoring to verify that no unacceptable exposures to potential hazards posed by the site or operable unit occur in the future.
- **Statutory Determinations:** None of the CERCLA §121 statutory determinations are necessary in this section since no remedy is being selected. Instead, the lead agency should state briefly that no remedial action is necessary to ensure protection of human health and the environment.
- ~~**ROD Data Certification Checklist**~~
- **Authorizing Signatures**

*Part 2: Decision Summary*

- **Site Name, Location, and Description**
- **Site History and Enforcement Activities**
- **Community Participation**
- **Scope and Role of Operable Unit or Response Action**
- **Site Characteristics**
- **Current and Potential Future Site and Resource Uses:** This section establishes the foundation for the site risks section, which provides the primary basis for the no action decision. Current and potential future land and ground-water resource uses should be clearly explained and documented. Site use characteristics shape the formation of realistic exposure scenarios for the baseline risk assessment.
- **Site Risks:** This section provides the primary basis for the no action decision. The discussion should support the determination that no remedial action is necessary to ensure protection of human health and the environment. The lead agency should explain the basis for its conclusion that unacceptable exposures to hazardous substances will not occur. (In most cases, this will be based on the baseline risk assessment conducted during the RI.) This information should correlate with the Current and Potential Future Site Resource Uses. In limited cases where alternatives were developed in the FS, the lead agency should reference the RI/FS Report. Generally, an FS is not necessary for a no action decision.
- ~~**Remedial Action Objectives**~~ Development of this and the four subsequent sections is unnecessary when the baseline risk assessment shows no unacceptable risks at the site.
- ~~**Description of Alternatives**~~
- ~~**Comparative Analysis of Alternatives**~~
- ~~**Principal Threat Waste**~~
- ~~**Selected Remedy**~~
- ~~**Statutory Determinations**~~
- **Documentation of Significant Changes**

*Part 3: Responsiveness Summary*

- **Stakeholder Issues and Lead Agency Responses**
- **Technical and Legal Issues**

## Highlight 8-5: Documenting a No Action Decision: No CERCLA Authority to Take Action

*Part 1: The Declaration*

- **Site Name and Location**
- **Statement of Basis and Purpose**
- ~~**Assessment of the Site**~~
- **Description of Selected Remedy:** The lead agency should state that no CERCLA remedial action can be taken for the site or operable unit, although it may authorize monitoring to verify that no releases that can be addressed under CERCLA occur in the future.
- **Statutory Determinations:** No §121 statutory determinations are necessary in this section since no remedy is being selected. This section should explain that EPA does not have authority under CERCLA §§104 or 106 to address the problem(s) posed by the site or operable unit. Explain if the problem has been referred to other authorities.
- ~~**ROD Data Certification Checklist**~~
- **Authorizing Signatures**

*Part 2: Decision Summary*

- **Site Name, Location, and Description**
- **Site History and Enforcement Activities**
- **Community Participation**
- **Scope and Role of Operable Unit or Response Action**
- **Site Characteristics (if necessary)**
- **Current and Potential Future Site and Resource Uses (if necessary)**
- ~~**Site Risks**~~
- ~~**Remedial Action Objectives**~~
- ~~**Description of Alternatives**~~
- ~~**Comparative Analysis of Alternatives**~~
- ~~**Principal Threat Waste**~~
- ~~**Selected Remedy**~~
- **Statutory Authority Finding:** The concluding statement of the absence of CERCLA authority to address the problem should be the same as in the Declaration.
- **Documentation of Significant Changes**

*Part 3: Responsiveness Summary*

- **Stakeholder Issues and EPA Responses**
- **Technical and Legal Issues**

## Highlight 8-6: Documenting a No Action Decision: No Further Action Necessary

*Part 1: The Declaration*

- **Site Name and Location**
- **Statement of Basis and Purpose**
- ~~**Assessment of Site**~~
- **Description of Selected Remedy:** The lead agency should state that no CERCLA remedial action is necessary for the site or operable unit, although it may authorize monitoring to verify that no unacceptable exposures to risks posed by the site or operable unit occur in the future.
- ~~**ROD Data Certification Checklist**~~
- **Statutory Determinations:** This Declaration should state that it has been determined that no remedial action is necessary at the site or operable unit. The Declaration should explain that previous response(s) at the site or operable unit eliminated the need to conduct further remedial action. This section should also note whether a five-year review is required based on the earlier response action(s). "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action" (NCP §300.430(f)(4)(ii)).
- **Authorizing Signatures**

*Part 2: Decision Summary*

- **Site Name, Location, and Description**
- **Site History and Enforcement Activities:** Information related to site history provides perspective, especially where previous removal(s) have occurred. This information is useful if the No Action ROD is a closeout ROD.
- **Community Participation**
- **Scope and Role of Operable Unit or Response Action**
- **Site Characteristics**
- **Current and Potential Future Site and Resource Uses:** This section establishes the foundation for the site risks section, which provides the primary basis for the no action decision. Current and potential future land and ground-water resource uses should be clearly explained and documented. Site use characteristics shape the formation of realistic exposure scenarios for the baseline risk assessment.
- **Site Risks:** This section provides the primary basis for the no action decision. The discussion should support the determination that no remedial action is necessary to ensure protection of human health and the environment. The lead agency should explain the basis for its conclusion that unacceptable exposures to hazardous substances will not occur. (In most cases, this will be based on the baseline risk assessment conducted during the RI.) Any previous responses that were conducted at the site or operable unit that served to eliminate the need for additional remedial action should be summarized in this discussion. In limited cases where alternatives were developed in the FS, the lead agency should reference the RI/FS Report.
- ~~**Remedial Action Objectives**~~
- ~~**Description of Alternatives**~~
- ~~**Comparative Analysis of Alternatives**~~
- ~~**Principal Threat Waste**~~
- ~~**Selected Remedy**~~
- ~~**Statutory Determinations**~~
- **Documentation of Significant Changes**

*Part 3: Responsiveness Summary*

- **Stakeholder Issues and Lead Agency Responses**
- **Technical and Legal Issues**

## Highlight 8-7: Documenting an Interim Action Decision

*Part 1: The Declaration*

- **Site Name and Location**
- **Statement of Basis and Purpose**
- **Assessment of the Site**
- **Description of the Selected Remedy**
- **Statutory Determinations:** *The declaration statement should generally read as follows*: This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed; complies with (or waives) those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action; and is cost-effective. This action is an interim solution only, and is not intended to utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this [*site/operable unit*]. [*NOTE: Where treatment is utilized, replace the previous sentence with the following: "Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus supports that statutory mandate."*] Because this action does not constitute the final remedy for the [*site/operable unit*], the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element [*NOTE: Include if treatment is being used: "although partially addressed in this remedy,"*] will be addressed by the final response action. Subsequent actions planned to address fully the threats posed by conditions at this [*site/operable unit*]. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and remedy will be ongoing as EPA continues to develop remedial alternatives for the [*site/operable unit*].
- **ROD Data Certification Checklist**
- **Authorizing Signatures**

*Part 2: Decision Summary*

- **Site Name, Location, and Description**
- **Site History and Enforcement Activities**
- **Community Participation**
- **Scope and Role of Operable Unit:** This section provides the rationale for taking the limited action. To the extent that information is available, the section should detail how the response action fits into the overall site strategy. This section should state that the interim action will neither be inconsistent with, nor preclude, implementation of the final remedy.
- **Site Characteristics:** This section should focus on the description of those site or operable unit to be addressed by the interim remedy.
- **Current and Potential Future Site and Resource Uses**
- **Site Risks:** This section should focus risks addressed by the interim action and should provide the rationale for the limited scope of the action. The rationale can be supported by facts that indicate that temporary action is necessary to stabilize the site or a portion of the site, prevent further environmental degradation, or achieve significant risk reduction quickly while a final remedial solution is being developed. Qualitative risk information may be presented if quantitative risk information is not yet available. The more specific findings of the baseline risk assessment, and the ultimate clean-up objectives (*i.e.*, acceptable exposure levels) for the site or unit, should be included in the subsequent final action ROD for the operable unit.
- **Remedial Action Objectives**
- **Description of Alternatives:** This section should describe the limited alternatives (including the no action alternative) that were considered for the interim action (generally three or fewer). Only those requirements that are applicable or relevant and appropriate requirements (ARARs) to the limited-scope interim action should be incorporated into the description of alternatives.
- **Comparative Analysis of Alternatives:** The comparative analysis should be presented in light of the limited scope of the action. Evaluation criteria not relevant to evaluation of interim actions need not be addressed in detail. Rather, their irrelevance to the decision should be noted briefly.

## Highlight 8-7 (cont.): Documenting an Interim Action Decision

- **Principal Threat Waste**
- **Selected Remedy**
- **Statutory Determinations:** The interim action should protect human health and the environment from the exposure pathway or threat it is addressing and the waste material being managed at least in the short term (until a final ROD is implemented). The ARARs discussion should focus only on those ARARs specific to the interim action (*e.g.*, residuals management during implementation). An interim action waiver may be appropriate where a requirement that is an ARAR cannot be met as part of the interim remedy, but will be attained (unless use of one of the five waivers is justified) by the final site remedy (CERCLA §121(d)(4)(A) and NCP §300.430(f) (1)(ii)(C)(1)). The discussion under "utilization of permanent solutions and treatment to the maximum extent practicable" should indicate that the interim action is not designed or expected to be final, but that the selected remedy represents the best balance of trade-offs among alternatives with respect to pertinent criteria, given the limited scope of the action. The discussion under the preference for treatment section should note that the preference will be addressed in the final decision document for the site or final operable unit, although treatment components "that support the preference" should be noted.
- **Documentation of Significant Changes**

*Part 3: Responsiveness Summary*

- **Stakeholder Issues and Lead Agency Responses**
- **Technical and Legal Issues**

## Highlight 8-8: Documenting a Contingency Remedy Decision

*Part 1: The Declaration*

- **Site Name and Location**
- **Statement of Basis and Purpose**
- **Assessment of the Site**
- **Description of the Selected Remedy:** Both the selected remedy and the contingency remedy should be described in bullet form.
- **Statutory Determinations:** The Declaration should be modified to indicate that both the selected remedy and the contingency remedy will satisfy the statutory requirements.
- **ROD Data Certification Checklist**
- **Authorizing Signatures**

*Part 2: Decision Summary*

- **Site Name, Location, and Description**
- **Site History and Enforcement Activities**
- **Community Participation**
- **Scope and Role of Operable Unit or Response Action**
- **Site Characteristics**
- **Current and Potential Future Site and Resource Uses**
- **Site Risks**
- **Remedial Action Objectives:** This is a crucial section for RODs that contain selected remedies with contingency provisions. A very explicit statement of the RAOs should be included. Other remedy performance expectations and criteria should be included as well.
- **Description of Alternatives:** This section should identify any uncertainties about the use of the technologies being considered and the extent additional testing is needed. The selected remedy and the contingency remedy must be fully described.
- **Comparative Analysis of Alternatives:** The selected remedy, the contingency remedy, and other alternatives considered should be evaluated fully against the nine criteria; the uncertainties should be noted, as well as the expectations for performance. Community (and support agency) acceptance of an innovative technology should be discussed.
- **Principal Threat Waste**
- **Selected Remedy:** The selected and contingency remedies should be identified. Additional testing/investigations to occur as part of remedial design to further evaluate the selected remedy should be discussed. The criteria that will be used to decide to implement the contingency remedy and the vehicle for invoking the contingency (*i.e.*, ESD) should be identified.
- **Statutory Determinations:** The statutory determination discussion should document that both remedies fulfill CERCLA §121.
- **Documentation of Significant Changes**

*Part 3: Responsiveness Summary*

- **Stakeholder Issues and Lead Agency Responses**
- **Technical and Legal Issues**

# 9.0 DOCUMENTING SPECIFIC REMEDY SELECTION SITUATIONS

## 9.1 INTRODUCTION

The purpose of this chapter is to provide suggested language and recommendations for documenting the following remedy selection cases:

- Presumptive remedy decisions.
- Response actions for lead (Pb) in soil.
- Response actions for ground water.
- Response actions involving the use of a technical impracticability waiver.

For each of the special cases listed above, this chapter provides general background information; details the sections of the remedy selection decision documents which may require modification; describes the information that should be included in the sections identified; provides sample language; and identifies sources of additional information. This chapter does not repeat the information presented in Chapters 3 and 6. It details how the recommended outline and checklist presented in those chapters should be modified to address the situations named above.

## 9.2 DOCUMENTING PRESUMPTIVE REMEDY DECISIONS

EPA developed the presumptive remedy initiative to expedite remedy selection at sites with similar characteristics (*e.g.*, municipal landfills) or contaminants (*e.g.*, volatile organic compounds (VOCs)). The selection of presumptive remedies is based on historical patterns of remedy selection and current scientific and engineering information. To date, EPA has issued presumptive remedies for VOCs in soil, municipal landfills, and woodtreater sites. In addition, EPA issued a presumptive response strategy for contaminated ground water at CERCLA sites and will soon be finalizing a presumptive remedy for sites with metals in soils.

### *9.2.1 Modifications to Remedy Selection Decision Documents*

The presumptive remedy selection approach is consistent with the standard RI/FS and remedy selection process and requires the same basic remedy selection documentation requirements, with some modifications as described below. Certain sections of remedy selection decision documents should be modified to explain the context and rationale for a remedy selection decision based on a presumptive remedy. The recommended documentation approach is described below.

#### *Community Participation Section*

Additional community outreach will usually be appropriate when implementing a presumptive remedy approach to ensure that the community understands the rationale and basis of the streamlining of remedial alternatives analysis. Any additional community outreach efforts should be documented in this section.

#### *Scope and Role of Operable Unit or Response Action Section*

This section should describe the role of the presumptive remedy in the response action for this operable unit (*e.g.*, the soils are contaminated with VOCs or the site was formerly a wood treatment facility). A brief description of the lead agency's basis for the use of the presumptive remedy should be provided in this section (*i.e.*, the site matches the type of site for which the presumptive approach was designed to address). Information on why and how the presumptive remedy process streamlines the RI/FS process should be summarized as well. Highlight 9-1 provides sample language for this section.

#### *Site Characteristics Section*

If streamlining mechanisms associated with a presumptive remedy were used, describe how the site characterization was affected. For example, in the case of a municipal landfill, describe how the presumptive remedy of containment eliminated the need to characterize the contents of the landfill, and that site characterization focused on ground-water contamination.

**Highlight 9-1: Sample Language for Describing a Presumptive Remedy Approach**

Soil vapor extraction (SVE) is considered by EPA to be a highly effective way to cleanup volatile organic compounds (VOCs) in soils in many cases. SVE has been identified as a presumptive remedy by EPA for VOCs in soil because it repeatedly has been shown to be effective at treating similar wastes at other CERCLA sites. Presumptive remedies were developed by EPA to streamline the selection of cleanup methods for certain categories of sites by narrowing the consideration of cleanup methods to treatment technologies or remediation approaches that have a proven track record in the Superfund program. EPA has determined that it is appropriate to apply the presumptive remedy for VOCs in soil at this Operable Unit based on the soil and contaminant characteristics found at the site and guidance provided in the directive, *Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils* (EPA 540-F-93-048). Further information on the selection of presumptive remedies for VOC soil contamination is presented in *User's Guide to the VOCs in Soils Presumptive Remedy* (EPA 540-F-96-008).

### *Site Risks Section*

A streamlined site risk analysis is possible for some categories of presumptive remedy sites. For example, in the case of municipal landfills, the risk evaluation may be streamlined if ground-water contamination at the site is sufficient to provide the basis for remedial action. If a streamlined risk evaluation is performed, a brief description of the process should be provided in this section. This description should identify the exposure pathways evaluated and their associated risk. An explanation should be provided for pathways not quantitatively evaluated (*e.g.*, a direct contact threat was not evaluated due to the nature of the cap that is being constructed at the site).

### *Description of Alternatives Section*

In addition to the descriptions of alternatives that are generally found in this section, a brief explanation of how the alternatives were selected within the context of the presumptive remedy should be provided. This is particularly important for the presumptive remedies that identify a "suite" of acceptable remediation technologies or approaches with a preferred technology identified (*i.e.*, VOCs in soil, woodtreater sites, and metals in soils). If the preferred technology is judged appropriate based on the circumstances of the specific site in question, an explanation that the preferred technology and the no action alternatives were the only alternatives considered should be provided. If the preferred technology was eliminated from consideration during the RI/FS, an explanation of the factors influencing that decision should be provided, along with any site-specific factors affecting consideration of the remaining presumptive remedies for that category. In some cases, it also may be appropriate to attach a technical appendix that provides more information about the presumptive remedy selected.

## 9.2.2 Special Considerations for the Administrative Record File

In order to meet NCP requirements, it is recommended that the Administrative Record file for a presumptive remedy site generally include the following: (1) relevant OSWER generic presumptive remedy documents (listed below); (2) a "bridging" memorandum or other documentation which shows that the presumptive remedy is appropriate to apply to the site in question; and (3) a notice in the Administrative Record file and in the Administrative Record file index regarding the availability of the data upon which the presumptive remedy is based. For additional information about Administrative Record file requirements specific to the presumptive remedy process, see *Presumptive Remedies and NCP Compliance*, a memorandum from James E. Costello, Chairperson CERCLA Administrative Records Workgroup, ORC Region VI, and George B. Wyeth, Office of General Counsel, dated June 14, 1995 contained in *Implementing Presumptive Remedies: A Notebook of Guidance and Resource Materials* (EPA 540-R-97-029, October 1997).

## 9.2.3 Additional Guidance

The following presumptive remedy directives have been issued to date, and are available through the Superfund homepage, http://www.epa.gov/superfund/oerr/techres/index.htm. All of these documents are also contained in *Implementing Presumptive Rem-*

*edies: A Notebook of Guidance and Resource Materials* (EPA 540-R-97-029, October 1997).

- *Presumptive Remedies: Policy and Procedures* (EPA 540-F-93-047, September 1993).
- *Presumptive Remedies and NCP Compliance* (Memorandum from James E. Costello, Chairperson CERCLA Administrative Records Workgroup, ORC Region VI, and George B. Wyeth, Office of General Counsel, dated June 14, 1995).
- *Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils* (EPA 540-F-93-048, September 1993).
- *Presumptive Remedy for CERCLA Municipal Landfill Sites* (EPA 540-F-93-035, September 1993).
- *Presumptive Remedies for Soils, Sediments, and Sludges at Wood Treater Sites* (EPA 540-R-95-128, December 1995).
- *Presumptive Response Strategy and Ex-situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites* (EPA 540-R-96-023, October 1996).
- *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills* (EPA 540-F-96-020, December 1996).
- *User's Guide to the VOCs in Soils Presumptive Remedy* (EPA 540-F-96-008, July 1996).
- *Presumptive Remedy: Supplemental Bulletin Multi-Phase Extraction (MPE) Technology for VOCs in Soil and Ground Water* (EPA 540-F-97-004, April 1997).
- *Presumptive Remedy for Sites with Metals in Soils* (Forthcoming).

## 9.3 DOCUMENTING RESPONSE ACTIONS THAT ADDRESS LEAD (Pb) IN SOIL

Sites with lead (Pb) contamination require special documentation because a unique risk assessment methodology is employed to evaluate potential threats to human health at such sites. As a result, the *Summary of Site Risks*, *Selected Remedy*, and *Remedial Action Objectives* sections should address the issues that are unique to sites contaminated with Pb.

### 9.3.1 Modifications to Remedy Selection Decision Documents

#### *Site Risks Section and Selected Remedy Section (Expected Outcomes)*

The *Summary of Site Risks* and *Selected Remedy* sections should document the use of Pb models and the site-specific assumptions that were made to determine remediation goals (*e.g.*, cleanup levels) for Pb in soil. Any studies of blood lead levels (PbBs) performed by the Agency for Toxic Substances and Disease Registry (ATSDR), as well as any additional EPA technical reviews should also be summarized. The information in the following discussion is intended to complement the suggested content for these sections, as described in Sections 6.3.7 and 6.3.12.

Important issues to document in these sections will depend on which methodology was used to assess Pb risks at the site. Three scenarios are described below:

*Scenario 1: IEUBK Model for Children*[1] *Used to Determine Cleanup Levels for Lead in Soil*

If the IEUBK Model was used, the *Summary of Site Risks* section should explain the following information:

[1] The Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead (Pb) in Children predicts PbB levels for children (age six months to seven years) exposed to Pb in their environment. The IEUBK model takes into account site-specific concentrations of Pb in various media in evaluating children's exposure to Pb contamination. Common site-specific inputs include Pb concentrations in soil, dust, air, water, and paint. In the absence of site-specific data, the model utilizes default values stored in the model. These values represent typical background concentrations in the United States. The IEUBK model employs the user-specified and default Pb values in a series of complex equations to estimate the potential concentration of Pb in the blood of a hypothetical child or population of children.

- Range of Pb concentrations detected for medium-specific inputs (*e.g.*, concentrations in soil, air, and water).

- Exposure pathway (*e.g.*, ingestion of soil, paint) associated with the exceedance of acceptable blood lead concentration.

- Summary of site-specific studies conducted (*e.g.*, PbB, relative bioavailability (RBA)).

- Output of the model (*e.g.*, percentage of children with PbBs in excess of 10 micrograms per deciliter (μg/dL)).

- References to the portions of the RI/FS or risk assessment that detail use of the model.

The *Selected Remedy* section should contain a complete discussion of expected outcomes, including a discussion of the selected cleanup levels for the remedial action. In the Proposed Plan, this discussion should contain preliminary remediation goals (PRGs) for site soils and other media that address Pb risk. In the ROD, this discussion should contain the final cleanup levels and the rationale for any modifications from the PRGs.

The following source provides additional information on the IEUBK model: *Guidance Manual for the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children* (EPA 540-R-93-089, February 1994).

*Scenario 2: Interim Adult Methodology[2] Used to Determine Cleanup Levels for Lead in Soil*

If the Interim Adult methodology was used, the *Summary of Site Risks* section should explain the following information:

- Range of Pb concentrations detected for medium-specific inputs (*e.g*, Pb concentrations in soil, air, and water).

- Exposure scenario (*e.g.*, commercial or industrial).

- References to the portions of the RI/FS or risk assessment that detail use of the methodology.

The *Selected Remedy* section should contain a complete discussion of expected outcomes, including a discussion of the selected cleanup levels for the remedial action. In the Proposed Plan, this discussion should contain preliminary remediation goals (PRGs) for site soils and other media that address Pb risk. In the ROD, this discussion should contain the final cleanup levels and the rationale for any modifications from the PRGs.

*Scenario 3: Neither of the above methodologies used to develop soil cleanup levels*

If neither of the above methods was used, the *Selected Remedy* section should explain the following:

- The basis and rationale for the final cleanup levels for lead in soils.

- Why neither of the above tools was used to determine these levels.

Highlight 9-2 provides sample language for these discussions.

### *Remedial Action Objectives Section*

The *Remedial Action Objectives* section should also address the unique circumstances posed by a site contaminated with Pb. The *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA 540-F-94-043, July 1994) provides the following guidance for how the remedial action objectives should be described for site contaminated with Pb: "EPA will generally take a response action if circumstances indicate that there is a greater than 5% probability that the blood lead levels of a child (age 6 to 84 months) may exceed 10 micrograms per deciliter. In accordance with this policy, one of the remedial action objectives at this site is that there will be no more than a 5% chance of a child's blood lead value exceeding 10 micrograms per deciliter."

[2] The Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil guidance utilizes a methodology for assessing risks associated with non-residential adult exposures to Pb in soil. This approach primarily focuses on estimating fetal PbB concentrations in pregnant women exposed to Pb-contaminated soils. This approach also provides tools that can be used to evaluate the risk of elevated PbB concentrations among exposed adults.

**Highlight 9-2: Sample Language for Evaluation of Human Health Risks at Sites with Lead (Pb) Contamination**

The Integrated Exposure Uptake Biokinetic (IEUBK) model for lead (Pb) in children was used to evaluate the risks posed to young children as a result of the lead (Pb) contamination at this site. Because Pb does not have a nationally approved reference dose (RfD), slope factor, or other accepted toxicological factor which can be used to assess risk, standard risk assessment methods cannot be used to evaluate the health risks associated with Pb contamination. The IEUBK model was run using site-specific data to predict a Pb soil level that will be protective of children and other residents. Site-specific soil and ground-water Pb concentrations, as detailed in the summary tables for the Chemicals of Concern (COCs) in this ROD, were used in place of model default values. The IEUBK Model predicted that exposure to site soils would result in children's blood lead (PbB) levels that range from 7.8 to 12.5 µg/dL. Assuming a geometric standard deviation of 1.6, this range of values results in a distribution of PbB levels where approximately 15% of children aged 6 months to 7 years have blood lead (PbB) levels in excess of the level of concern recommended by the Centers for Disease Control and Prevention (10 µg/dL). A PbB study was not conducted at this site because the site is primarily industrial and has localized Pb contamination that has not impacted nearby residential areas. In addition, residents were not supportive of a community PbB study. To protect future residents in the local area, the IEUBK model was used to calculate a preliminary remediation goal (PRG) for Pb in soil of 540 ppm.

### 9.3.2 Additional Guidance

EPA's Technical Review Workgroup for Lead Home Page provides information regarding lead risk assessment and the use of the IEUBK model and Interim Adult methodology (http://www.epa.gov/superfund/programs/lead/index.htm), including the following documents:

- *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA 540-F-94-043, July 1994).
- *Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA 540-F-98-030, August 27, 1998).
- *Guidance Manual for the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children* (OSWER Directive 9285.7-15-1, February 1994).
- Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil, December 1996.

## 9.4 DOCUMENTING GROUND-WATER REMEDY DECISIONS

This section presents the suggested documentation approach when selected remedies address contaminated ground water. Ground-water remedy decisions often involve complex site conditions or remedy components that require additional explanation. Appendix B contains sample language for documenting specific ground-water remediation scenarios (*e.g.*, phased approach, NAPLs, monitored natural attenuation), and should be used in conjunction with this chapter when writing a remedy selection decision document.

### 9.4.1 Modifications to the Remedy Selection Decision Documents

#### *Site Characteristics Section*

In documenting ground-water remedy decisions it is important that the *Site Characteristics* section reflect specific information unique to a ground-water site. In particular, this section should include the following information:

- Nature and extent of ground-water contamination including source(s) of contamination, COCs, estimated extent and volume of contaminated plume and the potential for migration of the contaminant plume.
- Geology and hydrogeology of the site and surroundings (in addition to the topography and geography), including the following:

- Aquifer(s) affected or threatened by site contamination, types of geologic materials, approximate depths, whether aquifer is confined or unconfined.

- Ground-water flow directions within each aquifer and between aquifers and ground-water discharge locations (*e.g.*, surface waters, wetlands, other aquifers).

- Interconnection between surface contamination (*e.g.*, soils) and ground-water contamination.

- Confirmed or suspected presence and location of NAPLs.

- If ground-water models were used to define the fate and transport of COCs, identify the model used and major model assumptions.

### *Current and Potential Future Site and Resource Uses Section*

This section of the ROD (and the relevant discussion in the Proposed Plan) should explain the current ground-water uses and document the basis for future ground-water use assumptions. If the State has a Comprehensive State Ground Water Protection Plan (CSGWPP), its impact on future use assumptions also needs to be addressed (see *The Role of CSGWPPs in EPA Remediation Programs* (EPA 540-F-95-084, April 4, 1997)). If a potential future use of the ground water is as a drinking water source, the approximate time frame of this potential future use should be estimated and reported in this section as it may have an impact on the remediation time frames evaluated in subsequent sections (*e.g.*, use as a drinking water source not anticipated within the next 20 years).

### *Remedial Action Objectives Section*

When addressing ground-water contamination, the *Remedial Action Objectives* section of the Proposed Plan and ROD needs to clearly present the intended results of the remedial action. A range of Remedial Action Objectives (RAOs) may be applicable to ground-water remedy decisions. Some of these objectives may be achievable in a relatively short time frame (*e.g.*, exposure control, plume containment), while other objectives may require a much longer time frame (*e.g.*, plume restoration). For this reason, ground-water decision documents must present clear and precise documentation of the RAOs. The information presented in this section should be of sufficient detail to allow for a comprehensive analysis of remedial alternatives.

Ground-water remedies should be expressed in terms of the following overall objectives, clearly indicating which objectives are to be achieved over which portion of the plume, whether they are interim or final, and in what time frames these objectives are expected to be achieved:

1. Prevent exposure to contaminated ground water, above acceptable risk levels.

2. Prevent or minimize further migration of the contaminant plume (source control).

3. Prevent or minimize further migration of contaminants from source materials to ground water (source control).

4. Return ground water to its expected beneficial uses wherever practicable (aquifer restoration).

### *Description of Alternatives Section*

This section should highlight the following information for ground-water response decisions:

- *Ground-Water Extraction and Treatment Components*. Describe the following as appropriate:

  - Ground-water extraction method.

  - Location for discharging treated ground water.

  - Technologies for treating extracted ground water. Discuss whether presumptive treatment technologies or innovative technologies are being used for this purpose.

  - Additional treatment and/or management for treatment residuals.

  - Other methods/technologies that will be used for aquifer remediation (*e.g.*, air

sparging, in-situ bioremediation, monitored natural attenuation) and indicate whether any are innovative technologies.

- *Ground-water or Source Containment (e.g., NAPL) Components*. Describe the following as appropriate:
  - Containment method (*e.g.*, subsurface barriers, hydraulic control).
  - Area of source material or ground-water plume to be contained (both areal extent and vertical extent).
  - Basis for establishing containment area (*e.g.*, known or suspected extent of NAPLs, extent of plume above MCLs).
  - Geologic stratum that will serve as a bottom for the containment system. If none, explain how containment system will be effective.
- *Ground-Water Components that Incorporate Monitored Natural Attenuation*. Describe the following as appropriate:
  - Portions of the plume that will be addressed using a monitored natural attenuation approach.
  - Explain why monitored natural attenuation is expected to attain cleanup levels (or other remedial action objectives) in a time frame that is reasonable when compared to the cleanup time frames of the other alternatives and when compared to the time frame of the anticipated resource use.
  - Institutional controls that will restrict the use of ground water until cleanup levels are attained.

### *Selected Remedy Section*

This section should expand on the level of detail provided in the previous discussion, especially with regard to the following:

- Presentation of a detailed (*e.g.*, 1-2 page) cost estimate for the selected remedy.
- Phased implementation stages of the remedy that will be used to optimize the remedy for site conditions and increase cost-effectiveness.
- Remedy refinements that may be needed during the life of the remedy (*e.g.*, adjusting the number of extraction wells, adjusting the pumping rate, pulsed pumping of some wells).
- If applicable, the contingency actions that will be implemented in the event that remedy does not perform as expected (especially important for remedies such as natural attenuation).
- Brief discussion of the monitoring program necessary to ensure remedy effectiveness as well as the entity responsible for maintaining the monitoring program (especially important for remedies with long durations such as natural attenuation).
- Provisions for ground-water monitoring once the system is shut off to ensure cleanup levels are maintained.
- Identification and description of institutional controls to be implemented.

## 9.4.2 Additional Guidance

Additional guidance can be found in Appendix B of this document and in the following:

- *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites* (EPA 540-R-96-023, October 1996).
- *Considerations in Ground-Water Remediation of Superfund Sites and RCRA Facilities* (OSWER 9283.1-06, May 1992).
- *Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration* (EPA 540-R-93-080, October 1993).

## 9.5 DOCUMENTING TECHNICAL IMPRACTICABILITY (TI) WAIVERS

Since Technical Impracticability (TI) waivers are only used when site-specific cleanups cannot meet regulatory requirements, their use requires special documentation in Proposed Plans, RODs, ROD Amendments, and ESDs. This section describes how a technical impracticability (TI) waiver of an Applicable or Relevant and Appropriate Requirement (ARAR) should be documented in these decision documents.

Technical impracticability is the basis for one of the six statutory and regulatory ARAR waivers provided for in CERCLA §121(d)(4)(C) and NCP §300.430(f)(1)(ii)(C)(3). A technical impracticability waiver may be used when compliance with an ARAR is technically impracticable; that is, compliance is not feasible from an engineering standpoint or because of excessive costs, particularly in relation to performance.[3] TI waivers most often are used for ARARs that are used to establish cleanup performance standards or levels such as Maximum Achievable Control Technology (MACT) under the Clean Air Act or Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act, or State requirements that are more stringent than MCLs.

A decision to propose or invoke a TI waiver can be made at any time during the remedial process, but must be included in a remedy selection decision document. Information supporting the TI decision can be included in the RI/FS, a separate TI evaluation report, or in a separate section or technical appendix of the decision document itself. When a TI waiver is invoked, an alternative remediation strategy must be developed that ensures protection of human health and the environment. Both the TI waiver decision and the alternative remedial strategy must be documented in an appropriate decision document. A TI waiver decision can be made prior to implementation of the ground-water remedy, if sufficient information is available to support such a decision; or after implementation of the ground-water remedy when remedy performance data demonstrate that a TI waiver is justified.

[3] Cost is relevant to the technical impracticability waiver because engineering feasibility is ultimately limited by cost. EPA's policy is that cost can be considered in evaluating technical impracticability, although it "should generally play a subordinate role" and should not be a major factor unless compliance would be "inordinately costly" (55 *FR* at 8748, March 8, 1990).

Remedial Project Managers should contact the appropriate Regional Coordinator at EPA Headquarters to determine the review procedure for invoking a technical impracticability waiver. As summarized below, certain issues should be addressed in a Proposed Plan, ROD, ROD Amendment, or ESD when a TI waiver is invoked. More specific documentation recommendations are provided in Highlight 9-4.

### 9.5.1 Discussion of a TI Waiver in a Proposed Plan

If sufficient site characterization and other supporting information is available as a result of the RI/FS, a decision to invoke a TI waiver can be made in a subsequent decision document. In such a case, the Proposed Plan should explain that the lead Agency plans to invoke a TI waiver in the subsequent ROD or ROD amendment and describe the site conditions that make compliance with the ARAR technically impracticable. The Proposed Plan provides the foundation for invoking the TI waiver in the ROD. CERCLA and the NCP specify that the Proposed Plan must provide an explanation of any proposed ARAR waiver to allow the public an opportunity to comment on the waiver (NCP §300.430(f)(2)(iv)). EPA must respond to any significant Federal agency, State or public comments concerning the use of ARAR waivers. (Requirements for State and community involvement are provided in NCP §§300.430 and 300.500 - 300.515.) More detailed explanation supporting the TI waiver determination should be included in the subsequent ROD or ROD amendment.

### 9.5.2 Discussion of a TI Waiver in a ROD or ROD Amendment

A Technical Impracticability Waiver should be presented in a ROD only if it has been preceded by a public announcement of the waiver in a Proposed Plan. In the case of a ROD amendment, public comment on the appropriateness of a TI waiver should also be solicited. The most important sections of the ROD for documenting a TI waiver are as follows:

- Site Characterization.
- Remedial Action Objectives.
- Selected Remedy.
- Statutory Determinations.

A decision to modify the remedy selected in a previously signed ROD by invoking a TI waiver may constitute a fundamental change, and thus warrant a ROD amendment and requisite public comment procedures. When a fundamental change is proposed for a ROD, the lead agency must adhere to the public participation and documentation procedures specified in the NCP which include issuance of a proposed amendment to the ROD for public comment (NCP §300.435(c)(2)(ii)).

A ROD or ROD Amendment supporting a TI waiver should document the following:

- Site conditions that justify the TI waiver. This will generally be a summary of information contained in the TI evaluation report, or similar technical document.
- Explanation of how the TI waiver is reflected in the Remedial Action Objectives and how it modifies the objectives.
- How human health and the environment will be protected by an alternate remedial strategy.
- Specific changes in the remedy that will result from the TI waiver.
- Specific ARARs that are waived due to TI and whether the requirements are applicable or relevant and appropriate.

### 9.5.3 Discussion of a TI Waiver in an Explanation of Significant Differences

In some instances an ESD may be used to invoke a TI waiver. For instance, an ESD can be used in cases where the revised remedy is generally consistent with the contingency remedy discussed in the original ROD and that ROD satisfied the following conditions:

1. Contained detailed discussions of the potential need for a future TI waiver;
2. Identified a contingency remedy (*e.g.*, alternate remedial strategy) to be used in the event a TI waiver was determined to be appropriate for the site (such an alternate remedial strategy must have been discussed in the nine criteria analysis in the original ROD); and
3. Specific conditions were identified that would be used as the basis for implementing the contingency remedy (*i.e.*, triggers).

If an ESD is determined to be sufficient, public notice and opportunity for comment should also be provided (although not required by the NCP, public comment is highly recommended when invoking a TI waiver). For more information on an ESD or ROD Amendment, see Chapter 7 of this document.

### 9.5.4 Additional Guidance

Highlight 9-3 provides tips for documenting the use of TI waivers. The following documents provide more detailed guidance for evaluation of Technical Impracticability and use of Technical Impracticability waivers:

- *Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration* (EPA 540-R-93-080, October 1993).
- *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, Final Guidance* (EPA 540-R-96-023, October 1996).

**Highlight 9-3: Tips for Documenting Use of a Technical Impracticability Waiver**

- Often a decision to modify the remedy selected in a previous ROD by invoking a TI waiver will constitute a fundamental change in the remedy and will require a ROD amendment.
- The most important parts of the ROD for documenting a TI waiver are the site characterization, remediation objectives, selected remedy description, and statutory determinations sections.
- Where the TI waiver applies to several alternatives, and the waived ARAR(s) and justification are identical, this information can be described once and referenced in the text for other alternatives.
- The ROD should state which ARAR(s) are being waived and whether the requirement is applicable, or relevant and appropriate.
- The decision to invoke a TI waiver can occur at any time during implementation of a remedial action, regardless of whether the decision document contains contingency language.

## Highlight 9-4: Technical Impracticability Waiver Information for Proposed Plans and RODs

This table shows the additional information that should be included in a Proposed Plan or ROD when a TI waiver is proposed or invoked.

| Section | Proposed Plan | ROD |
|---|---|---|
| | **DECLARATION** | |
| **Description of Selected Remedy** | Not Applicable | ◻ Identify the TI waiver as a component of the remedy and provide a brief justification for the waiver. |
| **Statutory Determinations** | Not Applicable | ◻ Use the following standard language: *"The Selected Remedy is protective of human health and the environment, complies with or meets the requirements for a waiver of Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable."* |
| | **DECISION SUMMARY** | |
| **Site Background (Proposed Plan)/ Site Characteristics (ROD)**<br><br>*Site Characteristics is presented as a separate section in the ROD, however it is included as a component of the Site Background in the Proposed Plan.* | Describe site characteristics that show there are constraints on attaining ARAR(s). (The TI waiver does not need to be mentioned in this section; however, the foundation for proposing the waiver later in the decision document should be provided.)<br><br>Site characteristics include the following:<br><br>◻ The nature and extent of contamination.<br><br>◻ Key site conditions shown in the Site Conceptual Model that limit restoration of media and attainment of ARAR (*e.g.*, geologic or hydraulic conditions, contaminant fate and transport, contaminant sources).<br><br>◻ Briefly describe remedy performance data if appropriate, under the Site Background section in the Proposed Plan, (*e.g.*, studies show no technology is effective in removing contaminant X from the media under certain conditions found at the site). | Describe site characteristics that show there are constraints on attaining ARAR(s). (The TI waiver does not need to be mentioned in this section, however, the foundation for proposing the waiver later in the decision document should be provided.)<br>Site characteristics include the following:<br><br>◻ The nature and extent of contamination.<br><br>◻ Key site conditions shown in the Site Conceptual Model that limit restoration of media and attainment of ARAR (*e.g.*, geologic or hydraulic conditions, contaminant fate and transport, contaminant sources). The ROD should provide more information on this topic than the Proposed Plan, such as specific site characterization studies and diagrams showing the extent of contamination.<br><br>◻ Describe remedy performance data pertinent to invoking the TI waiver, if available. This information could be included at the conclusion of the Site Characteristics section. |
| **Remedial Action Objectives** | ◻ Describe how the Remedial Action Objectives, such as those related to attaining ARARs and cleanup levels for the site, were modified by the TI waiver (*e.g.*, the TI waiver may have been factored into the cleanup goals by assuming ARARs would not be met in part of the ground-water plume). | ◻ Describe how the Remedial Action Objectives, such as those related to attaining ARARs and cleanup levels for the site, were modified by the TI waiver (*e.g.*, the TI waiver may have been factored into the cleanup levels by assuming ARARs would not be met in part of the ground-water plume). |
| **Summary of Alternatives (Proposed Plan)/ Description of Alternatives (ROD)** | ◻ For each alternative where a TI waiver is proposed or invoked, identify the ARAR(s) being waived. | ◻ For each alternative where a TI waiver is proposed or invoked, generally describe the ARAR(s) being waived (*e.g.*, Federal and State drinking water standards). |

| Section | Proposed Plan | ROD |
|---|---|---|
| **Evaluation of Alternatives (Proposed Plan)/ Comparative Analysis of Alternatives (ROD)** | Threshold criteria:<br>□ Overall protection of human health and the environment.<br>- Briefly address how alternatives with a TI ARAR waiver component will be protective (this criterion draws on ARARs, among other factors, to assess protectiveness).<br>□ Compliance with ARARs (or justify a waiver).<br>- Identify the specific ARARs under each alternative for which a waiver is proposed or invoked.<br>- Provide a brief justification for the TI waiver, and explain that more detailed justification is provided in the preferred alternative section of the Proposed Plan.<br>Balancing criteria:<br>□ Describe, where appropriate, how the TI waiver will impact the performance of each balancing criterion (*e.g.*, will there be less reduction in toxicity, mobility or volume because of the waiver?)<br>Modifying Criteria:<br>□ Describe both the State and the community positions on the TI waiver. (The State's position is especially important when State ARARs are waived. This information may not be available for Proposed Plans.) | Threshold criteria:<br>□ Overall protection of human health and the environment.<br>- Briefly address how alternatives with a TI ARAR waiver component will be protective (this criterion draws on ARARs, among other factors, to assess protectiveness).<br>□ Compliance with ARARs (or justify a waiver).<br>- Identify the specific ARARs under each alternative for which a waiver is proposed or invoked.<br>- Provide a brief justification for the TI waiver, and explain that more detailed justification is provided in the *Selected Remedy* section of the ROD.<br>Balancing criteria:<br>□ Describe, where appropriate, how the TI waiver will impact the performance of each balancing criterion (*e.g.*, will there be less reduction in toxicity, mobility or volume because of the waiver?)<br>Modifying Criteria:<br>□ Describe both the State and the community positions on the TI waiver. (The State's position is especially important when State ARARs are waived.) |
| **Preferred Alternative (Proposed Plan)/ Selected Remedy (ROD)** | □ State that a TI ARAR waiver is a component of the remedy but that other components of the remedy will provide protection from site contamination (*i.e.*, the alternative remedial strategy).<br>□ In the expected outcomes section, explain the impact the TI waiver will have on land and water uses and on risk reduction. | Describe the TI waiver in a separate sub-section under the Selected Remedy description. Include the following information:<br>□ Generally describe the ARARs for which a TI waiver will be invoked.<br>□ Summary of the most important data, analysis, studies, and remedy performance information that provide the foundation for the waiver (reference Technical Impracticability Evaluation or other relevant documents in the Administrative Record file as a source of additional information).<br>□ Describe components of the remedy that constitute the alternate remedial strategy. Even though some ARARs are waived, the remedy must protect human health and the environment. For example, the alternative strategy should prevent further contamination migration and prevent exposure to the contaminated ground water. Describe remedy components used to achieve these objectives.<br>□ In the expected outcomes section, explain the impact the TI Waiver will have on land and water uses and on risk reduction. |

| Section | Proposed Plan | ROD |
|---|---|---|
| **Statutory Determinations** | Not Applicable | A remedy is required to comply with ARARs, and if it does not, a waiver must be justified:<br>□ Cite each ARAR for which a TI waiver will be invoked. Identify whether it is an applicable requirement or a requirement that is relevant and appropriate.<br>□ Reference the statutory and regulatory authority for a TI waiver (CERCLA §121 (d)(4)(C) and NCP §300.430(f)(1)(ii)(C)(3)).<br>□ Summarize the principal reasons that justify the waiver (be specific).<br>□ Cite ARARs that are expected to be attained by the remedy<br>A remedy must satisfy the preference for treatment, and if it does not, justification for not meeting this preference must be provided:<br>□ Describe any impact the TI waiver will have on complying with the statutory requirement to reduce toxicity, mobility or volume through treatment. |

# APPENDIX A

# SAMPLE PROPOSED PLAN

**Superfund Program**
**Proposed Plan**

**Region 4**

**EIO Industrial Site**

## EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternative for cleaning up the contaminated soil and ground water at the EIO Industrial Site and provides the rationale for this preference. In addition, this Plan includes summaries of other cleanup alternatives evaluated for use at this site. This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency for site activities, and the Tennessee Department of Environment and Conservation (TDEC), the support agency. EPA, in consultation with the TDEC, will select a final remedy for the site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with the TDEC, may modify the Preferred Alternative or select another response action presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the RI/FS report and other documents contained in the Administrative Record file for this site. EPA and the State

Dates to remember:
**MARK YOUR CALENDAR**

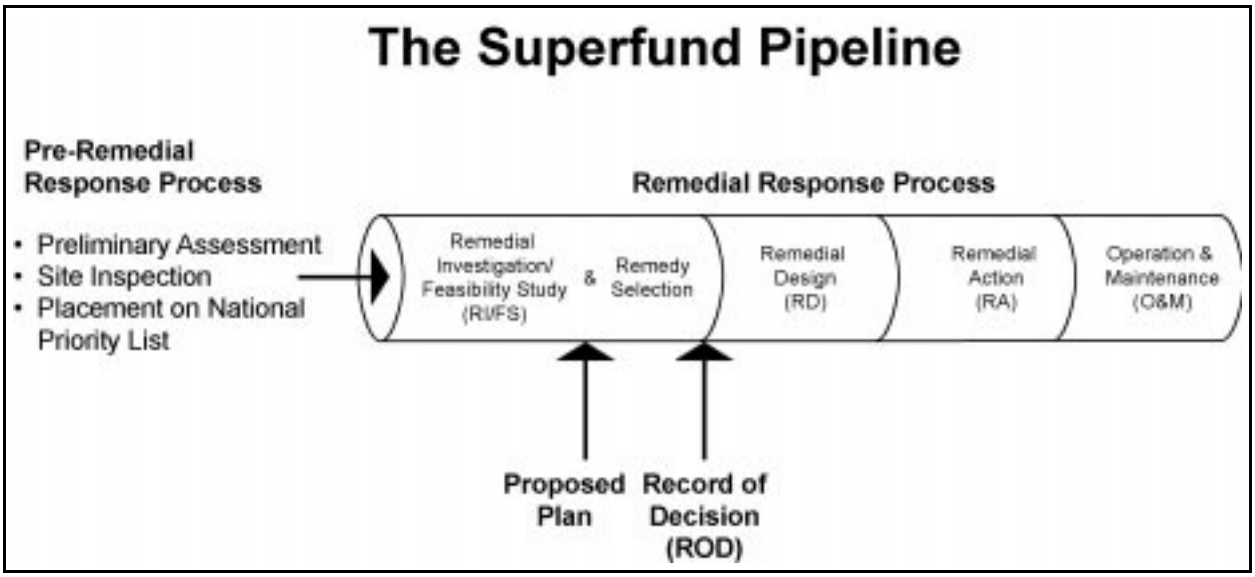
**PUBLIC COMMENT PERIOD:**
**March 1 - March 30, 1999**
U.S. EPA will accept written comments on the Proposed Plan during the public comment period.

**PUBLIC MEETING:**
**March 13, 1999**
U.S. EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at Nameless Community Hall, 237 Appleton Street, Nameless, TN at 7:30 p.m.

**For more information, see the Administrative Record at the following locations:**

Public Library
619 South 20th Street
Nameless, TN 00000
(101) 999-1099
Hours: Mon-Sat,
9 a.m. to 9 p.m.

U.S. EPA Records Center
Region 4
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104
(555)-555-5555
Hours: Mon-Fri,
8:30 a.m. to 5:00 p.m.

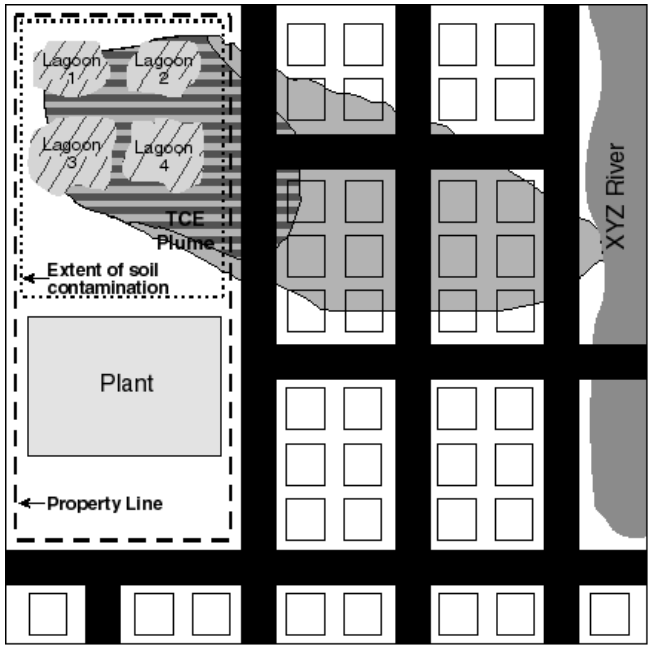


encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted at the site.

## SITE HISTORY

Beginning in the early 1980s, the EIO Industrial Company disposed of liquid industrial wastes at its plant located at 81 North Delaware Avenue in Nameless, Tennessee. The wastes were disposed of in four unlined lagoons on the ten-acre site until site operations ceased in 1990. As a result of disposal activities, contaminants seeped from the lagoons into site soil. Although the EIO Industrial Company emptied the lagoons in 1991, the soil remained contaminated. In addition, ground water is contaminated at and around the site. The ground water served as a drinking water source for area residents until EPA provided an alternate water supply in 1996.

The site was placed on the Superfund National Priorities List (NPL) in 1994. On January 11, 1995, a consent decree was lodged among EPA, TDEC, and the EIO Industrial Company outlining the terms by which the cleanup would be conducted. Under the terms of the consent decree, which was approved by an Administrative Judge following a public comment period, the EIO Industrial Company will implement, and incur all costs associated with, the agreed upon response action.




## SITE CHARACTERISTICS

In 1996 and 1997, the EIO Industrial Company conducted a Remedial Investigation/Feasibility Study (RI/FS) under EPA's oversight. The RI/FS identified the types, quantities, and locations of contaminants and developed ways to address the contamination problems. The RI indicated that:

- Within the former lagoon area, on-site surface and subsurface soils are contaminated with benzo(a)pyrene (B[a]P), 4,4'-DDT, and dieldrin. Contamination extends to a depth of three feet over a 225' x 300' area.
- A plume of ground water contaminated with trichloroethylene (TCE) extends from the site to the XYZ River, which is a half-mile away. The plume of

**WHAT ARE THE "CONTAMINANTS OF CONCERN"?**

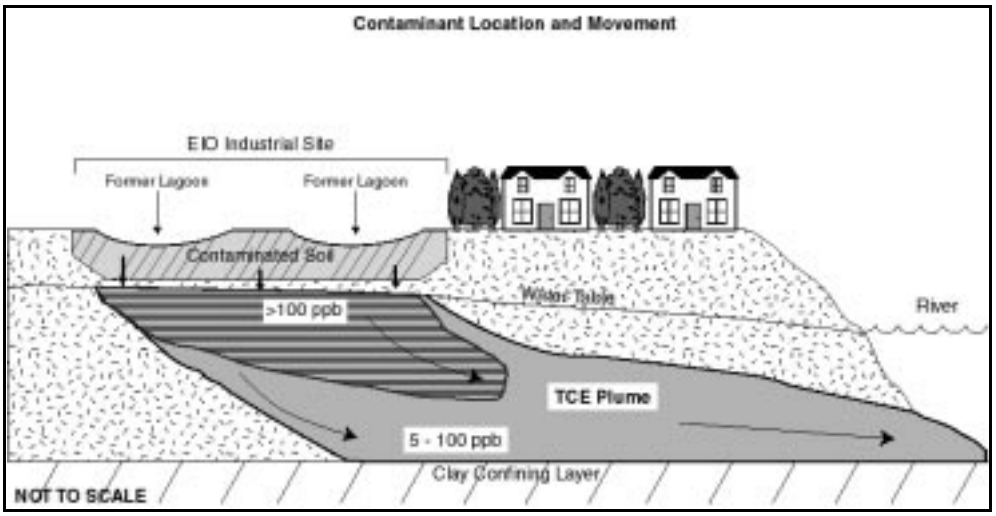
EPA and the TDEC have identified four contaminants that pose the greatest potential risk to human health at this site.

**Benzo(a)pyrene (B(a)P):** Benzo(a)pyrene, detected onsite at concentrations ranging from 100 to 430 ppm, is a polycyclic aromatic hydrocarbon (PAH) that is formed when gasoline, garbage, or any animal or plant material is burned. It is found in cigarette smoke, soot, creosote, and the coal tar pitch that industry uses to join electrical parts together. B(a)P is a probable human carcinogen. According to information provided by the Agency for Toxic Substances and Disease Registry (ATSDR), B(a)P has been found to cause cancer in laboratory animals when applied to their skin. It has also been shown to be harmful to mice fetuses, causing birth defects and lower-than-normal body weight in newborns. B(a)P is not very mobile and binds readily to soils.

**4,4'-DDT:** DDT, detected onsite at concentrations ranging from 20 to 350 ppm, is an organochlorine compound widely used after WWII as an agricultural pesticide and malaria control agent. The United States banned the use of DDT in 1972 because of its adverse environmental and health effects. DDT is a probable human carcinogen. Short-term exposure to DDT primarily affects the central nervous system; direct contact may cause rashes or irritation of the eyes, nose and throat. Long-term exposure at low doses causes some changes in the level of liver enzymes in humans. DDT can persist for a long time in the environment, bound to soils.

**Dieldrin:** Dieldrin, detected onsite at concentrations ranging from 15 to 60 ppm, is an organochlorine compound widely used from the 1950s to 1970s as an insecticide in agriculture, for subsurface termite treatment, and for control of disease vectors such as mosquitos. Most uses of dieldrin (termite control was an exception) were banned in 1974 because of its adverse environmental and health effects. In 1987 EPA banned all uses of dieldrin. Dieldrin is a probable human carcinogen. Short-term exposure to dieldrin can cause headaches, dizziness, loss of consciousness, nausea, and loss of appetite. Dieldrin can persist for a long time in the environment, bound to soils.

**Trichloroethylene (TCE):** TCE, detected in ground water at concentrations ranging from 0.055 to 12 ppm, is a halogenated organic compound historically used as a solvent and degreaser in many industries. Exposure to this compound has been associated with deleterious health effects in humans, including anemia, skin rashes, diabetes, liver conditions, and urinary tract disorders. Based on laboratory studies, TCE is considered a probable human carcinogen.




contaminants is confined to the surficial aquifer, and has not penetrated a clay confining layer that occurs approximately 45' below ground surface. TCE was not detected in any of the soil samples collected from the site.

- In the immediate vicinity of the former lagoons, concentrations of ground water contaminants exceed 100 parts per billion (ppb) (the "primary" plume). The remainder of the plume (the "secondary" plume) is delineated as the area in which TCE concentrations exceed 5 ppb, the Maximum Contaminant Level (MCL) for TCE in drinking water.

The contaminated soils in the area of the lagoons are considered to be "principal threat wastes" because the chemicals of concern are found at concentrations that pose a significant risk. The excess carcinogenic risk to an individual posed by these materials is upwards of one in one hundred ($1 \times 10^{-2}$). In other words, if the contaminated soil at the EIO Site is not remediated, as many as one out of every 100 individuals exposed to the soil could develop cancer as a result of that exposure. Although contaminated ground water also poses a risk, it is not considered a "principal threat" as defined by EPA guidance.

**WHAT IS A "PRINCIPAL THREAT"?**

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

## SCOPE AND ROLE OF THE ACTION

This action, referred to as Operable Unit 2 (OU2), will be the final action for the site. A 1996 ROD for Operable Unit 1 (OU1) provided for an alternate water supply by connecting 50 homes to the public water distribution system. The Remedial Action Objectives for OU2 are to prevent current and future exposure to contaminated media through a combination of treatment and containment of soil and ground water at the EIO Site. Through the use of treatment technologies, this response will permanently reduce the toxicity, mobility, and volume of those source materials that constitute the principal threat wastes at the site.

## SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a baseline risk assessment to determine the current and future effects of contaminants on human health and the environment. According to the zoning board of Nameless, TN, the area adjacent to the site is zoned for residential usage. Therefore, this is the reasonably anticipated future land use for the site itself. In addition, the potential future use of ground water will be as a drinking water source for the community once safe cleanup levels have been achieved. Hence, the baseline risk assessment focused on health effects for both children and adults, in a residential setting, that could result from current and future direct contact with: (1) contaminated soil (*e.g.*, children ingesting soil while playing in the area), and (2) contaminated ground water (*e.g.*, through ingestion and inhalation of volatile contaminants). It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

### Human Health Risks

EPA's statistical analysis of soil sampling data indicates that probable exposure concentrations of B[a]P, 4,4'-DDT, and dieldrin in soil are 300 parts per million (ppm), 350 ppm, and 40 ppm, respectively. These concentrations are associated with

**WHAT IS RISK AND HOW IS IT CALCULATED?**

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies helps EPA to determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, EPA considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. EPA considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer *may* occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, EPA calculates a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, EPA determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are combined, evaluated and summarized. EPA adds up the potential risks from the individual

excess lifetime cancer risk levels due to ingestion of contaminated soil of $1.2 \times 10^{-2}$, $6.5 \times 10^{-4}$, and $3.5 \times 10^{-3}$, respectively for current residents. Hazard quotients of 3.9 for 4,4'-DDT and 4.4 for dieldrin also are associated with these exposure concentrations.

Similarly, EPA's statistical analysis of ground water sampling data found that the average exposure concentration of TCE in the ground water was 8,400 ppb, which is in excess of the Safe Drinking Water Act MCL of 5 ppb. In addition, this concentration is associated with an excess lifetime cancer risk of $2.5 \times 10^{-3}$ for current residents. Dieldrin, 4,4'-DDT and B[a]P were not found in ground water at concentrations above their detection limits.

These risks and hazard levels indicate that there is significant potential risk to children and adults from direct exposure to contaminated soil and ground water. These risk estimates are based on current reasonable maximum exposure scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of an individual's exposure to the soil and ground water, as well as the toxicity of B[a]P, 4,4'-DDT, dieldrin, and TCE.

### Ecological Risks

A screening ecological risk assessment indicated that the potential for significant ecological impacts to occur was small. Based upon the relatively small size of the contaminated source areas (*i.e.*, the soil that had been under the lagoons) in comparison to the home ranges of the target ecological receptor habitats and the lack of any current natural habitat in these areas, there was little potential for significant exposure of wildlife to the contaminants. The concentrations of TCE found in the XYZ River is below the freshwater screening level of 350 µg/l (ppb).

## REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for the site are to:

- Restore the aquifer to drinking water standards within a reasonable time frame.
- Minimize future migration of ground-water contamination.
- Reduce or eliminate further contamination of ground water.
- Reduce or eliminate the direct contact threat associated with contaminated soil.
- Minimize or eliminate contaminant migration to the ground water and surface waters to levels that ensure the beneficial reuse of these resources.

This proposed action will reduce the excess cancer risk associated with exposure to contaminated soil to one in one million. This will be achieved by reducing the concentrations of the soil contaminants to the following target levels:

| | |
|---|---|
| Benzo(a)pyrene | 0.026 ppm |
| DDT | 0.012 ppm |
| Dieldrin | 0.54 ppm |

Because there are no Federal or State cleanup standards for soil contamination, EPA established these targets, or Preliminary Remediation Goals (PRGs), based on the baseline risk assessment. Targets were selected that would both reduce the risk associated with exposure to soil contaminants to an acceptable level, and ensure minimal migration of contaminants into the ground water. The Preliminary Remediation Goal for TCE in ground water is 0.005 ppm, which is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.

## SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives for the EIO Site are presented below. The alternatives are numbered to correspond with the numbers in the RI/FS Report.

**Common Elements.** Many of these alternatives include common components. The soil contains hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) and is therefore subject to the RCRA land disposal restrictions (LDRs) if the waste is excavated and treated or removed from the area of contamination. All remedies involving such activities will comply with the LDR (63 FR 28555; May 26, 1998) and will meet 90% removal efficiency or ten times the universal treatment standard for that contaminant in the material prior to land disposal in a RCRA-compliant landfill.

The ground water does not contain RCRA hazardous waste and therefore the LDR standards are not applicable, and are also not relevant or appropriate requirements.

Several of the remedies require institutional controls (e.g., deed restrictions such as an easement or covenant) to limit the use of portions of the property or to ensure that the water is not used for drinking water purposes. These resource use restrictions are discussed in each alternative as appropriate. The type of restriction and enforceability will need to be determined for the selected remedy in the ROD. Consistent with expectations set out in the Superfund regulations, none of the remedies rely exclusively on institutional controls to achieve protectiveness. Monitoring to ensure the effectiveness of the remedy, including deed restrictions, are a component of each alternative except the “no-action” alternative.

Each ground water alternative (except the “no action” and the monitored natural attenuation alternatives) requires extraction of ground water prior to treatment. Additionally, each treatment alternative is evaluated under two ground water disposal options: (1) discharge to XYZ River, and (2) reinjection into the aquifer. All soil and ground water alternatives, except the “no action” alternatives, are expected to attain the Remedial Action Objectives.

### *NO ACTION ALTERNATIVES*

Alternative S1/G1: NO ACTION

*Estimated Capital Cost: $0*
*Estimated Annual O&M Cost: $0*
*Estimated Present Worth Cost: $0*

**SUMMARY OF REMEDIAL ALTERNATIVES**
**EIO INDUSTRIAL SITE**

| Medium | RI/FS Designation | Description |
|---|---|---|
| **SOIL** | S1 | No action |
| | S2 | Cap waste in place; institutional controls; monitoring |
| | S3 | Excavate wastes; on-site thermal desorption; on-site disposal of residual wastes with vegetative cover |
| | S5 | Excavate wastes; off-site thermal destruction; off-site disposal of residual wastes |
| **GROUND WATER** | G1 | No action |
| | G2 | Pump and treat the entire plume; discharge to XYZ River |
| | G3 | Pump and treat the entire plume; vicinity reinjection |
| | G5 | Pump and treat the "primary" plume; discharge to XYZ River; natural attenuation of "secondary" plume |
| | G7 | Pump and treat the "primary" plume; vicinity reinjection; natural attenuation of "secondary" plume |
| | G8 | Monitored natural attenuation of the entire plume |

*Estimated Construction Timeframe: None*

Regulations governing the Superfund program generally require that the "no action" alternative be evaluated generally to establish a baseline for comparison. Under this alternative, EPA would take no action at the site to prevent exposure to the soil and ground water contamination.

***SOIL ALTERNATIVES***

**Alternative S2: CAPPING WASTE IN PLACE, INSTITUTIONAL CONTROLS, MONITORING.**

*Estimated Capital Cost: $3,500,000*
*Estimated Annual O&M Cost: $0*
*Estimated Present Worth Cost: $3,500,000*
*Estimated Construction Timeframe: 9 months*
*Estimated Time to Achieve RAOs: 9 months*

Approximately 7,500 cubic yards of soil would be capped in place with a RCRA hazardous waste compliance cap. Institutional controls would be put in place to prevent the use of the area for any purposes other than waste management. This is necessary to ensure that the cap is not impaired due to other activities. Since direct contact exposure will not pose a risk with a cap, restricting access to the capped area will not be required. However, signs will be posted around the perimeter of the area that provides notice that hazardous waste are contained in the area. The area would be monitored in perpetuity to verify that the cap retains integrity, is not leaking, and that the institutional controls remained effective.

**Alternative S3: EXCAVATION, ON-SITE THERMAL DESORPTION, AND ON-SITE DISPOSAL OF RESIDUALS.**

*Estimated Capital Cost: $6,230,000*
*Estimated Annual O&M Cost: $0*
*Estimated Present Worth Cost: $6,230,000*
*Estimated Construction Timeframe: 3 months*
*Estimated Time to Achieve RAOs: 24 months*

Approximately 7,500 cubic yards of soil would be excavated and would be treated by on-site thermal desorption. The treated soil will be returned to the excavated area and capped with a vegetative cover if the material meets the final cleanup levels. If the technology does not achieve the remedial cleanup level standards for the waste left in place, the waste would be disposed of off-site at a RCRA hazardous waste Subtitle C facility. (Such material would meet the LDR standards prior to disposal.) It is expected that thermal treatment will achieve the health-based standards. The contaminants collected from the thermal desorption process will be sent off-site to a RCRA Subtitle C hazardous waste facility for treatment and disposal in accordance with the RCRA LDR standards.

Since this alternative will achieve Preliminary Remediation Goals or better that are protective for residential land use, and which are protective for all other uses, institutional controls and monitoring will not be needed for this alternative.

**Alternative S5: EXCAVATION, OFF-SITE THERMAL DESTRUCTION, AND OFF-SITE DISPOSAL OF RESIDUALS**

*Estimated Capital Cost: $6,731,317*
*Estimated Annual O&M Cost: $ 0*
*Estimated Present Worth Cost: $6,731,317*
*Estimated Construction Timeframe: 0*
*Estimated Time to Achieve RAOs: 12 months*

This alternative is the same as S3 except that the waste is transported off-site to a RCRA hazardous waste Subtitle C facility for the treatment and disposal of the soil. For the purposes of developing a cost estimate, the assumed treatment technology was an off-site incinerator, but any technology that can achieve the LDR treatment standards for contaminated soil could be used during the actual implementation of the remedy.

***GROUND WATER ALTERNATIVES***

**Alternative G2: PUMP AND TREAT THE ENTIRE PLUME WITH DISCHARGE TO THE XYZ RIVER**

*Estimated Capital Cost: $ 3,650,000*
*Estimated Annual O & M Cost: $ 124,000*
*Estimated Present Worth Cost: $ 4,779,000*
*Estimated Construction Timeframe: 15 to 18 months*
*Estimated Time to Achieve RAOs: 15 years*

Ground water extraction wells would be placed at locations selected to capture the entire area of the contaminated ground-water plume. Once extracted, the contaminated ground water would be treated on site by

using a combination of air-stripping and/or carbon adsorption and would then be discharged to the XYZ River. The ground water would be restored to drinking water quality through treatment to meet the final cleanup levels throughout the entire plume. Restrictions on the installation of new drinking water wells will be implemented by the town zoning authority. Existing wells will be sealed to prevent exposure to contaminated ground water.

During the remedial design phase, EPA will determine the most cost-effective technology for treating the extracted ground water. These technologies will include either carbon adsorption or air stripping alone or in combination to meet the National Pollutant Discharge Elimination System (NPDES) requirements and State and/or local air quality standards. Any carbon units used for on-site treatment will be regenerated off-site. Used carbon units will be disposed of in accordance with RCRA requirements.

**Alternative G3: PUMP AND TREAT THE ENTIRE PLUME WITH VICINITY REINJECTION**

*Estimated Capital Cost: $ 10,752,000*
*Estimated Annual O& M Cost: $ 167,000*
*Estimated Present Worth Cost: $ 12,078,000*
*Estimated Construction Timeframe: 18 to 24 months*
*Estimated Time to Achieve RAOs: 12 years*

The components and requirements of this alternative are the same as those described in Alternative G2, with the exception that the treated ground water would be reinjected into the aquifer rather than discharged to the XYZ River. Reinjection wells would be located at selected points to enhance flushing within the contaminant plume.

**Alternative G5: PUMP AND TREAT THE PRIMARY PLUME WITH DISCHARGE TO THE XYZ RIVER AND MONITORED NATURAL ATTENUATION OF THE SECONDARY PLUME.**

*Estimated Capital Cost: $ 2,850,000*
*Estimated Annual O& M Cost: $ 84,000*
*Estimated Present Worth Cost: $ 3,695,000*
*Estimated Construction Timeframe: 12 to 15 months*
*Estimated Time to Achieve RAOs: 18 years*

In this alternative, ground-water extraction wells would be placed at locations selected to capture the primary plume and the secondary plume would be allowed to remediate through natural physical, chemical and biological processes (also known as natural attenuation). Isolation and cleanup of the primary plume would prevent further contamination to the secondary plume and expedite attainment of final cleanup levels in the secondary plume through natural attenuation. Ground water extracted from the primary plume would be treated in the same manner as described in Alternative G2. The ground water would be restored to drinking water use through treatment and natural attenuation to meet the final cleanup levels throughout the entire plume.

**Alternative G7: PUMP AND TREAT THE PRIMARY PLUME WITH VICINITY REINJECTION AND MONITORED NATURAL ATTENUATION OF THE SECONDARY PLUME.**

*Estimated Capital Cost: $ 8,250,000*
*Estimated Annual O& M Cost: $ 107,000*
*Estimated Present Worth Cost: $ 9,225,000*
*Estimated Construction Timeframe: 15 - 18 months*
*Estimated Time to Achieve RAOs: 15 years*

The components and requirements of this alternative are the same as those described in Alternative G5, with the exception that the treated ground water would be reinjected into the aquifer rather than discharged to the XYZ River. Reinjection wells would be located at selected points to enhance flushing of contaminants within the contaminant plume and facilitate natural attenuation processes.

**Alternative G8: MONITORED NATURAL ATTENUATION OF ENTIRE PLUME**

*Estimated Capital Cost: $ 15,000*
*Estimated Annual O& M Cost: $ 34,000*
*Estimated Present Worth Cost: $ 501,000*
*Estimated Construction Timeframe: 3 months*
*Estimated Time to Achieve RAOs: 220 years*

This alternative would utilize natural physical, chemical and biological processes (i.e., natural attenuation) to restore ground water to drinking water use. Final cleanup levels would be met throughout the entire plume within an estimated timeframe of 220 years.

| EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES |
|---|
| ***Overall Protectiveness of Human Health and the Environment*** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. |
| ***Compliance with ARARs*** evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified. |
| ***Long-term Effectiveness and Permanence*** considers the ability of an alternative to maintain protection of human health and the environment over time. |
| ***Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment*** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present. |
| ***Short-term Effectiveness*** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. |
| ***Implementability*** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services. |
| ***Cost*** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent. |
| ***State/Support Agency Acceptance*** considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan. |
| ***Community Acceptance*** considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance. |

## EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. The "Detailed Analysis of Alternatives" can be found in the FS.

### 1. Overall Protection of Human Health and the Environment

All of the alternatives except the "no action" alternative would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, and/or institutional controls. Chemicals of concern are treated to risk-based levels by Alternative S3 (on-site thermal desorption) and Alternative S5 (off-site thermal destruction). Alternative S2 would provide protection by preventing direct contact exposure to contaminated soils and prevent leakage of these contaminated source materials to the ground water by capping the area; however, long-term maintenance and monitoring would be required to ensure that the cap remained protective.

With the exception of Alternative G8 (monitored natural attentuation), all ground water alternatives would eliminate human and environmental risks from direct contact with contaminated ground water through treatment. Although Alternative G8 does not prevent migration of contaminants to the XYZ River, surface water quality standards are not being exceeded and therefore is still considered protective. Experience has shown that in some cases reinjecting ground water (Alternatives G3 and G7) may cause some horizontal or downward migration of contaminants, increasing the potential for exposure to contaminated ground water. At this site, such contaminant migration is not likely to occur due to the presence of a confining clay layer and the site's proximity to the river. All alternatives include institutional controls as an added means of protecting human health.

Because the "no action" alternatives (S1 and G1) are not protective of human health and the environment, they were eliminated from consideration under the remaining eight criteria.

### 2. Compliance with ARARs

All soil and ground water alternatives would meet their respective ARARs from Federal and State laws.

### 3. Long-term Effectiveness and Permanence

Alternative S3 (on-site thermal desorption) and Alternative S5 (off-site thermal destruction) would reduce the inherent hazards posed by the contaminants at the site to health-based levels and further controls

would not be necessary to ensure the long-term effectiveness and permanence. Alternative S2 (capping) would prevent the direct contact exposure and contaminant migration, however, monitoring would be necessary to ensure the long-term effectiveness and permanence of this alternative.

All ground water alternatives would be effective in the long term by reducing contaminant concentrations in ground water. The adequacy and reliability of the pump and treatment technologies have been well proven for the chemicals of concern. However, experience has shown that reinjection systems (G3, G7) have extensive maintenance problems and as such may not be considered reliable. Natural attenuation has some uncertainty associated with the remediation methods and the time required to reach the final cleanup levels (G5, G7, G8).

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

Both Alternative S3 (on-site thermal desorption, the preferred alternative) and Alternative S5 (off-site, thermal destruction) would remove or destroy the contaminants from soil, and may in fact get the soil down to the Preliminary Remediation Goals without further need for subsequent containment. Alternative S2 (capping) will not achieve reduction of toxicity, mobility or volume through treatment.

All ground water alternatives, except for G8, use treatment to reduce toxicity, mobility and volume of contaminants. Alternative G8 uses natural processes to achieve the same goals. For all other alternatives, carbon units containing treatment residuals would be thermally destroyed or recycled, and managed in accordance with RCRA.

5. **Short-term Effectiveness**

Both Alternative S3 (on-site thermal desorption) and Alternative S5 (off-site thermal destruction) involve excavation of contaminated soils and thus present a potential for short-term exposure. Alternative S5 presents a higher short-term risk than Alternative S3 because of the potential for exposure to contaminated soils by trucking the 7,500 cubic yards of material to an off-site facility.

The contaminants are not volatile so the risk of release is principally limited to wind blown soil transport or surface water run off. Control of dust and run-off will limit the amount of materials that may migrate to a potential receptor. Alternative S3 and Alternative S5 also present a potential risk for short-term exposure to releases of contaminants or products of combustion as a result of the treatment technology. In both cases the treatment unit will be required to meet the RCRA emissions standards (i.e., RCRA Subpart X would apply to thermal desorbption units and Subpart O would apply to incineration units). Alternative S2 (capping) does not present a short-term threat except to the extent that area presents direct contact or migration potential during the time it takes to fully implement the remedy. Construction of Alternative S3 (on-site thermal desorption) could be completed in 3 months, with achievement of remedial action objectives within 2 years. Alternative S5 (off-site thermal destruction) will not require construction, and would thus enable cleanup objectives to be achieved in less than 2 years. Completion of Alternative S2 (capping) would take 9 months to construct.

Precautions will be taken during construction of the extraction wells under Alternatives G2, G3, G5 and G7 to eliminate any risk to the public from excavation. Because ground water remediation will occur after completion of soil remediation, air emissions during well-drilling should not constitute a threat. Short-term risk to workers associated with normal construction hazards and potential contact with contaminated water will be eliminated through appropriate controls and adherence to proper health and safety protocols. G2, G3, G5, and G7 will take approximately the same amount of time to achieve final cleanup levels. However, Alternative G3 would require a longer construction period due to the installation of reinjection wells or infiltration basins, and piping systems to transport the treated ground water to the wells or basins. Under Alternative G2, only a small amount of time is needed to construct the pipeline to the XYZ River. Alternative G8 has no risks associated with implementation and requires little or no implementation time.

6. **Implementability**

All soil technologies and remedies are readily available and generally proven.

All ground water alternatives are equally implementable without construction difficulties. Ground water “pump and treat” is well-proven and fully capable of removing the contamination. There is a potential for operation and maintenance problems associated with reinjecting the large volume of water into the aquifer, under Alternatives G3 and G7. All alternatives have few associated administrative difficulties.

7. **Cost**

The estimated present worth cost of Alternative S3 is less than that of Alternatives S5. The estimated present worth cost of Alternative G5 is less than G2, G3, and G7. Even though Alternative G8 is the least costly of the remedial alternatives, the time frame required to achieve final cleanup levels is excessive.

8. **State/Support Agency Acceptance**

The State of Tennessee supports the Preferred Alternative without comment.

9. **Community Acceptance**

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the site.

## SUMMARY OF THE PREFERRED ALTERNATIVE

The Preferred Alternative for cleaning up the EIO Site is a combination of Soil Alternative S3 (Excavation, On-Site Thermal Desorption, and On-Site Disposal of Residuals) and Ground-Water Alternative G5 (Pump and Treatment of the Primary Plume with Discharge to the XYZ River and Monitored Natural Attenuation of the Secondary Plume).

The preferred soil alternative was selected over other alternatives because it is expected to achieve substantial and long-term risk reduction through treatment, and is expected to allow the property to be used for the reasonably anticipated future land use, which is residential. The preferred ground-water alternative was selected over the other alternatives because it is expected to achieve substantial risk reduction through treatment of contaminants in the ground water and provides measures to prevent future exposure to currently contaminated ground water. Hence the combination of Alternatives S3 and G5, hereafter referred to as the Preferred Alternative, reduces the risk within a reasonable time frame and at less cost than the off-site treatment alternative and provides for long-term reliability of the remedy.

Based on the information available at this time, EPA and the State of Tennessee believe the Preferred Alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Because it would treat the source materials constituting principal threats, the remedy also would meet the statutory preference for the selection of a remedy that involves treatment as a principal element. The Preferred Alternative can change in response to public comment or new information.

## COMMUNITY PARTICIPATION

EPA and TDEC provide information regarding the cleanup of the EIO Industrial Site to the public through public meetings, the Administrative Record file for the site, and announcements published in the Nameless, Tennessee Newspaper. EPA and the State encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted at the site.

The dates for the public comment period , the date, location, and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan.

**For further information on the EIO Industrial Site, please contact:**

| | |
|---|---|
| John Doe<br>Remedial Project Manager<br>(000) 000-0000 | Joan Nameless<br>Community Relations Coordinator<br>(000) 000-0000 |

U.S. EPA
61 Forsyth Street, S.W.
Atlanta, GA 30303-3104

## GLOSSARY OF TERMS

Specialized terms used in this Proposed Plan are defined below:

***Applicable or relevant and appropriate requirements (ARARs)*** **-** the Federal and State environmental laws that a selected remedy will meet. These requirements may vary among sites and alternatives.

***Bioremediation*** **-** the use of microorganisms to transform or alter, through metabolic or enzymatic action, hazardous organic contaminants into nonhazardous substances.

***Carbon adsorption*** **-** a process using activated carbon to remove primarily soluble organics from air and water. There are granular and powdered activated carbon based on the size of the carbon particles.

***Consent Decree*** **-** a legal document, approved by a judge, that formalizes an agreement between EPA and one or more potentially responsible parties (PRPs) outlining the terms by which the response action will take place. A Consent Decree is subject to a public comment period prior to its approval by a judge, and is enforceable as a final judgement by a court.

***Contaminant plume*** **-** a column of contamination with measurable horizontal and vertical dimensions that is suspended in and moves with ground water.

***Ex situ*** **-** the removal of a medium (for example, water or soil) from its original place, as through excavation, in order to perform the remedial action

***Ground water*** **-** underground water that fill pores in soils or openings in rocks to the point of saturation. Ground water is often used as a source of drinking water via municipal or domestic wells.

***LDR*** **-** Land Disposal Restriction. The land disposal restrictions program requires certain wastes to be treated before they may be disposed of in the land.

***Monitoring*** **-** ongoing collection of information about the environment that helps gauge the effectiveness of a clean-up action. Monitoring wells drilled at different levels at the EIO Site would be used to detect any leaks from containment structures.

***Organic compounds*** **-** carbon compounds, such as solvents, oils, and pesticides. Most are not readily dissolved in water. Some organic compounds can cause cancer.

***Present Worth Analysis*** **-** a method of evaluation of expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative. When calculating present worth cost for Superfund sites, total operations & maintenance costs are to be included.

***Resource Conservation and Recovery Act (RCRA)*** **-** the Federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final disposal. RCRA also provides for safe hazardous waste management practices and imposes standards for transporting, treating, storing, and disposing of hazardous waste.

***Revegetate*** **-** to replace topsoil, seed, and mulch on prepared soil to prevent wind and water erosion.

***Safe Drinking Water Act Maximum Contaminant Level (SDWA MCL)*** **-** the maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

***Treatability Variance*** **-** where a remedial alternative cannot achieve a LDR treatment standard, treatability variance may be granted. A treatability variance establishes alternate treatment standards.

## USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the EIO Industrial Site is important to EPA. Comments provided by the public are valuable in helping EPA select a final cleanup remedy for the site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by March 30, 1999. If you have any questions about the comment period, please contact Joan Nameless at (000) 000-0000 or through EPA's toll-free number at 1-800-000-0000. Those with electronic communications capabilities may submit their comments to EPA via Internet at the following e-mail address: nameless.joan@epa.gov.

**Name**_____

**Address**_____

**City**_____

**State**_____ **Zip**_____

# APPENDIX B:

# DOCUMENTING SPECIAL GROUND-WATER REMEDY DECISIONS

This section presents recommendations and suggested language for remedy selection decision documents when ground-water remedies involve the following situations:

- Use of a phased approach to ground-water restoration.
- Remediation of sites where non-aqueous phase liquids (NAPLs) are present (or highly suspected) in the subsurface.
- Deferral of ex-situ treatment components of a pump and treat remedy until Remedial Design.
- Remedies using monitored natural attenuation to achieve remediation objectives.

General background information, examples of how the situations named above should be documented, and references to additional information are detailed below.

## B.1 PHASED APPROACH

Where complex ground-water contamination problems are present at a site (*e.g.*, complex hydrogeology or non-aqueous phase liquids), it will generally be necessary to implement a phased approach toward the cleanup of that site. In a phased remedy, site response activities are implemented in a sequence of steps so that the information gained in earlier phases can be used to refine subsequent investigation objectives or actions. Ground-water response actions, in particular those using extraction and treatment, should generally be implemented in more than one phase. Phased response actions can be implemented by either two separate actions where an early or interim ground-water remedy is followed by a later, more comprehensive, long-term remedy (*i.e.* using separate decision documents), or one action that is implemented in more than one phase (in one decision document).

The following information should be included in the *Selected Remedy* section of a ROD (and *Preferred Alternative* section of the Proposed Plan when phased implementation of a remedy is planned):

- Ultimate remedial action objectives for contaminated ground water at the site.
- Clear identification of the purpose and scope of each phase and the interrelationships between the phases.
- Estimated time period for operation and monitoring of each phase.
- Explanation of how performance data from an earlier phase will be used to refine scope or design of later phases.
- Explanation that the last phase of the remedy will consist of refinement of the remedy to increase remedy performance during the operating life of the remedy. Such refinements are relatively minor modifications that would not be considered significant changes (*e.g.*, optimizing pumping rates or placement/abandonment of ground-water extraction wells).

Where appropriate, this section should also state that performance data from an early phase of the remedy may show that attainment of the ultimate remediation objectives is not technically practicable, which would result in re-evaluation of the Selected Remedy and preclude implementation of later remedy phases.

Highlight B-1 illustrates how a phased approach for a single action is described in the *Selected Remedy* section of a ROD.

## Highlight B-1: Example Language for Documenting Use of Phased Implementation for the Extraction Component of a Remedy at a DNAPL Site in the Selected Remedy Section of a ROD

The ultimate objectives for the ground-water portion of this remedial action is to restore Aquifer A to its beneficial uses to the maximum extent practicable. The beneficial use of Aquifer A is as a source of drinking water and is currently used off-site for this purpose. Based on information obtained during the remedial investigation and a careful analysis of all remedial alternatives, EPA and the State believe that the Selected Remedy will achieve this objective in a reasonable time frame.

The extraction portion of the ground-water remedy will be implemented in two phases. During phase one, a sufficient number of extraction wells will be installed and operated to achieve the following remedial objectives: 1) minimize further migration of contaminants from suspected subsurface DNAPL areas to the surrounding ground water; and 2) minimize further migration of the leading edge of the contaminant plume. After construction of phase one is complete, the extraction system will be monitored on a regular basis and its performance evaluated. Operation and monitoring of phase one may be necessary for a period of up to two years to provide enough information to complete the phase two design.

Evaluation of the monitoring data collected during phase one may provide further information concerning the likelihood that DNAPLs are present in the aquifer, and if so, the likely extent of the DNAPL zone. EPA will use this information to determine whether an ARAR-waiver is appropriate for the suspected DNAPL zone. If EPA determines that attaining cleanup levels is "technically impracticable from an engineering perspective," these cleanup levels would be waived over the suspected DNAPL zone (a TI waiver). If EPA determines that a TI waiver is appropriate for this site, the selected remedy will be re-evaluated. In this event EPA would issue a ROD Amendment and phase two of the remedy may be modified from that described below.

During phase two of this remedy, additional extraction wells will be installed with the objective of restoring Aquifer A as a viable source of drinking water to the maximum extent practicable. Reinjection wells and related pumping equipment for flushing a portion of the treated ground water through the aquifer (water flooding) will be installed to enhance the recovery of contaminants. Restoration is defined as attainment of required cleanup levels in the aquifer, over the full extent of the contaminant plume. Cleanup levels for each ground-water contaminant of concern are specified in Table ___.

Current estimates indicate that cleanup levels can be attained in the portion of Aquifer A outside the suspected DNAPL zone within a time frame of approximately 25 years. Monitoring and evaluation of the performance of phase one will be used to determine the actual number and placement of wells for phase two. The system's performance will be carefully monitored, in accordance with the monitoring plan defined in Section ___ of the ROD, and adjusted and refined as warranted by the performance data collected during operation.

Once phase two of the remedy has been implemented, some refinement to the extraction component of the remedy may still be needed to enhance remedy performance or to maintain performance at reduced cost. These minor adjustments could include one or more of the following:

- Adjusting the rate of extraction from some or all wells.
- Discontinuing pumping at individual wells where cleanup levels have been attained.
- Pulsed pumping of some or all extraction wells to eliminate flow stagnation areas, allow sorbed contaminants to partition into ground water, or otherwise facilitate recovery of contaminants from the aquifer.
- Installing additional ground-water extraction wells to facilitate or accelerate cleanup of the contaminant plume.

For the purpose of estimating the approximate cost of the treatment component of the Selected Remedy, it is estimated that three to five extraction wells will need to be installed as part of phase one and an additional two to six extraction wells and two to four reinjection wells will need to be installed as part of phase two.

NOTE: Ex-situ treatment component of remedy and discharge of treated water are discussed in subsequent paragraphs of the *Selected Remedy* section of the ROD (See Highlight B-2).

## B.2 NONAQUEOUS PHASE LIQUIDS (NAPLS)

Nonaqueous phase liquids (NAPLs) are either singular free product organic compounds or mixtures of organic compounds that are resistant to mixing with water. There are two types of NAPLs, Light Nonaqueous Phase Liquids (LNAPLs) and Dense Nonaqueous Phase Liquids (DNAPLs). LNAPLs are less dense than water and tend to float on the water table (*e.g.*, gasoline). DNAPLs have a density greater than water. This property allows them to sink through the water table and penetrate the deeper portions of an aquifer, making them difficult to locate and remediate. Examples of DNAPLs include some chlorinated solvents (*e.g.*, TCE), coal tar wastes, creosote based wood-treating oils, and some pesticides. NAPL zones are the delineated portions of the subsurface (including one or more aquifers) where immiscible liquids (free-phase or residual NAPL) are present.

In general, restoration of an aquifer contaminated with DNAPLs to ARARs or risk-based cleanup levels in a reasonable time frame will not be attainable in the DNAPL zone unless the DNAPLs can be removed. Removing DNAPLs from the subsurface is often not practicable. Due to the inherent difficulty in the treatment of DNAPLs, Technical Impracticability (TI) Waivers are often appropriate for areas of an aquifer associated with DNAPLs (the DNAPL zone). That portion of the contamination plume outside of the DNAPL zone can often be restored to beneficial uses. Different remediation objectives should be developed for the DNAPL zone and for the portion of the aquifer outside of the DNAPL zone.

Highlight B-1 also presents example language for the *Selected Remedy* section of a ROD for a DNAPL site where the remedy is to be implemented in phases. Please refer to Chapter 9 for details on the sections of the Proposed Plan and ROD that will be impacted by use of a TI waiver.

## B.3 DEFERRAL TO THE DESIGN PHASE - SELECTION OF EX-SITU TREATMENT METHODS

Although the technologies employed for treating extracted ground water are important components of a remedy, they have little influence on reducing contaminant levels in the aquifer or minimizing plume migration. Presumptive technologies for the ex-situ treatment component of a pump and treat remedy are identified in *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites* (EPA 540-R-96-023, October 1996). A given treatment train could include a combination of one or more of the presumptive technologies for treatment of dissolved contaminants as well as other technologies for other purposes (*e.g.*, separation of solids or treatment of vapor phase contaminants).

Presumptive technologies for ex-situ treatment of dissolved organic contaminants (*e.g.*, volatiles, semivolatiles) are:

- Air stripping
- Granular activated carbon (GAC)
- Chemical/UV oxidation (for cyanides also)
- Aerobic biological reactors

Presumptive technologies for ex-situ treatment of dissolved metals are:

- Chemical precipitation
- Ion exchange/adsorption
- Electrochemical methods (when metals are the only dissolved contaminants)
- Aeration of background metals

At the ROD stage, the lead agency often lacks important site information needed for optimizing the selection of technologies to treat extracted ground water. In such cases it may be appropriate to defer final selection among ex-situ treatment technologies to the remedial design phase, when the needed information will be available. The technologies that may ultimately be selected and the timing and criteria for the future technology selection should be described in sufficient detail in the Proposed Plan so that the public can evaluate and comment on the proposal. The Proposed Plan provides the foundation for the ROD to defer the final technology selection to the remedial design phase.

The following information should be provided in the *Selected Remedy* section of the ROD (and the *Preferred Alternative* section of the Proposed Plan):

- Statement that one or more of the presumptive treatment technologies described in *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites* will be used.

- Statement that the actual technologies and sequence in which they will be employed is being deferred until the remedial design stage, when additional information will be available.

- Description of what the treatment system will be designed to accomplish (*e.g.*, attain State requirements for discharge to surface water).

- Reference the presumptive remedy guidance cited above for a description of presumptive technologies and their advantages and limitations.

- Assumed treatment sequence and statement that this will be used only as a basis for estimating remedy costs (in this case, for the aqueous and vapor phase contaminants in ground water).

Highlight B-2 provides example Selected Remedy language for a case where selection of a specific presumptive technology for treatment of extracted ground water was deferred until the Remedial Design phase.

## B.4 DOCUMENTING REMEDIES USING MONITORED NATURAL ATTENUATION

Monitored natural attenuation (MNA) may be utilized as a remedy or as a portion of a remedy, to address site contamination. Guidance on the use of monitored natural attenuation for the remediation of contaminated soil and ground water can be found in *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (EPA 540-F-99-009, April 1999).

Monitored natural attenuation, as defined in the OSWER Directive, "refers to the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. The 'natural attenuation processes' that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or ground water."[1]

EPA does not view MNA to be a "no action" remedy[2], but rather considers it to be a means of addressing contamination under a limited set of site circumstances where its use meets the applicable statutory and regulatory requirements. Also, MNA should be evaluated and compared to other viable remediation methods (including innovative technologies) during the study phases leading to the selection of a remedy and should not be considered a "presumptive" or "default" remediation alternative. The decision to implement MNA should include a comprehensive site characterization, risk assessment where appropriate, and measures to treat or otherwise control sources. In addition, the progress of natural attenuation towards a site's remediation objectives should be carefully monitored and compared with expectations to ensure that it will meet site remediation objectives within a time frame that is reasonable compared to time frames associated with other methods. Where MNA's ability to meet these expectations is uncertain and based predominantly on predictive analyses, decision-makers should incorporate contingency measures into the remedy.

If monitored natural attenuation comprises all or part of the remedy, the following points should be included in the *Summary of Alternatives* section of a Proposed Plan or the *Description of Alternatives* section of a ROD:

- A brief explanation of why natural processes are expected to achieve remedial objectives in a time frame that is reasonable in comparison to other alternatives.

[1] Natural attenuation processes can also convert some contaminants to more toxic forms.

[2] A remedial alternative using natural attenuation as the cleanup method is not the same as the "no action alternative." When cleanup is required, natural attenuation may be able to attain cleanup levels in a timeframe that is "reasonable" when compared to other comparable alternatives. In general, the "no action" alternative is appropriate only when cleanup is not required.

## Highlight B-2: Example Language for Selected Remedy Section of a ROD Deferring Selection of Treatment Component

The ex-situ treatment component of the ground-water remedy will utilize presumptive technologies identified in *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites* (EPA 540-R-96-023, October 1996), included as Appendix __ of the ROD. Since contaminants of concern include volatile and semivolatile organic compounds, one or more of the presumptive technologies - air stripping, granular activated carbon (GAC), chemical/UV oxidation and aerobic biological reactors - will be used for treating aqueous contaminants in the extracted ground water. Other technologies will also be needed in the treatment system for removal of suspended mineral solids and treatment of vapor phase contaminants. The actual technologies and sequence of technologies used for the treatment system will be determined during the remedial design. Final selection of these technologies will be based on additional site information to be collected during the remedial design. (See Section 3.4 and Appendix C3 of EPA 540-R-96-023 for a discussion of site information needed for selection and design of the ex-situ treatment system.) Based on this additional information and sound engineering practice the treatment system shall be designed to accomplish the following:

- Attain the chemical-specific treatment levels specified in the State NPDES permit (see Table__) and other performance criteria specified in Table __ of the ROD.
- Treat, or be easily modified to treat, the expected flow increase from phase one to phase two of the extraction system.

Other design factors shall include the following:

- Maximizing long-term effectiveness.
- Maximizing long-term reliability (*i.e.*, minimize the likelihood of process upsets).
- Minimizing long-term operating costs.

Additional information concerning presumptive technologies for the ex-situ treatment component of the remedy is provided in EPA 540-R-96-023. In this directive, descriptions of each of the presumptive technologies are presented in Appendices D1 through D8, and advantages and limitations of each of these technologies are listed in Appendix C4.

For the purpose of estimating the approximate cost of the treatment component of the Selected Remedy, the following treatment sequence is assumed for contaminants dissolved in ground water: flow equalization tanks, a gravity oil-water separator, an air stripper, followed by GAC units. GAC will also be used to treat vapor phase contaminants from the air stripper. The GAC units will be thermally reactivated at an off-site facility. Separated DNAPL compounds will be recycled if possible, but since the actual composition of the recovered liquids is unknown, costs for incineration at an off-site facility were used for the cost estimate.

- If a relatively long time frame is required for natural processes to attain remediation goals, explain why this remediation time period is appropriate for conditions at the site (*e.g.*, no anticipated need for site ground water during this period).

- A description of the performance monitoring that will be part of the remedy and will be used to determine if natural attenuation is proceeding as anticipated.

- If applicable, a description of the contingency measures that will be implemented should the monitoring show that natural attenuation is unable to achieve the cleanup goals. Conditions that would trigger the contingency should also be specified (e.g., continued plume migration or contaminant levels are well above levels predicted for a specified time)

- Describe the institutional controls that will be implemented to prevent use of contaminated ground water until cleanup levels are achieved.

Example language for documenting use of monitored natural attenuation in the *Selected Remedy* section of the ROD is provided in Highlight B-3.

## B.5 ADDITIONAL INFORMATION FOR SPECIAL GROUND-WATER REMEDIES

Additional guidance can be found in Sections 9.4 and 9.5 of this document and in the following:

- *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, Final Guidance* (EPA 540-R-96-023, October 1996) (Note: Highlights B-1 and B-2 in this Appendix were adapted from Appendix B of this guidance document.)

- *Considerations in Ground-Water Remediation of Superfund Sites and RCRA Facilities* (OSWER 9283.1-06, May 1992).

- *Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration* (EPA 540-R-93-080, October 1993).

- *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (EPA 540-F-99-009, April 1999)

## Highlight B-3: Example Language for Documenting Use of Monitored Natural Attenuation in the Selected Remedy Section of the ROD

The ultimate objective for the ground-water portion of this remedial action is to restore contaminated ground water in Aquifer A to its beneficial uses. This aquifer could be used as a future source of drinking water, but is not being used currently for this purpose either on-site or off-site. Based on information obtained during the remedial investigation and a careful analysis of all remedial alternatives, EPA and the State believe that the Selected Remedy will achieve this objective in a reasonable time frame.

Monitored natural attenuation (Alternative 4) will be used to restore Aquifer A to its future beneficial use as a source of drinking water. Cleanup levels for each ground-water chemical of concern (COC) are specified in Table ___. Current estimates indicate that cleanup levels will be attained throughout the contaminated portion of Aquifer A within approximately 25 years. This compares to an estimated time frame of ten years for those alternatives that involve pumping and treating of ground water (Alternatives 2 and 3). (See Appendix __ of the RI/FS for further information concerning the predictive models used for this estimate.) Although the estimated time for natural processes to attain remediation objectives is longer than that required for alternatives using pump and treat, twenty-five years is considered a reasonable remedial time for this site because there is no anticipated need for the contaminated ground water within this period (see *Current and Potential Future Site Use* section of the ROD).

In addition to the modeling estimates, concentration levels for all COCs have decreased since source control measures were completed (OU1). This trend of declining contaminant levels has been confirmed in four successive rounds of sampling over a period of three years, indicating that source control measures have been effective and are reducing the uncertainty of the modeling predictions.

Since two separate lines of evidence (trends of declining COCs and predictive modeling) were used to indicate that monitored natural attenuation would be successful in attaining remediation objectives for site ground water, EPA and the State have determined that contingency measures are not needed as part of the remedy selected in this ROD.

Actual performance of the natural attenuation remedy will be carefully monitored in accordance with the monitoring plan detailed in Section__ of the ROD. If monitoring data indicate that contaminant levels do not continue to decline, as estimated in the modeling predictions, EPA and the State will reconsider the remedy decision. One or more of the following observations could lead to re-consideration of the remedy, if confirmed by four or more rounds of sampling:

- Increase in levels of parent contaminants, indicating that other sources may be present.
- Concentration levels of parent contaminants and/or daughter products differ significantly from modeling predictions.
- Contaminant plume for parent contaminants and daughter products increases significantly in areal or vertical extent and/or volume from that predicted by modeling estimates.

Institutional controls will be implemented to prevent the use of contaminated ground water until the cleanup levels specified in Table ___ have been attained throughout Aquifer A. These institutional controls will consist of a county ordinance prohibiting drilling of wells within the vicinity of the plume. An ordinance is expected to be effective in preventing ground-water use, because the county requires that a permit be obtained prior to drilling a public or private water supply well and no permit can be issued in areas known to be contaminated.

# APPENDIX C

# CONSULTATION PROCEDURES FOR SUPERFUND RESPONSE DECISIONS

***Consolidated Guide to Consultation Procedures for Superfund Response Decisions***
**Fact Sheet with transmittal memorandum dated May 14, 1997**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

**Signed May 14, 1997**
OSWER Directive 9200.1-18FS

**MEMORANDUM**

SUBJECT: Transmittal of "Consolidated Guide to Consultation Procedures for Superfund Response Decisions" and FY97 Focus Areas for OERR regional coordination support

FROM: Stephen D. Luftig, Director
Office of Emergency and Remedial Response

TO: Director, Office of Site Remediation and Restoration
Region I
Director, Emergency and Remedial Response Division
Region II
Director, Hazardous Waste Management Division
Regions III, IX
Director, Waste Management Division
Region IV
Director, Superfund Division
Regions V, VI, VII
Assistant Regional Administrator, Office of Ecosystems Protection and Remediation
Region VIII
Director, Environmental Cleanup Office
Region X

This memorandum: 1) transmits a completed fact sheet entitled "Consolidated Guide to Consultation Procedures for Superfund Response Decisions;" and 2)communicates the FY97 Focus Areas for OERR Regional coordination support.

**Consolidated Guide to Consultation Procedures for Superfund Response Decisions**

The goal of this fact sheet is to describe management review

procedures employed by EPA to ensure that national remedy selection policies and procedures are being implemented in a reasonable and appropriately consistent manner. EPA believes that consistent application of national policy and guidance is an important means by which we ensure the reasonableness, predictability, and cost-effectiveness of Superfund decisions. This document has been developed as a result of the National Consistency directive (OSWER Directive 9200.0-21) and the Remedy Selection "Rules of Thumb" Superfund Reform efforts announced by Administrator Carol Browner in October 1995.

This fact sheet provides a consolidated guide to EPA Headquarters and Regional consultation procedures for response decisions management. Pursuant to the final report of the Superfund Delegations Workgroup (OSWER Directive 9242.2-10), the Remedy Delegation Report was eliminated in favor of managing necessary Headquarters consultations through individual OSWER directives (this report had been used in the past to manage consultation requirements and procedures for Superfund remedy selection decisions). This fact sheet was developed to clarify and consolidate the various consultation procedures that have been established for both remedial and removal response selection decision making through various OSWER Directives, memoranda, and recommendations of national policy workgroups.

**FY97 Focus Areas**

As part of our effort to ensure appropriate national consistency, last year OERR established four technical and policy focus areas for Headquarters regional coordination efforts. The four focus areas include: 1)risk management and cost-effectiveness decision documentation; 2)ground water policy; 3)lead policy; and 4) presumptive remedies. (See "Focus Areas for Headquarters OERR Support for Regional Decision Making," OSWER Directive 9200.1-17, May 22, 1996.)

In FY97, OERR plans to continue to use the focus areas and consultation procedures outlined in this May 1996 memorandum, and refined through your work with individual Regional Center management and staff over the course of the past year. The primary goal of OERR's regional coordination effort is to communicate and coordinate nationally on cross-cutting issues to ensure that we all share a common understanding of program policies and, as a result, approach site cleanups in a consistent manner. OERR staff will flag any inconsistencies with respect to focus area policies and will work with Regional staff on an informal basis to resolve these issues in a timely manner. At

the same time, Regional staff should look upon OERR staff as a resource that can provide assistance in working through issues as early as possible during the development of site response strategies and draft Proposed Plans.

Thank you for your assistance in recent efforts to promote appropriate national consistency. Please continue to contact my staff as early as possible in the response selection process as relevant issues arise.

Attachment

cc: Larry Reed, OERR
Elaine Davies, OERR
OERR Regional Accelerated Response Center Directors
David Evans, OERR
Suzanne Wells, OERR
OERR Senior Process Managers
Jim Woolford, FFRRO
Liz Cotsworth, OSW
Barry Breen, OSRE
Craig Hooks, FFEO

United States
Environmental Protection
Agency

Office of
Solid Waste and
Emergency Response

OSWER 9200.1-18FS
EPA540-F-97-009
PB97-963216
May 1997

# Consolidated Guide to Consultation Procedures for Superfund Response Decisions

Office of Emergency and Remedial Response

Quick Reference Fact Sheet

The goal of this fact sheet is to describe management review procedures employed by EPA to ensure that national remedy selection policies and procedures are being implemented in a reasonable and appropriately consistent manner. EPA believes that consistent application of national policy and guidance is an important means by which we ensure the reasonableness, predictability, and cost-effectiveness of Superfund decisions. This document has been developed as a result of the National Consistency directive (OSWER Directive 9200.0-21) and the Remedy Selection "Rules of Thumb" Superfund Reform efforts announced by Administrator Carol Browner in October 1995.

This fact sheet provides a consolidated guide to EPA Headquarters and Regional consultation procedures for response decisions management. This document was developed to clarify and consolidate the various consultation procedures that have been established for both remedial and removal response selection decision making through various OSWER Directives, memoranda, and recommendations of national policy workgroups.

NOTE: This fact sheet only highlights the review and/or consultation procedures that exist between EPA headquarters and EPA Regional offices for Superfund response selection decision-making. Every response decision goes through a rigorous technical and management review process within each Regional EPA office as well. The specific management review procedures are unique to each Region, and have evolved over time to reflect the best technical and program management expertise as well as the different organizational structures in each office.

## FOCUS AREA REVIEW

In May 1996, the Office of Emergency and Remedial Response (OERR) issued a directive describing the goal of promoting "appropriately consistent CERCLA program implementation . . . and effective communication between Headquarters and the Regions" with a focus on four technical and policy areas. *(Focus Areas for Headquarters OERR Support for Regional Decision Making,* OSWER Directive 9200.1-17, May 22, 1996).

The four focus areas include: risk management and cost-effectiveness decision documentation; ground water policy; lead (Pb) policy; and presumptive remedies.

The consultation procedures outlined in the memorandum involve the review of draft proposed plans by staff in OERR's Accelerated Response Centers. In some circumstances, OERR may request the review of draft decision documents such as Records of Decision (RODs), ROD amendments, Explanations of Significant Differences (ESDs), or Action Memoranda for non-time-critical removal

actions. Consultations are still required for non-time-critical removal actions costing over $5 million (see *SACM Regional Decision Teams* and *Early Action and Long-Term Action Under SACM*, OSWER Directive 9203.1-05I, December 1992). Headquarters staff will flag any inconsistencies with respect to focus area policies and will work with Regional staff, on an informal basis, to resolve these issues in a timely manner. Issues of a national precedent-setting nature may be discussed with management as well.

At the same time, this memorandum encourages Regional staff to look upon Headquarters staff as a resource that can provide assistance in working through issues as early as possible during the development of site response strategies and draft proposed plans. The specific elements within each focus area are summarized in Table 1 and discussed in more detail in the May 1996 Focus Area memorandum.

## HEADQUARTERS APPROVAL/CONCURRENCE ON REMOVAL ACTIONS

The Superfund statute established certain limitations on the use of removal actions. Some of the approval authority for exceeding these statutory limitations has been delegated to EPA Regional offices, and some approval authority remains at Headquarters. Table 2 lists the specific elements of the Headquarters approval/concurrence consultation process for removal actions.

## CROSS-REGIONAL RESPONSE DECISIONS MANAGEMENT GROUPS

Cross-regional response decisions management groups have also been formed to share critical site information and improve remedy selection decision making. (See Table 3). Sharing draft proposed plans, decision documents, or other site-specific response strategies with these review groups as early as possible in the remedy selection process, will help facilitate a quick and efficient review.

The National Remedy Review Board was formed to promote cost-effectiveness and national consistency in remedy selection at Superfund sites. The Board is staffed with technical experts and senior managers from each EPA Region and several EPA Headquarters offices and focuses its reviews on high cost remedies. *(National Remedy Review Board Progress Report: Fiscal Year 1996*, OSWER Directive 9220.0-24, January 1997; and *National Remedy Review Board Review Criteria for Federal Facility Superfund Sites*, OSWER Directive 9220.0-25, draft).

Lead is one of the most frequently encountered chemicals at Superfund sites. Lead cleanups are also some of the most costly cleanups. As a result, a Lead Sites Management Workgroup has been formed by the Superfund Waste Management Division Directors in order to have management level involvement in key lead site decisions across the nation. Criteria will be developed in the near future and will provide proposed action levels and/or risk management alternatives that trigger a review by this group. *(Per direction of Superfund Waste Management Division Directors' Lead Policy Forum on February 6, 1997.)*

## CROSS-REGIONAL TECHNICAL REVIEW WORKGROUPS

Finally, cross-regional technical review workgroups have also been formed to focus on technical issues underlying risk assessment and response management issues. (See Table 4).

In order to support site-specific lead risk assessments and assist in the development of national lead policy for Superfund, the Technical Review Workgroup for lead was established. This group of scientists and technical experts is familiar with the development and refinement of the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) and provides advice on questions relating to site-specific lead risk assessments. OERR has asked Regional offices to identify any application of the IEUBK model that is expected to be challenged or will set a precedent in IEUBK model application so that the Technical Review Workgroup can be informed of the issues and provided an opportunity to comment on the approach undertaken. *(Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, OSWER Directive 9355.4-12, July 14, 1994; and *Administrative Reforms for Lead Risk Assessment*, OSWER Directive 9200.4-20, April 17, 1996).

For sites where EPA is developing dioxin soil cleanup levels, OERR asks the Regions to consult with Headquarters and the Superfund Dioxin Workgroup as early as possible in the remedy selection process. This consultation process is needed to ensure a consistent transition in implementing the results of the Agency Dioxin Reassessment. *(Headquarters Consultation for Dioxin Sites*, OSWER Directive 9200.4-19, December 13, 1996).

## POINTS OF CONTACT

OERR Focus Area Reviews: Contact staff in individual OERR Regional Accelerated Response Centers.

Removal Program Concurrences: Contact staff in individual OERR Regional Accelerated Response Centers.

National Remedy Review Board: Regional Remedy Review Board members or Bruce Means (OERR) at 703-603-8815.

Lead Sites Management Workgroup: Nick Ceto (Region 10) at 206-553-1816 or Shahid Mahmud (OERR) at 703-603-8789.

Lead Technical Review Workgroup: Pat Van Leeuwen (Region 5) at 312-886-4904, Paul White (Office of Research and Development) at 202-260-2589, or Larry Zaragoza (OERR) at 703-603-8867.

Dioxin Review Workgroup: Marlene Berg (OERR) at 703-603-8701, Elmer Akin (Region 4) at 404-562-8634, or Dwain Winters (Office of Prevention, Pesticides, and Toxic Substances) at 202-260-8558.

**EPA employees can obtain copies of OSWER directives cited in this guide by calling the Superfund Document Center at (703) 603-9232 or sending an e-mail to: "superfund.documentcenter@epamail.epa.gov"**

| **TABLE 1**<br>**OERR FOCUS AREA REVIEWS**<br><br>**<u>Levels of Management Review</u>**<br>**1. Regional Staff (S) and Management (M) (Region)**<br>**2. Office of Emergency and Remedial Response Staff (S) or Management (M) (OERR)**<br>**3. Assistant Administrator for the Office of Solid Waste and Emergency Response (AA)** | 1<br>REGION | 2<br>OERR | 3<br>AA |
|---|---|---|---|
| Submit draft proposed plans[1] to OERR Regional Center Staff for reviews in the following focus areas: (*Focus Areas for Headquarters OERR Support for Regional Decision Making,* OSWER Directive 9200.1-17, May 22, 1996) | | | |
| **1) Risk management and cost-effectiveness decision documentation**<br>• Clear presentation of risks that justify action, using reasonable land use and exposure assumptions<br>• Description of how response action will address risks<br>• Description of other benefits of response action<br>• Determination that effectiveness of response justifies cost | S | S | |
| **2) Ground water policy**<br>• Consistent implementation of presumptive response strategy for contaminated ground water<br>• Consistent implementation of technical impracticability guidance (*Consistent Implementation of the FY1993 Guidance on Technical Impracticability of Ground Water Restoration at Superfund Sites,* OSWER Directive 9200.4-14, January 1995) | S | S | |
| **3) Lead policy**<br>• Consistent implementation of OSWER lead policy and coordination with cross-regional technical and management review groups | S | S | |
| **4) Presumptive remedies**<br>• Appropriate use of presumptive remedies whenever possible | S | S | |
| [1] Consultations are still required for non-time-critical removal actions costing over $5 million (see *SACM Regional Decision Teams* and *Early Action and Long-Term Action Under SACM,* OSWER Directive 9203.1-05I, December 1992). | | | |

| **TABLE 2**<br>**HQ APPROVAL/CONCURRENCE ON REMOVAL ACTIONS**<br><br>**<u>Levels of Management Review</u>**<br>**1. Regional Staff (S) and Management (M) (Region)**<br>**2. Office of Emergency and Remedial Response Staff (S) and Management (M) (OERR)**<br>**3. Assistant Administrator for the Office of Solid Waste and Emergency Response (AA)** | 1<br><br>R<br>E<br>G<br>I<br>O<br>N | 2<br><br>O<br>E<br>R<br>R | 3<br><br>A<br>A |
|---|---|---|---|
| **Removal Program Approval/Concurrence** | | | |
| The Superfund statute established certain limitations on the use of removal actions. Some of the approval authority for exceeding these statutory limitations has been delegated to EPA Regional offices, and some approval authority remains at Headquarters. | | | |
| <u>$2 million statutory limit exemptions</u>: | | | |
| • **Emergency Exemption** requests exceeding $6 million | | | M |
| • **Consistency Exemption** requests for non-NPL sites | | | M |
| • All other exemptions | M | | |
| <u>12-month statutory limit exemptions</u>: | | | |
| • All exemptions to the 12-month statutory limit | M | | |
| In addition, the process for obtaining Headquarters concurrence on **nationally significant fund-lead removal actions** is described in *Guidance on Non-NPL Removal Actions Involving Nationally Significant or Precedent Setting Issues*, OSWER Directive 9360.0-19, March 3, 1989. Subsequent guidance has modified some of these consultation requirements *(Response Actions at Sites with Contamination Inside Buildings*, OSWER Directive 9360.3-12, August 12, 1993). | | | |
| 1) Removal actions at sites within the United States or its territories involving contamination or response actions that may affect other sovereign nations, including Indian Tribes. | | M | |
| 2) Removal actions involving pesticide contamination arising from: a) improper storage of pesticide products awaiting indemnification; b) lawful application of pesticides, including special local use pesticides; or c) grain fumigation operations. | | M | |
| 3) Removal actions at sites involving any form of dioxin when it is one of the principal contaminants of concern. | | M | |
| 4) Removal actions at sites involving releases from consumer products in consumer use (e.g., lead-contaminated soil resulting from peeling lead-based paint on houses). | | M | |
| 5) Removal actions involving asbestos when it is the principal contaminant of concern. | | M | |
| 6) Removal actions involving substances or releases which may be subject to statutory exclusions or limitations in CERCLA. | | M | |
| 7) Response actions at sites with contamination inside buildings (e.g., indoor releases of mercury). | | M | |

| TABLE 3<br><br>CROSS-REGIONAL<br>RESPONSE DECISIONS MANAGEMENT GROUPS<br><br>**Levels of Management Review**<br>**1. Regional Staff (S) and Management (M) (Region)**<br>**2. Office of Emergency and Remedial Response Staff (S) and Management (M) (OERR)**<br>**3. Assistant Administrator for the Office of Solid Waste and Emergency Response (AA)** | 1<br>REGION | 2<br>OERR | 3<br>AA |
|---|---|---|---|
| **1) National Remedy Review Board** (*National Remedy Review Board Progress Report: Fiscal Year 1996*, OSWER Directive 9220.0-24, January 1997; and *National Remedy Review Board Review Criteria for Federal Facility Superfund Sites*, OSWER Directive 9220.0-25, draft). | | | |
| Response selection decisions for <u>all sites</u> (except DOE Radioactive-waste and DOD BRAC sites): | | | |
| • Proposed remedy cost estimate exceeds $30 million | M | M | |
| • Proposed remedy cost estimate exceeds $10 million and is 50% greater in cost than that of the least-costly, protective, ARAR-compliant alternative | M | M | |
| Response selection decisions involving <u>radioactive-waste at DOE sites</u>: | | | |
| • Proposed remedy cost estimate exceeds $75 million | M | M | |
| • Proposed remedy cost estimate exceeds $25 million and is 50% greater in cost than that of the least-costly, protective, ARAR-compliant alternative | M | M | |
| **2) Lead Sites Management Workgroup**<br>*(Per direction of Superfund Waste Management Division Directors' Lead Policy Forum on February 6, 1997.)* | | | |
| • Proposed remedy involves national precedent setting issues | M | M | |

| TABLE 4<br><br>CROSS-REGIONAL TECHNICAL REVIEW GROUPS<br><br>**Levels of Management Review**<br>**1. Regional Staff (S) and Management (M) (Region)**<br>**2. Office of Emergency and Remedial Response Staff (S) and Management (M) (OERR)**<br>**3. Assistant Administrator for the Office of Solid Waste and Emergency Response (AA)** | 1<br>REGION | 2<br>OERR | 3<br>AA |
|---|---|---|---|
| **1) Technical Review Workgroup (TRW) for Lead Sites** *(Administrative Reforms for Lead Risk Assessment,* OSWER Directive 9200.4-20, April 17, 1996) | | | |
| • Send all completed lead risk assessments which used the IEUBK model to the TRW. A review will focus on consistency with guidance. | S | S | |
| • Identify for the TRW all IEUBK risk assessments that are either in planning or underway. | S | S | |
| • Identify for the TRW any application of the IEUBK that is expected to be challenged or will set a precedent in IEUBK application. | S | S | |
| • Send any draft Regional guidance relating to lead to Headquarters for review prior to release. | S | S | |
| • Any IEUBK risk assessment with outputs that are outside the range of 400 ppm to 1200 ppm should be submitted for review. | S | S | |
| • Any adult lead risk assessment that would suggest a preliminary remediation goal (PRG) output outside the range of 500 ppm to 2000 ppm should be submitted for review. | S | S | |
| **2) Technical Review Workgroup for Dioxin Sites** *(Headquarters Consultation for Dioxin Sites,* OSWER Directive 9200.4-19, December 13, 1996) | | | |
| • Submit for review pertinent information for all sites where remediation goals are to be developed for dioxin in soil, regardless of whether dioxin itself drives the decision-making process. | S | S | |

# APPENDIX D:

# RECORDS OF DECISION AND OTHER DECISION DOCUMENTS TO EPA HEADQUARTERS

All Proposed Plans, RODs, ESDs, and ROD Amendments should be sent to the Superfund Document Center at EPA Headquarters within five working days after they have been signed. Signed RODs are abstracted for the ROD Annual Report and the ROD Database. Documents should be sent to:

ROD Clearinghouse
Superfund Document Center
U.S. EPA Mail Code 5202G
401 M Street, SW
Washington, DC 20460

## FORMAT

In order to ensure consistency and to facilitate duplication and readability, please read the following checklist and submit documents accordingly:

- Provide one clear, legible copy of the document (Proposed Plan, ROD, ESD, or ROD Amendment).
- Provide an electronic copy in the currently approved EPA word processing software.
- Follow the formats described in this guidance to the maximum extent practicable.
- Submit complete documents (*i.e.*, do not send sections separately).
- Submit clear copies (*i.e.*, legible and ready to be reproduced).
- Print on white, 8 ½" x 11" paper with black ink only (maps should be reproducible in black and white).
- Copies should be single-sided, unbound, and without tabs (**please do not send bound copies**).
- Landscape pages should be oriented so that the top (long edge) of the landscape page is placed on the left-hand side of the document.
- Every page should be numbered.
- Every page should have 1" margins on each side of the page and at least ½" margins on the top and bottom of each page.
- All documents should be single-spaced.
- For RODs and ROD Amendments, **the signed and dated signature page should always be included**. For ESDs, the publication or notice date should be included.

## ATTACHMENTS, CHARTS, TABLES, MAPS, AND EXHIBITS

- All columns and text should be displayed completely.
- Computer printouts should be legible, especially cost estimate summary sheets. Dot-matrix printouts do not copy well.
- All tables, maps, and text should be on 8 ½" x 11" paper. Do not reduce documents; instead, have the documents reformatted.

## ENFORCEMENT-CONFIDENTIAL INSERTS

- Enforcement-confidential pages should be labeled as such.

# APPENDIX E:

# SOURCES OF INFORMATION

The following is a list of additional documents that may be useful in preparing Superfund decision documents or are pertinent to the remedial decision-making process.

*Administrative Reforms for Lead Risk Assessment* (EPA 540-F-97-015, OSWER 9200.4-20, April 17, 1996).

*Answers to Comments Submitted After the ROD is Signed*, October 11, 1995 (http://www.es.epa.gov/oeca/osre/951011.html).

*Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills* (EPA 540-F-96-020, OSWER 9355.0-67FS, December 1996).

*CERCLA Compliance with Other Laws Manual, Part 1, Interim Final* (EPA 540-G-89-006, OSWER 9234.1-01, August 8, 1988).

*CERCLA Compliance with Other Laws Manual, Part 2, Clean Air Act and Other Environmental Statutes and State Regulations* (EPA 540-G-89-009, OSWER 9234.1-02, August 1989).

*Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA 540-F-98-030, OSWER 9200.4-27P, August 27, 1998).

*Close Out Procedures for National Priority List Sites* (EPA 540-R-95-062, OSWER 9320.2-09, August 1995).

*Community Relations During Enforcement Activities and Development of the Administrative Record* (OSWER 9836.0-1A, November 3, 1988).

*Community Relations in Superfund: A Handbook* (EPA 540-R-92-009, OSWER 9230.0-03C, January 1992).

*Considerations in Ground-Water Remediation at Superfund Sites and RCRA Facilities, Update* (OSWER 9283.1-06, May 27, 1992).

*Consistent Implementation of the FY1993 Guidance on Technical Impracticability of Ground-Water Restoration at Superfund Sites* (EPA 540-F-95-001, OSWER 9200.4-14, January 19, 1995).

*Consolidated Guide to Consultation Procedures for Superfund Response Decisions* (EPA 540-F-97-009, OSWER Directive 9200.1-18FS, May 14, 1997). Available as Appendix C of this guidance.

*Early Action and Long-Term Action Under the Superfund Accelerated Cleanup Model (SACM)* (OSWER 9203.1-05I, Vol. 1, No. 2, December 1992).

*Final Guidance on Administrative Records for Selecting CERCLA Response Actions* (OSWER 9833.3A-1, December 1990).

*Focus Areas for Headquarters OERR Support for Regional Decision Making* (OSWER 9200.1-17, May 22, 1996).

*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final* (EPA 540-G-89-004, OSWER 9355.3-01, October 1988).

*Guidance for Data Useability in Risk Assessment, Parts A and B, Final* (OSWER 9285.7-09A and B, April and May 1992).

*Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration* (EPA 540-R-93-080, OSWER 9234.2-25, October 1993).

*Guidance Manual for the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children* (EPA 540-R-93-081, OSWER 9285.7-15-1, February 1994).

*Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) Under CERCLA and the NCP* (OSWER 9203.1-03, July 7, 1992).

*Guidance on Lead Determinations for CERCLA Fund-financed Responses* (OSWER 9355.2-02, April 1992).

*Guidance on Non-NPL Removal Actions Involving Nationally Significant or Precedent-Setting Issues* (OSWER 9360.0-19, March 1989).

*Guidance on Oversight of Potentially Responsible Party Remedial Investigations and Feasibility Studies: Volumes 1 and 2*, *Final* (EPA 540-G-91-010a and b, OSWER 9835.1(c) and (d), July 1991).

*A Guide to Principal Threat and Low Level Threat Wastes* (OSWER 9380.3-06FS, November 1991).

*A Guide to Selecting Superfund Remedial Actions* (OSWER 9355.0-27FS, April 1990).

*Headquarters Consultation for Dioxin Sites* (EPA 540-F-97-014, OSWER 9200.4-19, December 1996).

*Implementing Presumptive Remedies: A Notebook of Guidance and Resource Materials* (EPA 540-R-97-029, OSWER 9378.0-11, October 1997).

*Incorporating Citizen Concerns into Superfund Decision-Making* (OSWER 9230.0-18, January 1991).

*Institutional Controls: A Reference Manual*, March 1998, Draft.

*Interim Guidance on Addressing Immediate Threats at NPL Sites* (OSWER 9200.2-03, January 1990).

*Interim Final Guidance on Preparing a Superfund Memorandum of Agreement (SMOA)* (OSWER 9375.0-01, May 1989).

Internet Home Page for EPA's Technical Review Workgroup for Lead (http://www.epa.gov/superfund/programs/lead/index.htm).

*Land Use in the CERCLA Remedy Selection Process* (EPA 540-R-95-052, OSWER 9355.7-04, May 1995).

*National Remedy Review Board Progress Report*: *Fiscal Year 1996* (EPA 540-R-97-001, OSWER 9220.0-24, January 1997).

*National Remedy Review Board Progress Report*: *Fiscal Year 1997* (EPA 540-R-97-032, OSWER 9220.0-26, February 1998).

*National Oil and Hazardous Substances Pollution Contingency Plan (The NCP)* (OSWER 9200.2-14, January 1992).

*Presumptive Remedies and NCP Compliance* (Memorandum from James E. Costello, Chairperson CERCLA Administrative Records Workgroup, ORC, Region VI, and George B. Wyeth, Office of General Counsel, June 14, 1995).

*Presumptive Remedies for Soils, Sediments, and Sludges at Wood Treater Sites* (EPA 540-R-95-128, OSWER 9200.5-162, December 1995).

*Presumptive Remedies: Policies and Procedures* (EPA 540-F-93-047, OSWER 9355.0-47FS, September 1993).

*Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils* (EPA 540-F-93-048, OSWER 9355.0-48FS, September 1993).

*Presumptive Remedy for CERCLA Municipal Landfill Sites* (EPA 540-F-93-035, OSWER 9355.0-49FS, September 1993).

*Presumptive Remedy for Sites with Metals in Soils* (forthcoming).

*Presumptive Remedy: Supplemental Bulletin Multi-Phase Extraction (MPE) Technology for VOCs in Soil and Ground Water* (EPA 540-F-97-004, OSWER 9355.0-68FS, April 1997).

*Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, Final Guidance* (EPA 540-R-96-023, OSWER 9283.1-12, October 1996).

*Publishing Effective Public Notices* (OSWER 9378.0FS, April 1997).

*Questions and Answers About the State Role in Remedy Selection at Non-Fund-Financed Enforcement Sites* (OSWER 9831.9, April 1991).

*Remedial Action Costing Procedures Manual* (EPA 600-8-87-049, October 1987).

*Remedy Cost Estimating Procedures Manual: A Guide to Developing and Documenting Remedial Alternative Cost Estimates During the Feasibility Study* (EPA 540-R-98-045, OSWER 9355.0-10B-P, Draft).

*Response Actions at Sites with Contamination Inside Buildings* (OSWER 9360.3-12, August 12, 1993).

*Restoration Advisory Board Implementation Guidelines* (U.S. EPA and Department of Defense, September 27, 1994).

*Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA 540-F-94-043, OSWER 9355.4-12, July 1994).

*Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (PartA), Interim Final* (EPA 540-1-89-002, December 1989).

*Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), Interim Final* (OSWER 9285.7-01B, December 1991). [Note: *Soil Screening Guidance* provides improvements in inhalation and ground water exposure pathway discussions.]

*Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part C, Risk Evaluation of Remedial Alternatives), Interim Final* (EPA 540-R-92-004, OSWER 9285.7-01C, December 1991).

*Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments) Interim Final*, (EPA 540-R-97-033, OSWER 9285.7-01D, January 1998).

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