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REPLY TO ATTN OF: Office of Environmental Guidance (EH-23 I): DiCerbo:6-5047

SUBJECT: Comparison of the RCRA Corrective Action and CERCLA Remedial Action Processes

TO: Distribution

The purpose of this memorandum is to provide Department of Energy Program Offices and Field Organizations with a copy of an environmental guidance document entitled: ***A Comparison of the RCRA Corrective Action and CERCLA Remedial Action Processes,*** prepared by the Office of Environmental Guidance, RCRA/CERCLA Division (EH-231).

The intent of the attached document is to provide a comprehensive "side-by-side" comparison of the RCRA corrective action and the CERCLA remedial action processes. Unlike the typical narrative style, this document does not read like a book; on the even-numbered pages a discussion of the RCRA corrective action process is presented, and on the odd-number pages a comparative discussion of the CERCLA remedial action process can be found. Because the two programs have a different structure, there is not always a direct correlation between the two throughout the document.

The document serves as an informative reference for Departmental and contractor personnel responsible for oversight or implementation and integration of RCRA corrective action and CERCLA remedial action activities at DOE environmental restoration sites. EH-231 wishes to express its appreciation to those participating Program Offices and Field Organizations for the comprehensive and professional job provided in reviewing the draft guidance and assisting us in finalizing this document.

Questions regarding the attached document may be directed to Jerry DiCerbo at (202) 586-5047 or Mark Petts at (202) 586-2609 of my staff.

Thomas T. Traceski
Director, RCRA/CERCLA Division
Office of Environmental Guidance

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Environmental Guidance

A Comparison of the RCRA Corrective Action and CERCLA Remedial Action Processes

February 1994

U.S. Department of Energy
Office of Environmental Guidance
RCRA/CERCLA Division, EH-231
Washington, DC 20585

TDOE F 1325.8
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DOE/EH-0365

A Comparison of the RCRA Corrective Action and CERCLA Remedial Action Processes

FEBRUARY 1994

Prepared by

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENVIRONMENTAL GUIDANCE
RCRA/CERCLA DIVISION
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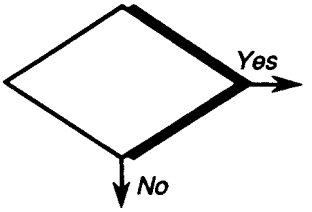
Flowchart Symbols

Flowcharts are a central element of this guidance. The flowcharts provide step-by-step procedures required in the CERCLA remedial and RCRA Corrective Action processes. All of the flowcharts in this guidance use four symbols; these symbols are as follows:

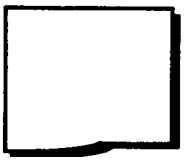
Ovals represent the beginning of a new flowchart;

Solid Line Rectangles indicate actions that should be completed;

Diamonds represent decision points (evaluate the question contained in the diamond and follow the appropriate path: Yes or No);



•Piano **Shape** represents documents; and



• **Shaded Thin Dashed Line Rectangles** usually contain notes ('continued on,“ ''continued from,” or “proceed to”), which direct the reader to different parts of the flowchart or the quidance.

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Chapter 1
An Introduction to the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act

I. Introduction 1-1

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Chapter 1
An Introduction to RCRA and CERCLA

I. Introduction

The U.S. Department of Energy (DOE) must comply with an increasingly complex spectrum of environmental regulations. Two major programs requiring DOE compliance address both the investigation and the remediation of releases of hazardous substances and hazardous wastes into the environment. These two programs, the corrective action program of the Resource Conservation and Recovery Act of 1976 (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA) and the remedial response program of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), are the two main regulatory programs that directly impact Environmental Restoration activities at DOE facilities.

This guidance document is intended as a comprehensive overview and comparison of the RCRA Corrective Action and CERCLA remedial response programs. ***The document does not read like*** *a* ***book–on the even-numbered pages is a discussion of the steps in the RCRA Corrective Action process, and on the odd-numbered pages is a discussion of the analogous steps in the CERCLA Remedial Action process.*** *Because the two programs have a different structure, there is not always a direct correlation, but one can see, based on the discussion of one program, approximately where one would be in the other program. Further, this document does not draw extensive distinctions between the two programs, nor does it discuss DOE policy on integrating environmental restoration activities under both programs.* ***The document was developed to be useful to those facility Environmental Restoration personnel who are new, and as a refresher to all other personnel who are responsible for oversight or implementation and integration of RCRA Corrective Action and CERCLA remedial response activities at DOE facilities.***

This guidance document is designed to be used in tandem with, not in lieu of, other documents on RCRA Corrective Action and CERCLA remedial response actions such as DOE or EPA guidance documents; Federal Facility Compliance Agreements; Inter-Agency Agreements; DOE Orders; and appropriate guidance and regulations based on other Federal, State, and local requirements.

A list of references used appears at the end of each chapter. A detailed listing of other guidance documents related to RCRA Corrective Action and CERCLA remedial response is provided in Appendix 2 of this document. These documents are available from the DOE Office of Scientific and Technical Information (OSTI) or the National Technical Information Service (NTIS). Information on how to contact these organizations is provided at the beginning of Appendix 2.

How to Use This Guidance

This guidance document provides an overview graphic of each topic, followed by a more detailed presentation using both graphics and text. To use the document, follow the sequence in the overview graphic on pages 1-6 and 1-7 to determine what portion of the process is of interest, then turn to the appropriate chapter and module. ***Within each module the information related to RCRA Corrective Action is presented on the left page and the corresponding CERCLA Remedial Action information is presented on the right page.***

On page 3 of the Table of Contents is a key to the symbols used in the flow charts contained in this guidance document.

II. Background: The Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) was signed into law in 1976. The purpose of RCRA is to protect human health and the environment through a comprehensive approach to hazardous and solid waste management at facilities *currently in operation.* This document focuses on Subtitle C, Hazardous Waste Management. Two other important subtitles of RCRA are Subtitle D, Solid Waste Management, and Subtitle I, Underground Storage Tanks.

The key elements of Subtitle C are the establishment of the following:

- **Methods for classifying waste as hazardous waste;**
- **A "cradle-to-grave" tracking system for hazardous wastes;**
- **Standards for generators and transporters of hazardous waste;**
- **A Parmitting program and standards for the design and operation of hazardous waste treatment, storage, or disposal facilities (TSDFs); and**
- **Requirements for facilities to imoplement hazardous waste minimization programs.**

In 1984, Congress amended RCRA with the Hazardous and Solid Waste Amendments (HSWA). Some key provisions of HSWA include the following:

- **Regulation of small-quantity generators of hazardous waste,**
- **Requirements for the cleanup of releases of hazardous waste or hazardous waste constituents from any solid waste management unit (SWMU) at TSDFS,**
- **Restrictions on land disposal of hazardous wastes,and**
- **Regulation of underground storage tanks (USTs) (Subtitle I).**

Each of these elements is intended to aid in reducing total quantity of hazardous waste generated and to help prevent releases of hazardous wastes to the environment.

Section 6001 of RCRA indicates that RCRA applies to Federal agencies. This section of RCRA states the following:

> *Each department, agency, and instrumentality of... the Federal Government (1) having jurisdiction over any solid waste management facility or disposal site, or (2) engaged in any activity resulting in, or which may result in, the disposal or management of solid waste or hazardous waste shall be subject to, and comply with, all Federal, State, interstate, and local requirements.*

Through this requirement, Federal agencies must comply with RCRA, including RCRA §3008(h) Corrective Action Orders, and the terms of permits issued under RCRA authority.

Federal agencies are also required to comply with RCRA under Executive Order 12088, *Federal Compliance with Pollution Control Standards.* Under E.O. 12088, all Federal agencies must submit pollution control plans and request funding to implement and support pollution control activities.

Lastly, under DOE Order 5400.3, *Hazardous and Radioactive Mixed Waste Program,* all DOE facilities are required to do the following:

- **Comply with the requirements of RCRA and the Atomic Energy Act [AEA) for the management of hazardous and radioactive mixed wastes generated by operations;**
- **Protect the environment and the safety of the public, DOE, and contractor employees through safe handling, transportation, treatment storage, and disposal of hazardous end radioactive mixed wastes generated through DOE operations: and**
- **Implement waste minimization procedures as specified in RCRA for hazardous end radioactive mixed wastes.**

For an overview graphic of the RCRA Corrective Action process, see Figure 1.

III. Background: The Comprehensive Environmental Response, Compensation, and Liability Act

Congress enacted and the President signed into law CERCLA (as amended by SARA) to identify and remediate sites where hazardous substances were, or could be, released into the environment. This is the primary difference between CERCLA and RCRA–CERCLA addresses uncontrolled releases of hazardous substances often from facilities no longer in operation where contamination resulted from past practices; by contrast, RCRA focuses on prevention and remediation of releases from currently operating facilities.

CERCLA applies to all Federal agencies. Section § 120(a)(1) of CERCLA states:

> *Each department, agency, and instrumentality of the United States (including the executive, legislative, and judicial branches of government) shall be subject to, and comply with, this Act in the same manner and to the same extent, both procedurally and substantively, as any non-governmental entity.*

This intent is continued in CERCLA § 120(a)(2), which requires:

> *All guidelines, rules, regulations, and criteria which are applicable to preliminary assessments carried out under this chapter for facilities at which hazardous substances are located, applicable to evaluations of such facilities under the National Contingency Plan, applicable to inclusion on the National Priorities List, or applicable to remedial actions at such facilities shall also be applicable to facilities which are owned or operated by a department, agency, or instrumentality of the United States in the same manner and to the same extent as such guidelines, rules, regulations, and criteria are applicable to other facilities.*

Section 120 of CERCLA also includes many requirements applicable *only* to Federal agencies. These include the following requirements:

- **All potential Federal CERCLA sites be listed on the Federal Agency Hazardous Waste Compliance Docket (referred to as "the Docket"):**
- **The responsible Federal agency complete a preliminary assessment {PA) for each site listed on the Docket;**
- **National Priorities List (NPL) listing decisions be made for those sites on the Docket;**
- **For Federal sites on the NPL, the responsible Federal agency, in consultation with the Environmental Prutection Agency (EPA). commence are medial investigation/feasibility study (RI/FS) within 6 months of NPL fisting:**
- **The responsible Federal agency enter into en lnter-Agancy Agreement (IAG) with EPA to conduct a remedial action (RA) within 180 days of the completion of the RI/FS and**
- **There be "substantial progress" in conducting the RA within 15 months of completion of the RI/FS .**

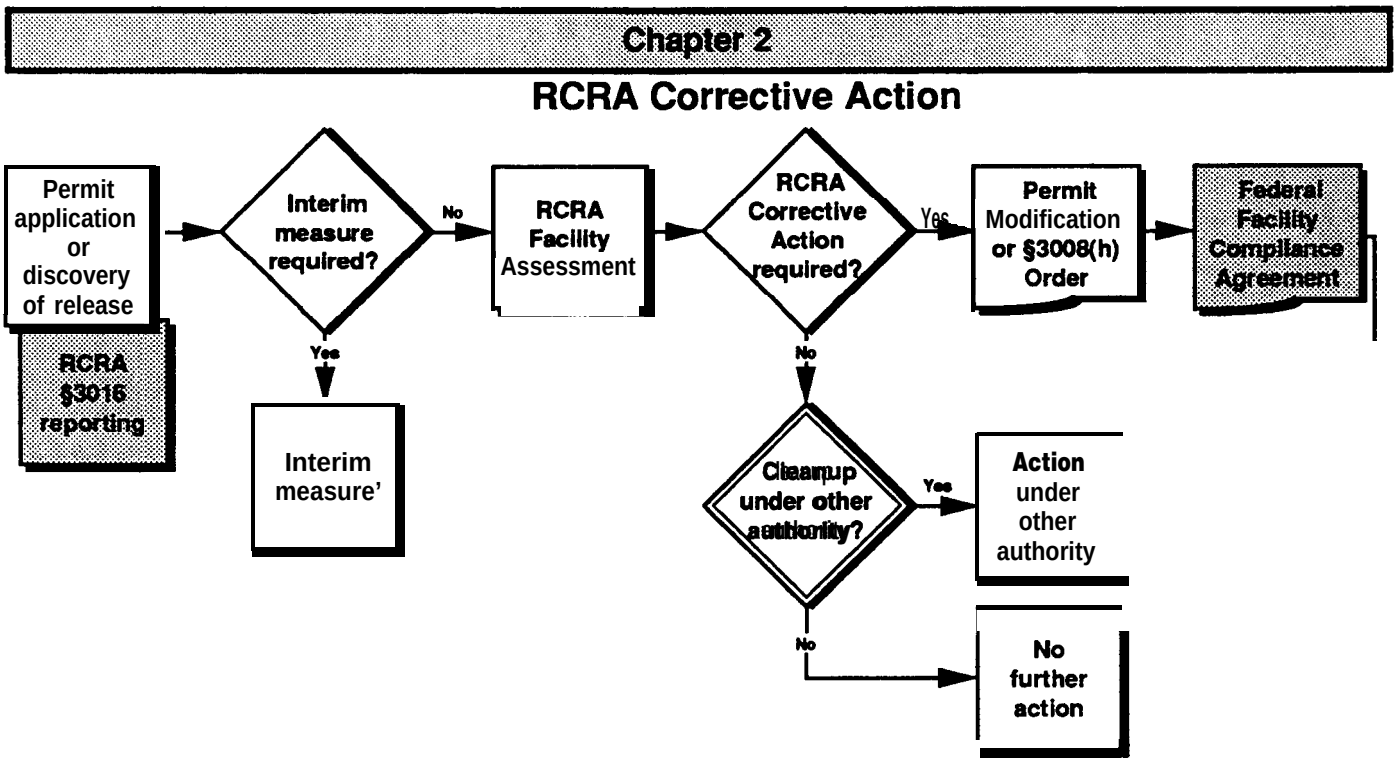
Executive Order 12580, *Superfund Implementation,* delegated the responsibility for CERCLA compliance at Federal facilities to the responsible official for that facility (i.e., the Secretaries of Defense and Energy, and the heads of all other Executive Branch departments or agencies).

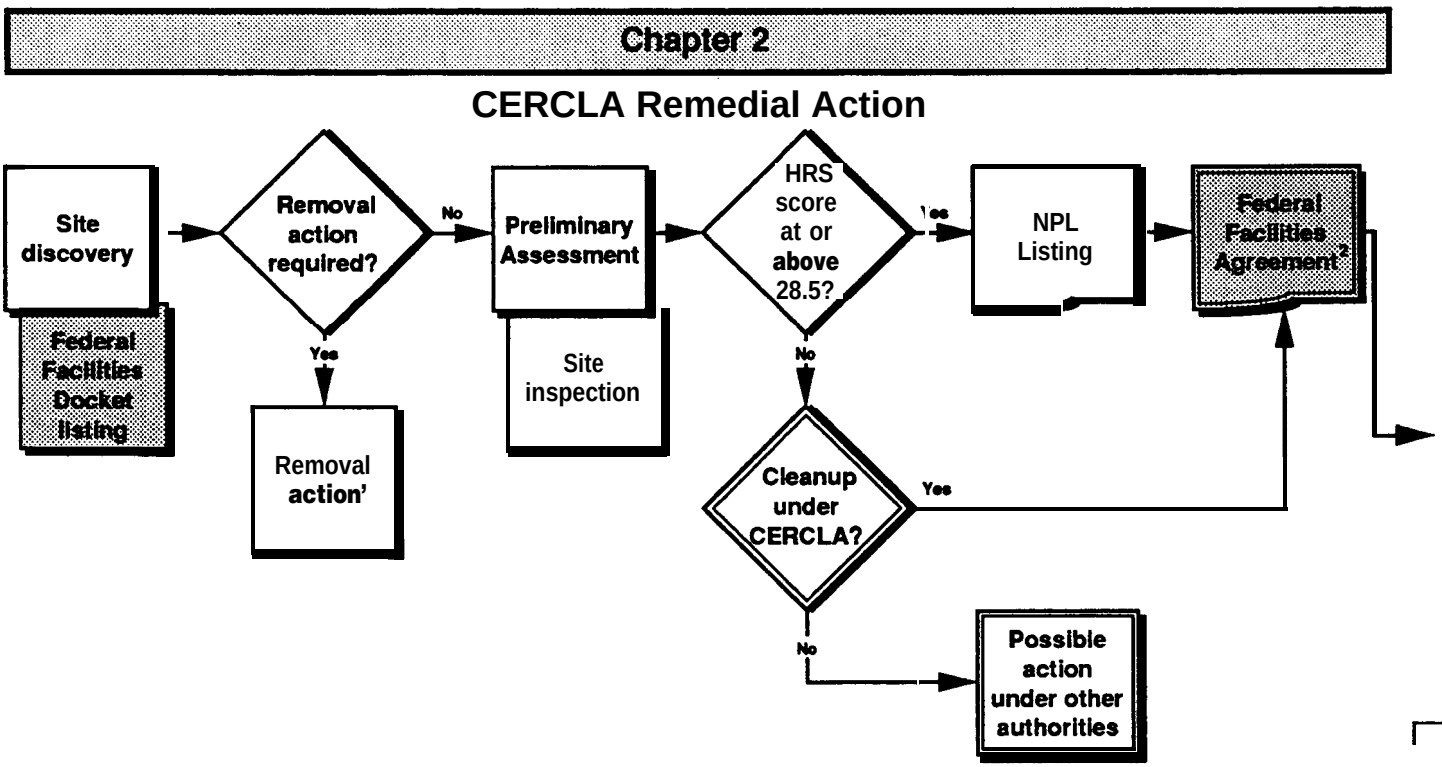
Also, DOE issued Order 5400.4, *The Comprehensive Environmental Response, Compensation, and Liability Act Requirements,* establishing DOE's policy regarding CERCLA compliance at DOE facilities. The requirements of DOE Order 5400.4 include the following:

- **Responding to releases of hazardous substances from facilities under DOE jurisdiction or control,**
- **Entering into Federal Facility Agreements (FFAs) with EPA end the State (a type of IAG) et both NPL and non-NPL sites for the purpose of conducting RI/FSs and remedial design/remedial actions (RD/RAs),**
- **Where appropriate, integrating RCRA Corrective Action with CERCLA remedial actions to ensure that the RCRA Corrective Action are not inconsistent with the Nationail Oil and Hazardous Substances Pollution Contingency Plan (NCP),**
- **Conducting natural resource damage assessments as required for resources under DOE trusteeship.**

For an overview graphic of the CERCLA process, see Figure 1.

Figure 1
Overview Graphic



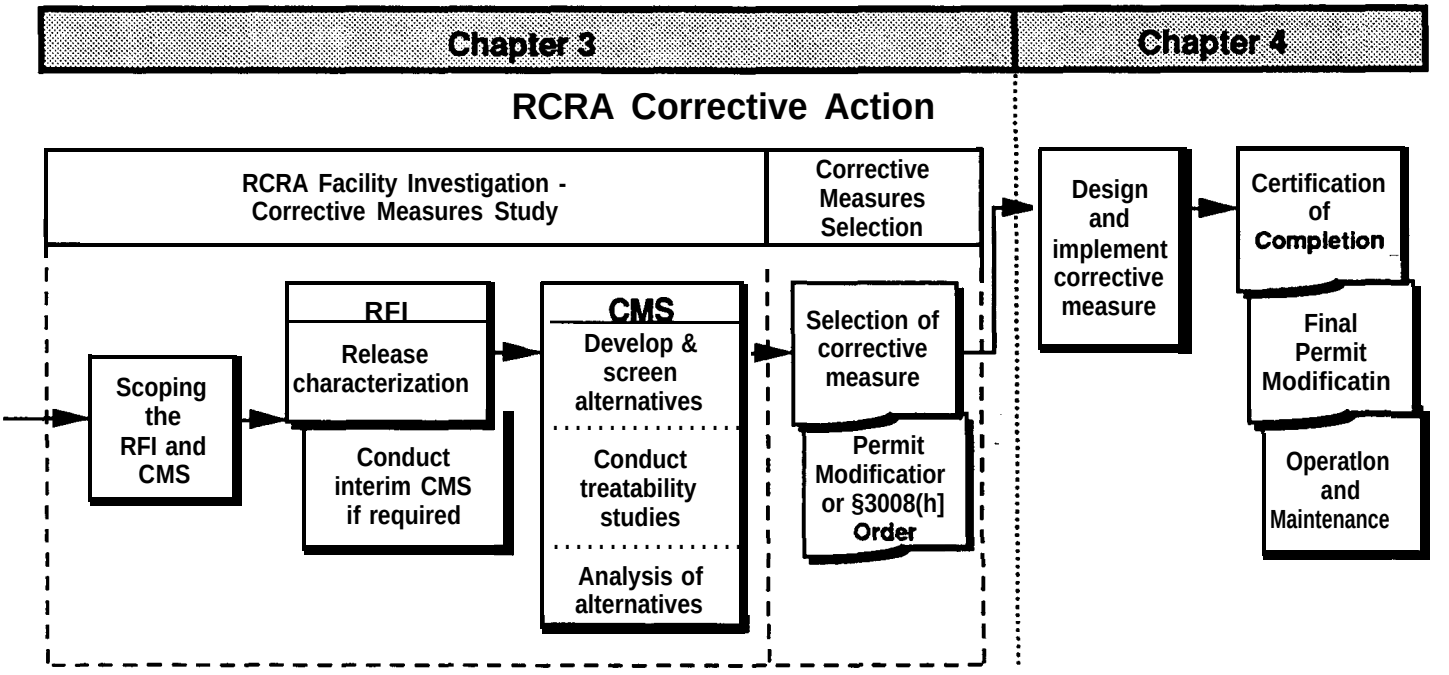


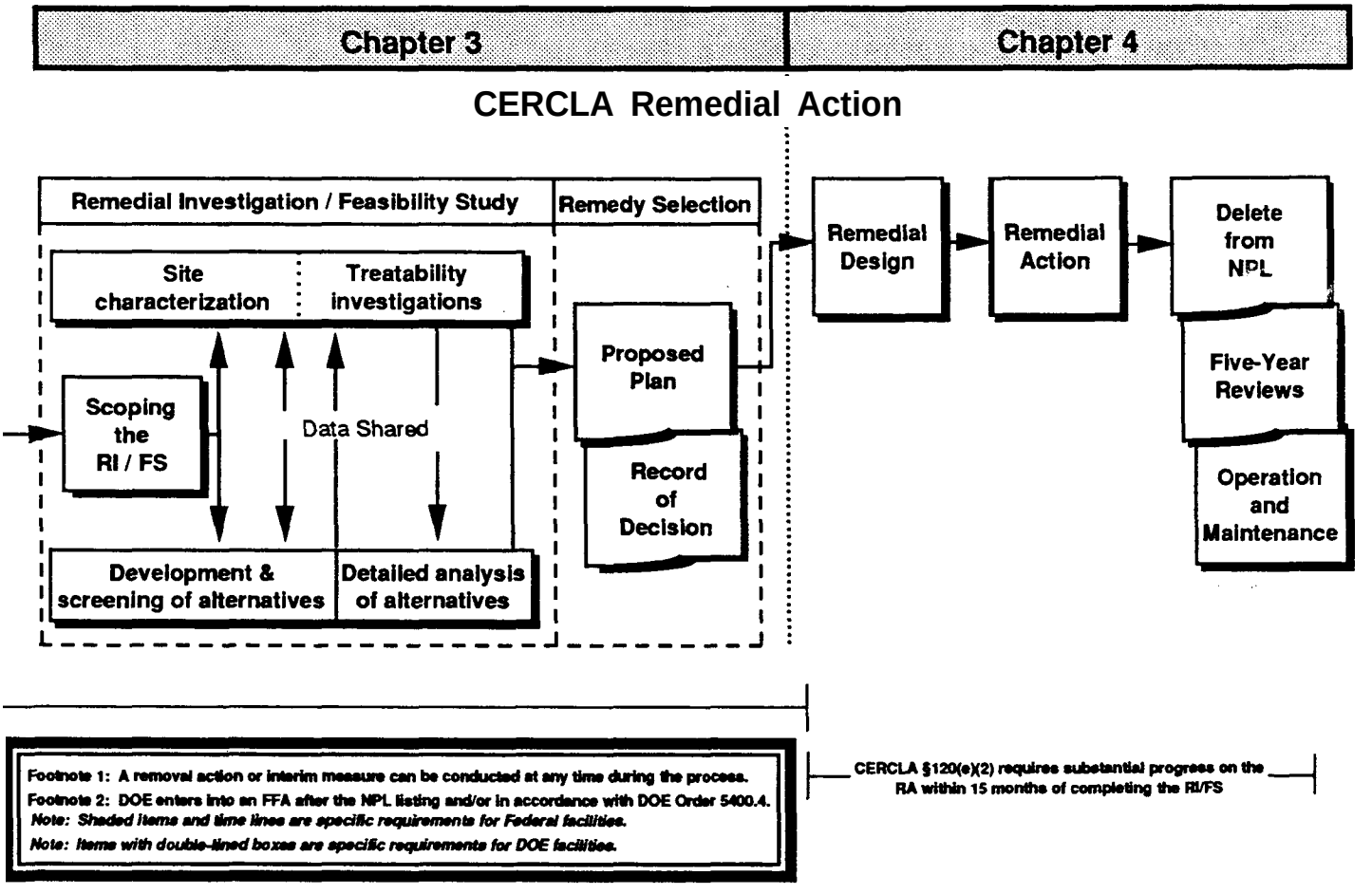
CERCLA §120(d)requires that a PA be completed within 18 months from listing on the Federal Facilities Docket

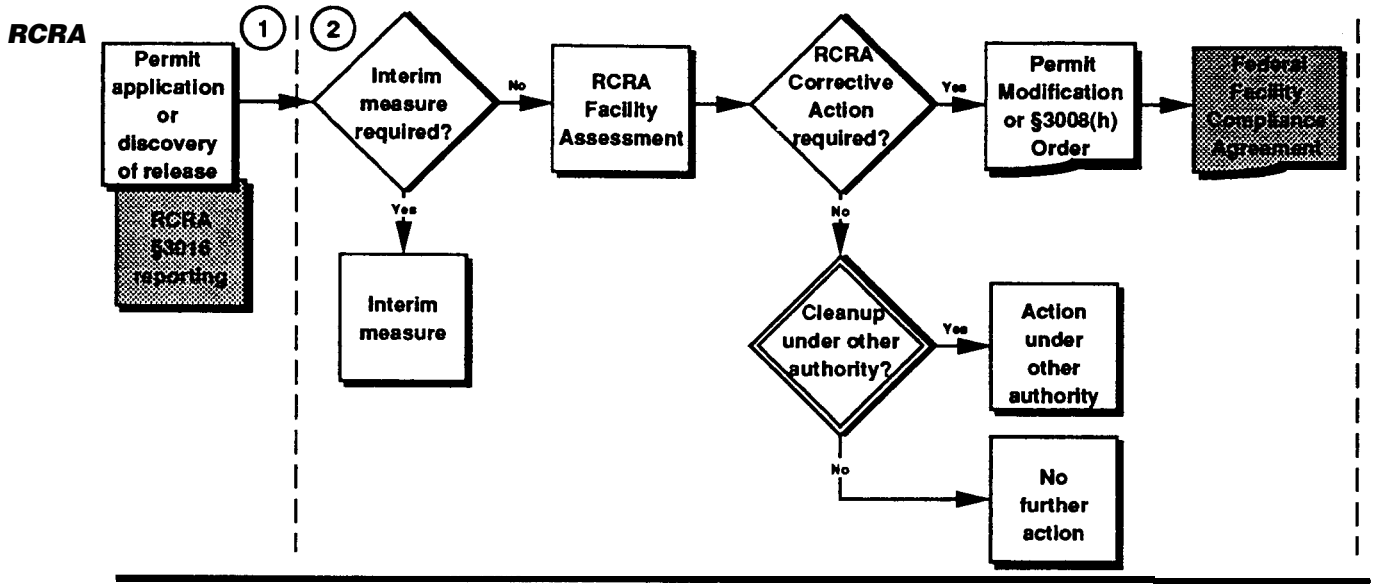
CERCLA §120(d) and EPA policy require the final NPL listing decision within 30 months of Docket listing

CERCLA §120(e)(2)reguires an IAG (or FFA) be signed within 6 months of completing the RI/FS. DOE enters into an FFA after the NPL listing or when a decision is made to conduct the remediation consistent with CERCLA and the NCP

Figure 1
Overview Graphic







Iv. Overview of the RCRA Corrective Action Program

On July 27, 1990, EPA issued a proposed rule (55 FR 30798) establishing the procedures and technical requirements for conducting corrective action under RCRA. This proposed rule creates *40* CFR Part 264 Subpart S, *Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities.* Although Subpart S is only a proposed rule, EPA is encouraging its use as guidance for conducting corrective action activities. The proposed Subpart S rule creates a four-phased approach to RCRA Corrective Action: (1) the RCRA Facility Assessment (RFA); (2) the RCRA Facility Investigation (RFI); (3) the Corrective Measures Study (CMS) and selection of the corrective measure; and (4) the Corrective Measures Implementation (CMI).

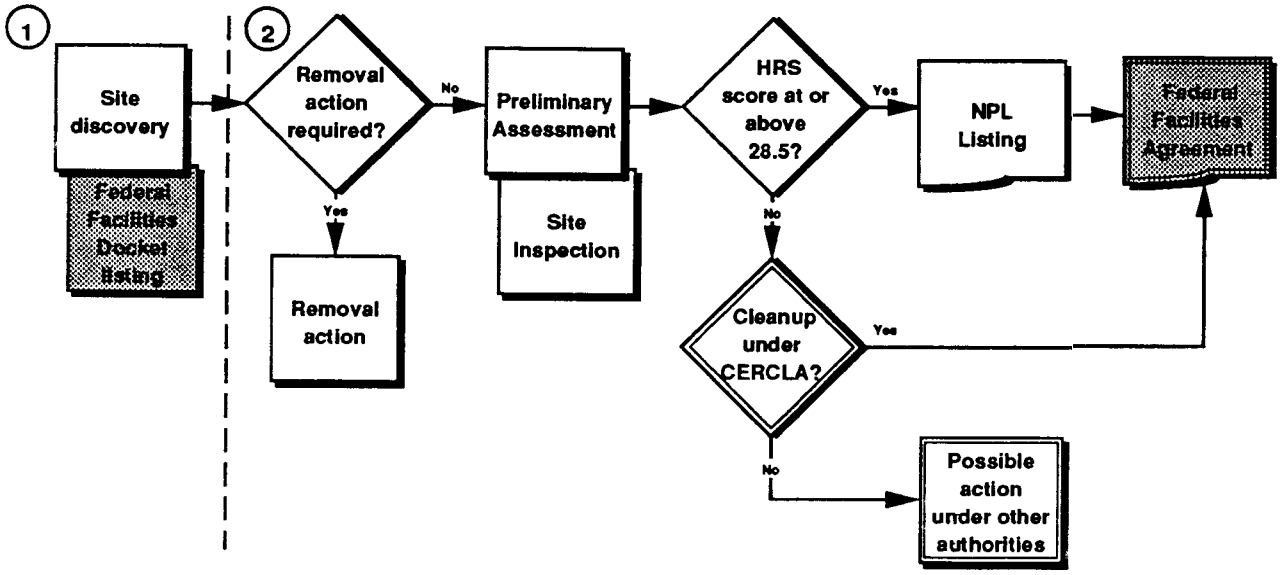
1. When Corrective Action Is Required

Facilities may be required to initiate corrective action in the following circumstances: (1) when applying for a RCRA permit to treat, store, or dispose of hazardous waste; (2) upon discovering a release of hazardous waste or hazardous waste constituents from a SWMU at a permitted or interim status facility; or (3) upon discovering additional SWMUs or releases from SWMUs at a facility already conducting corrective action. In any case, when a release of hazardous waste or hazardous waste constituents is discovered, further corrective action is required through modification of the facility's permit, or through a RCRA §3008(h) Order.

2. The RCRA Facility Assessment (RFA)

The RFA is the first phase in the corrective action process. EPA will conduct (or require the permittee to conduct) the RFA. The RFA consists of a review of existing information about a facility, a visit to the facility, and if warranted, sampling of environmental media to determine if there is an actual or potential release of hazardous wastes or hazardous waste constituents from SWMUs at the facility.

If the RFA results in a finding that an actual or potential release of hazardous waste or hazardous waste constituents exists, the facility permit will require modification, or, in the case of an interim status facility, issuance of a RCRA §3008(h) Order to require an RFI. A Federal Facility Compliance Agreement (FFCA) between DOE and EPA will also be developed to require the facility to conduct further studies. If RCRA Corrective Action is not the correct legal authority for addressing the contamination, DOE will examine the requirements for remediation under other legal authorities, such as CERCLA. If no remediation is required, a "Determination of No Further Action" is issued by EPA.



V. Overview of the CERCLA Remedial Action Program

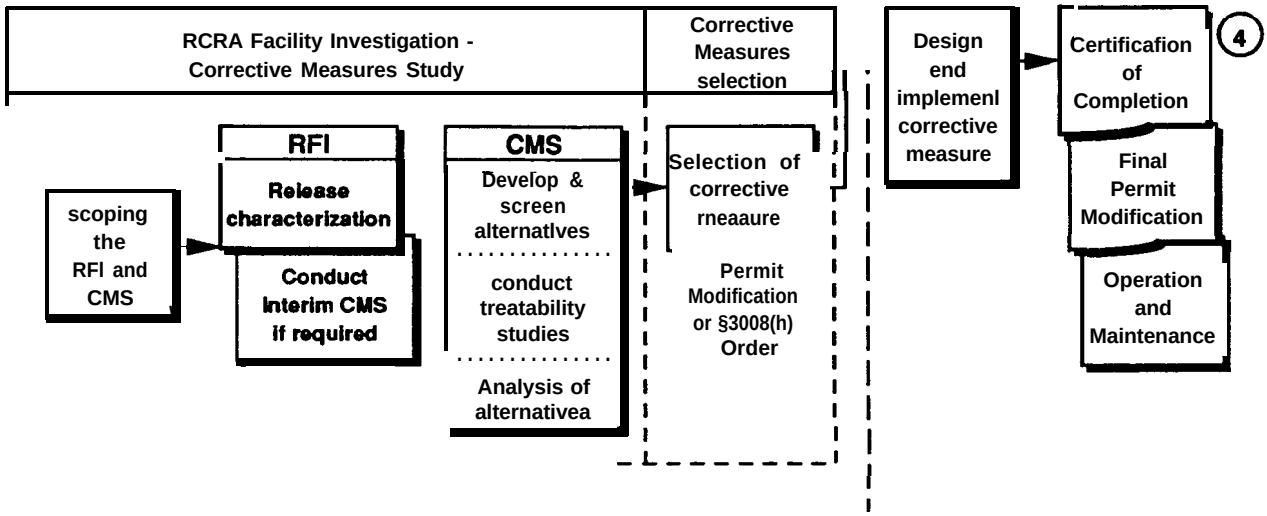
Procedural and technical standards for conducting CERCLA response activities are codified at 40 CFR Part 300, *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) (55 FR 8666, March 8, 1990). The NCP establishes four phases to respond to releases of hazardous substances under CERCLA: (1) site discovery; (2) conducting a site assessment, and, if warranted, listing the site on the NPL; (3) performing a remedial investigation/feasibility study (RI/FS); and (4) implementing the remedy through remedial design and remedial action (RD/RA). The Superfund Accelerated Cleanup Model (SACM) seeks to remove the distinction between these phases by using a streamlined site screening and assessment process, consistent with the NCP, to collect data to support early action (i.e., 3-5 years) to eliminate public health risks. These actions will be followed by longer term studies and actions to restore contaminated media.

1. Site Discovery

Site discovery, the first phase of the CERCLA response, occurs through various means, including reports of releases to EPA, investigations by government authorities, land inventories or surveys, or incidental discoveries. All instances should be reported to the National Response Center and all Federal sites listed on the Federal Agency Hazardous Waste Compliance Docket.

2. Site Assessment

Site assessment, the second phase in the CERCLA remedial process, is outlined in the NCP at 40 CFR §300.420, and has several steps. Its investigative aspects are similar to the RCRA Corrective Action process. First, DOE conducts a remedial preliminary assessment (PA), a “desktop” review of available information about the site, involving the collection of demographic information and physical characteristics. Sites not posing sufficient threat to human health or the environment to warrant CERCLA response are screened out. The second step, remedial site inspection (SI), may be required to further evaluate site conditions. The remedial SI is a more detailed investigation of site conditions, usually involving sampling of environmental media. Information from the remedial PA and remedial SI is the basis for the third step–scoring the site using the Hazard Ranking System (HRS) (40 CFR 5300.425). This differs from the RCRA process in that RCRA Corrective Action does not use a site-ranking model. The HRS is a model for assessing the site’s relative threat to human health and the environment. If a site scores at or above 28.5, it may be placed on the NPL, and an RI/FS will be required. For sites that are not listed, DOE’s policy is to remediate contaminated sites using CERCLA or, when appropriate, other authorities, such as RCRA. Within 6 months of NPL listing, DOE policy requires that the facility enter into an FFA or IAG with EPA and the State to establish the requirements for conducting the RI/FS.



In addition to the RFA, under proposed 40 CFR §264.540, interim measures may be conducted during this phase (or any other phase) of the corrective action process. Interim measures are actions taken to mitigate actual or potential threats while a long-term, comprehensive, corrective action strategy is being developed.

3. The RCRA Facility Investigation and Corrective Measures Study

The RFI is the second phase of the RCRA Corrective Action process. As described under proposed 40 CFR §264.510-13, the RFI is a detailed investigation to determine the nature, extent, and migration rate of the release, if any, and to provide information necessary for developing a strategy for addressing contamination. While similar to the CERCLA RI, the RFI is more focused and generally pertains to characterization of releases from SWMUs, rather than characterization of the entire facility.

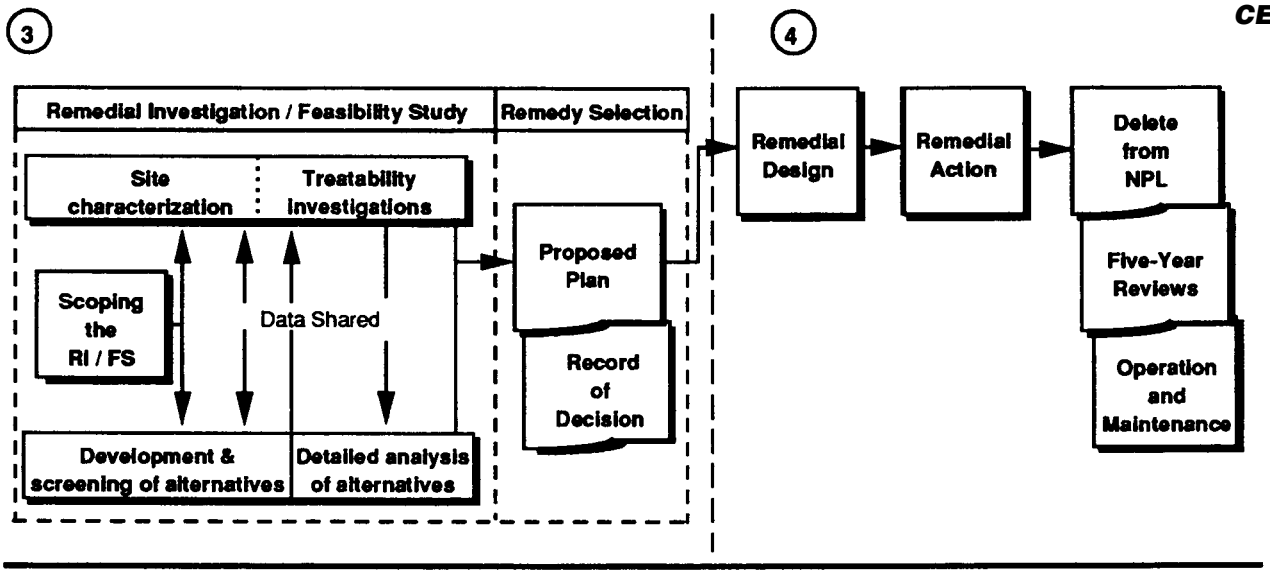
The CMS is the third phase of the RCRA Corrective Action process, as is described in proposed 40 CFR §264.520-24. If the RFI results in a finding that there is a need to implement a corrective measure, the CMS serves as a focused examination of the alternatives for the corrective measure. The CMS corresponds to the CERCLA FS.

Following the CMS, a permit modification or RCRA §3008(h) Order and an FFCA or IAG are developed to select the technology to be used as the corrective measure at the facility.

4. Corrective Measures Implementation

Implementation of the corrective measure selected for the site is conducted during the fourth phase of the RCRA Corrective Action process. Under proposed 40 CFR §264.527-31, this phase includes all aspects of design, construction, operation, and completion of the corrective measure, and parallels the CERCLA RD/RA process. Upon completion of the corrective measure, the facility is issued a final permit modification ending the requirements for RCRA Corrective Action.

On February 16, 1993, EPA issued as a final rule a portion of the Subpart S proposed rule. This rule, *Corrective Action Management Units [CAMUs] and Temporary Units* [TUs]; *Corrective Action Provisions (58 FR 8658),* accomplished the following: (1) created 2 new classes of waste management units, CAMUs and TUs; (2) created a new class of hazardous wastes called "remediation wastes"; (3) provided an exemption from the land disposal restrictions for remediation wastes managed in CAMUs; and (4) codified several new definitions under RCRA.



At any time during a CERCLA response a removal action can be conducted. Removals, as described under 40 CFR §300.415, are those actions taken to mitigate immediate threats to human health and the environment. There are three types of removals: emergency removals where action is required within hours or days, time-critical removals where up to 6 months can elapse before action is necessary, and non-time-critical removals where more than 6 months can elapse before action is taken.

3. The Remedial Investigation/Feasibility Study

The third phase of the CERCLA remedial process is an RI/FS (40 CFR §300.430). The RI/FS characterizes the site and evaluates various alternatives for remediation of the site. Unlike the SI, the RI is the collection of sufficient detailed information to characterize site conditions, determine the nature and extent of the contamination, evaluate risks posed by the site, assess the performance of options for remediation, and make an informed risk management decision. The FS involves development, screening, and detailed evaluation of each remedial option. The RI and FS are conducted concurrently. This is a principal difference between the CERCLA RI/FS and the RCRA RFI and CMS. Under RCRA, the RFI and CMS are not necessarily conducted concurrently. The RI/FS phase leads to the selection of the remedial option, the development of a proposed plan, and the signing of the Record of Decision (ROD). Once the ROD is signed, the RI/FS phase is completed.

4. The Remedial Design and Remedial Action

The fourth phase of the CERCLA remedial process, outlined under 40 CFR §300.435, is the RD/RA, where the selected remedy is actually implemented. The RD involves all aspects of designing the remedial action including development of technical drawings, specifications, operational guidance, and training. The RA involves the actual construction, operation, and monitoring of the remedial action selected to clean up the contamination at the site. Depending upon site conditions, an RA may continue for many years. Upon completion of the RA and demonstration that the site has been remediated to the required levels, the site is deleted from the NPL.

Summary

Topic	RCRA
Statutory Citation	The Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984
Applicable Executive Orders	E.O. 12088, Federal Compliance with Pollution Control Standards
Applicable DOE Orders	Order 5400.3, Hazardous and Radioactive Mixed Waste Program
Timeframes for Initiation of Response	Established in the facility permit
Types of Releases Addressed	Release of hazardous waste or hazardous waste constituents from a solid waste management unit (SWMU) at an operating RCRA facility
Phases in Process	• Interim measures • RCRA Facility Assessment • RCRA Facility Investigation • Corrective Measures Study • Selection of corrective measure and permit modification • Corrective Measures Implementation

S u m m a r y

Topic	CERCLA
Statutory Citation	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986
Applicable Executive Orders	E.O. 12580, *Superfund Implementation*
Applicable DOE Orders	Order 5400.4, *The Comprehensive Environmental Response, Compensation, and Liability Act Requirements*
Timeframes for Initiation of Response	• CERCLA §120 requires that all Federal CERCLA sites be listed on the Docket • The responsible Federal agency must complete a PA for each site listed on the first Docket within 18 months of October 18, 1986 • The final NPL listing decision for those sites on the first Docket must be completed within 30 months of October 18, 1986 • For Federal sites on the NPL, the responsible Federal agency, in consultation with EPA, must commence an RI/FS within 6 months of NPL listing • The responsible Federal agency must enter into an IAG with EPA and the State to conduct an RA within 180 days after the completion of the RI/FS • There must be "substantial progress" in conducting the RA within 15 months after completion of the RI/FS
Types of Releases Addressed	Uncontrolled releases of hazardous substances
Phases in Process	• Removal actions • Preliminary Assessment • Site Inspection • Remedial Investigation/Feasibility Study • Selection of remedy and Record of Decision • Remedial Design/Remedial Action

References

Executive Order 12088, *Federal Compliance with Pollution Control Standards.*

Executive Order 12580, *Superfund Implementation.*

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act [SARA)). 42 USCA §9601 et seq.

The National Oil and Hazardous Substances Pollution Contingency Plan. (40 CFR Part 300).

The Resource Conservation and Recovery Act (RCRA) (as amended by the Hazardous and Solid Waste Amendments [HSWA]). 42 U.S.C. §6901 et seq.

US DOE. *USDOE Order 5400.3, Radioactive and Hazardous Waste Management.*

USDOE. *USDOE Order 5400.4, The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Requirements.* October 6, 1988.

USDOE. *RCRA Corrective Action Program Guide (Interim Guidance).* Washington, D. C.: US DOE. May 1993.

USEPA. *Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities (Proposed Rule). 55* FR 30798, July 27, 1990.

USEPA. *Corrective Action Management Units and Temporary Units; Corrective Action Provisions (Final Rule). 58* FR 8658, February 16, 1993.

USEPA. *Federal Facilities Hazardous Waste Compliance Manual.* Washington, DC: USEPA. January 1990.

USEPA. *Guidance for Conducting Preliminary Assessments Under CERCLA.* Washington, DC: USE PA. September 1991.

USEPA. *Guidance for Conducting Remedial Investigations/Feasibility Studies (RI/FS) Under CERCLA.* Washington, DC: USEPA. October 1988.

USEPA. *RCRA Corrective Action Plan.* Washington, DC: USEPA. June 1988.

USEPA. *RCRA Corrective Action Interim Measures Guidance.* Washington, DC: USEPA. June 1988.

USEPA. *RCRA Facility Assessment Guidance.* Washington, DC: USEPA. October 1986.

USEPA. *RCRA Facility Investigation Guidance.* Washington, DC: USE PA. May 1989.

USEPA. *Superfund Remedial Design/Remedial Action (RD/RA) Guidance.* Washington, DC: USE PA. June 1988.

USEPA. *Superfund Removal Procedures: Revision Number Three.* Washington, DC: USEPA. February 1988.

Chapter 2
Facility/Site Assessment

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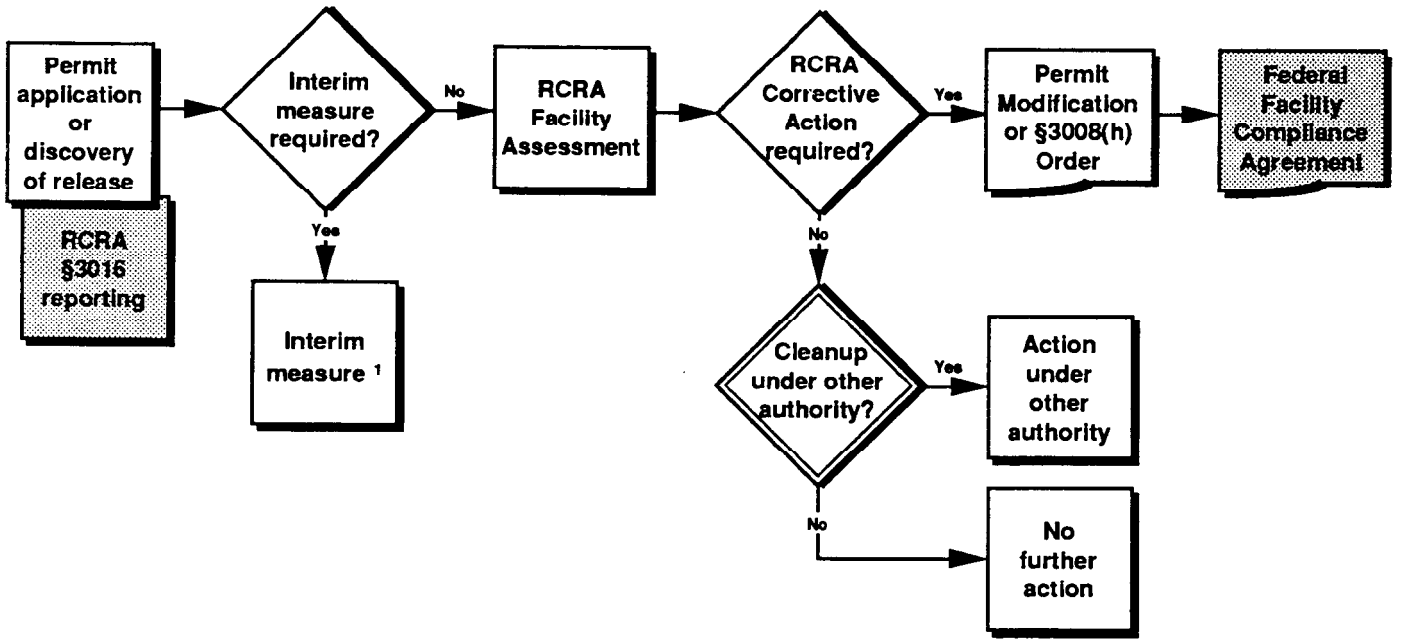
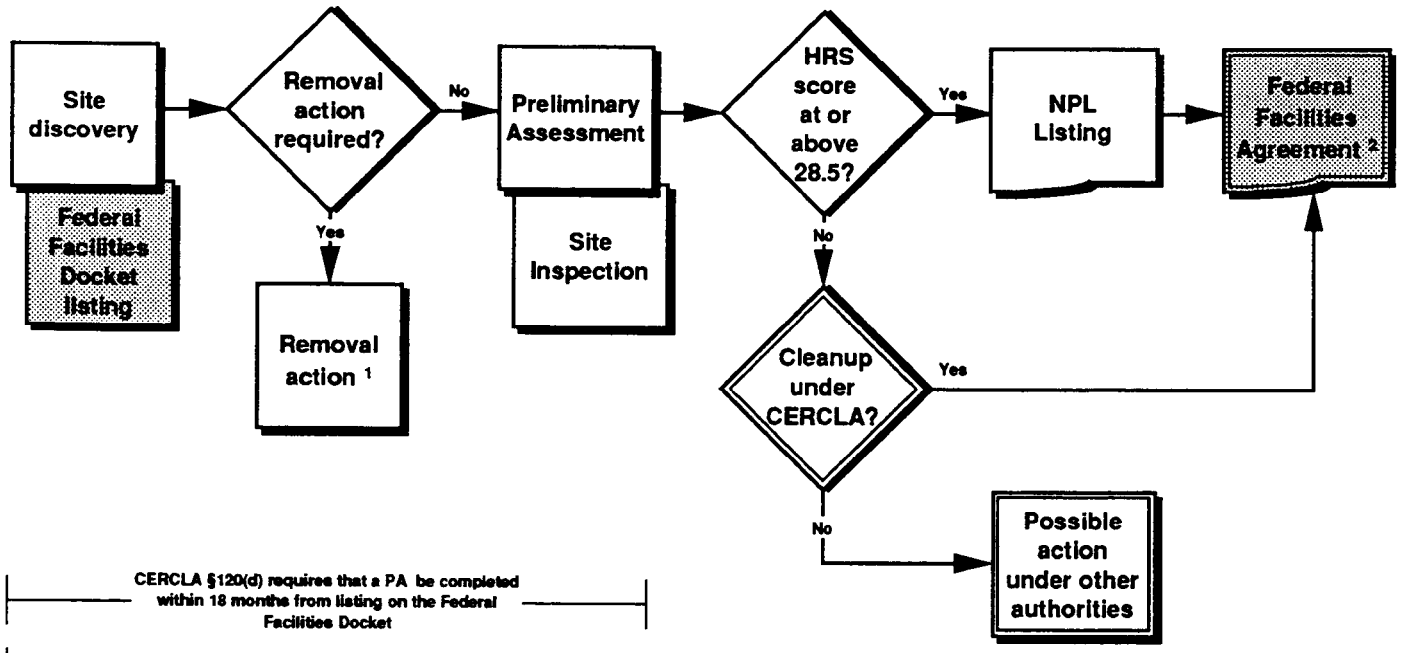
Figure 2-1

Facility Assessment Under RCRA Corrective Action



Site Assessment Under CERCLA Remedial Action



CERCLA §120(d) requires that a PA be completed within 18 months from listing on the Federal Facilities Docket

CERCLA §120(d) requires final NPL listing decision within 30 months of Docket listing

CERCLA §120(e)(2) requires an IAG (or FFA) be signed within 6 months of completing the RI/FS. DOE enters into an FFA after the NPL listing or when a decision is made to conduct the remediation consistent with CERCLA and the NCP

Footnote 1: A removal action or interim measure can be conducted at any time during the process.

Footnote 2: DOE enters into an FFA after the NPL listing and/or in accordance with DOE Order 5400.4.

Note: Shaded items and time lines are specific requirements for Federal facilities.

Note: Items with double-lined boxes are specific requirements for DOE facilities.

Chapter 2
Facility/Site Assessment

I. Introduction

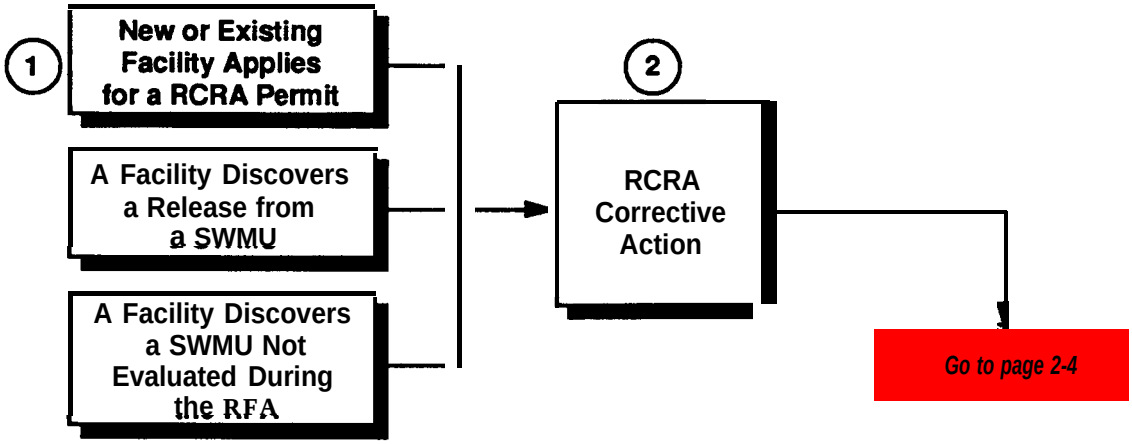
The first phase of conducting RCRA Corrective Action or CERCLA response is to eliminate from consideration under either program those sites or facilities where releases of hazardous substances, hazardous waste, or hazardous waste constituents have either not occurred or present no, or insufficient, risk to human health and the environment to require further action. While there are some significant differences between the site assessment process under RCRA and CERCLA, the basic goal under RCRA and CERCLA is the same–to provide enough information to decide if a very detailed and costly investigation is warranted.

This chapter discusses the following:

- **The applicability of RCRA Corrective Action and CERCLA response authorities;**
- **Reporting and other requirements applicable only to Federal agencies;**
- **Determining the need for interim measures or removal actions to mitigate immediate threats to human health and the environment;**
- **The process for conducting the initial site assessment under both the RCRA Corrective Action and CERCLA remedial programs;**
- **Determining the need for additional investigations and/or cleanup under both RCRA and CERCLA: arid**
- **Developing inter-Agency Agreements (IAGs} betwenn DOE and EPA to conduct a RCRA Facility Investigation end Corrective Measures Study (RFI/CMS) or to conduct a CERCLA remedial investigation/feasibility study (RI/FS).**

Figure 2-1 on the preceding page is a graphic representation of the portion of the two programs discussed in this chapter.

APPLICABILITY OF RCRA



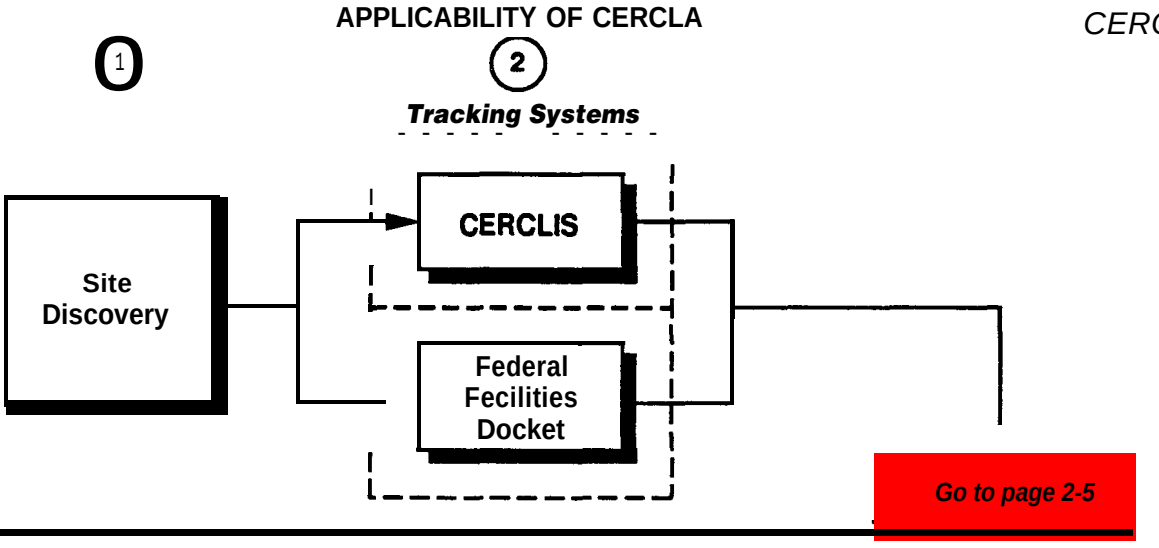
II. Applicability of RCRA Corrective Action

1. **When RCRA Corrective Action Applies.** Hazardous waste treatment, storage, or disposal facilities (TSDFs) are required to have either a RCRA permit or interim status. A RCRA permit consists of two parts: a Part A application providing general information about the facility and a Part B application, which is a detailed discussion on how the facility intends to comply with the applicable regulations. Interim status is the period during which a TSDF, which was in existence as of November 19, 1980 (or which was subsequently regulated under RCRA due to new regulations being issued) may continue to operate without having an approved RCRA Part B permit, provided that the facility has subsequently submitted a Part A permit application. Under proposed 40 CFR §264.500, RCRA Corrective Action typically applies in these cases:

- **An existing or planned facility applies for a RCRA permit. In these cases, corrective action will begin with a RCRA Facility Assessment (RFA). Both new end interim status facilities seeking RCRA permits are subject to RCRA Corrective Action as pert of the permitting process and as a condition of the final permit or**

- **A facility that has a RCRA permit or that is already conducting corrective action (1) discovers en actual or potential release of hazardous wastes or hazardous constituents from a solid waste management unit (SWMU) at the facility or (2) discovers an SWMU that was not examined during the initial RFA at the facility.**

2. **RCRA Corrective Action.** Both new and interim status facilities seeking RCRA permits undergo an RFA to determine if there are actual or potential releases of hazardous waste or hazardous waste constituents from SWMUs already in existence at the facility. RCRA §3004(u) and (v) provide EPA with the authority to require that the facility investigate and address existing or potential releases of hazardous wastes or hazardous waste constituents at the facility as a condition of the facility's permit. Typically, a RCRA permit contains provisions requiring a facility to conduct RCRA Corrective Action if the facility (1) discovers a release of hazardous waste or hazardous waste constituents or (2) discovers an SWMU not evaluated during the permitting process. Under RCRA §3008(h), interim status facilities are subject to RCRA Corrective Action if there is an actual or potential release of hazardous wastes or hazardous waste constituents from SWMUs at the facility.



III. Applicability of CERCLA

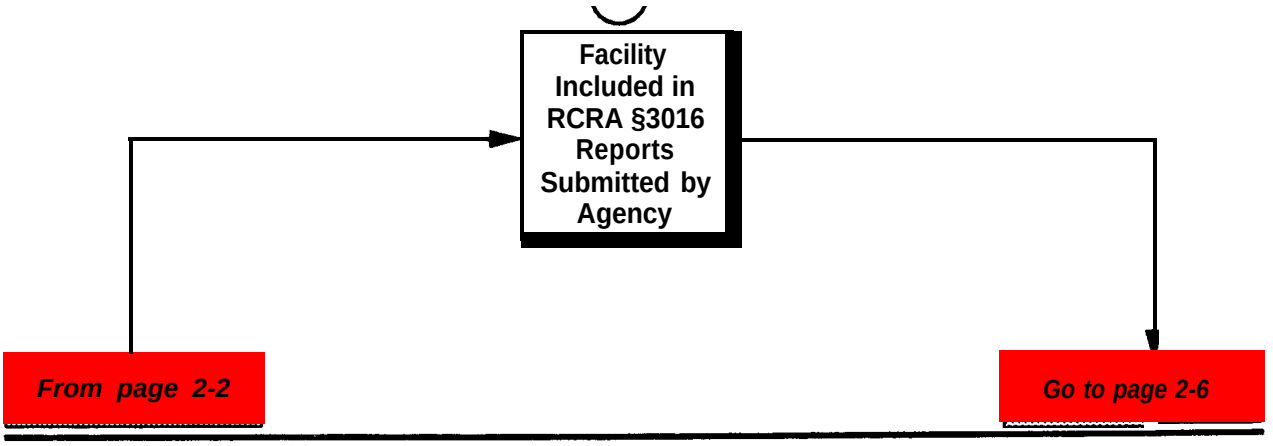
1. **Site Discovery.** CERCLA site assessment begins with site discovery or notification to EPA of the presence of a possible hazardous waste site or the possible release of a hazardous substance. Sites are discovered in several ways:

Self-reporting by the facility (as required by CERCLA §103[al for releasas that exceed a reportable quantity end §103(c) for the existence of a hazardous waste facility):

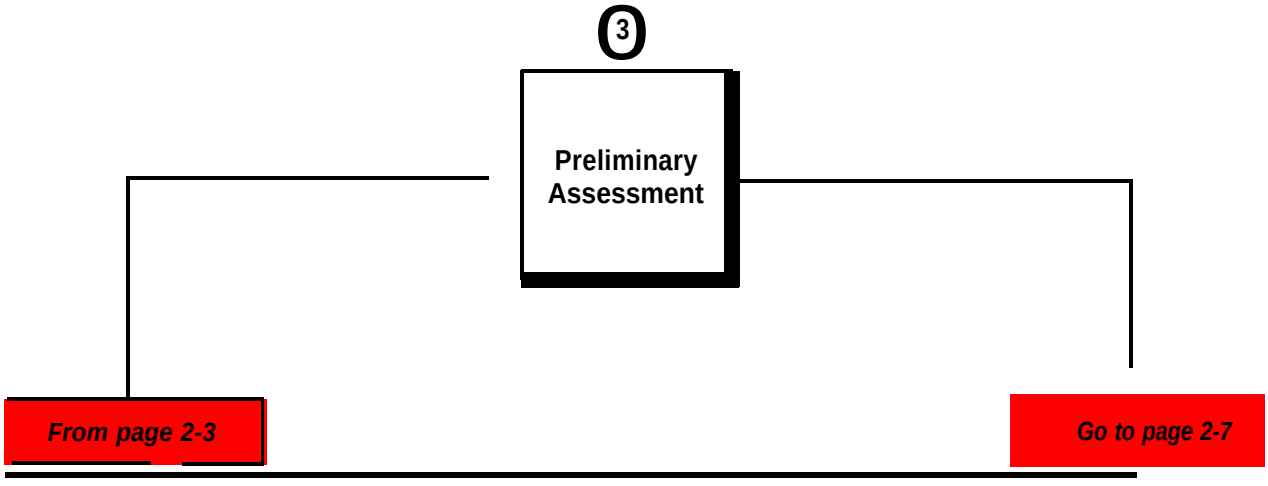
- **Active discovery programs. conducted by EPA, other Federal agencies, or States, that are designed to identify contaminated sites in a particular geographic area or industrial sector;**
- **Citizen complaint. made either informally or formally through submission of a petition to conduct a preliminary assessment, as provided under CERCLA §105(d); or**
- **Incidental discovery by EPA. other Federal agencies, or States (40 CFR §300.405).**

2. **Tracking Systems.** Once discovered, sites are entered in the CERCLA Information System (CERCLIS), EPA's computerized inventory and tracking system for sites with potential releases requiring a CERCLA response. CERCLIS maintains a permanent record of all response milestones at each site, including site investigations and cleanup activities. As of August 1993, more than 35,000 sites are listed in CERCLIS. The RCRA Corrective Action program does not utilize a tracking system such as CERCLIS.

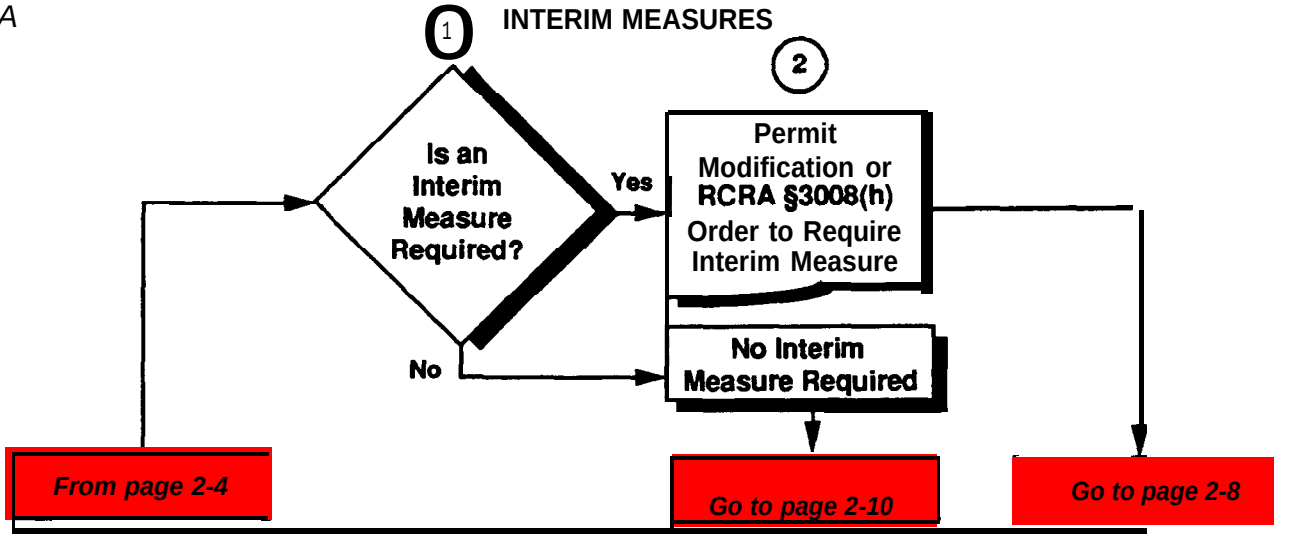
As required by CERCLA § 120(c), Federal facility sites are also entered on a second, separate list–the Federal Agency Hazardous Waste Compliance Docket. Any Federal site where hazardous wastes have been stored, treated, or disposed of, including sites where such action occurred in accordance with a RCRA permit, are listed in this Docket. The Federal Facilities Docket, as it is known, provides specific accountability for EPA and responsible Federal agencies in meeting the reporting requirements and schedules for Federal facility response as required by CERCLA § 120. (As of August 1993, more than 1,200 sites are listed on this Docket.)



3. **RCRA §3016 Reporting.** Under RCRA §3016, all Federal agencies are required to submit to EPA a biennial report on all facilities owned or operated by the agency, where hazardous wastes have been treated, stored, or disposed of at any time. These reports are often referred to as "3016 reports. " Under CERCLA §120, sites reported under RCRA §3016 are listed on the Federal Agency Hazardous Waste Compliance Docket. if the facility was listed on the first Docket, CERCLA § 120(d) requires that a preliminary assessment (PA) be conducted within 18 months of October 18, 1986. Current DOE and EPA policy for sites listed on the fourth Docket update (September 27, 1991) is that a PA, and, if warranted, a site inspection (SI), must be completed within 18 months of September 27, 1991 (55 FR 49328).



3. **Preliminary Assessment.** A PA is conducted for each site in CERCLIS (40 CFR §300.420). A PA is a "desktop" review of available information about the site. This includes demographic and physical information. DOE is responsible for conducting PAs at its own facilities and submitting the results to EPA. CERCLA § 120(d) requires that a PA for each site listed on the first Docket be conducted within 18 months of October 18, 1986. Current EPA policy is that for sites listed on a given Docket update, a PA, and, if warranted, an SI, must be completed within 18 months of publication of that Docket update in the *Federal Register.* PAs will be discussed in detail in Section Vll of this chapter.

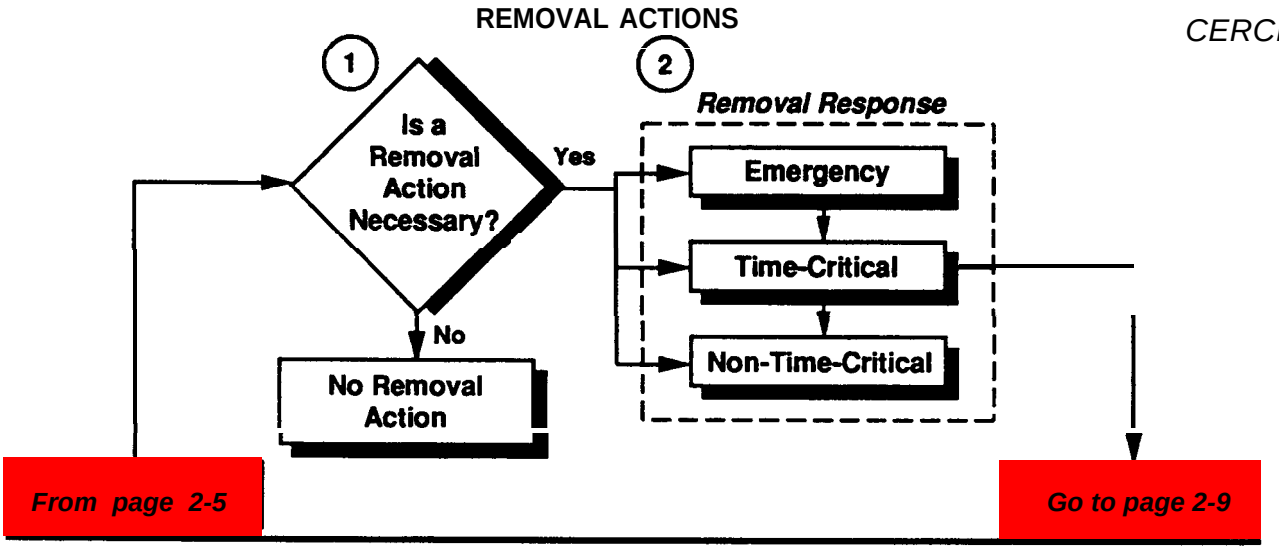


IV. RCRA Interim Measures

1. **Interim Measures.** Interim measures are short-term actions taken to mitigate actual threats, or to prevent realization of imminent threats, posed by a release of hazardous waste or hazardous waste constituents from an SWMU. These measures are described in the proposed Subpart S rule at 40 CFR §264.540. They are usually conducted as part of the development of a long-term comprehensive cleanup strategy for the facility. Interim measures under RCRA Corrective Action are similar to removal actions under CERCLA. The most significant difference is in the mechanisms used to require that a facility conduct an interim measure. The need for, and the time available to plan, an interim measure relates to the nature, immediacy, and magnitude of the threat posed to human health and the environment. Under proposed 40 CFR §264.540(b), typical evaluation factors for determining the need for an interim measure include, but are not limited to, the following:

- **The time to develop end implement a RCRA corrective measure;**
- **Actual or potential exposure of nearby populations, drinking water supplies. or sensitive ecosystems;**
- **The potential for further environmental degradation:**
- **The potential for a release or migration of a release of hazardous wastes or hazardous waste constituents; or**
- **The risk of fire, explosion, or failure of containment systems.**

2. **Permit Modification or Order to Conduct en Interim Measure.** Once the nature. immediacy, and magnitude of the threat are determined, EPA will modify the facility permit or issue a RCRA §3008(h) Order to require an interim measure. In some emergency situations, such as a serious fire or explosion threat, EPA may require that immediate action be taken before actual issuance of the permit modification or RCRA §3008(h) Order. Such action may be taken under the authority of RCRA §7003. The process that EPA will follow when ordering a facility to conduct an interim measure is described at proposed 40 CFR *§264.540(a).*



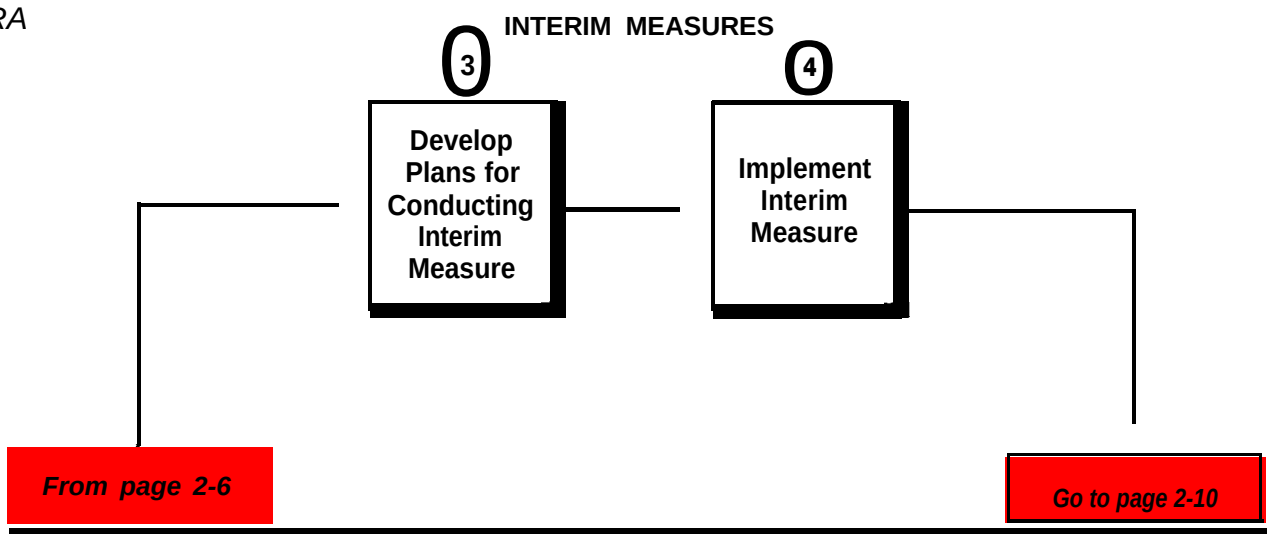
V. CERCLA Removal Actions

1. **Removal Site Evaluation.** At any time in the remediation process (even before a remedial PA is conducted), DOE may perform a removal site evaluation, as described under 40 CFR §300.41O, to determine whether emergency action is necessary to reduce any threat posed by an actual or potential release of a hazardous substance. The evaluation may be based on information developed during a previous investigation (e.g., PA or SI), or may entail its own investigation in the form of a removal PA and, if necessary, a removal SI.

   Removals are relatively short-term actions, as compared to the long-term remedial solutions, and are an integral part of Superfund Accelerated Cleanup Model (SACM). Conditions that might call for a removal action include the following:

   - **Actual or potential exposure of nearby human or animal populations or sensitive ecosystems (40 CFR §300.415 (b)(2)(i);**
   - **The potential for contamination of drinking water supplies or the food chain (40 CFR §300.415(b)(2)(ii);**
   - **The potential for further environmental degradation (40 CFR §300.415(b)(2)(viii):**
   - **The potential for a release or migration of a release of hazardous substances, pollutants, or contaminants (40 CFR §300.415(b)(2)(iv)); or**
   - **The risk of fire. explosion. or failure of containment systems (40 CFR §300.415(b)(2)(vi)).**

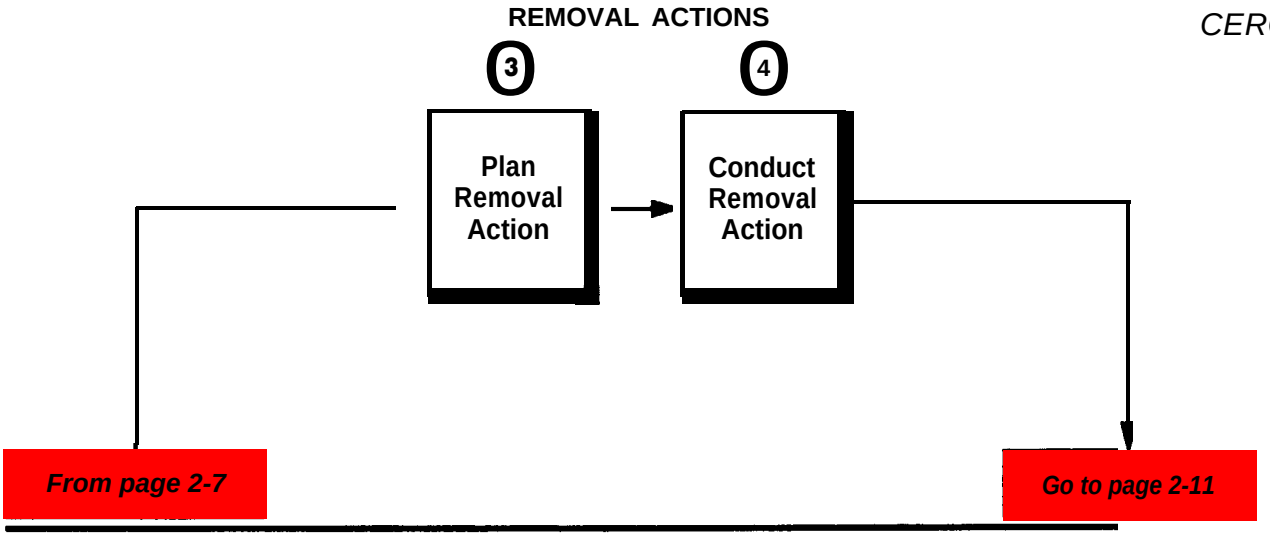
2. **Removal Response.** The requirements for removals are established under 40 CFR §300.415. According to the 1988 EPA guidance, removals fall into three categories: (1) emergencies that require immediate response (i.e., within hours or days), (2) ***time-critical*** removals where response must be rapid, within 6 months, but need not be immediate, or (3) ***non-time-critical*** removals where response may be delayed more than 6 months. Under 40 CFR §300.415(m)(3), if a removal action requires onsite activities longer than 120 days, a community relations plan is required. For non-time-critical removals, 40 CFR **§300.415(m)(4)** requires that an engineering evaluation/cost analysis (EE/CA) be conducted if a planning period of more than 6 months is available before onsite activities commence.



3. **Develop Plans for Conducting Interim Measures.** The facility will develop, and submit for EPA approval, plans for the design, construction, and implementation of the interim measure. Examples of actions considered interim measures include implementing source controls, preventing migration of the release, or installing measures to control exposure to the release. Any interim measure considered should contribute to the final cleanup of the site and should, to the extent possible, not interfere with the ultimate cleanup of the facility. For detailed information on interim measures, see Chapter 2 of the DOE guidance document titled *RCRA Corrective Action Program Guide (Interim Guidance).*

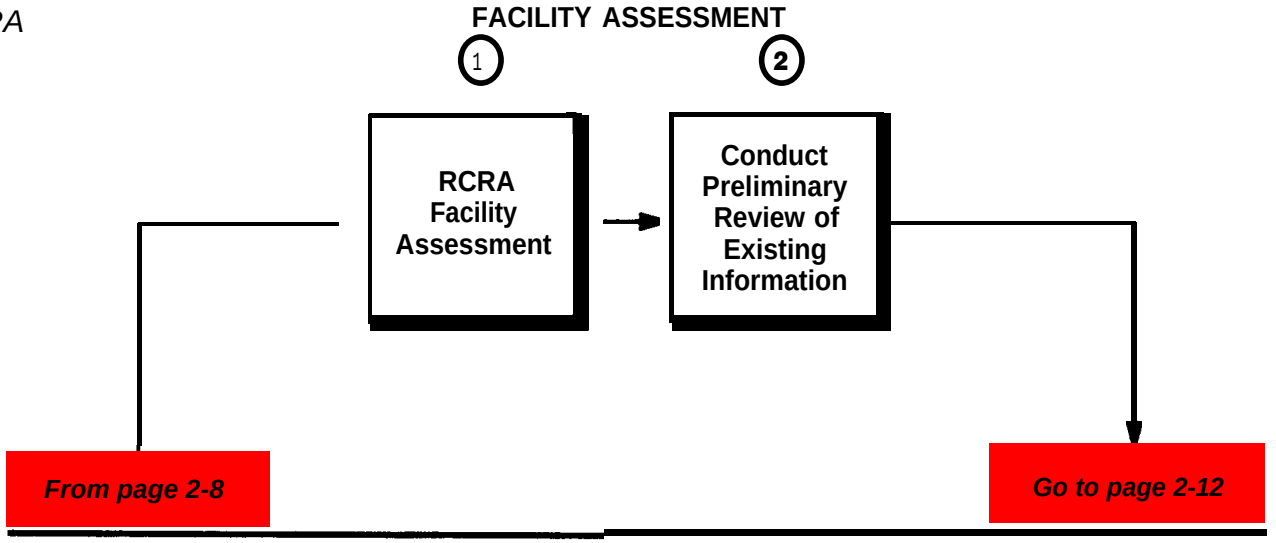
   While the use of interim measures, as described in the proposed Subpart S rule, is designed to permit the implementation of short-term actions to protect human health and the environment, EPA recently began to promote a somewhat parallel concept called "stabilization." The stabilization initiative stems from the RCRA Implementation Study (July 1990), which recommended that EPA adopt, as a program strategy, more frequent use of interim actions to achieve near-term environmental results at facilities with the most serious problems. Although the interim measures and the stabilization initiative appear to be the same concept, interim measures should be viewed as *too/s* to achieve the stabilization *goal.* The "stabilization initiative, " therefore, appears to be the overall programmatic driver for the process of implementing short-term remediation activities and will likely be incorporated into the final corrective action rule language regarding interim measures.

4. **Implement the Interim Measure.** Once these plans are approved, the facility implements the interim measure. The facility may be required to provide periodic progress reports to EPA and will be required to submit a final interim measures report, which describes the release or potential release triggering the need for an interim measure, the actions taken, and the effectiveness of the interim measure in mitigating the threat.



3. **Plan Removal Action.** The facility should have a plan for implementing a removal activity. Removals are not limited to the physical removal of wastes; other types of removals include implementing source controls, preventing migration of the release, or installing measures to control exposure to the release (e.g., a fence). Any removal action considered should contribute to the final remedial action at the site.

4. **Conduct Removal Action.** Once the removal action is complete, the facility must submit a report on the nature of the threat, the actions taken, and the success in mitigating the threat to the Regional and National Response Teams and to other DOE officials as described in the Federal Facility Agreement or by DOE direction.

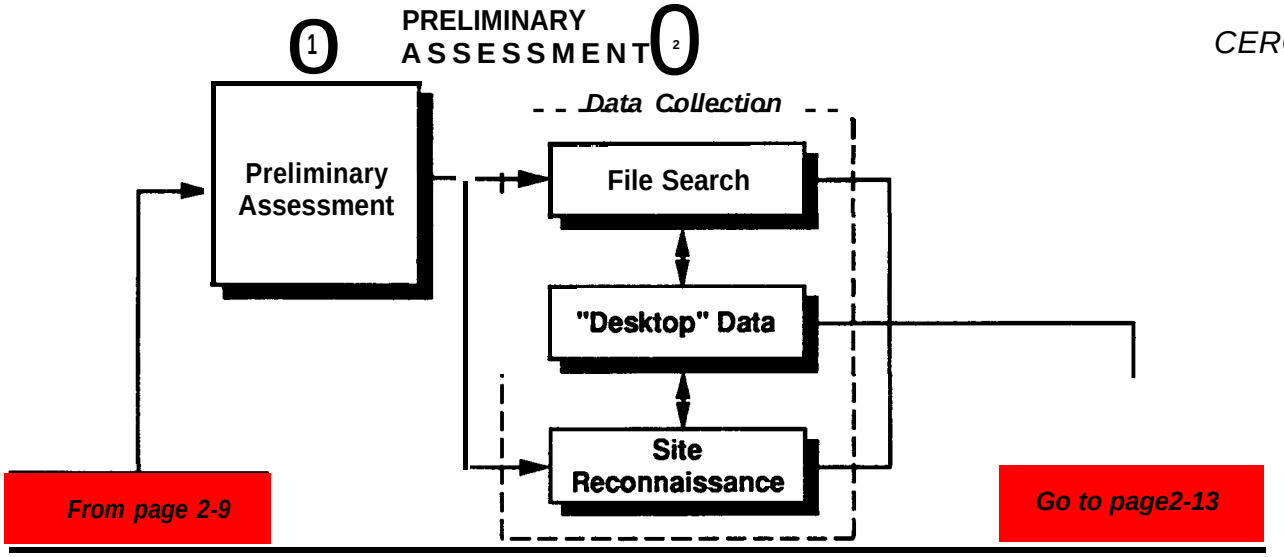


VI. The RCRA Facility Assessment

1. **The RCRA Facility Assessment.** The first phase of the RCRA Corrective Action process is the RFA. The proposed Subpart S rule does not specifically address RFAs; however, EPA has developed a guidance document on RFAs titled *RCRA Facility Assessment Guidance (1986).* EPA usually conducts the RFA; however, some DOE facilities have been authorized to conduct RFAs. The RFA is a screening device, similar to the CERCLA PA/SI process, used to ***determine if there is a release or threat of release of hazardous waste or hazardous waste constituents at a TSDF.*** Information collected during the RFA identifies those SWMUs, environmental media, or parts of a facility requiring further investigation, and eliminates those units that do not require additional investigation.

2. **Tha Preliminary Review.** There are three steps in conducting an RFA. The first is a preliminary review of existing information about the facility. This review involves gathering and evaluating existing information on the facility in order to identify the SWMUs at the facility, and to provide an initial evaluation of the potential for release of hazardous wastes or hazardous waste constituents from those SWMUs. The preliminary review examines the following information:

- **In permit applications submitted to EPA or contained in existing permits for discharges or emissions (the RCRA Part A and Part B applications, National Pollutant Discharge Elimination System [NPDES] or Clean Air Act [CAA] permits, etc.);**
- **On inspections of the facility by the owner/operator, EPA, or others;**
- **In reports of known releases, other investigations, or cleanups at the facility;**
- **About current and past waste generation and handling practices;**
- **Showing the location of known or potential SWMUs;**
- **Assessing the potential for a release to environmental media; and**
- **Describing the environmental setting of the facility.**



VII. CERCLA Preliminary Assessment

1. **The Preliminary Assessment.** If a removal action is not warranted, a PA is conducted. A PA is a limited-scope investigation designed to distinguish between sites posing little or no threat to human health and the environment and sites that do pose a threat and thus warrant further investigation and action under CERCLA or other authorities. A PA may also identify a site requiring a removal action.

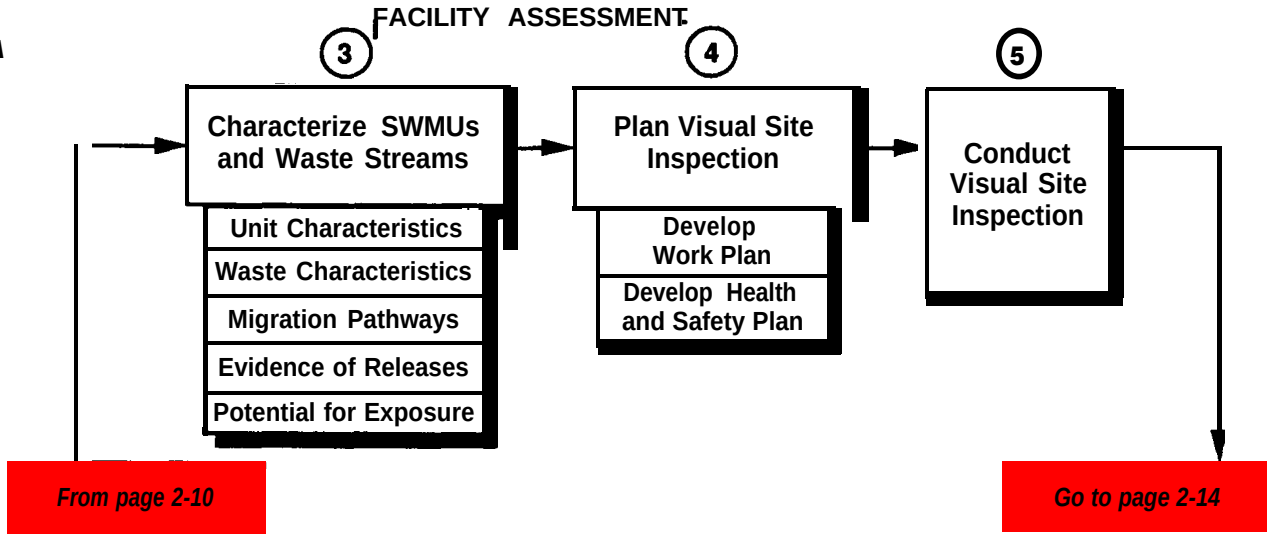
   The PA is defined in 40 CFR §300.420 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). As the first stage of Superfund site assessment, the PA is a ***relatively quick. low-cost compilation of existing information*** about the site and its surroundings, similar to the PR of an RFA under the RCRA Corrective Action program. The PA emphasizes comprehensive information on targets—that is, people and resources that might be threatened by a release of a hazardous substance, pollutant, or contaminant. Environmental media and waste sampling is not required during the PA.

2. **Data Collection.** PA information is typically collected through a combination of file searches, “desktop” data development, and site reconnaissance.

- **Review of the files at tha facility should provide useful information concerning site operations and history, waste types end quantities, waste handling and disposal practices. environmental permitting and possible violations, etc.**

- **A significant portion of the information needed for a PA can be obtained from “desktop” sources such es topography maps, aerial photographs, on-line databases, and published geologic or hydrologic studies.**

- **Reconnaissance is nacessary to fully characterize tha site and its surroundings, and to locate and verify targets. An offsite reconnaissance is generally required; a site reconnaissance may be performed if access is easily obtainable and health end safety considerations do not present obstacles.**

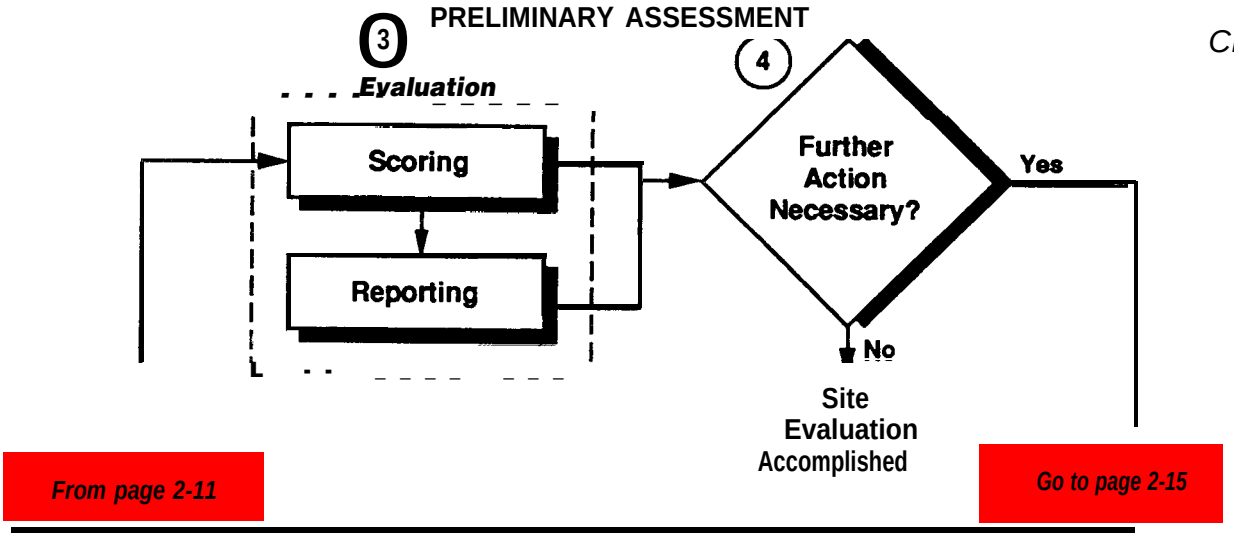


3. **Characterize SWMUs and Waste Streams.** Once the preliminary review is complete, each waste stream and the SWMUs associated with them are characterized according to the following:

- **Unit characteristics such as design, age. materials used in construction, etc.:**
- **Tha characteristics of the waste such as physical state, volume, and known hazardous constituents;**
- **Factors related to potential migration pathways such as depth to groundwater, surface water runoff patterns, vents to air. etc.;**
- **Evidence of releases including groundwater sampling records, reports of releases or spills, etc.; and**
- **Potential for exposure of humans, animals, or sensitive ecosystems to releases of hazardous waste or hazardous waste constituents.**

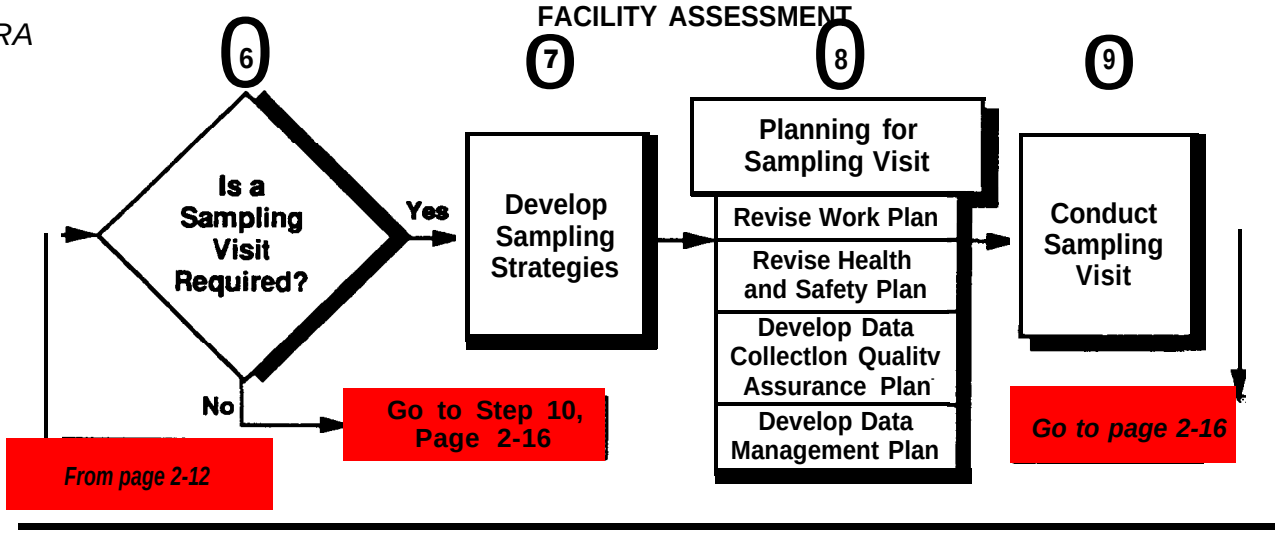
4. **Planning a Visual Site Inspection.** The next step in conducting an RFA is a visual site inspection (VSI). Development of a work plan discussing the activities to be conducted during the VSI is recommended. Further, a health and safety plan (HASP) meeting the requirements of 29 CFR 51910.120 should be developed and implemented to establish safety guidelines and procedures for the onsite activities.

5. **Conducting a Visual Site Inspection.** During the VSI, the list of SWMUs developed during the preliminary review is revised (as necessary); detailed information about the operations at the facility and at each SWMU is collected; and ***each SWMU is examined for visual evidence of releases or potential releases of hazardous waste or hazardous waste constituents.*** Photographs of each unit are taken to document any evidence of releases and are included in the RFA report. Standard practices for field operations such as the use of bound, waterproof field notebooks must be followed during the VSI. The combined data of the preliminary review and VSI may be sufficient to determine the need for interim measures or to determine the need for further investigation of each SWMU.



3. **Evaluation.** The information collected during the PA is analyzed to formulate hypotheses about suspected releases and who or what has been exposed. EPA requires a brief narrative report and a completed "Potential Hazardous Waste Site Preliminary Assessment Form" (EPA Form 2070-12, revised September 1991). In addition to information on the PA form, the site is initially scored using a streamlined application of the Hazard Ranking System (HRS) specifically designed for the data constraints of the PA. Manual scoresheets are available for this purpose ("PA Scoresheets, " EPA Form 2070-1 5), as is a computerized scoring program ("PA-Score Software, Users Manual, and Tutorial, " EPA/540/P-91 /01 O).

4. **Further Action Necessary?** On the basis of the PA score and supporting information, EPA determines whether further investigation is necessary. Sites that score 28.5 or higher are recommended for an SI. Generally, sites that score below 28.5 are designated as "Site Evacuation Accomplished (SEA), meaning that EPA does not require further action under CERCLA. However, DOE (pursuant to DOE Order 5400.4) or State authorities may choose to pursue further action beyond the mandate of CERCLA, or may be required to pursue remedial activities under other authority (e.g., RCRA, TSCA). States, other regulatory authorities, or Federal agencies may undertake further action at their own SEA sites. in the case of sites that do not score above 28.5, and thus are not listed on the NPL, DOE's policy is to remediate such contaminated sites using CERCLA or, when appropriate, other authorities, such as RCRA. A removal assessment may be recommended for any site, regardless of its score. As is the case with the PA, Federal agencies are responsible for conducting SIs at their own facilities and submitting the results to EPA.

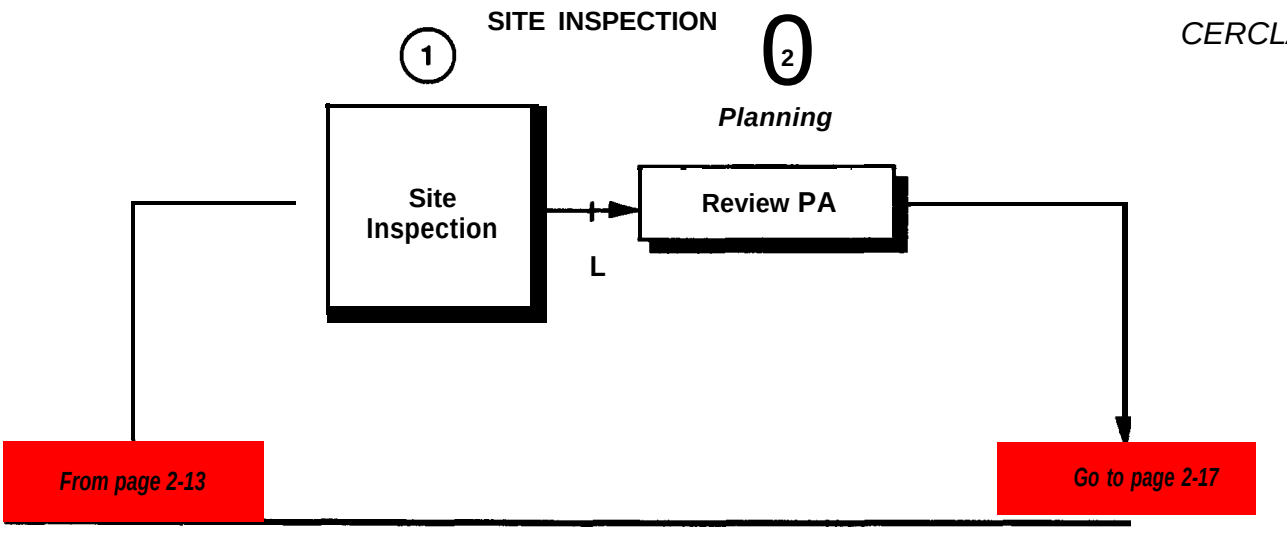


6. **Sampling Visit Required?** Based upon analysis of the data collected during the preliminary review and VSI, it is often possible to determine the need for the sampling of environmental media. If sampling is not required, it is possible to proceed to the development of the RFA report. If sampling is required, the next step in conducting an RFA is to conduct a sampling visit. The VSI and sampling visit have objectives similar to the CERCLA SI process.

7. **Develop Sampling Strategy.** Which media are to be sampled and the location of sampling points are decisions usually based upon the information gathered during the preliminary review and VSI. Analysis of the data from the preliminary review and VSI is used to focus the sampling visit on those SWMUs or areas suspected of being contaminated by releases of hazardous waste or hazardous waste constituents. However, if the data gathered during the preliminary review and VSI are of limited or poor quality, it may be necessary to develop a comprehensive sampling strategy for the facility (see EPA's 1986 RFA Guidance, Chapter 4).

8. **Planning for Sampling.** In either case, the work plan for the VSI should be revised to include discussion of the activities required while conducting the sampling visit. The HASP developed for the VSI may also require revision to reflect the need for personnel safety during sampling. A data collection quality assurance plan (DCQAP) and a data management plan (DMP) should be developed as part of planning the sampling visit. The DCQAP is a document that presents in specific terms the data collection strategy, sampling procedures, sample collection points, sample preservation techniques, field measurements procedures, chain-of-custody requirements, and sample analysis procedures designed to achieve adequate data quality, The DMP is a document that details the procedures and format for tracking and presenting data and results of the sample analyses.

9. **Conduct Sampling.** During the sampling visit, all sampling must be documented using standard practices for field operations. Each sampling event should be photographed, and the location of the sampling points should be noted on a map of the facility. In addition to the sampling activities, the sampling team often can collect information about the operations, SWMUs, and environmental setting of the facility. All sampling and analysis activities conducted during the sampling visit must conform to the procedures set forth in the DCQAP. Any deviation from the DCQAP must be completely documented. All data generated by the analyses must be managed according to the procedures established in the DMP. Development of the RFA report begins following completion of the analysis of the environmental samples collected during the sampling visit.



VIII. CERCLA Site Inspection

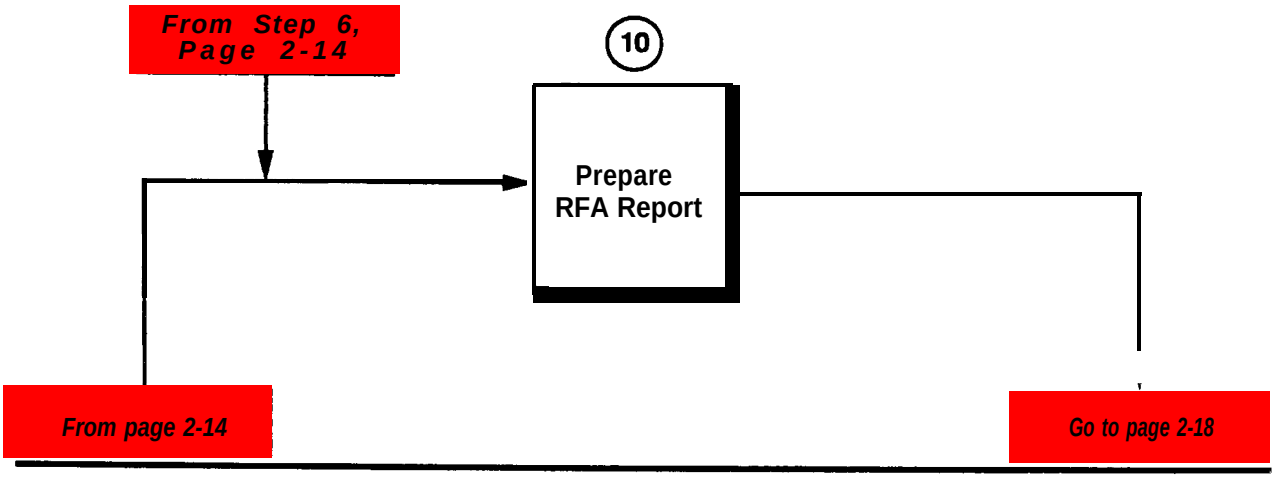
1. **Site Inspection.** The SI is a more detailed investigation than the PA, with an emphasis on ***collecting and analyzing samples of environmental and waste media.*** The objective is to identify sites that may pose a threat to human health or the environment sufficient to warrant placement on the NPL. The SI also identifies sites that may pose an immediate threat and require a removal action (40 CFR 9300.420 [c]).

   Depending upon site complexity and objectives, the SI may be conducted in one stage or two. This is consistent with the dual nature of the SI, which must fulfill one of two distinct functions that frequently have different purposes:

   - **Provide a more refined screen to *eliminate low- and no-threat sites* from further Superfund activity (typically a narrowly focused SI with limited sampling requirements); or**
   - **Provide sufficient date, of sufficient quality, to support a documented HRS score sufficient to *Place high-threat sites on the NPL* (typically e more sophisticated investigation with greeter sampling requirements end, potentially, special field activities).**

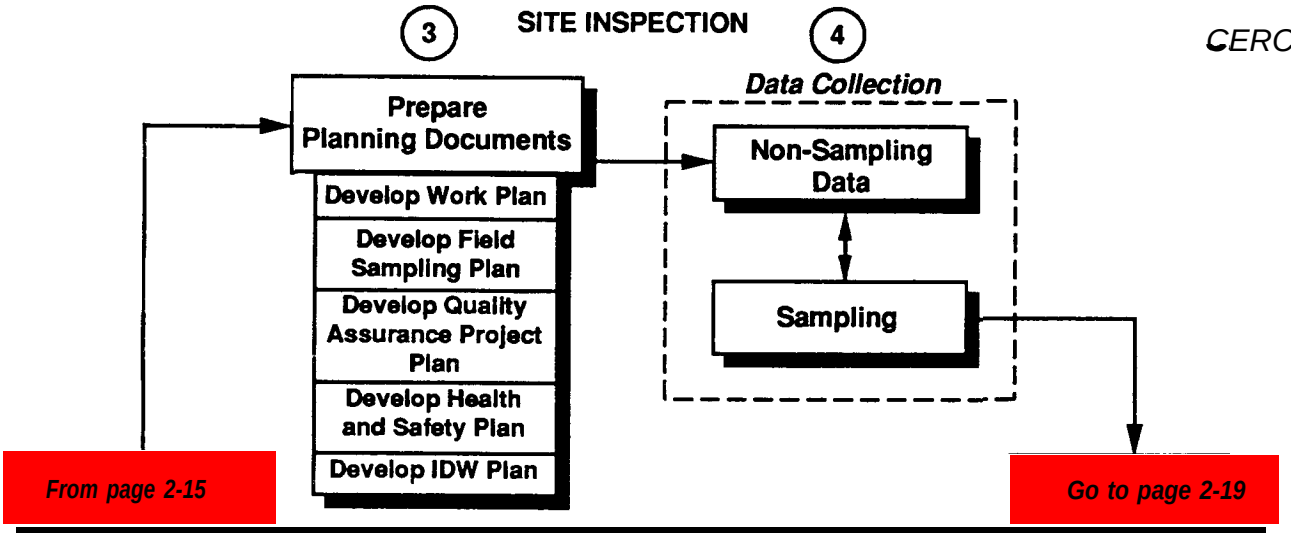
2. **Planning.** SI planning begins with a review of the PA findings and all information collected regarding hazardous substance releases and target exposures. If the site is clearly an NPL candidate (i.e., HRS score equal to or greater than 28.5), a *single SI* designed to provide full HRS documentation may be conducted. More often, a two-stage approach is appropriate. A *focused S/first* tests the PA findings that resulted in the SI recommendation. If the findings are not supported by sampling results, the site may be designated as SEA. If the PA findings are supportable, an *expandad SI* is conducted to fully document site conditions for an HRS evaluation. For additional information on CERCLA SIs, refer to the DOE Office of Environmental Guidance Information Brief *Site /inspections (S/s) Under CERCLA (EH-231-*013/0693, June, 1993).

FACILITY ASSESSMENT



10. Preparing the RFA Report. Upon completion of the preliminary review, VSI, and sampling visit, the RFA report is developed and submitted to EPA for review. According to EPA's RFA guidance, the RFA report discusses the following.

- **The purpose and scope of the RFA;**
- **A brief discussion of the history of the facility;**
- **A list of the SWMUs identified at the facility;**
- **A list of the types of waste managed at the facility;**
- **The environmental setting of the facility;**
- **A detailed description of each SWMU, the waste managed in the SWMU, end the potential for release of hazardous waste or hazardous waste constituents from that SWMU:**
- **A list of all suspected or confirmed releases at the facility; and**
- **Recommendations for further actions at the facility.**



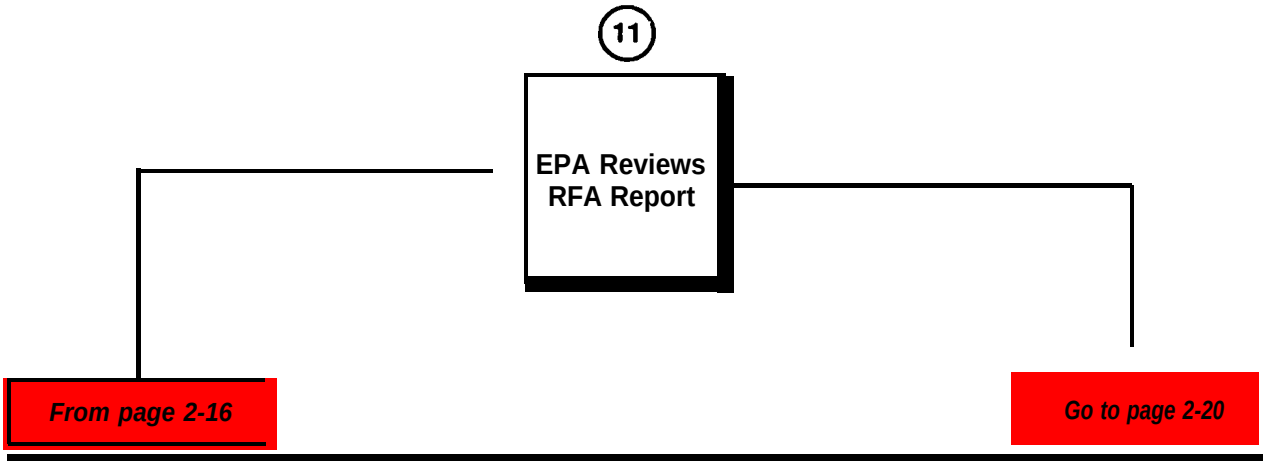
3. **Prepare Planning Documents.** Planning documents are prepared either separately or as elements of a single document, to guide the SI. These include:

- **A work plan that specifies personnel, administrative. and logistical requirements;**
- **A field sampling plan (FSP) that identifies the location, type, rationale, and analysis of each sample;**
- **A quality assurance project plan (QAPP] that details sample collection. handling, and analysis protocols;**
- **A health and safety plan (HASP) detailing procedures to protect the workers performing the SI; end**
- **An investigation-derived waste (IDW) management plan for handling weste materiels (e.g.. soil cuttings, decontamination fluids) produced during the SI.**

4. **Data Collection.** The amount of non-sampling data that needs to be collected depends primarily on the type of SI selected. A *focused SI* centers on testing PA hypotheses through sampling; it does not usually require much non-sampling data beyond what were collected during the PA. If the PA findings are supported and an *expandad SI is* conducted, sampling as well as non-sampling data requirements for a full HRS evaluation must be collected and rigorously quality-assured.

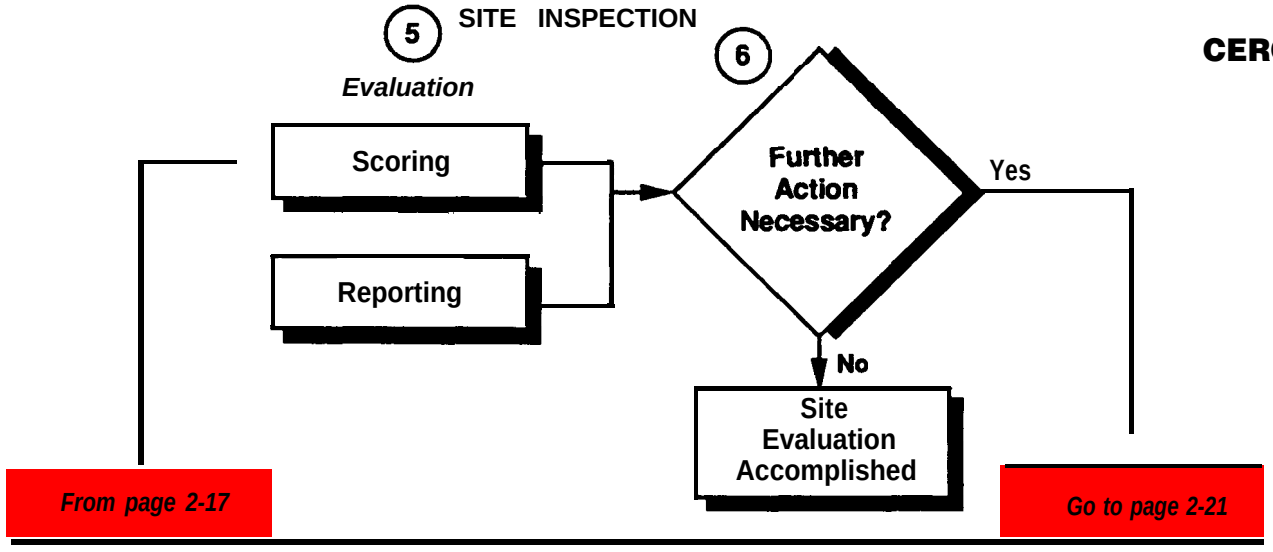
Sampling requirements and strategies also vary according to the type of SI. Focused SI sampling, designed to test PA findings, is usually limited to a relatively small number of samples. The emphasis is on waste media and target sampling in order to identify hazardous substances associated with the site and indicate whether targets are contaminated. Both the expanded SI and the single SI are designed to document releases of hazardous substances to HRS standards of certainty; therefore, sampling is intensive and subjected to rigorous quality assurance/quality control (QA/QC).

FACILITY ASSESSMENT



11. EPA Review. EPA will review the RFA report and assess the need for additional investigations. The factors considered in determining the need for additional investigations include the following:

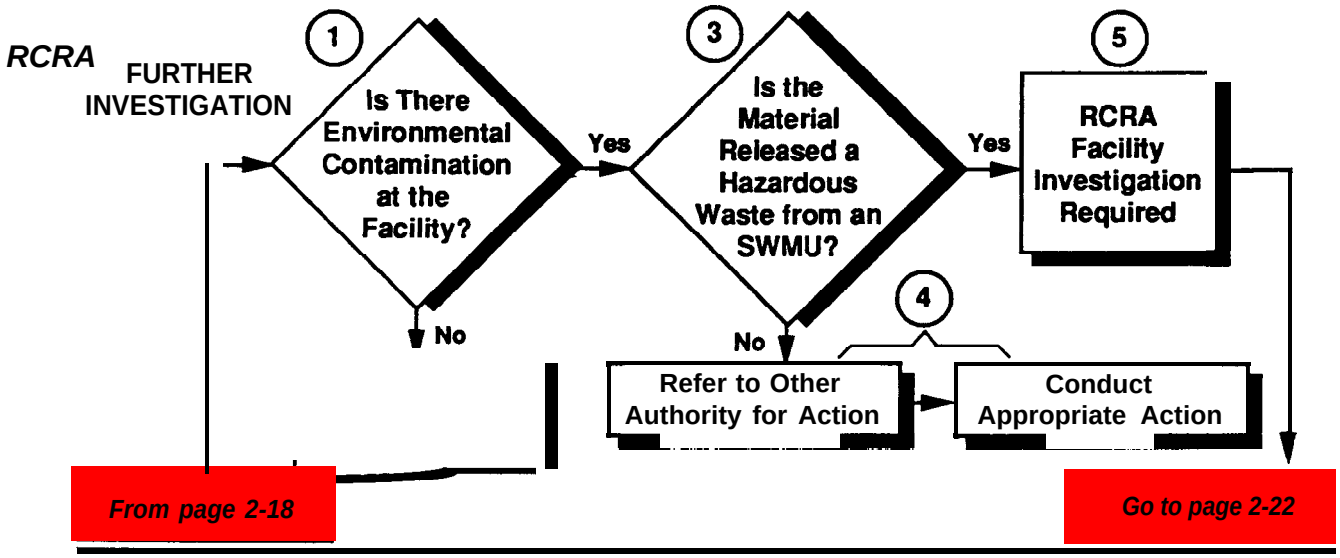
- **The presence or absence of, the age of, the integrity of, and the materials used to construct any engineered features intended to prevent releases of hazardous waste or hazardous waste constituents to surface water, groundwater. air, or soil;**
- **The potential for generation of subsurface gases {especially methane from the decomposition of organic compounds);**
- **Direct or indirect evidence of releases of hazardous wastes or hazardous waste constituents; and**
- **Whether any actual or potential release discovered during tha RFA is subject to RCRA Corrective Action or whether another regulatory program has authority over that release.**



5. **Evaluation.** When sufficient information has been gathered, the site is scored according to the HRS (Appendix A of the NCP). EPA developed the HRS to assess the relative risk posed by a site. The HRS evaluates the relative threat posed through four exposure pathways: (1) groundwater, (2) surface water, (3) soil, and (4) air. Each pathway requires an evaluation of (1) the likelihood that a hazardous substance has been or could be released from the site; (2) the quantities and specific characteristics of hazardous substances at the site; and (3) the type, quantity, and exposure levels of targets.

   Scores are assigned to individual factors that make up these evaluations, and an overall site score, ranging from O to 100, is calculated. The HRS site score is the primary *means* of determining whether NPL placement is warranted.

6. **Further Action Necessary?** On the basis of the site score and supporting information, EPA determines whether further investigation is necessary. Generally, sites that score below 28.5 are designated as SEA. As with PA SEA sites, States, other regulatory authorities, or Federal agencies may undertake further action at their own SI SEA sites. Focused SI sites that score 28.5 or higher are recommended for an expanded SI. A removal assessment may be recommended for any site, regardless of score.



Ix. Determination of the Need for Further Investigation

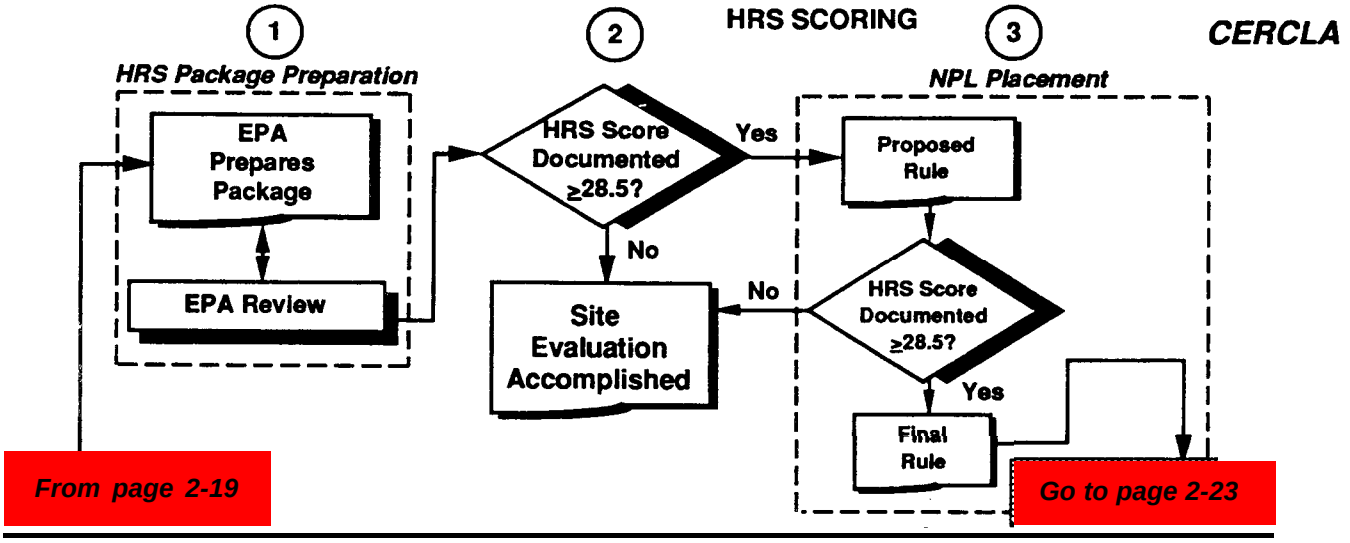
1. **Contamination Present?** EPA reviews the report to assess if there is environmental contamination at the facility.

2. **No Further Action.** If the RFA does not identify any actual releases of hazardous waste or hazardous waste constituents from SWMUs or does not identify any SWMUs with a potential for releasing hazardous waste or hazardous waste constituents to the environment, the facility may request termination of RCRA Corrective Action. The facility does this by requesting a "Determination of No Further Action" (DNFA). The DNFA is developed by EPA and is issued either through a modification of the facility's permit or through revocation of the RCRA §3008(h) Order requiring the RFA. However, a DNFA usually includes provisions for requiring RCRA Corrective Action if subsequent information identifies a release or potential release of hazardous waste or hazardous waste constituents at the facility.

Ralease of Hazardous Waste from SWMU? EPA assesses if the environmental contamination is due to a release of a hazardous waste or hazardous waste constituent from an SWMU.

4, **Action Under Other Authority.** If no releases or potential releases of hazardous waste or hazardous waste constituents subject to RCRA Corrective Action are identified, but the RFA does identify an area of contamination posing a threat to human health or the environment that is not subject to RCRA Corrective Action or that is permitted under another program (i e., a release regulated through an NPDES permit), EPA will refer these releases to the appropriate EPA program office. DOE policy is to consider the use of other legal authorities to address such releases.

5. **RFI Required.** If analysis of the data collected during the RFA identifies actual releases of hazardous waste or hazardous waste constituents from SWMUs or identifies SWMUs with a potential for releasing hazardous waste or hazardous waste constituents to the environment, EPA will usually require an additional investigation at the facility, usually an RFI (discussed in the next chapter).



X. HRS Scoring Documentation and NPL Placement

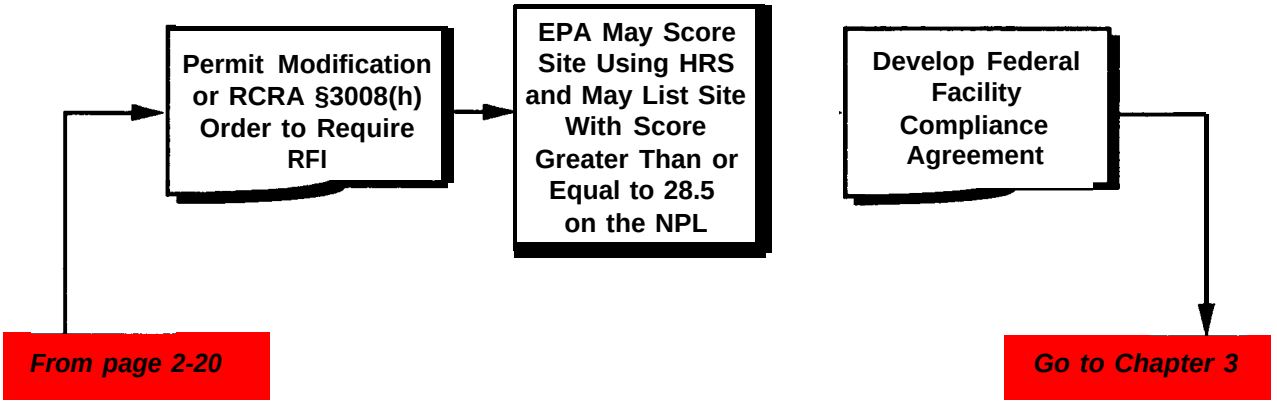
1. **HRS Package Preparation.** HRS packages may be prepared for sites that score 28.5 or higher. EPA prepares the HRS package. The HRS package includes a narrative summary describing the site; a set of scoresheets summarizing HRS factor values, factor category scores, am-l site scores; detailed documentation supporting each assigned factor value; and reference materials providing the raw data from which factor values were derived.

   For Federal facilities that involve several non-contiguous sources, EPA also requires an "aggregation rationale." The aggregation rationale explains the reasons for grouping non-contiguous areas as a single site for HRS scoring and response purposes.

   Each EPA Region subjects HRS packages to QC to ensure completeness of the submittal, proper format, and conformance with HRS scoring and NPL eligibility policies. EPA Headquarters then conducts a rigorous QA review in which the documentation is scrutinized and independently evaluated to ensure accuracy, defensibility of interpretations and conclusions, and conformance with the technical requirements of the HRS.

2. **HRS Score.** If the QC/QA process does not result in a documented, defensible site score of 28.5 or higher, the site is referred back to the responsible Federal agency for revision, or to the EPA Region for further consideration, or designation as SEA.

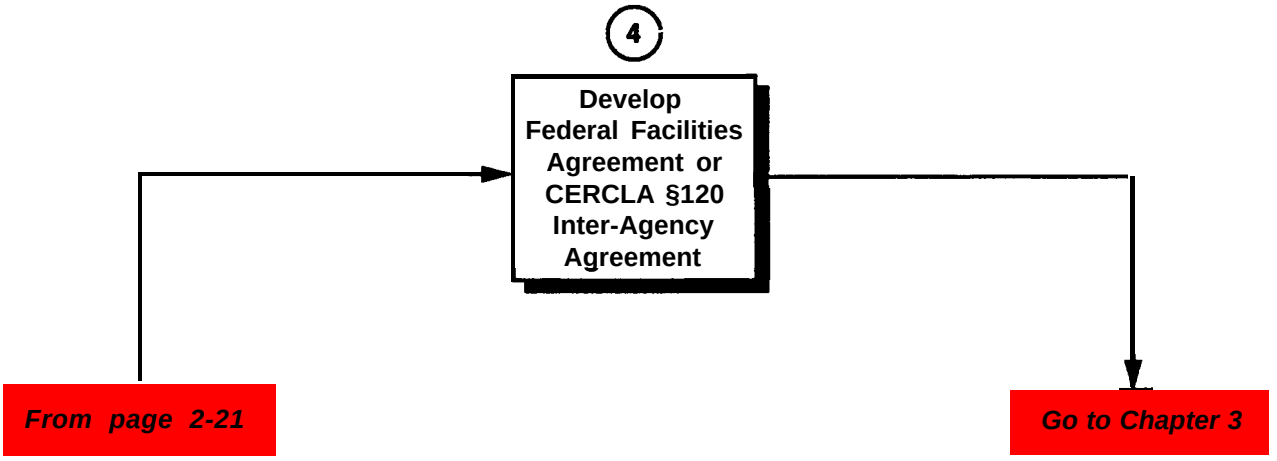
3. **NPL Placement.** EPA is required to update the NPL at least once a year. EPA follows a formal ruiemaklng process in which sites are first proposed to the NPL and a 60-day public comment period is offered (40 CFR §300.425). If technical information submitted by commenters warrants, site scores are adjusted. Sites where the score drops below 28.5 are referred back to the Region for further consideration or SEA designation; those retaining scores at or above 28.5 are placed on the NPL in a final rule published in the *Federal Register.* Currently, 1,200 sites are on the NPL, over 100 of which are Federal facilities. For Federal facility sites listed on the NPL, the responsible Federal agency must conduct an RI/FS for that site (discussed in the next chapter).



6. **Requirement for RFI.** If additional RCRA Corrective Action is required at a permitted facility, EPA will issue a permit modification requiring the facility to conduct an RFI. For interim status facilities, EPA will issue a RCRA §3008(h) Order requiring the facility to conduct an RFI. Usually, these permit modifications or Orders include a schedule of compliance specifying the length of time the facility has to develop the plans and necessary documents for an RFI and for actually conducting the RFI.

7. **NPL Placement.** Currently, the RCRA Corrective Action program does not use the HRS or any other formalized method to evaluate the relative risks posed by each facility, but the proposed Subpart S rule makes reference to a method as being under development. However, for Federal facilities, EPA may evaluate a release of hazardous waste or hazardous waste constituents subject to RCRA Corrective Action using the HRS (Appendix A to the NCP). Pursuant to current EPA policy (see 54 FR 16520, March 13, 1989), Federal facilities where releases of hazardous waste or hazardous waste constituents are addressed through the RCRA Corrective Action program are eligible for inclusion on the NPL. EPA intends to list such facilities on the NPL if the nature and extent of the release, the affected environmental media, and the potential exposure of humans, food chains, or sensitive environments lead to an HRS score greater than 28.5.

8. **Federal Facility Compliance Agreement.** If additional investigations are required at the facility, DOE and EPA will enter into an FFCA or a CERCLA §120 IAG to establish the specific requirements for conducting an RFI. The FFCA or IAG will set out timetables for conducting the investigation, establish reporting requirements, provide for integration of the RFI with responses under other authorities (important for RCRA facilities that are listed on the NPL), and provide for oversight and funding agreements.



4. Develop Agreement. Before conducting the RI/FS, DOE and EPA will enter into a CERCLA §120 IAG or an FFA. These agreements establish the specific requirements for conducting the RI/FS. DOE policy requires an FFA to be initiated within 6 months after NPL listing. The FFA will set out timetables for conducting the RI/FS, establish reporting requirements, integrate the RI/FS with actions taken under other authorities, and provide for oversight and funding agreements.

Summary

Topic	RCRA
Applicability	New or interim status facility applies for RCRA permit or permitted facility discovers a release of a hazardous waste or hazardous waste constituent or discovers SWMU which was not examined during initial RFA at the facility (see p. 2-2)
Reporting Requirements	• Submission of a "RCRA §3016 report" • Reporting under CERCLA §103(a) required if release is in excess of a reportable quantity
Response to Immediate Threats	• Known as "interim measures" • Actions to address actual or potential releases of hazardous waste or hazardous waste constituents from an SWMU
Steps in Conducting the Assessment	RCRA Facility Assessment consists of: • A preliminary review of available data • A visual site inspection • An optional sampling visit to collect a limited number of environmental samples • Determination of need for further action • RFA report preparation • Permit modification
HRS Scoring	EPA will perform an HRS scoring for Federal facilities if the facility is likely to score >28.5 (see 54 FR 41000, October 4, 1989)
NPL Listing	EPA will list on the NPL only Federal facilities with an HRS score >28.5 (see 54 FR 41000, October 4, 1989)
Next Step in Process	RCRA Facility Investigation/Corrective Measures Study

Summary

Topic	CERCLA
Applicability	Discovery of a site where there is an uncontrolled release of a hazardous substance, pollutant, or contaminant
Reporting Requirements	• Reporting of releases of hazardous substances to National Response Center (CERCLA § 103[a)) • Reporting of hazardous waste activities (CERCLA §103[cl) • Federal facility reporting under CERCLA §120(b) and (c)
Response to Immediate Threats	• Known as "removal actions" • Taken to eliminate threat posed by an actual or potential release of a hazardous substance, pollutant, or contaminant • Requires removal PA and, if necessary, a removal SI
Steps in Conducting the Assessment	Preliminary Assessment consists of: • File searches • "Desktop" data development • Site reconnaissance • PA report preparation and PA scoring Site Inspection consists of: • Review of PA findings • Additional data collection • Limited sampling of environmental media • SI report preparation • HRS scoring • HRS package development and NPL listing decision
HRS Scoring	All sites scored using HRS to determine NPL eligibility
NPL Listing	All sites with HRS score >28.5 are listed on NPL
Next Step in Process	Remedial Investigation/Feasibility Study

References

Hazard Ranking System: Appendix A of the National Oil and Hazardous Substances Pollution Contingency Plan. 40 CFR §300 Appendix A.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act [SARA)). 42 USCA §9601 et seq.

The National Oil and Hazardous Substances Pollution Contingency Plan. (40 CFR Part 300)

The Resource Conservation and Recovery Act (RCRA) (as amended by the Hazardous and Solid Waste Amendments [HSWA). 42 U.S.C. §6901 et seq.

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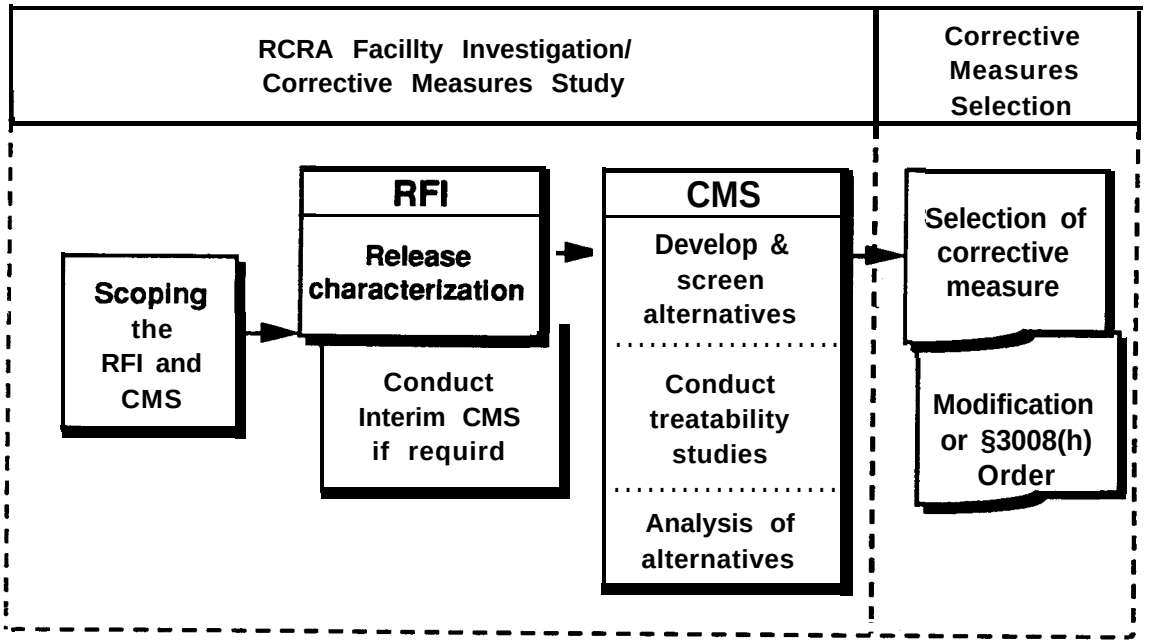
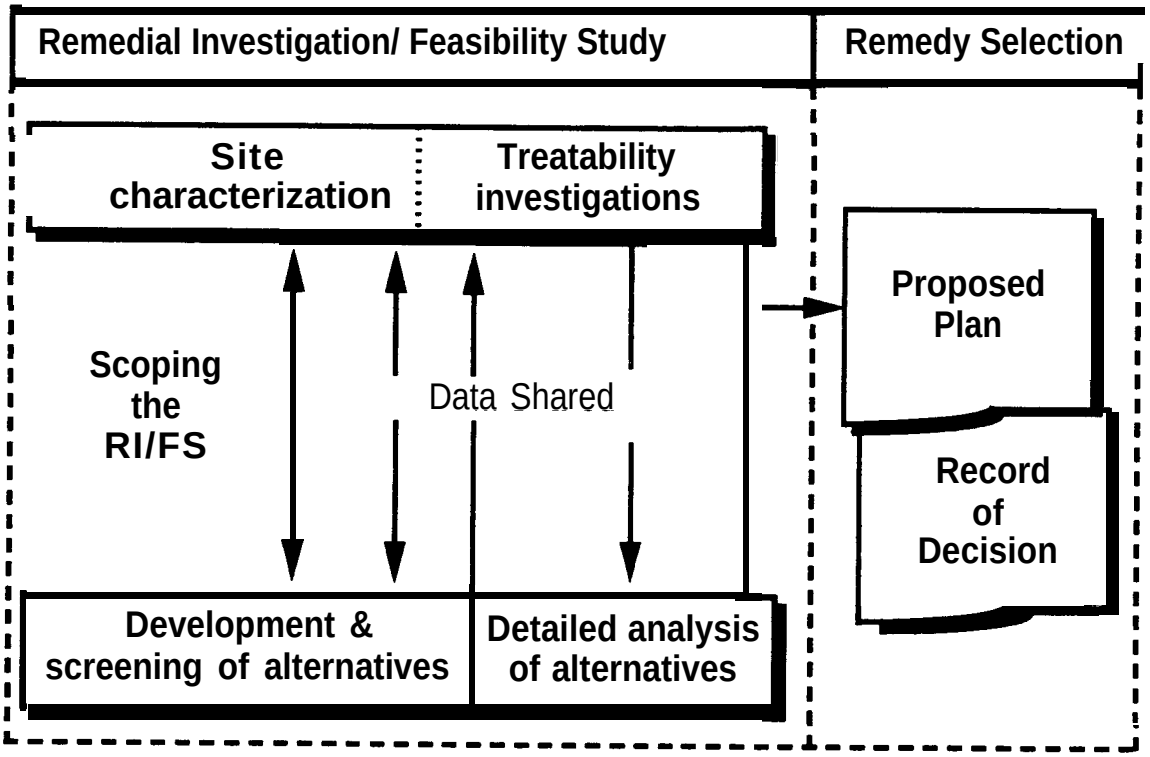
RCRA Facility Investigation/Corrective Measures Study



CERCLA Remedial Investigation/Feasibility Study



Chapter 3
The RCRA Facility Investigation/Corrective Measures Study and The CERCLA Remedial Investigation/Feasibility Study

I. Introduction

The RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) are detailed investigations to assess the extent, nature, associated risk, and alternatives for cleanup of actual or potential releases of hazardous wastes or hazardous waste constituents from solid waste management units (SWMUs) at an operating RCRA permitted or interim status treatment, storage, or disposal facility (TSDF). These releases are usually identified during the RCRA Facility Assessment (RFA). The CERCLA remedial investigation/feasibility study (RI/FS) is the methodology used to characterize the nature, extent, and risks posed by uncontrolled releases of hazardous substances, pollutants, or contaminants from closed or abandoned sites in order to make an informed risk management decision, and for evaluating potential remedial options for those sites.

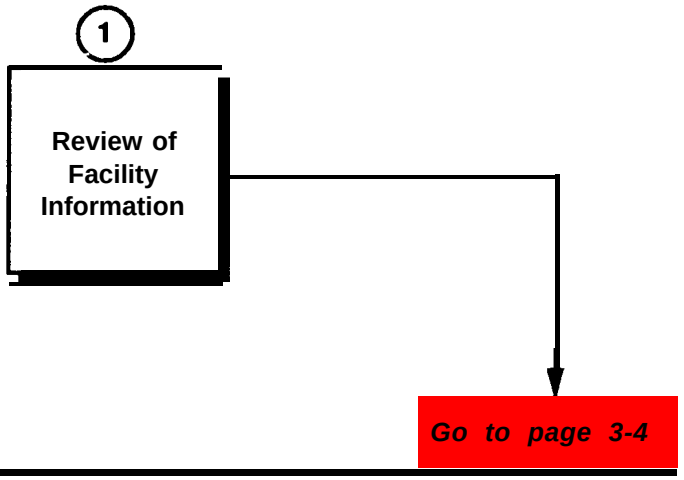
There is an important difference between the RFI/CMS and the RI/FS: the RI and FS are conducted concurrently and interactively, while the CMS is required if the RFI determines that a release of a hazardous waste or hazardous waste constituent poses a threat to human health or the environment. In short, an RI is always associated with an FS, but an RFI is not necessarily followed by a CMS.

This chapter presents an overview of the following topics:

RFI/CMS	RI/FS
Scoping the RFI	**Scoping the RI/FS**
The RFI Plan	**Conducting the RI: Site Characterization**
Conducting the RFI	**Conducting the RI: Baseline Risk Assessment**
The RFl Report	**The Remedial Investigation Report**
Determination of No Further Action	**Feasibility Study: Development and Screening of Alternatives**
Requirement for a CMS	**Treatebility Studies**
Scoping the CMS	**Feasibility Study: Detailed Analysis of the Alternatives**
The CMS Plan	**Development of the Feasibility Study Report**
The CMS	**Remedy Selection–Identifying the Preferred Alternative**
The CMS Report	**Remedy Selection end the Proposed Plan**
Selection of the Corrective Measure	**The Record of Decision**
Permit Modification	

Figure 3-1 on the preceding page is a graphic representation of the portion of the two programs discussed in this chapter.

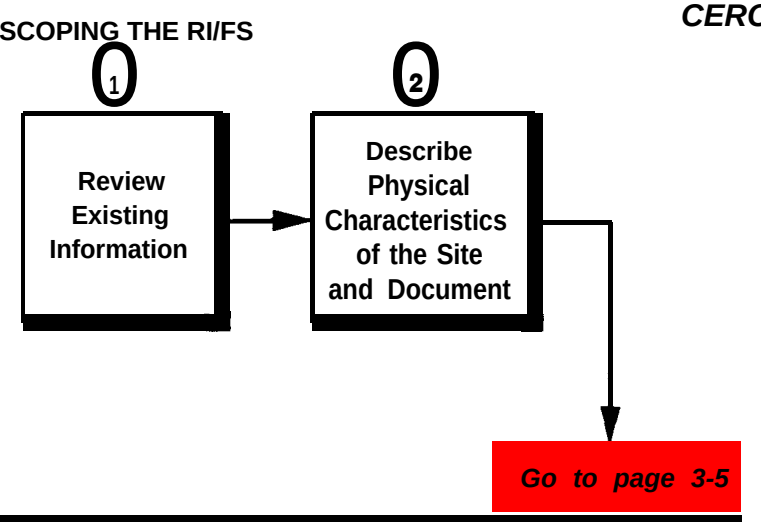
SCOPING THE RFI



II. Scoping the RCRA Facility Investigation

1. **Reviewing Facility Information.** The first phase of conducting the RFI is to collect and review all available information on the release, the SWMU, and the facility. Sources of information for this review include the facility permit or RCRA §3008(h) Order compelling the facility to conduct the RFI, the FFCA for the facility, reports of releases, reports on facility operations, the RFA report, interim measures reports, and reports of investigations or remedial activities conducted under other legal authorities. While recognizing that these documents may not include information on each of the following areas, the investigator should review the documents for information on the following:

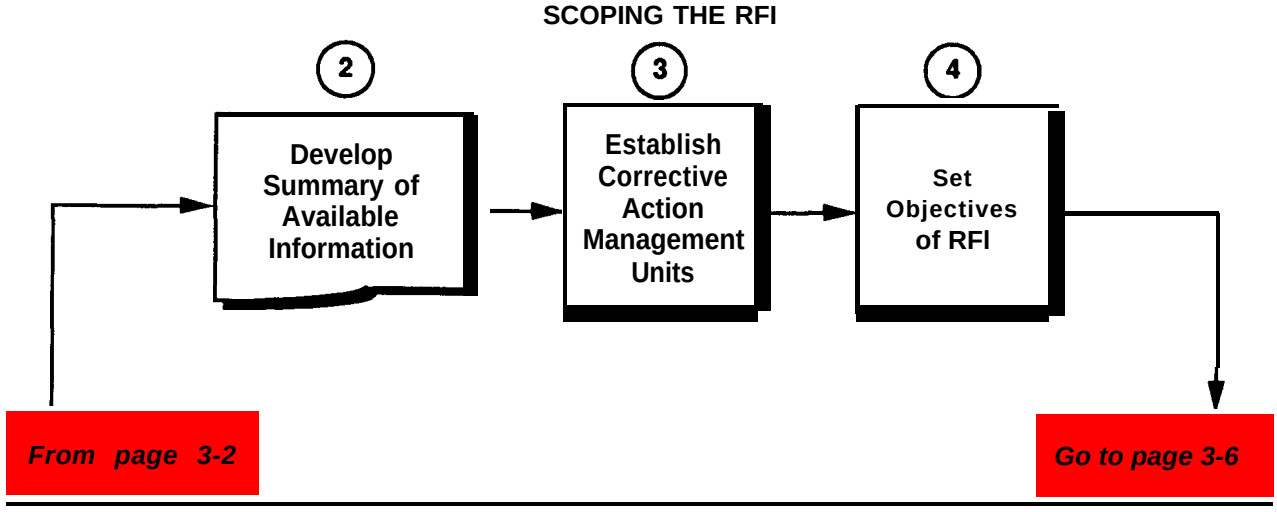
- **The characteristics of the release, including information on the identity, physical, chemical, and toxicological properties and estimated or known quantity or concentration released;**
- **The environmental setting of the facility, including geology, hydrogeology. topography, and population demographics; the reletionship of the SWMUs et the facility; end the relationship of the facility to the surrounding area;**
- **Any documented evaluations of the threats posed to human health and the environment;**
- **Any actions (including interim measures) taken at the facility to control or minimize the threat posed by the release;**
- **The terms and requirements of the permit, §3008(h) Order, or FFCA; and**
- **Current conditions and operations (including operations permitted under other legal authority) at the facility.**



III. Scoping the CERCLA Remedial Investigation/Feasibility Study (RI/FS)

1. **Review Existing Information.** According to Section 2.2.2 of the EPA guidance document titled *Conducting Remedial Investigation/Feasibility Studies Under CERCLA {Interim Final)* (hereafter referred to as the EPA RI/FS guidance), the first step in scoping the RI/FS is to collect and review all available information in order to gain an understanding of the characteristics of the site. Sources of information for this review include the PA and SI reports, reports of releases and/or hazardous waste operations submitted under CERCLA §103 or CERCLA §120, and reports of actions taken under other legal authorities. The documents are reviewed for information on the environmental setting, any risk evaluations, any previous actions (i.e., removals), the specific terms and requirements of the Federal Facility Agreement (FFA), and the current conditions and operations at the site.

2. **Describe tha Physical Characteristics of the Site.** The existing data should be used to develop a site description that includes discussion of the location, topography, geology, land use, waste types, estimated waste volume, and other pertinent information. The site description should also include a chronology of significant events at the site, such as known releases, chemical and waste management practices used at the site, and other response actions (e.g., removals) or regulatory oversight that have occurred at the site. The EPA RI/FS guidance recommends that this information be summarized in a technical memorandum or other appropriate document.

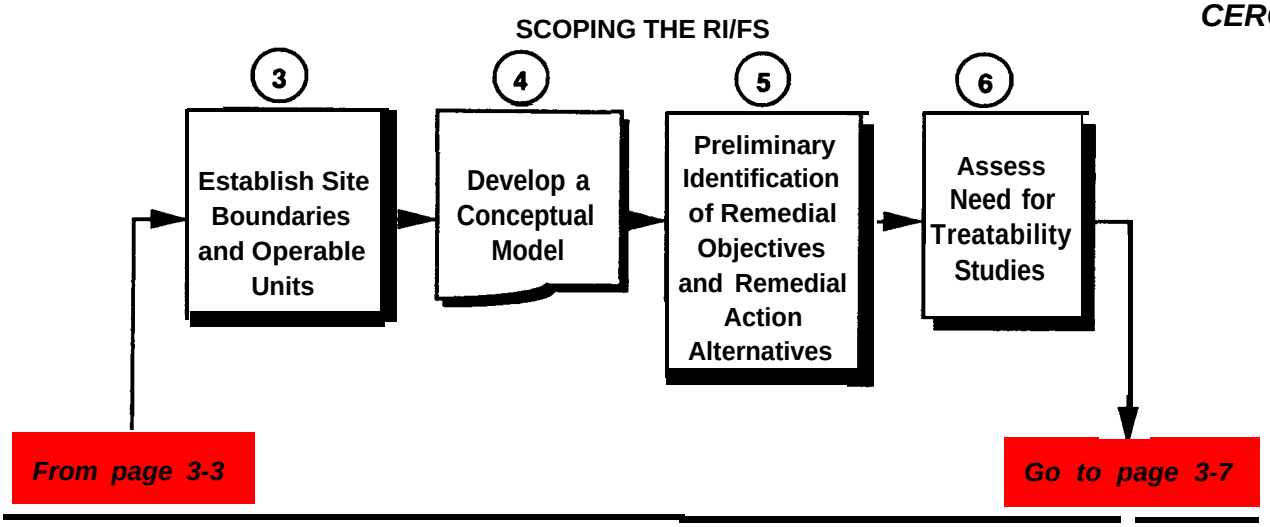


2. **Document Available Information.** The facility should prepare a brief document summarizing the results of this review process for use as a reference during the scoping pcess, and for inclusion in the final RFI report.

3. **Establish CAMUs.** The next step of the scoping process is to evaluate the potential for, and benefits of, establishing CAMUs at the facility. Under the new regulations for CAMUs (58 FR 8658, February 16, 1993), EPA can designate an area at a facility for the purpose of managing remediation wastes generated during corrective action. The identification of a CAMU usually takes place during the process for the selection of the corrective measure, but may occur at any time during the corrective action process. Based upon the review of information about the site, DOE should propose any appropriate areas as CAMUs. The primary benefit of using a CAMU to manage remediation wastes at a facility is that management and disposal of contaminated materials generated by corrective action activities at the facility can be conducted in a CAMU without requiring compliance with the land disposal restrictions or the minimum technology requirements for a new or lateral expansion of a unit.

4. **Set the Objectives of the RCRA Facility Investigation.** An important step in the scoping process is establishing the objectives of the RFI. The DOE RCRA Corrective *Action Program Guide* suggests that DOE should develop a document describing in detail the objectives set for the RFI. The specific objectives of an RFI may include the following:

- **Characterization of the environmental setting of, and the SWMU(s) at, the facility:**
- **Description of the human and environmental receptors that are, have been, or may be exposed to the release;**
- **Collection of information used to characterize the risk posed by the release end to extrapolate future contaminant migration;**
- **Datermination of the need for laboratory, bench-scale. or pilot-scale tests or studies to determine the feasibility or effectiveness of treatment or other technologies that may be appropriate in implementing remedies et the faciliti; and**
- **Statistical analysis of the date collacted during the investigation.**

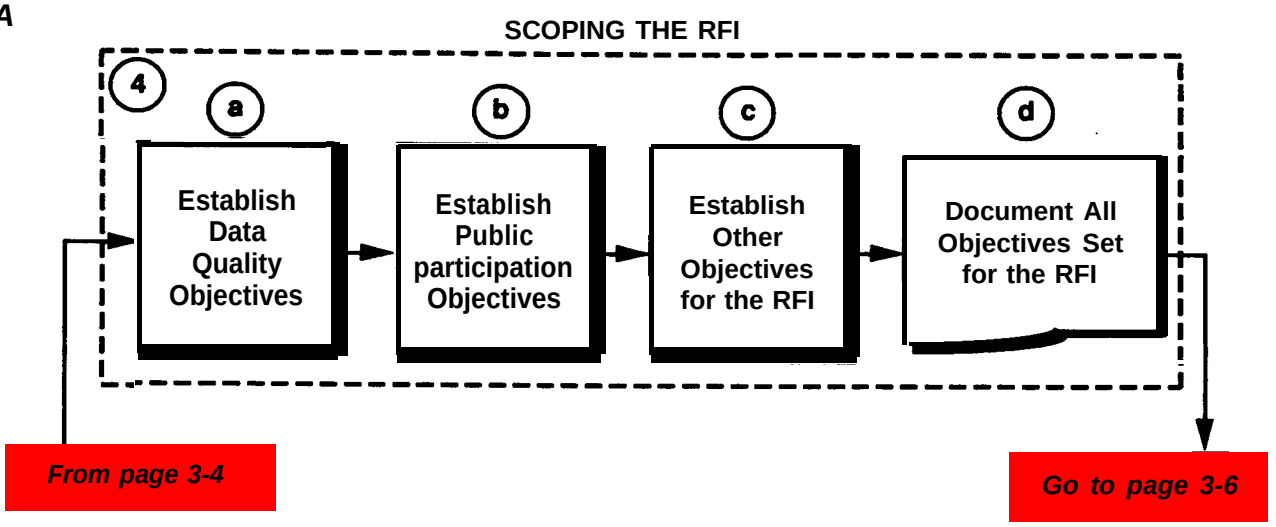


3. **Establish Site Boundaries and Operable Units.** The next step in scoping the RI/FS is establishing the site boundaries and establishing any operable units. The site boundary, according to the NCP (onsite), is defined as the "areal extent of contamination and all suitable areas in very close proximity...necessary for implementation of the response action." Operable units are discrete response actions conducted at a single part of a site, or conducted concurrently at different parts of the site.

4. **Develop a Conceptual Model.** Based upon the data collected during the review of existing information, a conceptual model of the site should be developed. A conceptual model, as described in the EPA guidance *Data Quality Objectives for Remedial Program Activities, Volume 1,* is a brief document providing a narrative, graphical, and/or pictorial description of the site.

5. **Preliminary Identification of Remedial Objectives and Remedial Action Alternatives.** Once the existing information about the site is analyzed and a conceptual model is developed, preliminary remedial objectives (e.g., residual contamination concentrations that are acceptable) are established for each contaminated medium. Based upon these objectives, potential remedial alternatives (i.e., remedial technologies which may prove effective) capable of achieving these objectives are identified.

6. **Assess the Need for Treatability Studies.** Once the potential remedial options are identified, the next step is to assess the need for treatability studies to determine the effectiveness of each potential remedial alternative. Treatability studies, especially pilot-scale studies, may take months to complete and should begin as quickly as possible to minimize delays in accomplishing the RI/FS. Additional information on treatability studies can be found in the EPA guidance document titled *Guide for Conducting Treatability Studies Under CERCLA (Interim Final).*



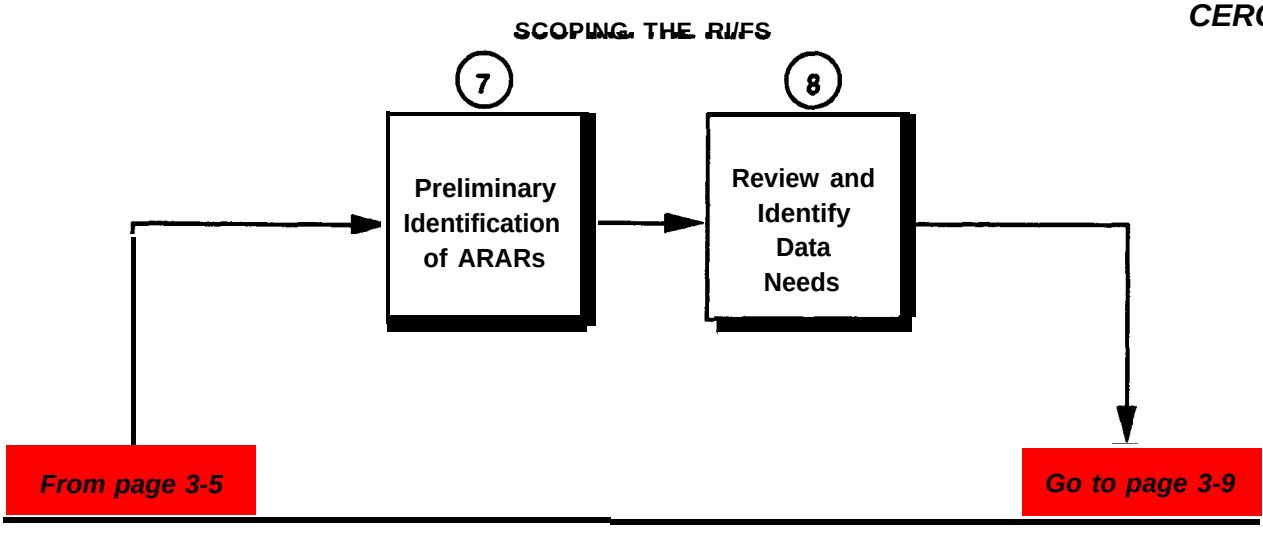
a. When setting the objectives of the RFI, particular importance should be attached to establishing the data quality objectives (DQOs) for the investigation. DQOs, as described in the EPA guidance document titled *Data Quality Objectives for Remedial Program Activities, Volume 1,* are qualitative and quantitative statements that identify the types, quantity, quality, and process for RFI data collection. Developing DQOs is specific to the facility and the SWMU or CAMU under investigation; however, some elements of the DQOs developed for one phase of the corrective action process may be applicable to other phases. The process of developing DQOs has three phases: (1) identifying the types of decisions the data support, (2) identifying data uses and needs, and (3) designing the data collection program. In the document detailing the objectives for the RFI, DOE should include a discussion of DQO development outlining the following:

- **Data collection and management strategy,**
- **Sample collection and analysis strategy, end**
- **Standards for field measurements.**

b. Another objective of the RFI is promotion of public participation in the RCRA Corrective Action process. While a certain amount of public participation is built into the corrective action process, it is usually prudent to implement a strong community outreach program. If concurrent compliance with CERCLA is required, the community relations element becomes mandatory. For additional information refer to the DOE Office of Environmental Guidance publication *Public Participation in Environmental Restoration Activities* (November 1991).

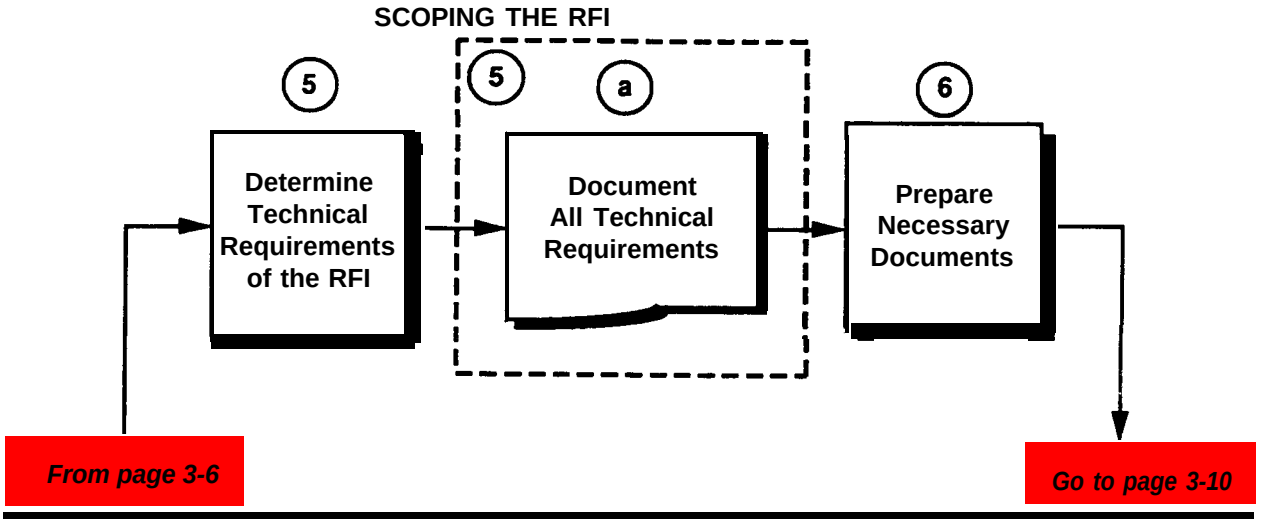
c. As discussed in the DOE *RCRA Corrective Action Program Guide,* other objectives developed during the scoping process may include adherence to the permit schedule of compliance requirements for the RFI, setting an acceptable degree of risk posed to workers engaged in conducting the RFI, or more general policy statements. Setting objectives provides direction for the scoping and conduct of the RFI and also provides a clearly defined means of assessing the progress of the RFI. All objectives should be discussed in the document describing the objectives of the RFI.

d. DOE should **develop a document detailing the objectives established for the RFI** for use as a project management tool. Such a document will prove useful when conducting periodic reviews of the progress of the RFI.



7. **Preliminary Identification of Applicable or Relevant and Appropriate Requirements (ARARs).** Once the preliminary analysis of information about the site and the options for remediation is complete, identification of potential Federal and State ARARs begins. ARARs may be chemical-specific requirements defining acceptable exposure limits; location-specific requirements such as floodplain or wetlands restriction; or action-specific requirements that prohibit or restrict certain responses. The identification of ARARs at this point helps in the identification of potential remedial alternatives and also helps focus later phases of the RI/FS. Additional information on ARARs can be found in the EPA guidance document CERCLA *Compliance with Other Laws Manual, Parts 1 and 2 (19891.*

8. **Review and Identify Data Needs.** Based upon a review of existing information, additional data requirements to better characterize the site and to better define the remedial objectives are identified. For example, the need for additional data on groundwater quality and hydrogeological conditions may be needed to assess remedial alternatives.

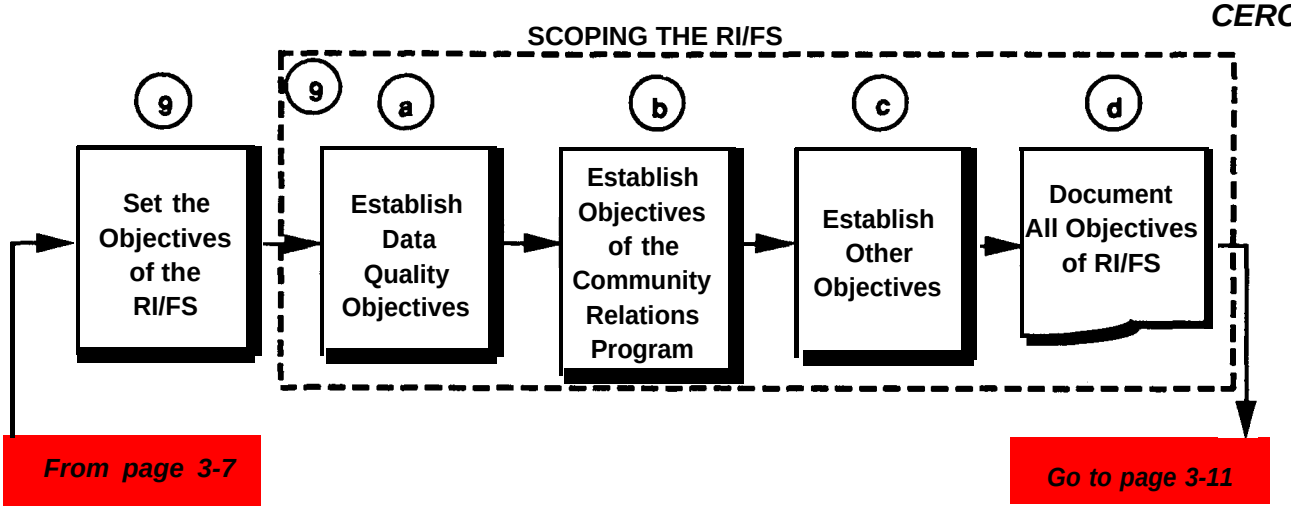


5. **Determining the Technical Requirements of the RCRA Facility Investigation.** The DOE *RCRA Corrective Action Program Guide* describes three categories of technical requirements. The first, the general technical requirements for the RFI, arises from available information on the nature and extent of the release, the affected media, and any requirements of the facility's permit, RCRA §3008(h) Order, or FFCA. The second category includes the specific requirements for collecting and analyzing environmental samples. These requirements are usually defined by the DQOs established for the investigation. The last category is the technical requirements arising from applicable statutory or regulatory requirements, such as the test methods for determining if a solid waste exhibits a characteristic of a hazardous waste.

   All three categories may apply during an RFI. For example, if a release from an SWMU impacts groundwater, the RCRA §3008(h) Order usually includes a general technical requirement for assessing groundwater quality. Accomplishing this requires installation of monitoring wells meeting specific standards for construction and the collection and analysis of samples according to acceptable scientific practices. These represent specific technical requirements. Under the proposed Subpart S rule, 40 CFR §261 Appendix Vlll and 40 CFR §264 Appendix IX specify the compounds for which analysis is conducted as part of the groundwater quality assessment, thus constituting a regulatory technical requirement.

a. DOE should develop a document listing the technical requirements for the RFI. This document is useful in other elements of the scoping process, preparation of the RFI plan, contracting, and preparation of the RFI report.

6.. **Preparing Necessary Documents.** Conducting an RFI usually requires development of several documents, including a site conceptual model, a program management plan (PMP), a data collection quality assurance plan (DCQAP), a data management plan (DMP), a health and safety plan (HASP), and a public involvement plan (PIP). While a DCQAP, DMP, HASP, and PIP are not specifically required by EPA, the EPA guidance on conducting RFIs suggests developing these documents, and the RFI plan will require discussion of most of the elements of these documents. Further, developing these documents represents a "best management practice," and, as such, is a strong recommendation for developing them as part of the scoping process. The DOE *RCRA Corrective Action Program Guide* provides additional information on the elements of each of these documents.



9. **Setting the RI/FS Objectives.** One of the most important steps in scoping is establishing the objectives for the RI/FS. The principal objectives of the RI/FS include, but are not limited to, the following:

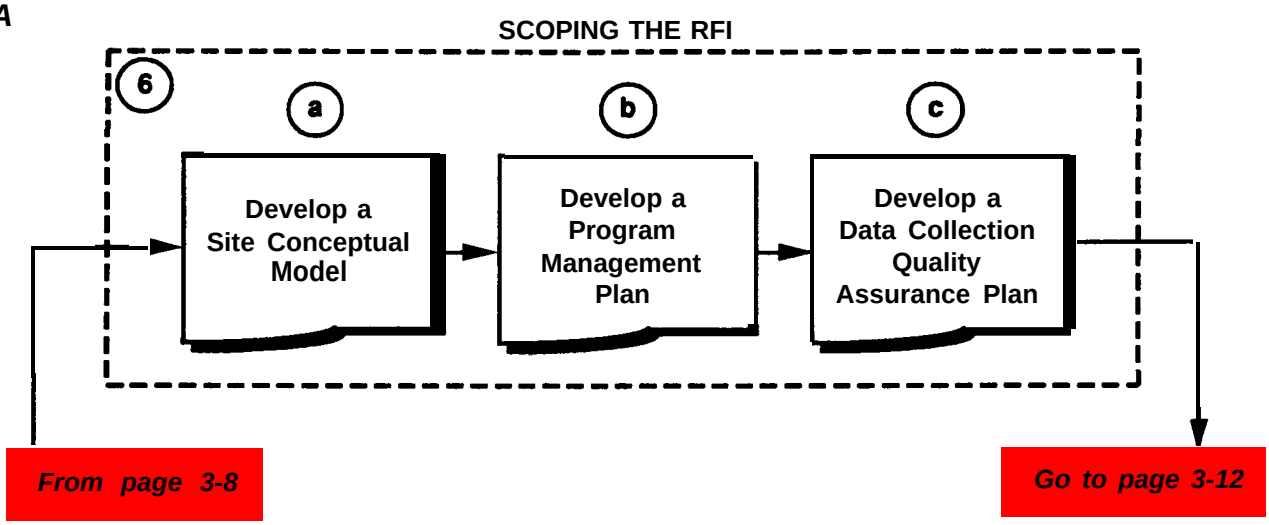
- **Collecting sufficient data to characterize the environmental setting;**
- **Characterizing the source of the contamination:**
- **Determining the human and environmental receptors that are, have been, or may be exposed to the release;**
- **Collecting information used to characterize the risk posed by the release; and**
- **Projecting future contaminant migration.**

a. Establishing the ***data quality objectives (DQOs)*** for the investigation is an important part of setting the overall objectives for the RI/FS. DQOs are qualitative and quantitative statements that identify the types, quantity, quality, and process for RI/FS data collection (e.g., the number of samples required). That is, they determine the quantity and quality of data that will be needed to make a specified decision. DQOs also directly link data collection to decision-making. DQOs are site specific; however, elements of the DQOs developed for one site may be applicable to other sites. A document should be prepared discussing the development of the DQOs that outlines the data collection and management strategy, the sample collection and analysis strategy, and the standards and acceptability criteria for field measurements.

b. Another objective of the RI/FS is to meet the CERCLA §117 requirement for public participation in the remedy selection process. As part of the scoping process, DOE should conduct interviews with community members in an effort to provide sufficient information for development of the ***community relations plan (CRP).*** Further information can be found in the DOE guidance document titled *Public Participation in Environmental Restoration Activities* (November 1991).

c. ***Other objectives*** developed during the scoping process may include the following: (1) adherence to a schedule for the RI/FS, and (2) establishment of the acceptable degree of risk posed to workers engaged in onsite activities.

d. *A* ***single document detailing all the objectives*** established for the RI/FS should be prepared for use as a project management tool, Setting specific objectives provides direction for the scoping and conduct of the RI/FS and defines ways of assessing the progress of the RI/FS. This summary is not a regulatory requirement, but it will be useful in preparing other required documents.

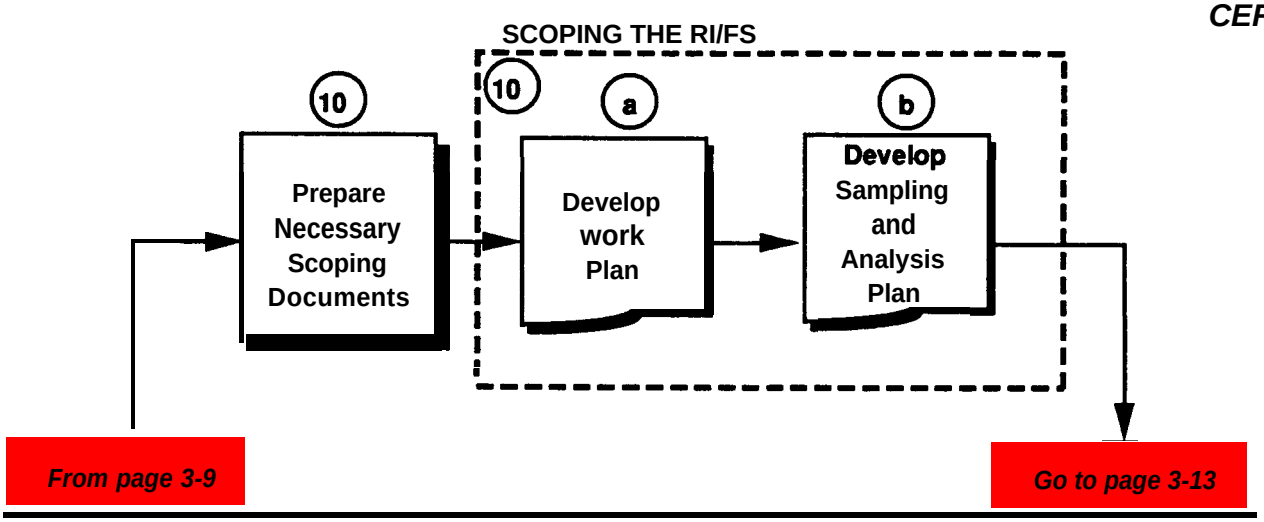


a. The site conceptual model for the facility is a narrative description of the facility, developed from information gathered during the review of existing information. This model is used to develop hypotheses regarding the extent of contamination at the facility, the available routes of migration, and the potential threats posed to human health and the environment. The hypotheses developed in the conceptual model are tested, redefined, and modified during the course of the RFI.

b. Given the size and complexity of most DOE facilities, it is likely the facility will ***prepare a facility-wide Installation Work Plan*** *folloewd by SWMU-specific work plans. If this approach is* used, it is necessary to develop a program management plan (PM P). A PMP describes:

- **The mission of the program;**
- **The chain-of-command and specific delegations of responsibility;**
- **Any internal reporting requirements;**
- **All programmatic quality assurance (QA) objectives and procedures including provisions for QA audits; and**
- **The minimum acceptable performance standards for developing documents (i.e., DCQAPs, work plans, HASPs, etc.), conducting investigations or remedial activities, and for required report formats.**

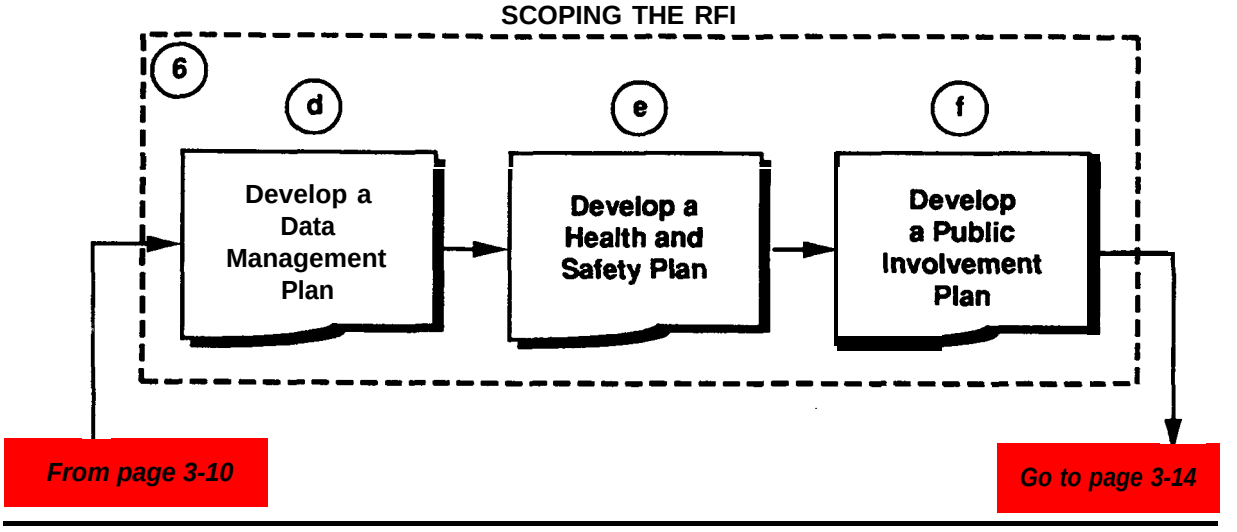
c. A ***data collection quality assurance plan (DCQAP)*** is a document that presents in specific terms the data collection strategy, sampling and analysis procedures, sample collection points, and field measurement procedures designed to achieve adequate data quality. The requirements of a DCQAP are discussed in the EPA guidance document RCRA *Corrective Action Plan* (Interim Final, November 1988).



10. Prepare Necessary Scoping Documents. The next step in scoping the RI/FS is to begin development of the planning documents for conducting the RI/FS. There are four planning documents required to conduct an RI/FS: (1) an RI/FS work plan, (2) a sampling and analysis plan (SAP), (3) a health and safety plan (HASP), and (4) a CRP. In addition, developing a data management plan (DMP) is recommended as a "best management practice."

a. The ***work plan documents*** the decisions and evaluations made during the review of existing information about the site and describes in detail the tasks required to complete the RI/FS. A detailed work plan also provides necessary information to develop a schedule for, and to estimate the cost of, the RI/FS. According to the EPA guidance on conducting an RI/FS, an RI/FS work plan has five elements: (1) the introduction; (2) a discussion of background information and the environmental setting of the site; (3) the initial evaluation of site conditions; (4) the work plan rationale; and (5) the RI/FS tasks.

b. The next planning document, the SAP, is required by 40 CFR §430(b)(8). A SAP has two parts: the ***quality assurance project plan (QAPP)*** and the ***field sampling plan (FSP).*** A QAPP describes the policy, organization, functional activities, and quality assurance and quality control (QA/QC) protocols necessary to achieve the DQOs developed previously. The EPA guidance document *Interim Guidelines and Specifications for Developing Quality Assurance Project Plans (QAMS 005/80)* describes the format and required elements of a QAPP. An FSP provides a detailed discussion of the sampling objectives, methods, frequency, and rationale for field operations. The elements of an FSP are discussed in Volume 4 of the EPA document *Test Methods for Evaluating Solid Waste, 3rd Edition (SW-846).* The basic requirements of an FSP include discussion of site background, sampling objectives, sampling point location and sampling frequency, sample identification, sampling equipment and procedures, and sample handling and analysis.



d. A ***data management plan (DMP)*** is a document that details the acceptable methods for recording and presenting data collected during the RFI. The specific elements of a DMP are:

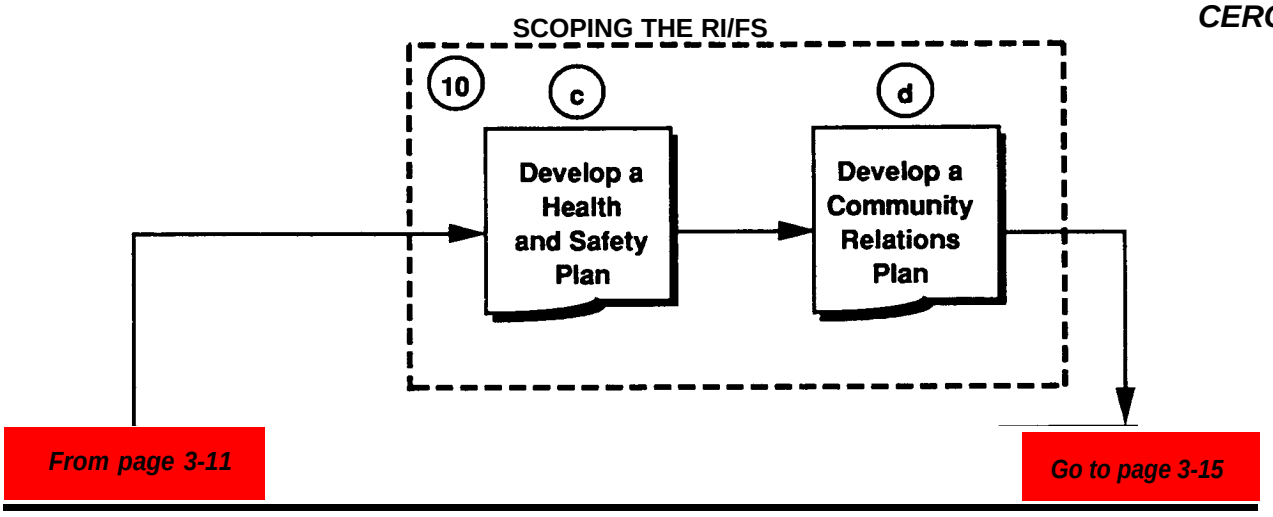
- **A discussion of the elements for the data record,**
- **The format for the tabular display of data, and**
- **The format for the graphical display of data.**

e. A ***health and safety plan {HASP),*** a legal requirement under 29 CFR § 1910.120, details the operational and institutional guidelines for ensuring the health and safety of employees engaged in any RCRA Corrective Action where there is a possibility of employee exposure.

f. The ***public involvement plan (PIP)*** is a document that outlines the procedures for disseminating to the public information on the results of the investigation. The elements of a PIP include the following:

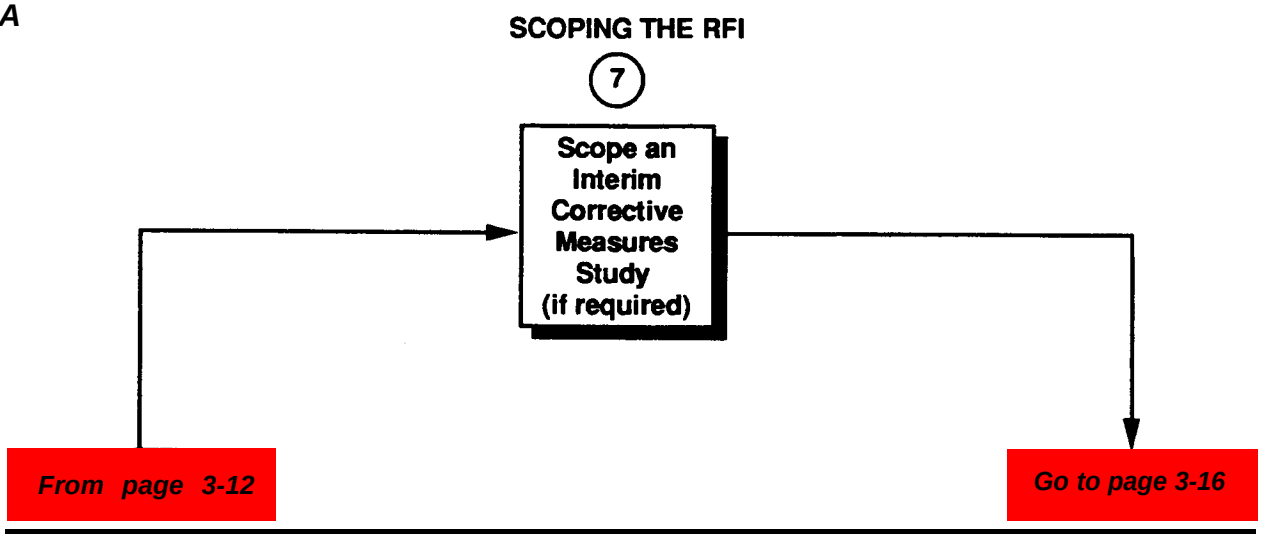
- **Provisions for interviewing local governmental officials, community leaders, and affected individuals to assess the concerns of the surrounding population:**
- **Specific plans to provide notification of the availability of information onon site conditions end the results of investigations;**
- **Plans for conducting public meetings to communicate directly with the citizens in the local community; and**
- **Provisions for a local information repository and administrative record.**

Many of the elements of a PIP will support the public involvement requirements of the permit modification and the process to select the corrective measure.

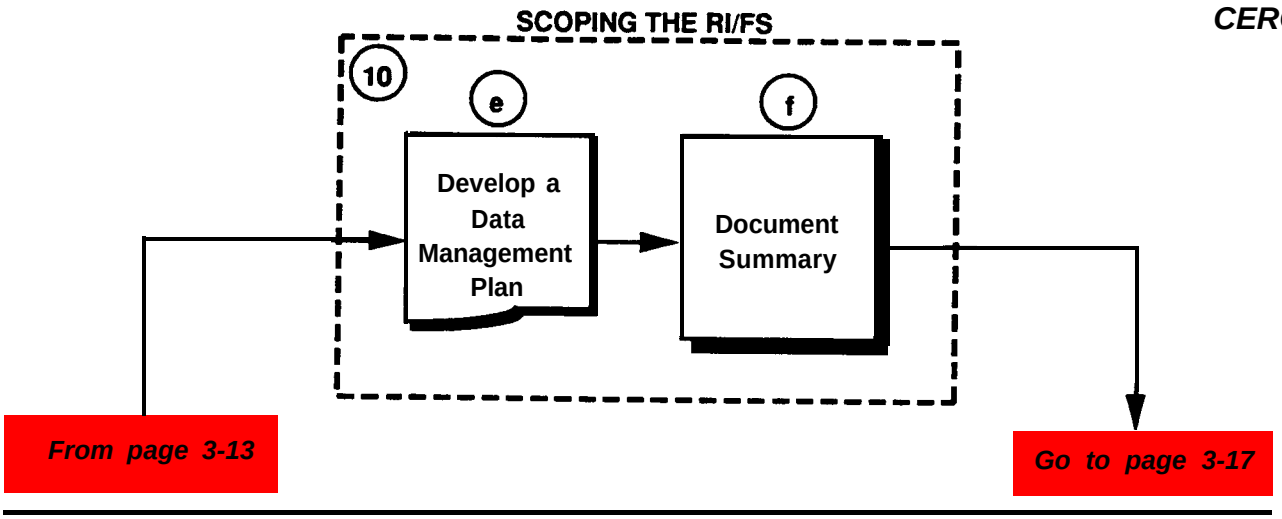


c. A ***health and safety plan (HASP)*** is required under 29 CFR § 1910.120 and under 40 CFR §300.430(b)(6). The HASP details the operational and institutional guidelines for ensuring the health and safety of employees engaged in any CERCLA response action where there is a possibility of employee exposure. The minimum required elements of an HASP are outlined in the EPA Guidance document *Health and Safety Roles and Responsibilities at Remedial Sites* (July 1991).

d. The ***community relations plan (CRP)*** is a document that outlines the procedures for disseminating to the public information on the results of the RI/FS. An active community relations program is required and the elements are outlined in 40 CFR §300.430(c). DOE's "Streamlined Approach for Environmental Restoration" (SAFER) recommends involvement of all "stakeholders" (e.g., the State, local community) as early as possible, to prevent later disputes from impacting the RI/FS and RD/RA processes. DOE has developed a detailed guidance document entitled *Public Participation in Environmental Restoration Activities* that provides information on the specific requirements for community relations.



7. **Scoping an Interim Corrective Measures Study.** While a CMS will usually follow completion of the RFI, under proposed 40 CFR §264.511(a)(6) EPA can require DOE to conduct an interim CMS to prevent delays in advancing through the corrective action process. Usually an interim CMS involves conducting limited-scale treatability studies to evaluate the effectiveness of one or two remedial technologies. EPA may, however, require other activities.



e. A ***data management plan (DMP)*** is not a specific requirement for conducting an RI/FS. However, an RI/FS generates an extensive amount of information, and the EPA RI/FS guidance recommends developing a DMP as standard RI/FS project management practice. The quality, consistency, and documentation supporting the data collected during the RI/FS must be ensured because the data are the basis of remedy selection. The areas a DMP should address include the following:

- **Documentation of sample collection, QA/QC, and custody during field activities;**
- **Sample management and tracking in the laboratory;**
- **Data reduction, validation, and reporting requirements; and**
- **Document inventory end control.**

f. In summary, the following documents typically are prepared when scoping an RI/FS:

Planning documents:

- **A conceptual model.**
- **The preliminary statement of all objectives of the remedial investigion/feasibility study.**

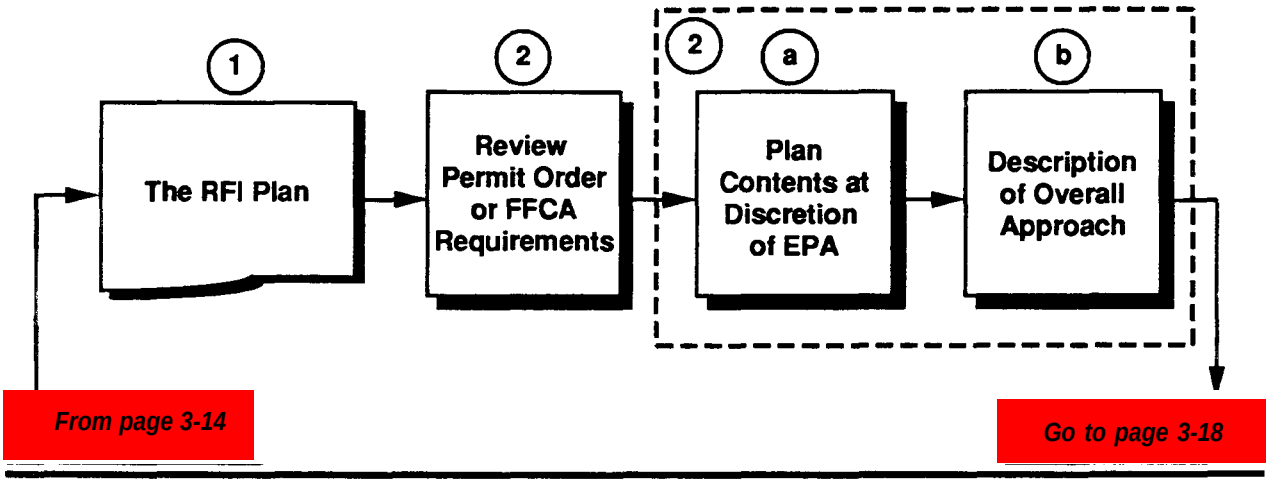
Required documents:

- **The RI/FS work plan.**
- **The sampling and analysis plan (consisting of the field sampling plan end the quality assurance project plan).**
- **The HASP.**
- **The CRP.**

Recommended document:

- **The DMP.**

THE RFI PLAN



IV. The RCRA Facility Investigation Plan

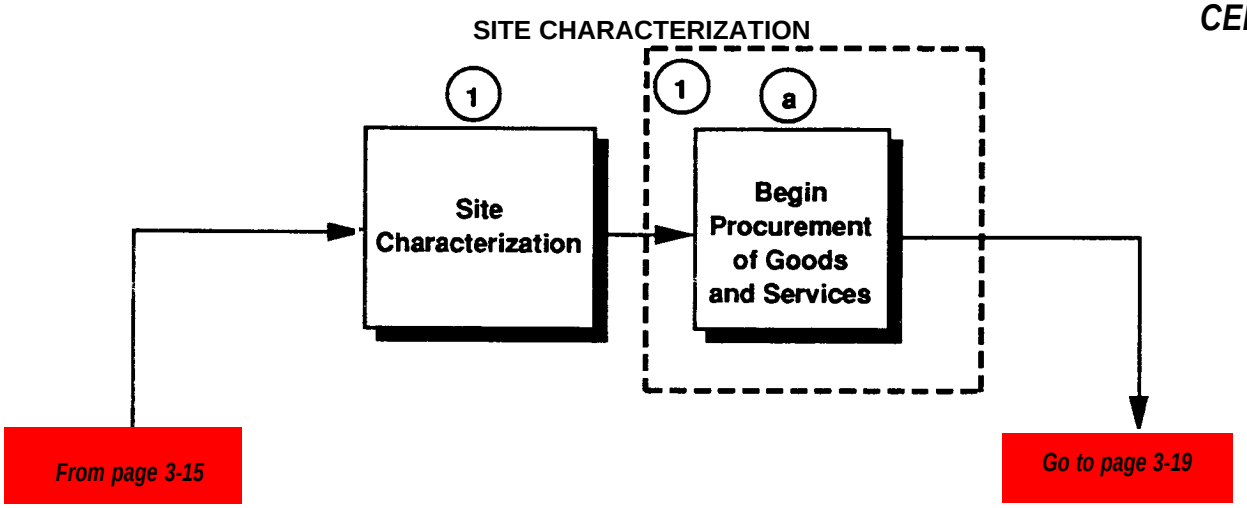
1. **The RFI Plan.** Conducting an RFI requires the development of the RFI plan. Under proposed 40 CFR 264.512 of the Subpart S rule, submission of an RFI plan is not mandatory; however, EPA usually requires that RFI plans be subject to EPA review and approval. The approved plan becomes a part of the facility permit and is subject to the permit schedule of compliance.

2. **Plan Contents.** The first step in developing the RFI plan is to review the permit, RCRA §3008(h) Order, or FFCA for requirements to submit an RFI plan to EPA and for specific content or format requirements.

a. Under the proposed Subpart S rule, the contents of the RFI plan are decided by EPA; however, the plan should include discussion of the overall approach to the investigation.

b. A description of the overall approach to the investigation should include the following:

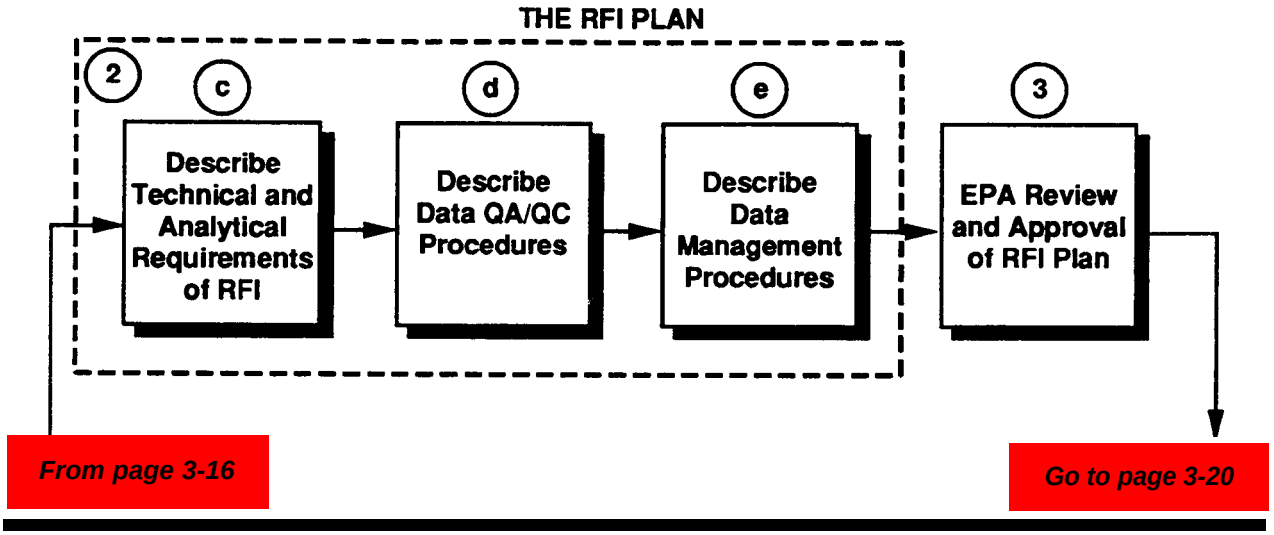
- **A discussion of the objectives for the investigation,**
- **A proposed schedule for the investigation,**
- **The qualifications of the persons invoked in conducting the investigation,**
- **Reference to any CAMUs established, and**
- **A plan for assessing the progress and direction of the investigation as the results of data collection and analysis begin to provide understanding of facility conditions.**



v . Conducting the CERCLA Remedial Investigation: Site Characterization

1. **Site Characterization.** Site characterization is conducted to assess the threat a site poses to human health and the environment. The process of site characterization, described in detail in the EPA RI/FS guidance, is largely a matter of implementing the work plan and the SAP developed during the scoping process.

a. Field work support activities, such as ***procurement of goods and services,*** coordination with analytical laboratories, and coordination of onsite facilities, are a significant part of conducting the site characterization. Since procurement of goods or services can take several months, this process should begin prior to the initiation of onsite activities.



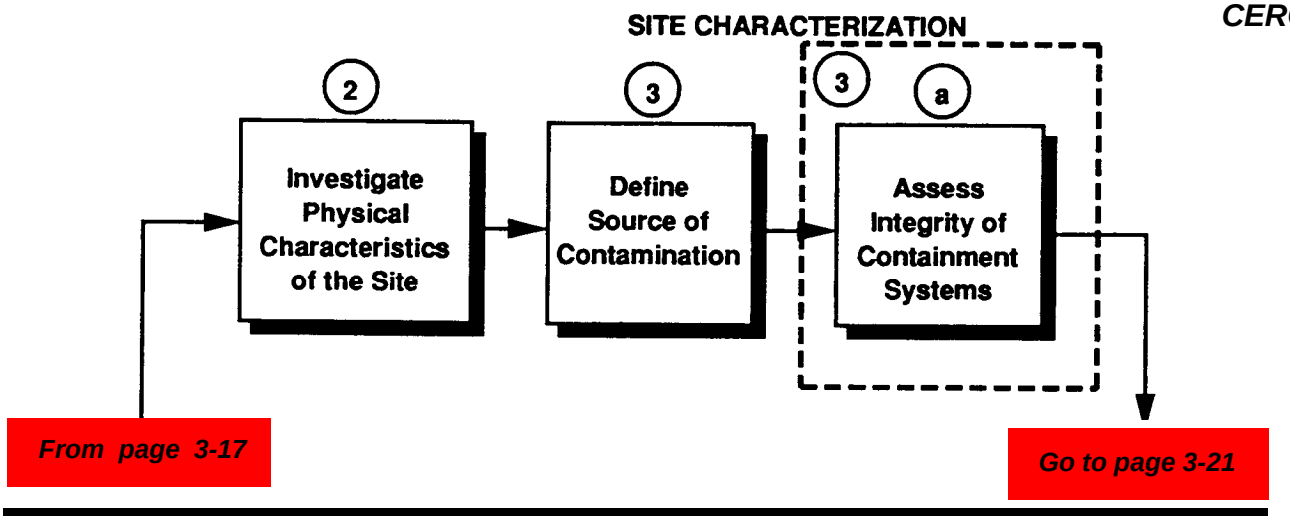
c. ***A specific description of the technical and analytical requirements*** for conducting the investigation must be included, as well as a discussion of how the RFI plan will fulfill these requirements. Many of the documents prepared during the scoping process may be inserted directly into this section of the RFI plan. These documents include:

- **The program management plan,**
- **The data collection quality assurance plan and date management plan,**
- **The date quality adjectives summary, and**
- **The list of specific end regulatory technical requirements for the investigation.**

d. The quality assurance and quality control procedures that are to be followed during the RFI are addressed in the DCQAP developed during the scoping process. To fulfill this requirement, the DCQAP should be incorporated directly into the RFI plan.

e. Discussion of the data management procedures and format is to ensure that RFI data and summary results are presented in a clear and logical manner.

3. EPA Review end Approval of RFI Plan. Once the draft RFI plan is complete, DOE will submit it to EPA for review and approval. If the draft RFI plan is not approved, any necessary revisions must be discussed and negotiated with EPA, and the plan revised and resubmitted. The final EPA-approved RFI plan will be incorporated into the facility permit schedule of compliance.



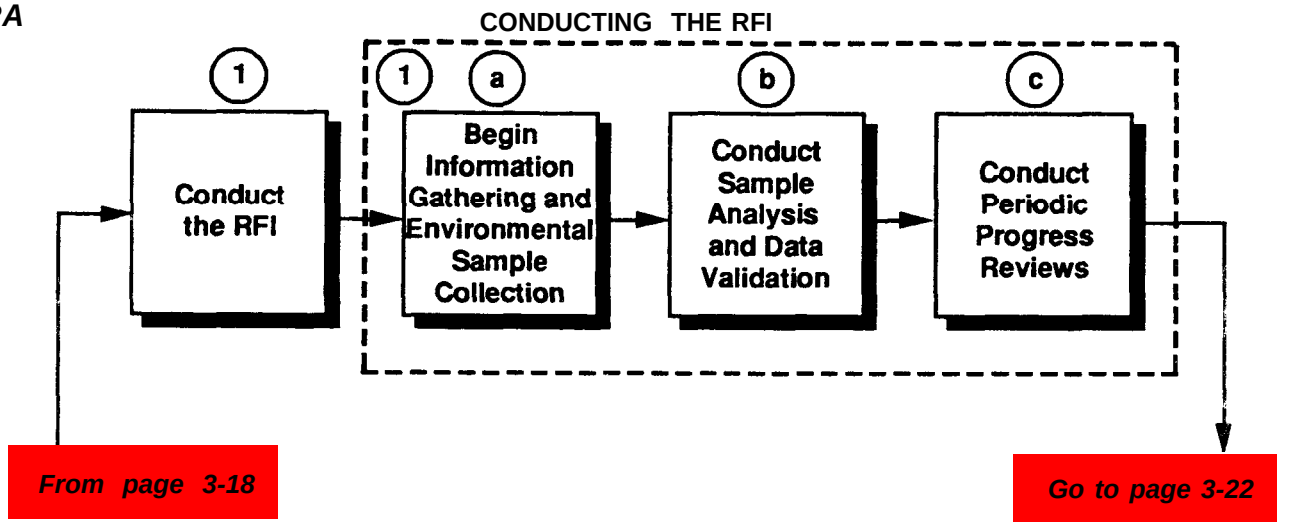
2. **Investigate Physical Characteristics of the Site.** The first step in site characterization is to investigate the physical characteristics of the site. This process includes, but is not limited to, the following:

- **Examination of surface features such as topography, structures, waste disposal areas, vegetation, or surface water bodies or drainage routes;**
- **Assessment of the regional geology of the site, as well as certain site-specific geology such es aquifer depth, location, and areal extent;**
- **Determination of the characteristics of site soils and the vadose zone;**
- **Analysis of surface water hydrology and the hydrogeology of the site:**
- **Determination of the prevailing local meteorological conditions; and**
- **Identification and characterization of effected human populations and assessment of local flora, fauna, or ecologic conditions.**

3. **Define Source of Contamination.** The next phase of site characterization is to define the source of the contamination. Source characterization involves collecting data to describe the following:

- **Facility characteristics and the source location. potential releasas, and engineering characteristics that are important in the evaluation of remedial alternatives;**
- **Waste characteristics, including the identity end quantity of any materials released; and**
- **The physical, chemical, and toxicologic properties of the hazardous substances, pollutants, or contaminants present in the source of the release.**

a. The characterization of sources includes assessment of the integrity of any containment vessels or engineered features designed to prevent or control releases.



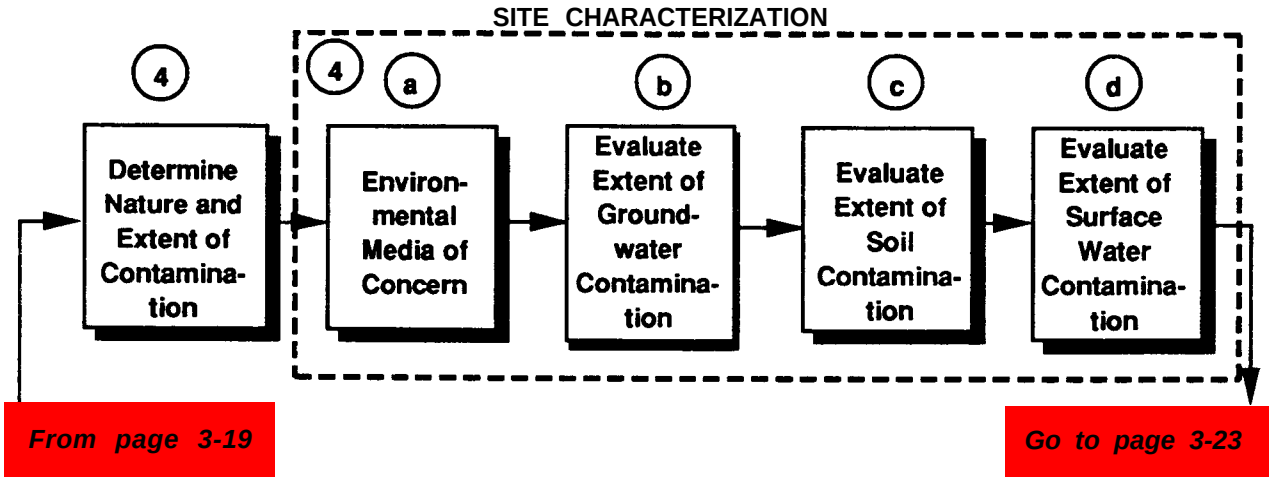
VI. Conducting the RCRA Facility Investigation

1. **Performing the RFI.** The actual performance of the RFI has three elements: (1) implementation of the planned procedures for information gathering and sampling activities; (2) sample analysis and data verification: and (3) periodic progress assessmenys. A more detailed discussion of the conduct of an RFI can be found in the EPA document *RCRA Facility Investigation Guidance, Volumes 1-4 (1989).*

a. The first element, ***information gathering and sample collection activities,*** is a matter of implementing the field measurement and sampling activities specified in the RFI plan and DCQAP. This involves such activities as installation of monitoring wells, collecting soil, water, or air samples; collection of information on the surrounding community; and waste characterization.

b. The second element, ***sample analysis and data validation,*** is largely a process of implementing the DCQAP and DMP.

c. The third element, ***periodic progress review,*** involves reviewing the collected data, evaluating the success and problems encountered during the investigation, and assessing whether the investigation is fulfilling the objectives set for the RFI. If the review finds implementation problems, or if the data collected reveal an unanticipated source or type of contamination, the investigation scoping process and RFI plan should be reexamined to determine their adequacy. The findings of these reviews should be documented for use in preparing both periodic reports and the final RFI report.



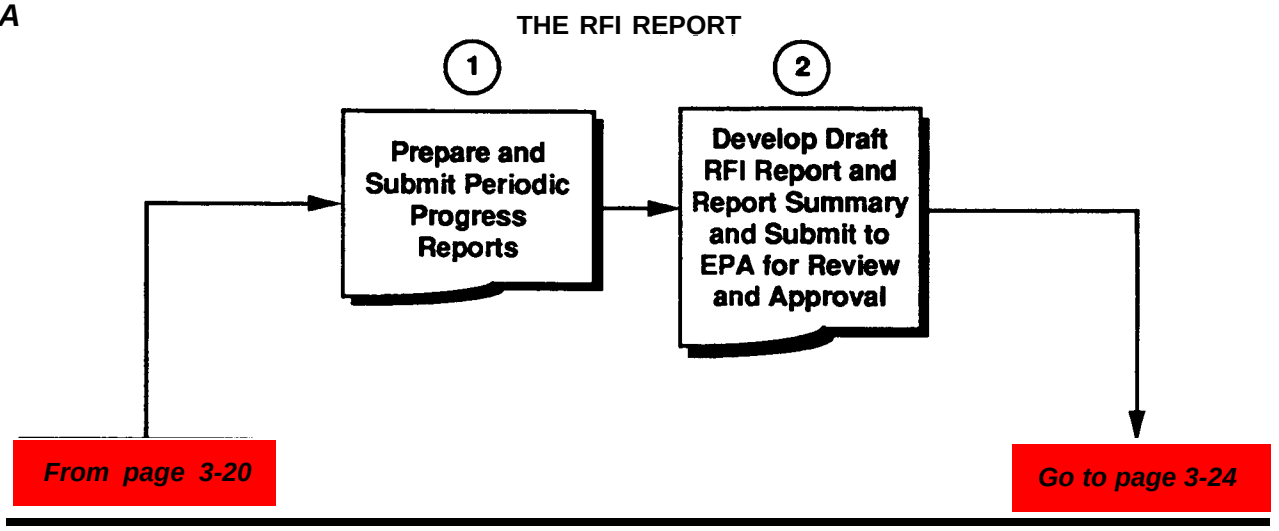
4. **Determine Nature and Extent of Contamination.** Once the source(s) of the contamination is identified, the next step is to determine the nature and extent of the contamination. This process is essentially the same for both RCRA Corrective Action and CERCLA in order to make an informed risk management decision. However, because more information on the specific wastes managed at a RCRA site is usually available, it is possible to narrow the focus of the data collection and site characterization efforts. By contrast, the information collected during this phase of the RI/FS allows informed decisions only on the level of risk presented by the site and the appropriate type of remedial response. Analysis of the physical characteristics of the site, the source, and the identity of the contamination is still necessary to estimate the extent of migration. ***The next step, confirmation of these estimates, often involves sampling and analysis of the affected media.***

a. There are five environmental media of concern: (1) groundwater, (2) soil, (3) surface water, (4) surface water sediments, and (5) air. In addition, sampling of biota may be required. The specific method used to assess the extent of contamination depends upon the medium under examination. While the EPA guidance document, Guidance for Conducting Remedial Investigation/Feasibility Study (RI/FS) under CERCLA (Interim Final), provides general information on the site characterization process, the EPA document A Compendium of Superfund Field Operations (1988) provides detailed guidance on the techniques for assessing the degree of environmental contamination at the site.

b. The extent of **groundwater** contamination must be defined horizontally and vertically. Hydrogeologic studies provide the data necessary to determine if groundwater contamination can affect human or environmental receptors. If such a threat exists, an extensive groundwater monitoring program is usually required to accurately assess the extent of the contamination.

c. Characterization of **soil** contamination is similar to the characterization of groundwater contamination. The objective is to determine the areal extent of the contamination and total quantity of contaminated soil present at the site. However, unlike groundwater investigations, if there is adequate knowledge of contaminant sources, the soil sampling process can be quickly focused on suspected areas of contamination.

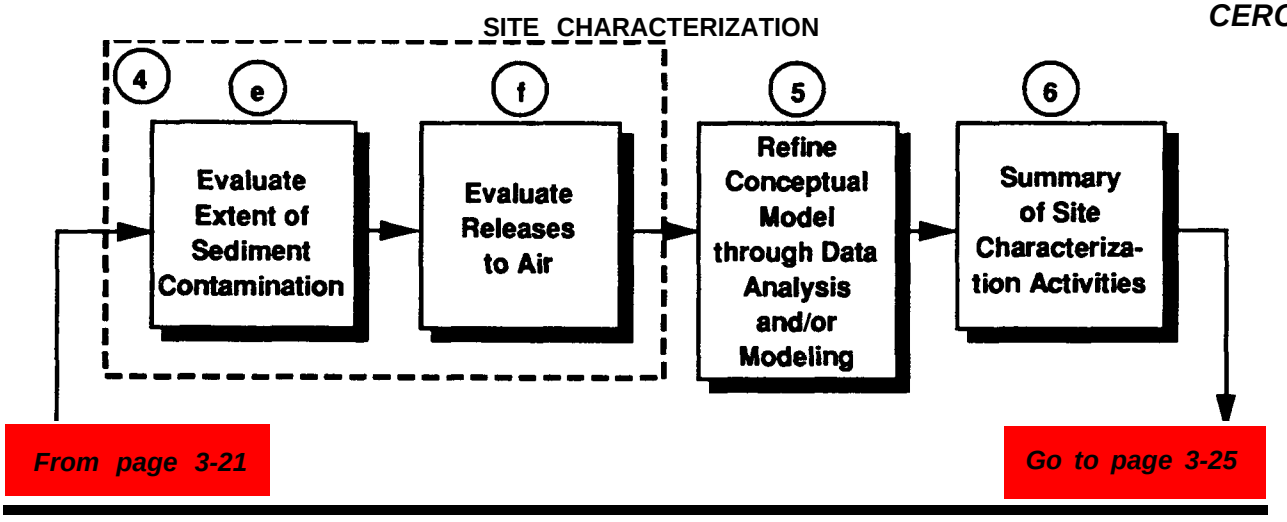
d. The extent of **surface water** contamination due to continuing releases is assessed through sampling at the point of entry into the surface water body and as far downstream as is needed to determine the extent of contaminant migration.



VII. The RCRA Facility Investigation Report

1. **Periodic Progress Reporting.** While the RFI is under way, under proposed 40 CFR §264.513(a), EPA may require the *submission of periodic progress reports.* The exact content, format, and schedule for these reports are at the discretion of EPA. Any specific requirements for these progress reports will be included in the permit, RCRA §3008(h) Order, or FFCA.

2. **Development and Submission of RFI Report.** Upon completion of the RFI, DOE prepares a draft RFI report and a separate document summarizing the report and submits these documents to EPA for review and approval. The findings of the report are the basis for a "Determination of No Further Action" or for the conduct of a CMS, and represent the culmination of all the effort involved in conducting the RFI. The summary is sent to all parties on the facility's mailing list.



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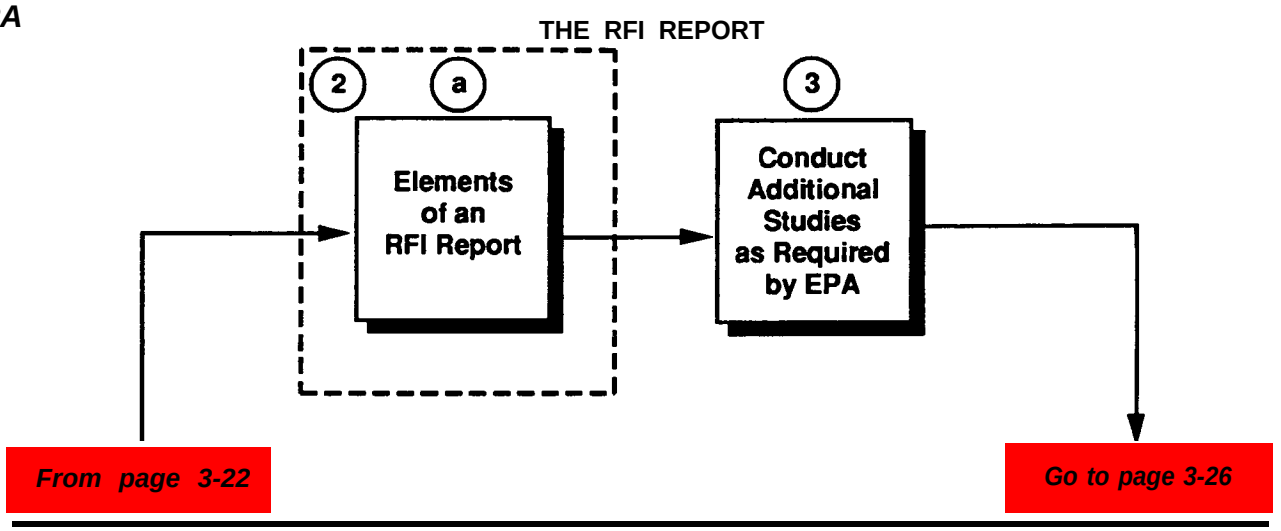
e. If surface water is determined to be contaminated, it is likely that the sediments are also contaminated. A sediment sampling program will be similar to a surface water sampling program, requiring sampling at the point of entry and at appropriate intervals downstream. A sediment sampling program will most likely be conducted concurrently with a surface water sampling program to allow analysis of the relationship between surface water hydrology and sediment contamination.

f. Characterization of *air* releases due to volatile or particulate emissions will probably be linked to meteorological studies. Until EPA issues new regulations to implement the Clean Air Act of 1990, determining the specific requirements for compliance will require close coordination with EPA and State regulatory agencies.

5. **Refine Conceptual Model.** Once data collection on the physical characteristics of the site, the source of contamination, the nature and extent of the contamination, and the affected media is completed, each data type is analyzed to refine the conceptual understanding of site conditions. In many cases, the process of data analysis will involve modeling the contaminant fate and transport to extrapolate future contaminant migration. Data collection is considered complete when the DQOs developed in the scoping process are fulfilled and sufficient data are available to select a remedial action.

6. **Summary.** In summary, site characterization involves the following:

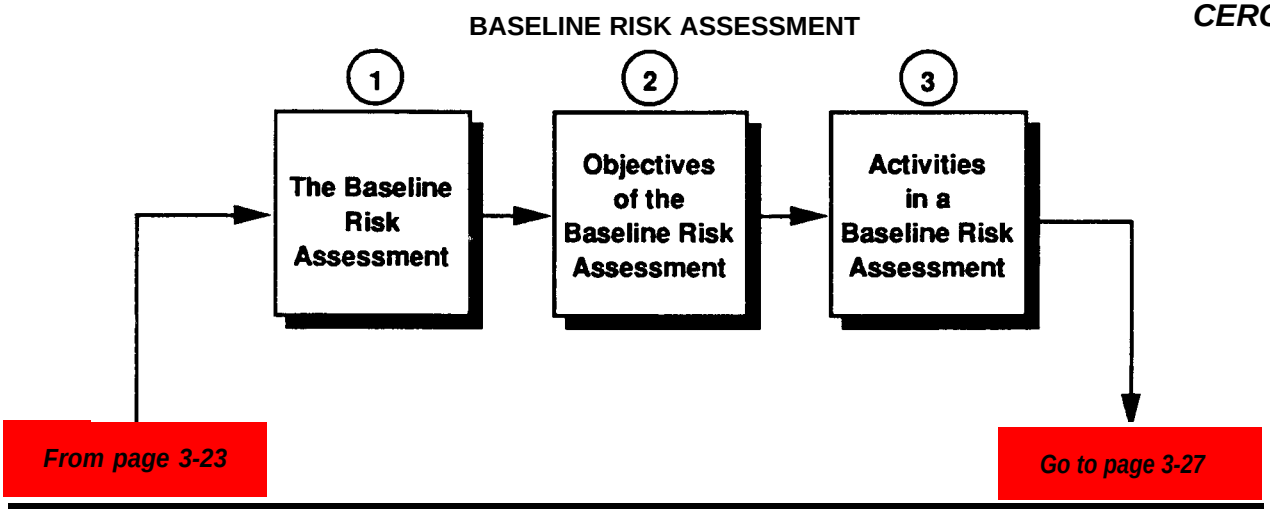
- **Initiate procurement of goods and services,**
- **Investigate the physical characteristics of the site,**
- **Define the source(s) of contamination and assess integrity of containment systems, and**
- **Determine the nature and extent of the contamination and the affected environmental media (i.e., groundwater, soil, surface water, sediments, and air).**



a. The RFI report must document the process and findings of the investigation and provide information to support any subsequent decisions. The elements of an RFI report are as follows:

- **A brief discussion of the facility history and current facility conditions, including the terms of the permit. RCRA §3008(h) Order, or FFCA:**
- **A discussion of the general approach to the investigation;**
- **A discussion of the objectives of the investigation and an assessment of the success in achieving each objective;**
- **Identification and discussion of the general, specific, end technical requirements of the RFI;**
- **A discussion of the quality assurance,quality control , and data management procedures utilized during the investigation:**
- **Presentation and discussion of the findings of the investigation;**
- **Comparison of actual contamination levels to action levels;**
- **A discussion of significant problems encountered during the RFI end**
- **Recommendations for subsequent action.**

3. **Conduct Additional Studies, If Required.** After review of the draft RFI report, EPA may require DOE to conduct additional investigations or studies. The final, EPA-approved RFI report becomes the basis for either a CMS or a “Determination of No Further Action. ”



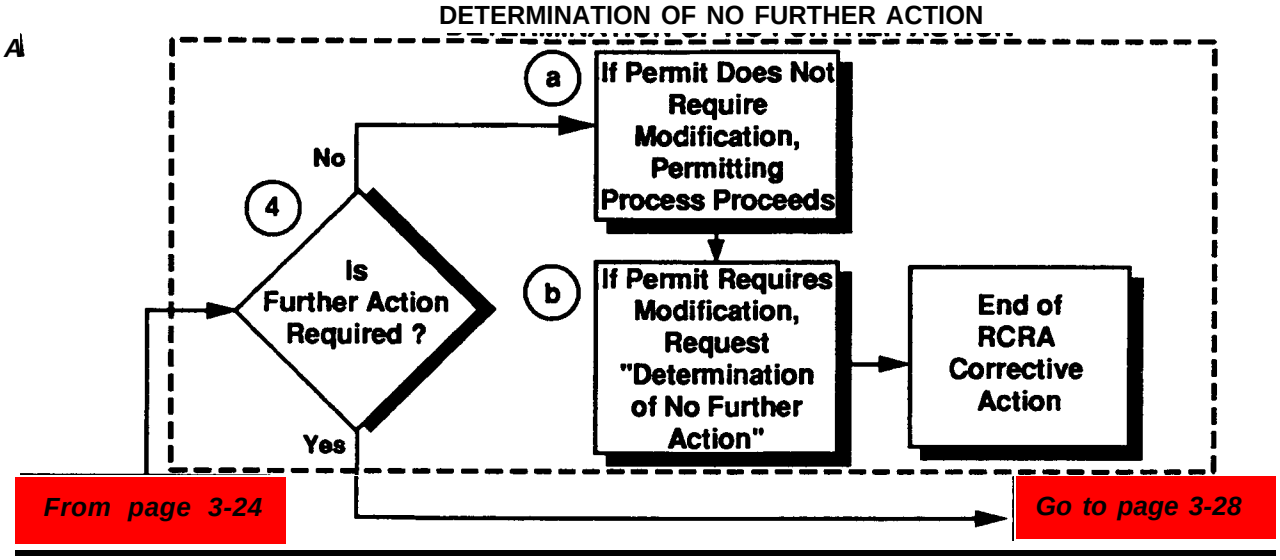
VIII. Conducting the CERCLA RI: Baseline Risk Assessment

1. **The Baseline Risk Assessment.** A baseline risk assessment evaluates the potential threat to human health and the environment posed by the site. The level of risk posed by the site is one element in making an informed risk management decision regarding the need for a remedial action. EPA has published a detailed guidance document on conducting baseline risk assessments entitled *Risk Assessment Guidance for Superfund, Volumes 1 and 2 (Interim Final,* 1989). The RCRA Corrective Action program uses a process very similar to a CERCLA risk assessment to determine the need for interim measures and to set action levels or media cleanup standards for contaminants without promulgated standards.

2. **Objectives of the Baseline Risk Assessment.** According to the EPA RI/FS guidance, the principal objective of the baseline risk assessment is collection of sufficient data to identify and characterize the following:

- **The concentrations and toxicity of contaminants present in each media,**
- **The environmental fete end transport mechanisms of these contaminants,**
- **Potential human and environmental receptors,**
- **Potential exposure routes and the extent of actual or potential exposure,**
- **The extent of expected impacts end the likelihood of such impacts occurring, and**
- **The level of uncertainty of the baseline risk assessment.**

3. **Activities in a Baseline Risk Assessment.** As described in Section 3.4.2 of the EPA RI/FS guidance, conducting a baseline risk assessment requires these basic activities: (a) contaminant identification; (b) exposure assessment; (c) assessment of the acute, chronic, and carcinogenic toxicity of the contaminants; and (d) risk characterization.

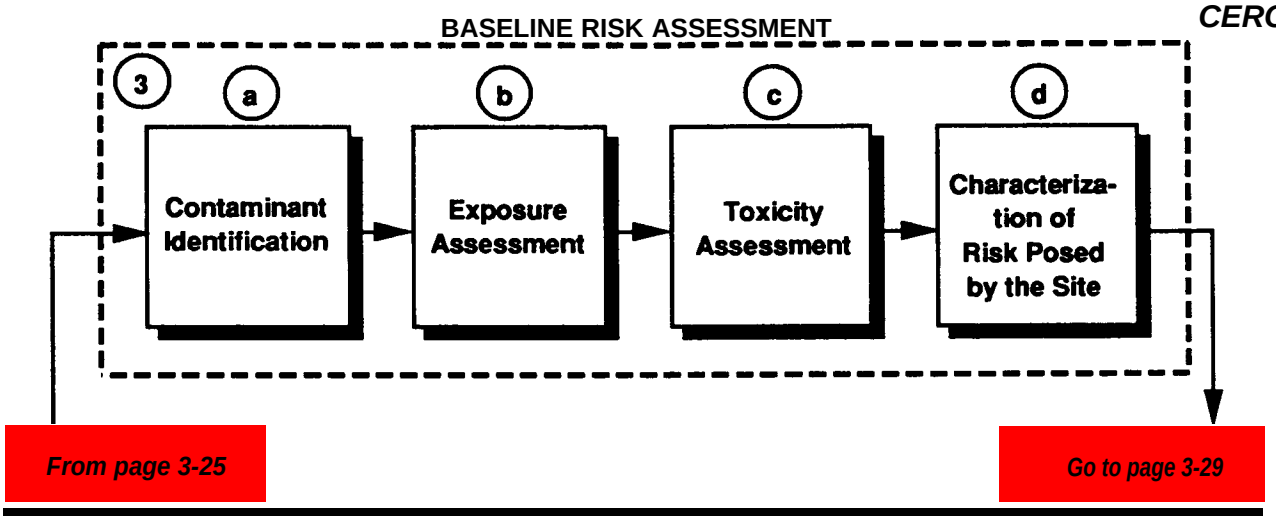


IX. RCRA Determination of No Further Action

4. **Need for Further Action?** EPA anticipates that at some facilities the releases at SWMUs identified through the RFA (or subsequent investigations) are not a threat to human health and the environment. If EPA conducted the RFI and discovered no release orthreatened release, then no further action is required at that SWMU, and the facility permit application continues through the normal process.

a. However, if a RCRA §3008(h) Order or an existing permit required DOE to conduct the RFI, DOE must request termination of the investigation requirement in the facility schedule of compliance. This requires a Class Ill permit modification, or rescission of the RCRA §3008(h) Order.

b. Permit modification for a “Determination of No Further Action,” as outlined in the proposed Subpart S rule at 40 CFR §264.514, requires negotiation of the modification with EPA, development of a draft permit, a public notice, a comment and response period, a public meeting (if necessary), incorporation of any revisions into the permit modification, and issuance of the final modified permit. For a RCRA §3008(h) Order, EPA merely rescinds the order. In either case, DOE is responsible for providing any supporting documentation.

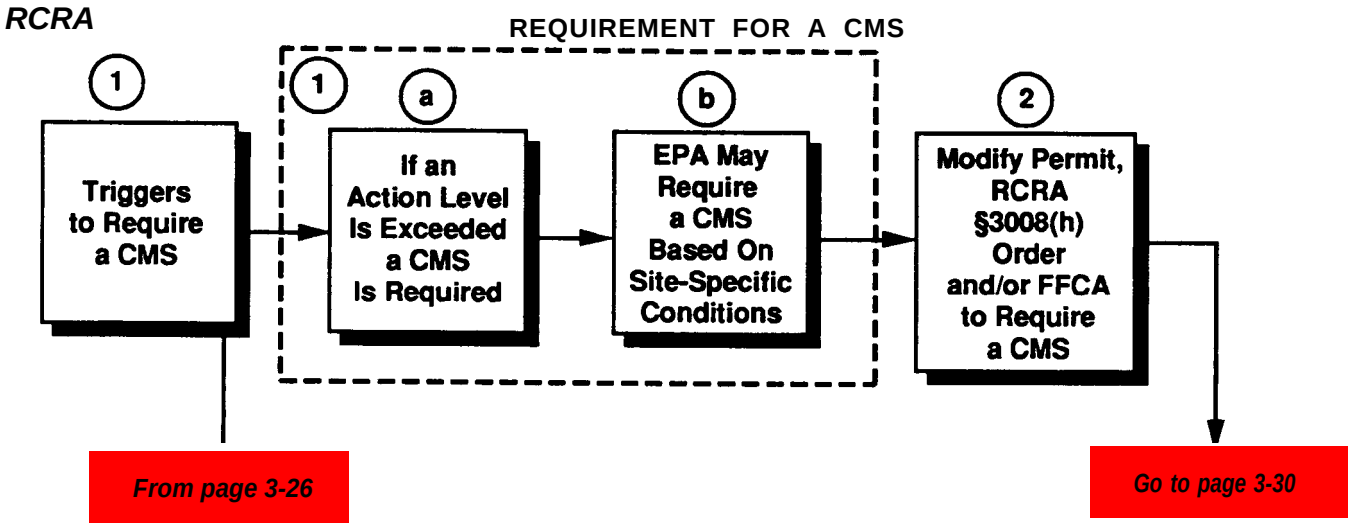


a. ***Contaminant identification*** consists of identifying those compounds posing the greatest concerns, especially the risk to human health and the environment. Contaminants of concern may be selected based on factors including their toxicological properties, quantities, or presence in critical exposure pathways.

b. ***Exposure assessment*** consists of identifying the actual or potential pathways of exposure. This consists of determining the migration pathways from the source to the receptor. Each migration pathway has four elements to investigate: (1) the source and mechanism of release; (2) the environmental transport medium; (3) the point where exposure occurs (referred to as the exposure point); and (4) the exposure route (e.g., inhalation, ingestion). The specific activities of an exposure assessment are described in detail in Chapter 6 of the EPA guidance document *Risk Assessment Guidance for Superfund, Volume 1 (Interim Final 1989).*

c. ***Toxicity assessment*** relies upon existing information about the acute, chronic, and carcinogenic effects of exposure. Examples of information collected during this step of a baseline risk assessment include carcinogenic potency factors (CPFs) or reference doses (RfDs). This information is available through EPA's Integrated Risk *information System, a* data base of health risk and regulatory information, as well as other sources. Additional information on toxicity assessment can be found in Chapter 7 of the EPA guidance document *Risk Assessment Guidance for Superfund, Volume 1 (Interim Final, 1989).*

d. The final step in the baseline risk assessment is the actual ***characterization of the risk*** posed to human health and the environment. Using the information from the identification, exposure, and toxicity assessments, this step integrates all this information to provide an estimate of the risk posed to human health and the environment. For non-carcinogenic substances (e.g., acute and chronic exposure), the "point of departure" is that no adverse effects will be seen in a lifetime of exposure. For carcinogenic compounds, the "point of departure" of developing cancer is in the range of 1 additional incidence of cancer in 10,000 persons to 1 additional incidence in 1,000,000 persons based upon a lifetime of exposure (often expressed as a 1×10^{-4} to 1×10^{-6} excess lifetime risk). Specific information on this process can be found in Chapter 8 of the EPA guidance document *Risk Assessment Guidance for Superfund, Volume 1 (Interim Final, 1989).*



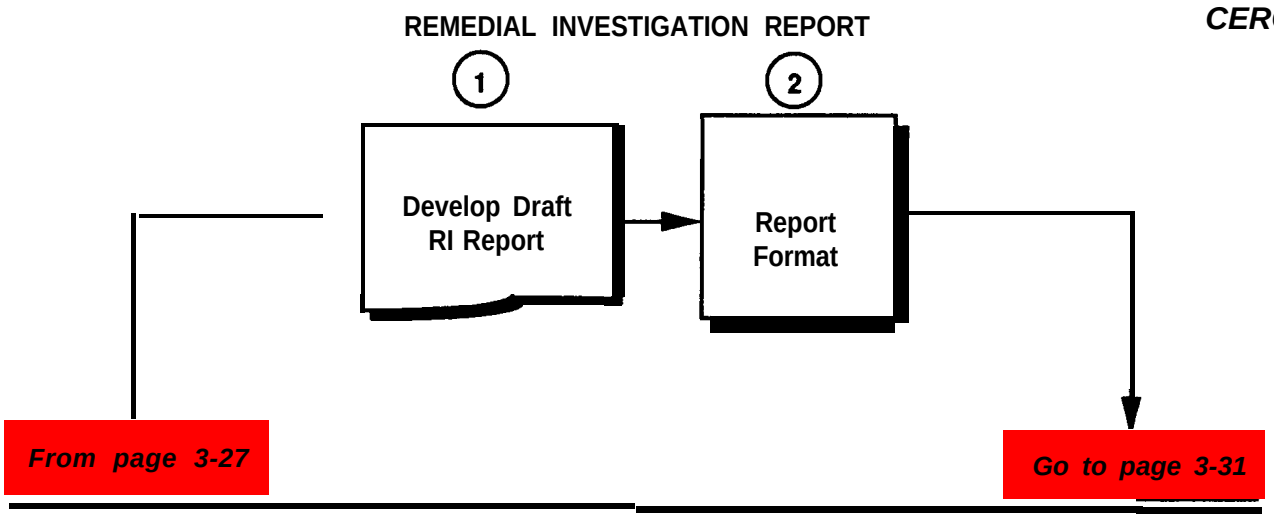
X. Requirement for a RCRA Corrective Measures Study

1. **Triggers for a Requirement To Conduct a CMS.** There are two mechanisms triggering the requirement for a CMS.

a. The primary mechanism for triggering a CMS (proposed 40 CFR §264.520[a]) is the discovery that the ***concentration of a contaminant released from an SWMU exceeds the action level set for that contaminant.*** Action levels are media-specific health and environmental-based contaminant concentrations considered protective of human health and the environment. Action levels are often standards issued under other statutes, such as the Maximum Contaminant Levels under the Safe Drinking Water Act. It must be noted that action levels do not necessarily represent the final concentrations that must be achieved through the implementation of a corrective measure. Action levels act as a presumptive contaminant concentration level, which, if exceeded, require the permittee to perform additional investigations, specifically the CMS.

b. The second mechanism for triggering a CMS (proposed 40 CFR §264.514[bl) allows EPA to require a CM S even when ***contaminant concentrations are below action levels but where other site-specfic considerations,*** such as impacts to sensitive environments, suggest a need for close evaluation of the need for remediation of the contamination.

2. **Formal Requirement Issuance.** Unless already specified in the facility permit or a RCRA §3008(h) Order compelling Corrective Action, conduct of a CMS requires a Class II modification of the facility permit or issuance of an additional RCRA §3008(h) Order. Permit modification requires negotiation of the modification with EPA, development of a draft permit, a public notice, a comment and response period, a public meeting (if necessary), incorporation of any revisions into the permit modification, and issuance of the final modified permit. For an interim status facility, EPA issues a RCRA §3008(h) Order requiring DOE to conduct a CMS.

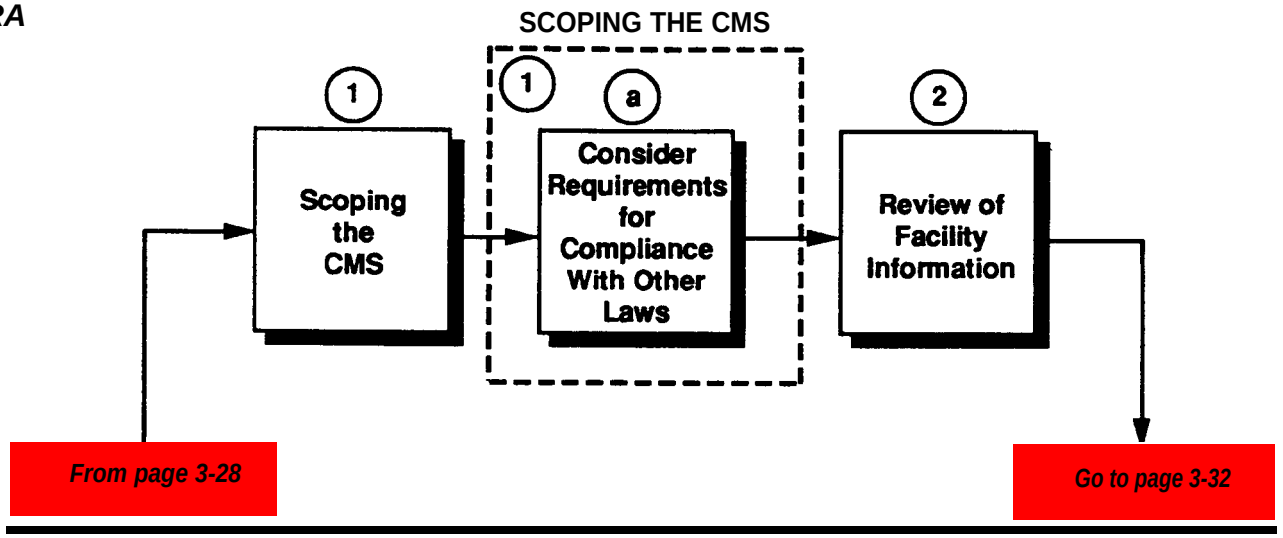


XI. The CERCLA Remedial Investigation Report

1. **Develop Draft RI Report.** Once the site characterization process is completed, DOE should develop a draft RI report to submit for EPA review. The RI report should be developed following completion of the baseline risk assessment and before starting to develop the draft FS report. Developing the RI report should not delay initiation or execution of the FS.

2. **RI Report Format.** A draft RI report format is provided in the EPA document *Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) Under CERCLA (1988).* For a more detailed discussion of these elements, see the sections of this chapter on scoping, site characterization, and conducting the baseline risk assessment. The suggested format for the RI report is as follows:

- **Introduction a discussion of the purpose of the report and site background,**
- **Study Area investigation-a discussion of all field activities conducted during the RI and any technical documentation prepared that relates to field activities,**
- **The Physical Characteristics of the Study Area – a discussion of the physical characteristics of the site determined during field investigations (e.g., topography, contaminant sources, receptors),**
- **Nature and Extent of Contamination -- a discussion of the results of the site characterization including discussion of both the natural conditions and the contamination present at the site,**
- **Contaminant Fate and Transport - identification of the potential routes of contaminant migration and discussion of the persistence of the contaminants in the environment and the ability of the contaminants to migrate,**
- **Baseline Risk Assessment – a discussion of the supporting data and the actual or potential risk to human health and the environmental evaluation posed by the site,**
- **Summary and Conclusions – a summary of the above data and recommendations for remedial action objectives, and**
- **Appendices.**



XII. Scoping the RCRA Corrective Measures Study

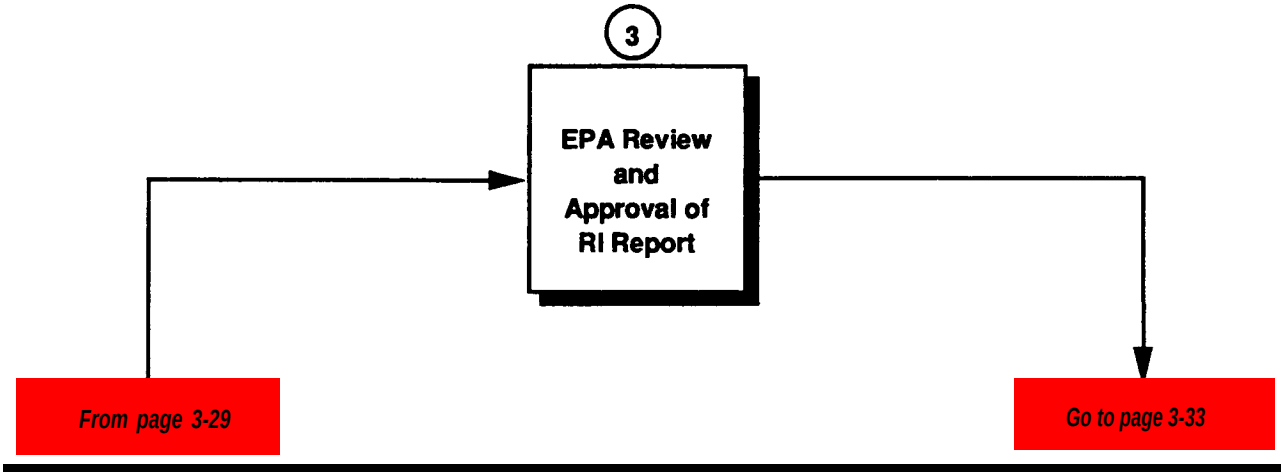
1. **Scoping a CMS.** As discussed in the DOE *RCRA Corrective Action Program Guide,* there are six basic steps to scoping a CMS: (1) reviewing existing information about conditions at the facility, (2) determining if a phased remedy or CAMUs are appropriate, (3) streamlining the CMS (as appropriate), (4) defining the objectives of the CMS, (5) establishing the process and criteria for evaluating the alternatives for the corrective measure, and (6) selecting candidate corrective measures for evaluation.

a. In addition, during the scoping process the facility should consider any requirements for compliance with other statutes. Examples include requirements relative to CERCLA, the Clean Water Act (CWA), and the Clean Air Act (CAA).

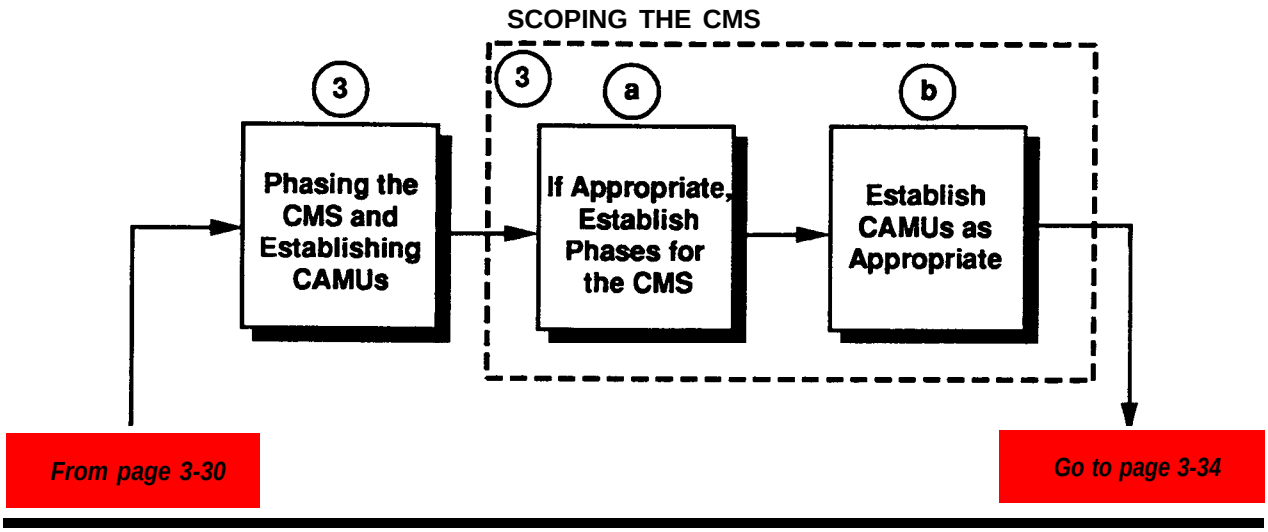
2. **Review of Facility Information.** The first step in the CMS process is to ***review information*** about the SWMU and the release from the SWMU. Most of this information is in the RFI report. Additional information may come from review of other sources, such as reports of releases, the RFA report, and interim measures reports. Specific information sought during this review includes the following:

- **Contaminant characteristics including identity, physical, chemical, and toxicological properties, and quantity or concentration;**
- **Environmental setting including the impacted media, information on geology, hydrogeology, topography, population demographics; the relation of the SWMU to other SWMUs at the facility; and the relationship of the facility to the surrounding area;**
- **Evaluation of the risks posed to human health and the environment by the release;**
- **Actions taken to control or minimize the threat posed by the release; and**
- **Current conditions at the facility.**

REMEDIAL INVESTIGATIVE REPORT



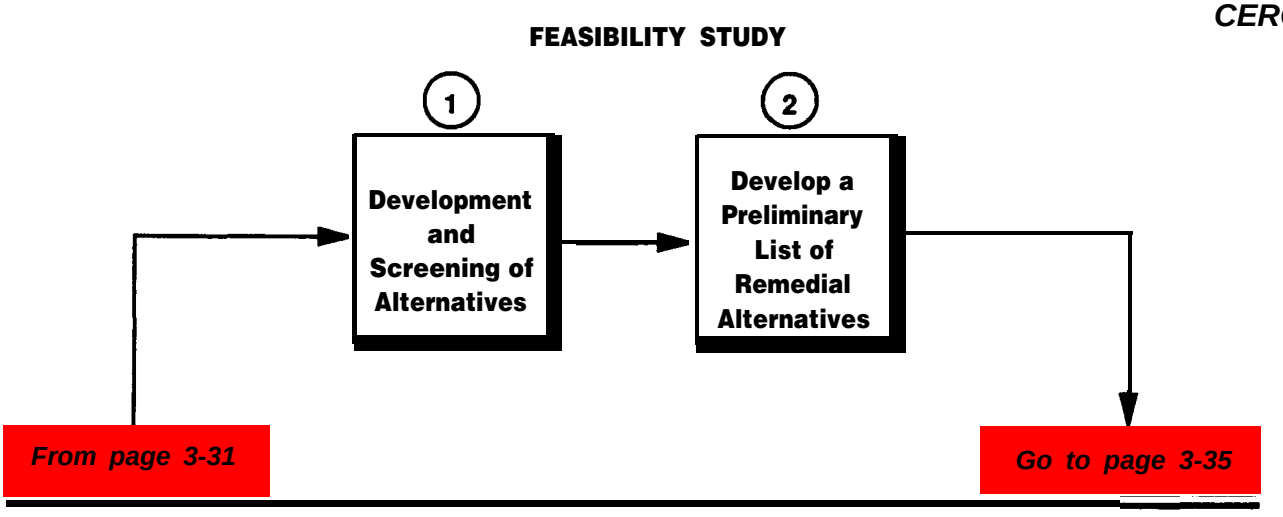
3. **EPA Review and Approval of RI Report.** EPA will review the draft RI report. If EPA does not approve the draft Ri report, EPA may direct DOE to conduct additional investigations.



3. **Phasing Corrective Measures and Establishing CAMUs.** The second step of the scoping process is to evaluate the usefulness of a phased corrective measure and the potential benefits of establishing CAMUs.

a. For complex sites where cleanup of the entire facility in a single action is impractical, under proposed 40 CFR §264.526(d) EPA can divide the corrective measure into phases. Phasing of a corrective measure is similar to the use of "operable units" under CERCLA and represents any logically connected set of actions performed sequentially over time or concurrently at different parts of the facility. If a phased corrective measure is appropriate at the facility, the CMS may also be broken into phases, with each phase of the CMS focusing on a particular phase of the corrective measure. Ideally, using a streamlined approach, a phased CMS requires consideration of the remedial alternative for the individual phase *and* the ultimate remedial goals for the entire facility. Any phased corrective measure should complement, not impede, future remedial activities at the facility.

b. Another consideration for the scoping process is the **use of *CAMUs.*** Under the recently promulgated CAMU regulations (58 FR 8658, February 16, 1993), EPA can designate an area at a facility used to manage remediation wastes as a CAMU. The use of CAMUs permits management, treatment, and disposal of remediation wastes in the CAMU without LDR or MTR compliance. The identification of a CAMU usually takes place during the selection of the corrective measure, but the evaluation of potential CAMUs and designation of areas as CAMUs should occur during the RFI and/or CMS. If CAMUs have not been designated prior to the CMS, DOE should consider proposing any appropriate areas as CAMUs. The primary benefit of using a CAMU at a facility is that management of remediation wastes within the CAMU during corrective action is not subject to either the land disposal restrictions or the minimum technology requirements for a new TSDF unit or the lateral expansion of an old unit.

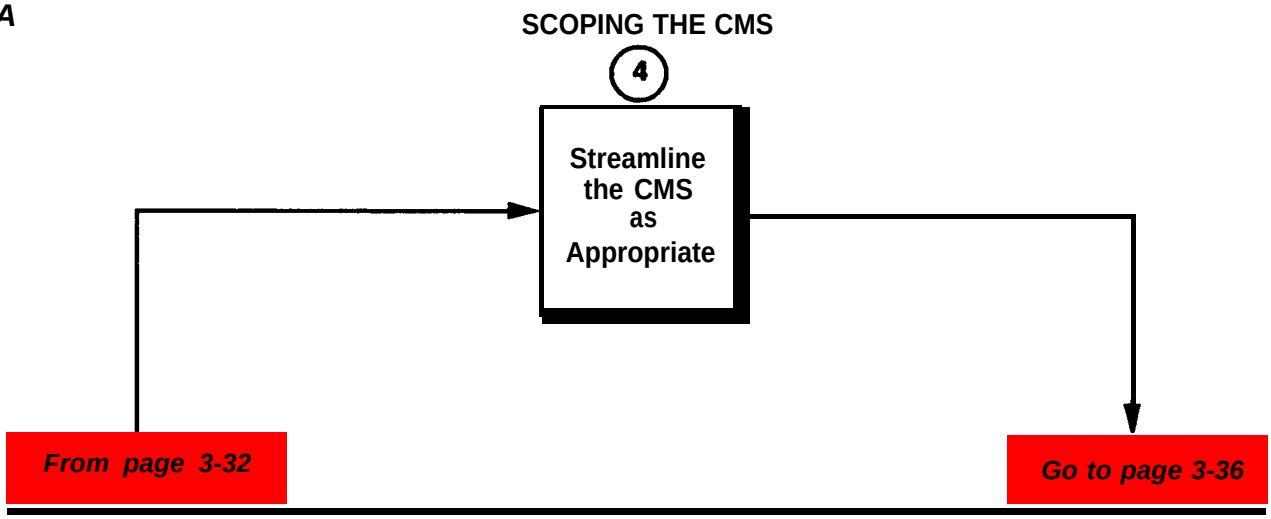


XIII. CERCLA Feasibility Study: Development and Screening of Alternatives

1. **Development and Screening of Alternatives.** The objective of this phase of the R1/FS is to develop a preliminary list of remedial alternatives for the site. This list should be refined based upon information gathered from the site characterization and the results of any treatability studies conducted during later phases of the RI/FS. A more detailed discussion of this process is found in Chapter 4 of the EPA RI/FS guidance.

2. **Develop a Preliminary List of Remedial Alternatives.** The process of developing a preliminary list of alternatives for the remediation of a site is accomplished through a six-step process:

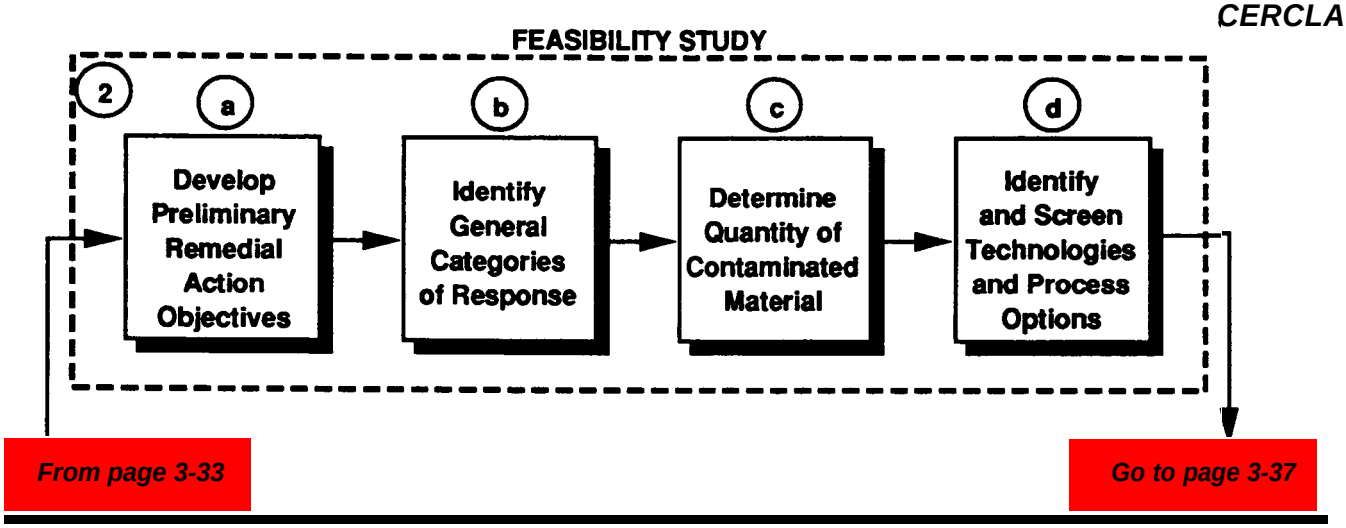
- **Development of preliminary remedial action objectives reflecting the requirements for compliance with ARARs and other considerations, such as the findings of the baseline risk assessment;**
- **Identification of general categories of responses applicable to each medium of concern {e.g., incineration, pump-and-treat);**
- **Determination of the quantity of contaminated material that must be treated and determination of those remedial alternatives that are technically impractical given site conditions;**
- **Identification of applicable technologies within each category of remedial alternatives identified (e.g., for the general class of incineration, specific process options include fluid bed incineration, rotary kiln incineration):**
- **A more detailed evaluation of the various technologies to reduce the number of alternatives in each category to a single technology: and**
- **If appropriate, assembly of the selected alternatives into a range of treatment and containment combinations.**



4. **Streamlining the Corrective Measures Study.** In scoping the CMS, the next step is determining whether a ***streamlined CMS*** is appropriate. Streamlining, as discussed in the preamble to the proposed Subpart S rule (55 FR 30821), involves tailoring the CMS to the complexity and scope of the situation at the facility. This process is similar to the observational approach used for CERCLA R1/FS. There are several advantages to a streamlined CMS. The most important of these is that a streamlined CMS may not require extensive evaluation of numerous alternatives for the corrective measure. A streamlined CMS is appropriate for sites with the following types of conditions:

- **The facility poses a low overall risk due to small areas of low-level contamination, which pose minimal exposure risk;**
- **DOE proposes a highly protective corrective measure, such as a RCRA clean closure;**
- **Because of site conditions, there are few alternatives for the corrective measure as justified by proposed 40 CFR §264.531, Technical Impracticability;**
- **Expected future use of the site dictates a highly protective degree of cleanup;**
- **The remedial solution is straightforward and will use a tested and proven remedial technology: or**
- **Use of a phased remedy.**

According to the preamble to the Subpart S proposed rule (55 FR 30821, July 27, 1990), the use of streamlined CMS is not appropriate for large, complex, “high risk” facilities, which may have large volumes of both contaminated wastes and soils and, for which several different treatment and containment systems technologies could be applicable. Likewise, a streamlined CMS may not be appropriate for contamination problems, for which there are very different technical approaches to remediating contamination problems at a facility, which would be implemented over different time frames and which would have varying degrees of long-term reliability.



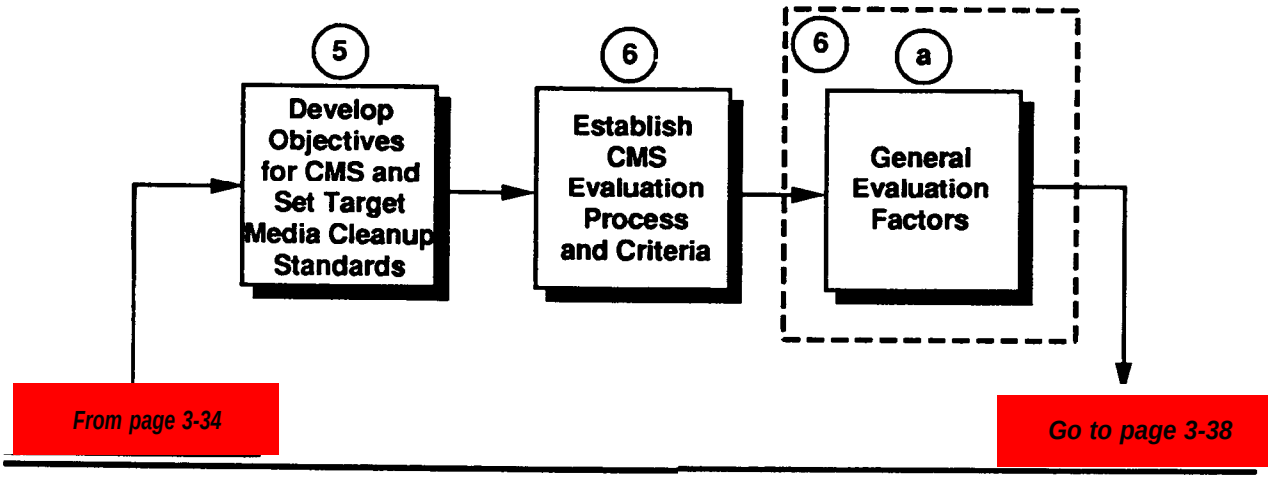
a. The first step in the preliminary identification of remedial alternatives is the **development of preliminary remedial action objectives.** The objectives for the remedial action are operable unit-specific cleanup goals that are protective of human health and the environment. Such goals are usually based upon existing information, such as ARARs, or available toxicological information.

b. The second step in the development and screening of alternatives is to **identify general categories of response** actions that will meet or exceed the cleanup goals. Examples of general categories of response actions include incineration, containment, excavation, or institutional controls specific to the contaminated media at the site.

c. The next step is to determine or estimate the **quantity of contaminated material** present at the site. A determination of the volume of contaminated material requiring remedial action is essential to the screening process. If the volume of the contaminated material is extremely large, some remedial alternatives may be technically impractical. This determination will allow those remedial alternatives incapable of treating the necessary quantity of contaminated material in a reasonable time frame to be dropped from consideration. The determination of the volume of contaminated material also allows decisions about the types of response required.

d. The fourth step is to identify and screen **technologies and, within a class of technologies,** options for the actual treatment process. This step screens the general categories of remedial alternatives by examining the technical implementability of specific remedial technologies in each category. Identification of specific technologies is accomplished through literature review and review of remedial actions at other CERCLA response sites. If a specific technology is determined to be technically impractical based upon the information collected during this review, it is eliminated from further consideration.

SCOPING THE CMS

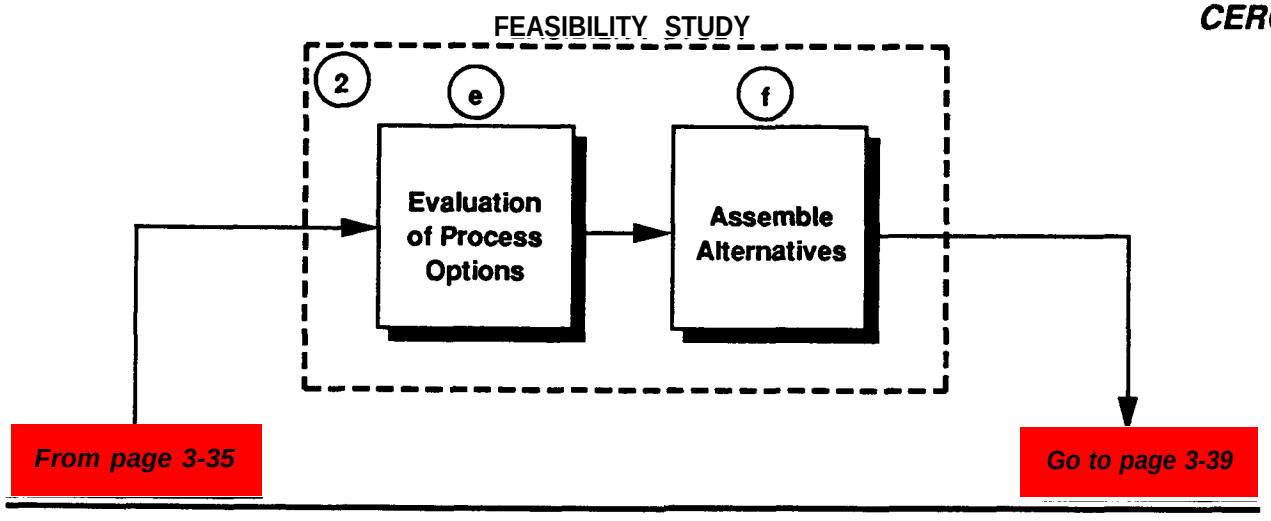


5. **Developing Objectives for the Corrective Measures Study.** The fourth step in the scoping process is developing the objectives of the CMS, primarily through ***establishing target media cleanup standards (MCS).*** As opposed to action levels, which are contaminant concentrations used to determine the need for a CMS, MCS are media-specific constituent concentrations that the corrective measure must achieve. The final MCS are set during the remedy selection process; however, setting target MCS provides an extremely useful tool for evaluating alternatives for the corrective measure. EPA is not required to set, and retains the authority to revise, such target MCS. However, DOE should try to negotiate with EPA for the creation of target MCS for the facility. If EPA is unwilling to set target MCS for the facility, DOE should consider developing its own target MCS for use in evaluating the alternatives for the corrective measure.

6. **Establishing the Corrective Measures Study Evaluation Process and Criteria.** The fifth step in scoping the CMS is to ***establish the process and criteria for evaluating each alternative*** for the corrective measure. The CMS evaluation process and criteria should reflect the general evaluation factors for a CMS. The process and criteria should also reflect the standards and specific factors against which each alternative corrective measure will be judged during the final remedy selection process.

a. The general evaluation factors for a CMS are as follows:

- **Performance, reliability. ease of implementation, and potential impacts from each alternative corrective measure;**
- **Effectiveness of each alternative in achieving adequate source control;**
- **Time required to begin and complete each alternative corrective measure;**
- **Costs of each alternative; and**
- **Institutional requirements (e.g.. State. local, or public health regulations or permitting requirements) that might impact the implementation of each alternative.**

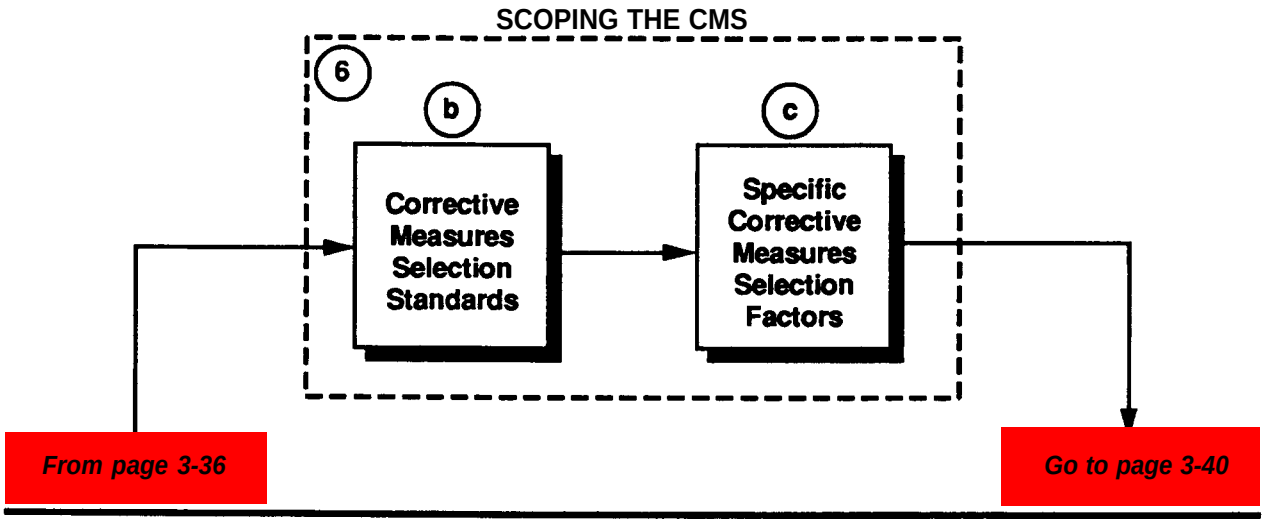


e. This fifth step is a more detailed ***evaluation of the various process options.*** In this step, each remedial alternative is screened even further to reduce the number of alternatives in each category of remedial technology to a single process option. The purpose of this step is to select an alternative. The evaluation criteria used in this process are the same as for the detailed analysis of alternatives (effectiveness, implementability, cost, etc.), but are applied to the individual technologies under consideration, without regard for the need for remedial action at the site as a whole.

The principal factor used in this evaluation is effectiveness. To assess the effectiveness of a given remedial alternative, one must assess the following:

- **The effectiveness of each alternative in treating the estimated volume and concentration of the contaminated media,**
- **The potential impacts to human health and the environment during implementation, and**
- **The reliability of the alternative given site conditions and contaminant concentrations.**

f. The final step is to ***assemble the alternatives.*** On the basis of the screening of the general categories and the process options for the various remedial alternatives selected within each category, the selected remedial alternatives are combined to form alternatives that address the site as a whole. For example, if a site had both contaminated soils and contaminated groundwater, the combined alternative could be to excavate and incinerate the soil and then to conduct a groundwater pump-and-treat operation.

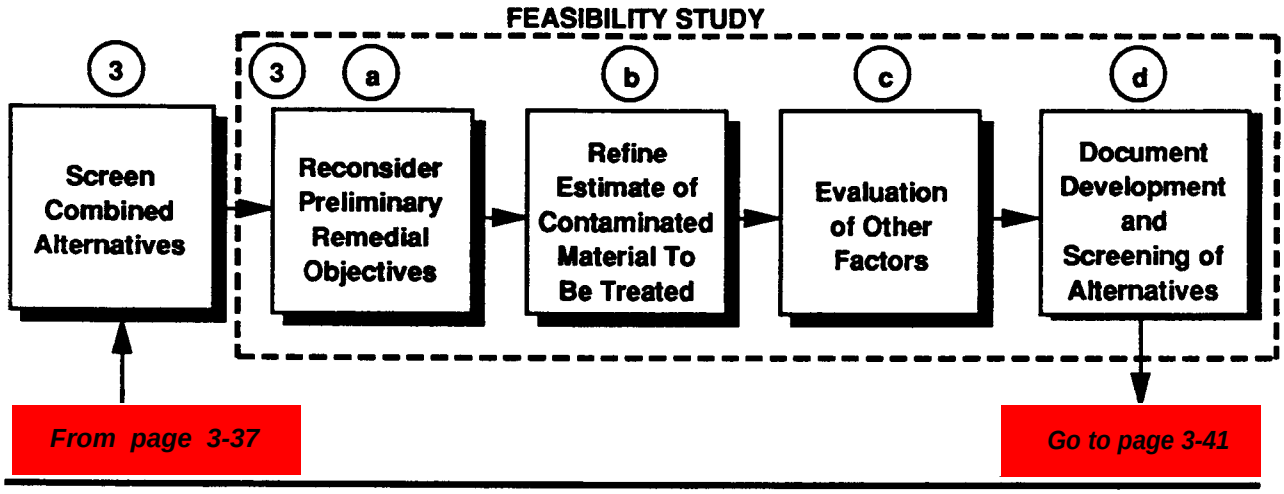


b. In rating each alternative for the corrective measure under these general evaluation factors, it is advisable to address each of the four standards for corrective measures and the five corrective measures selection factors. Under proposed 40 CFR §264.525(a), a corrective measure *must* do the following:

- **Be protective of human health and the environment,**
- **Attain final (es opposed to target) MCS,**
- **Provide source control to reduce or eliminate further releases that may pose a threat to human health end the environment, and**
- **Comply with the standards for management of wastes generated as part of oonducting the corrective measure.**

c. The five specific selection factors for the corrective measure, set forth in proposed 40 CFR §264.525(b), are as follows:

- **Long-term reliability (greater than 30 years);**
- **Reduction of toxicity, mobility, end volume of the contaminants at the facility;**
- **Short-term effectiveness;**
- **Ease of implementation and implementability and**
- **Cost.**



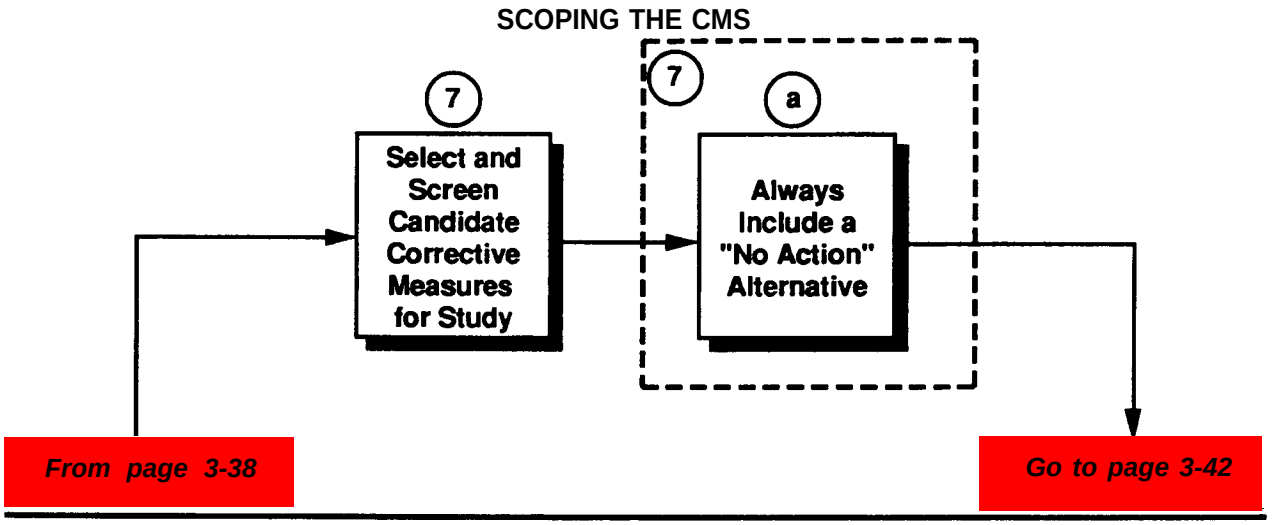
3. **Screen Combined Alternatives.** Once the remedial alternative development process is complete, additional ***screening should be conducted to assess the effectiveness of each altemative*** when considering media interactions, site-wide objectives for protection of human health and the environment, details of the specific operational requirements of each alternative, and other factors.

a. The first step in the screening process is to ***reconsider the preliminary remedial action objectives*** and to determine if each remedial alternative is able to achieve these objectives.

b. The second step in screening is to further ***refine the estimate of the quantity of contaminated material*** *present* at the site and to determine if each remedial alternative is capable of treating this volume of media in an appropriate time frame.

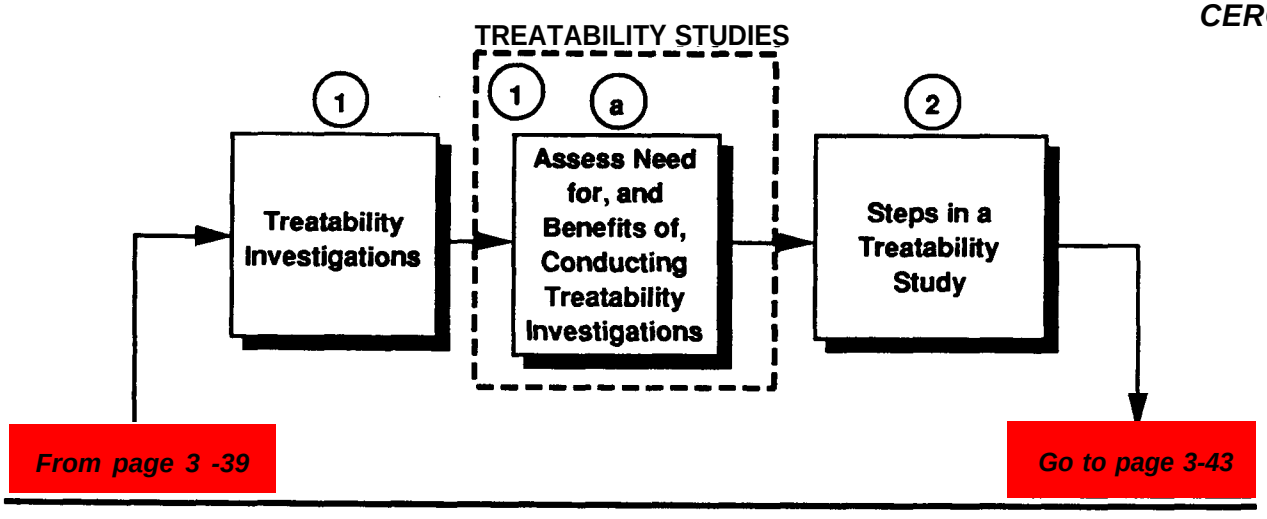
c. The third step in the screening process is to ***examine other factors*** impacting the implementability, cost, or effectiveness of each remedial alternative. Examples of considerations for this evaluation include the unit size and space requirements, permitting requirements for offsite disposal of wastes generated by the remedial action, the cost of construction of the remedial alternative, and the rate at which the alternative can treat the contaminated material.

d. Although no formal report on the development and screening of remedial alternatives is required under the National Oil and Hazardous Substances Pollution Contingency Plan (NC P), the EPA RI/FS guidance recommends that once the alternatives are screened and a final list of remedial alternatives is reached, DOE should develop a ***document detailing the evaluations and screening decisions*** made during the screening process. This document should also provide a detailed description of each alternative selected for detailed evaluation. This could be a letter report that would become a section or chapter of the FS.



7. **Select and Screen Candidate Corrective Measures for Study.** The sixth step in scoping a CMS is to ***develop a list of candidate alternatives*** for the corrective measure. The list of candidate alternatives is developed through analysis of facility conditions and review of information on existing and innovative remedial technologies applicable to the problems at the facility. In addition to the list of alternatives developed by DOE, under proposed 40 CFR §264.522(b) EPA has the authority to specify remedial alternatives for consideration and study. Following the review of existing information on the candidate alternatives, it is possible to eliminate from consideration any alternative that is impractical or inappropriate to site conditions.

a. The final list of alternatives for the corrective measures should always include a “no action” alternative. While selection of a “no action” alternative provides no active remediation of contamination, it is useful as a baseline for comparison of the other alternatives. Further, selection of a “no action” alternative may be justified in some cases. For example, the CMS may show that natural attenuation will result in achieving the MCS. A “no action” alternative may also be appropriate if DOE can show that no additional reduction of the risk posed to human health and the environment will result from conducting a corrective measure. A media-specific example for possible justification of a “no action” alternative is a contaminated aquifer that does not, and will not, impact a source or potential source of drinking water. Under proposed 40 CFR §264.525 (d)(2)(ii) of the proposed Subpart S rule, EPA may elect not to require remediation to the MCS if DOE can show that the contamination is not a threat to a current or potential source of drinking water or to environmental receptors.



XIV. CERCLA Treatability Studies

1. **Treatability Investigations.** As described in Chapter 5 of the EPA RI/FS guidance and in the EPA guidance document titled *Guide for Conducting Treatability Studies Under CERCLA (Interim Final),* ***treatability studies*** are conducted to do the following:

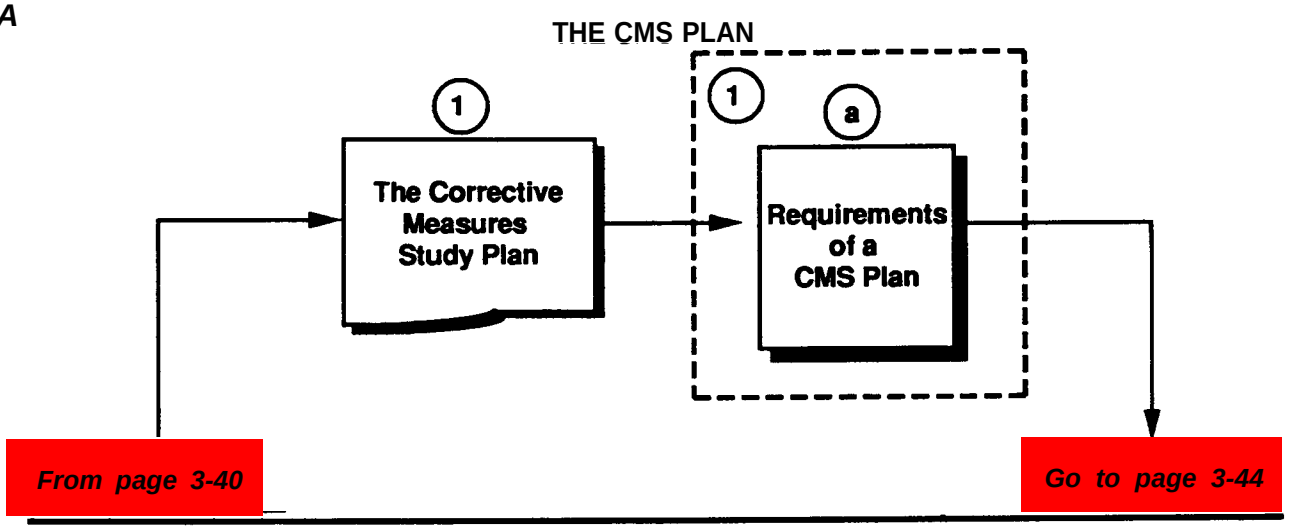
- **Provide sufficient data to fully assess the suitability of each remedial alternative that passed the screening process,**
- **Support the remedial design of the selected alternative, and**
- **Reduce costs and performance uncertainties to allow en informed selection of the remedial action to be performed at the site.**

Under RCRA Corrective Action, treatability studies are conducted during the CMS but are not identified as a separate step in the process.

a. Treatability investigations are not required in every case. If sufficient information exists to allow an accurate evaluation of each remedial alternative without conducting treatability studies, DOE should ***weigh the cost and time of conducting treatability investigations*** against the benefits of conducting such investigations.

2. **Steps in a Treatability Study.** A treatability study consists of the following five steps:

- **Determining data needs;**
- **Reviewing existing information on the site end the selected technologies;**
- **Conducting studies of treatability elements;**
- **Performing bench- and pilot-scale tests (as appropriate) to determine the operating parameters, effectiveness. and cost of each alternative: and**
- **Evaluating all data collected during the treatability study to ensure data needs have been met.**

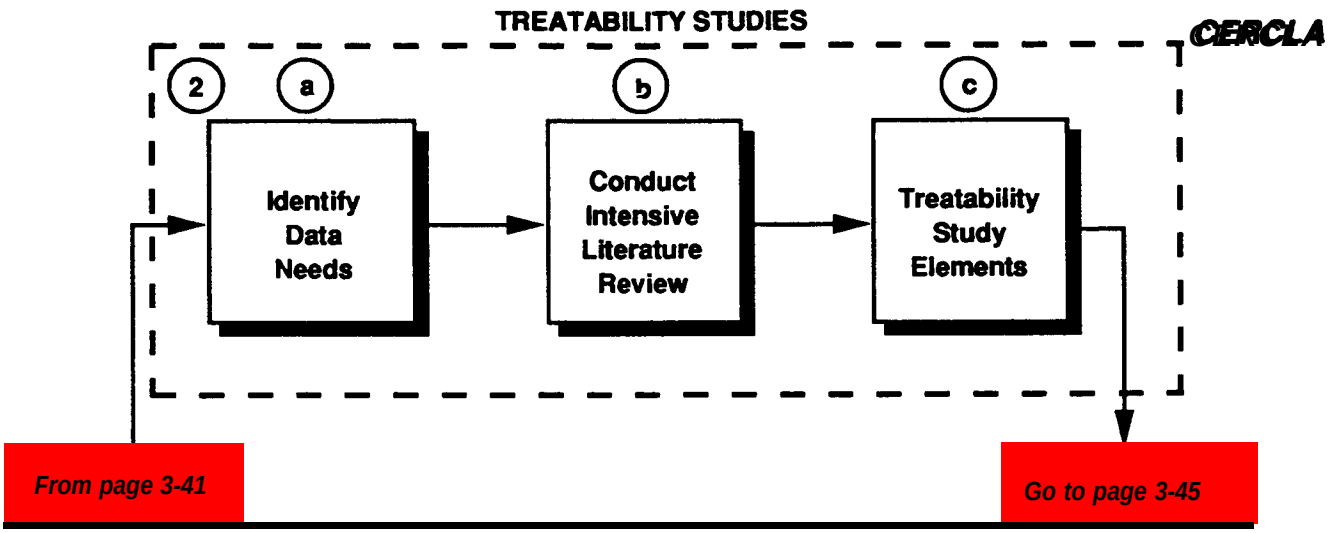


XV. The RCRA Corrective Measures Study Plan

1. **The CMS Plan.** Conducting a CMS includes the development of a CMS plan. Under the proposed Subpart S rule (proposed 40 CFR §264.523, EPA may require the Plan to follow specific criteria, may include development of the plan in the facility permit schedule of compliance, or may require that the plan be subject to EPA review and approval. Further, under the proposed rule, a requirement for the submission of a CMS plan is at the discretion of EPA. Plan submission is not mandatory. However, if EPA requires submission of a plan, the approved plan becomes a part of the facility permit and is subject to the permit schedule of compliance.

a. The CMS plan requires discussion of the following:

- **Current conditions at the facility,**
- **The general approach to investigating and evaluating alternatives for the corrective measure (e.g., use of a phased remedy or streamlined approach).**
- **Description of the overall objectives of the CMS.**
- **A proposed schedule for the CMS,**
- **Identification of the alternatives for the corrective measure.**
- **The evaluation process and evaluation criteria for each alternative, and**
- **The format for presentation of the findings of the CMS.**



a. The data required to conduct treatability studies should, to the extent possible, be collected during the site characterization. However, because of the iterative nature of the RI/FS, specific ***data needs*** are not always known at the time of site characterization. Once these data needs are identified, collection of the necessary data to allow evaluation of the alternatives under consideration should be undertaken.

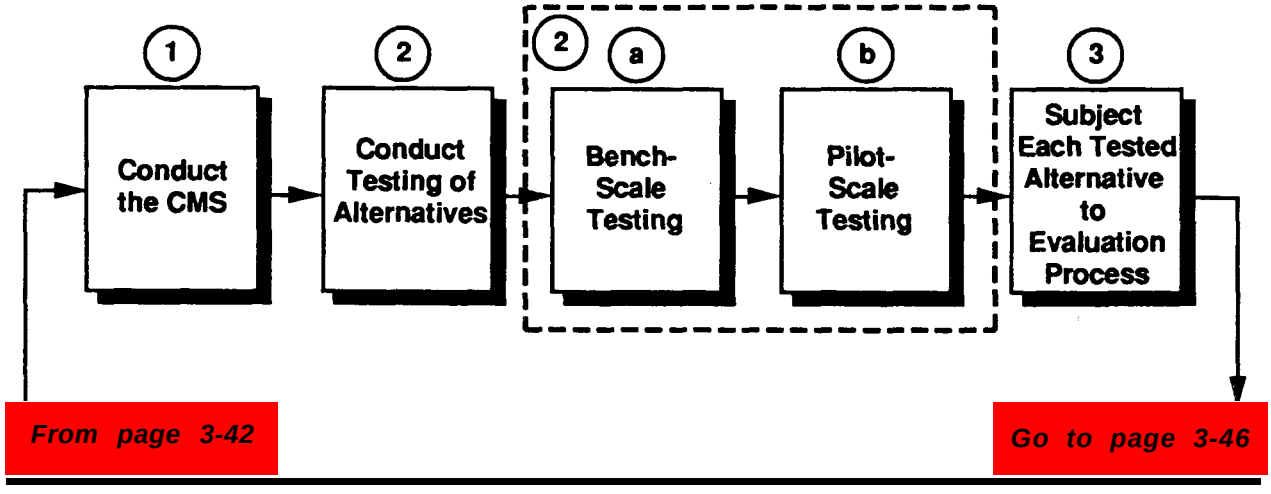
b. As part of the collection of additional information to support treatability studies for each remedial alternative, a more ***exhaustive literature search*** should be undertaken than was performed during the development and screening process. The objectives of this literature search follow:

- **To determine the performance of each alternative under similar site condtions, or on similar contaminants and effected media;**
- **To gather informationon the operating parameters of each remedial alternative treatment efficiencies: and the cost of design. construction. operation, and maintenance; and**
- **To confirm that treatability studies are required.**

c. The process of conducting studies of ***treatability elements*** involves:

- **Determining the scale of the study (e.g., bench or pilot scale:**
- **Preparing a work plan, QAPP, and FSP for the bench-or pilot-scale study;**
- **Performing the bench- or pilot-scale studies;**
- **Evaluating the results of the studies; and**
- **Preparing a brief report on the results of the treatabiliity studies.**

CONDUCTING THE CMS



XVI. The RCRA Corrective Measures Study

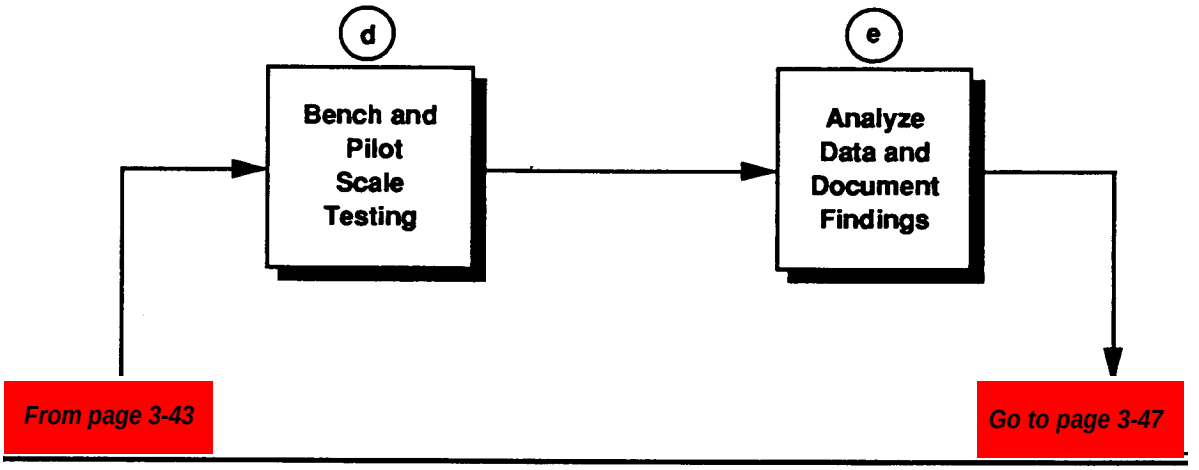
1. **Conducting the CMS.** As described in the DOE *RCRA Corrective Action Program Guide,* conducting a CMS is a two-step process involving (1) evaluating the effectiveness of each alternative for the corrective action, and (2) analyzing and evaluating the testing results according to the evaluation criteria developed during the scoping process and described in the CMS plan. While this process is usually conducted during the CMS, under the proposed Subpart S rule EPA has the authority to require testing to occur concurrently with the RFI in order to prevent a delay in conducting the corrective measure. Generally, such concurrent testing would occur in the form of treatability studies.

2. **Treatability Testing.** The first phase of conducting the CMS is similar to a treatability study conducted under CERCLA and involves ***testing each alternative for the corrective measure.*** Testing of the alternative corrective measures can be either bench or pilot scale, depending upon the nature of the technology under evaluation and the level of detail required for the evaluation. With a proven technology, used under conditions similar to those of the site under study, the testing requirements may be minimal, especially if adequate data on the effectiveness of the technology are available for review. Treatability testing can also be conducted as part of the RFI. However, testing during the RFI should be very limited, as the CMS process may show the technology inappropriate to the conditions at the facility.

a. ***Bench-scale treatabitity testing*** is usually performed in a laboratory. Such testing involves conducting a series of treatability tests with different parameters on small quantities of contaminated material. Analysis of the results of these small-scale tests permits evaluation and optimization of the operational parameters of the alternative quickly and at a relatively low cost.

b. ***Pilot-scale treatabifity testing*** involves building a scaled-down version of a treatment technology and simulates the physical and chemical parameters of that particular remedial technology. Pilot-scale testing should simulate full-scale operations and usually permits only limited variance of operational parameters. The results of a pilot-scale test allow assessment of the overall effectiveness and practicality of a remedial technology.

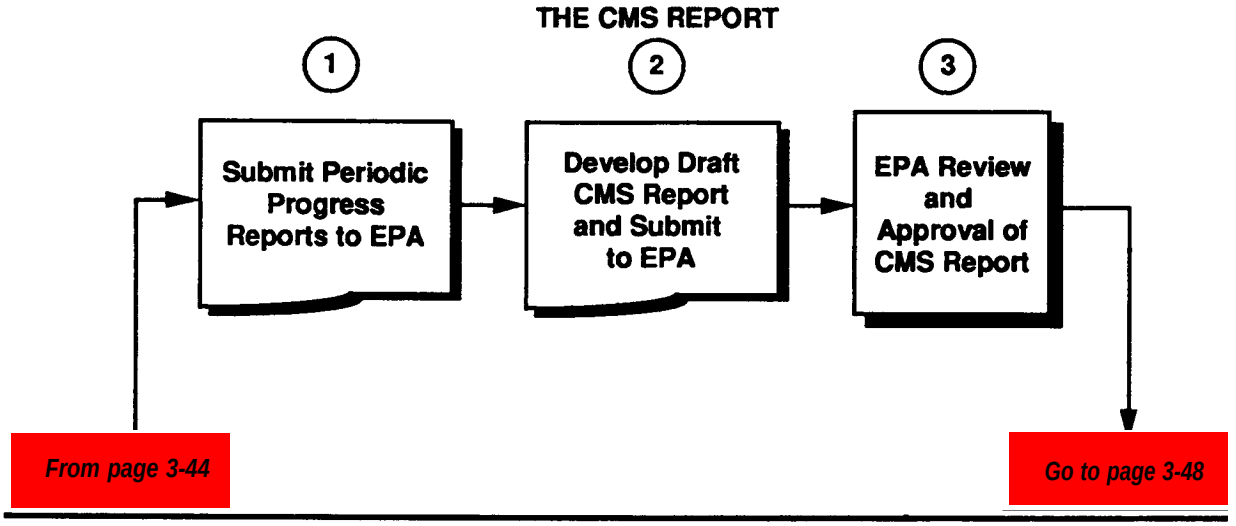
3. **Evaluation of Alternatives.** Once the testing of the alternatives for the corrective measure is complete, each alternative is subjected to the evaluation criteria developed during the scoping process.



d. ***Bench-scale treatability testing*** is usually performed in a laboratory. Such testing involves conducting a series of treatability tests with different parameters "on small quantities of contaminated material taken from the site. Analysis of the results of these small-scale tests permits evaluation of the alternative quickly and at a relatively low cost.

Pilot-scale treatabifity testing involves building a scaled-down version of a treatment technology that simulates the physical and chemical parameters of that particular remedial technology. Pilot-scale testing should simulate full-scale operations and usually permits only limited variance of operational parameters. The results of a pilot-scale test allow assessment of the overall effectiveness and practicality of a remedial technology.

e. Once the treatability studies are complete, DOE should carefully ***analyze the data*** collected to determine the effectiveness, implementability, and cost of each alternative tested. DOE should develop a ***document summarizing the results*** of the treatability testing. This document will be used in the detailed evaluation of the alternatives and will also be used during the selection of the remedy.



XVII. The RCRA Corrective Measures Study Report

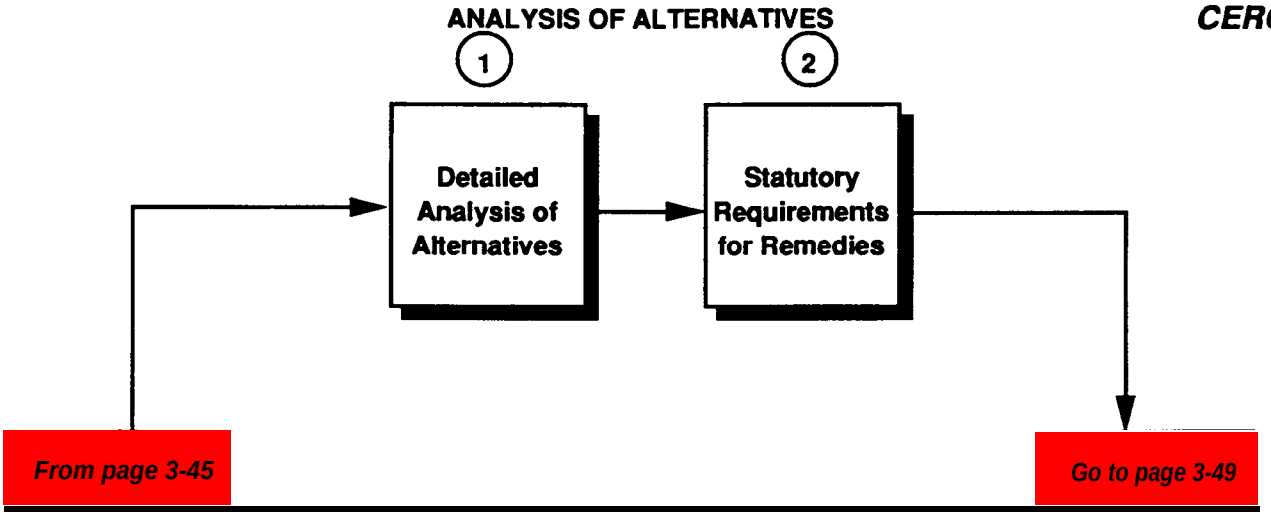
1. **Submit Periodic Progress Reports.** Under proposed 40 CFR §264.524, EPA may require that periodic progress reports be submitted during the CMS. Based upon the information in these reports, EPA may change any part of the CMS.

2. **Development and Submission of Draft CMS Report.** Upon completion of the CMS, DOE prepares a draft CMS report and submits the report to EPA for review and approval. The CMS report must discuss how each alternative for the corrective measure satisfies the standards and selection factors. The key points to discuss in the CMS report follow:

- **A brief discussion of the history and current facility conditions, including a summary of risks posed by the facility;**
- **Identification and a description of each alternative corrective measure;**
- **Evaluation of each alternative including discussion of the following:**

  - Long-term reliability and effectiveness of each remedy
  -Reduction of toxicity. mobility. or volume of contaminants at the facility:
  - The short-term effectiveness of each potential remedy;
  - Implementability of each potential remedy;
  - Cost of each remedy; end
- **Identification and justification of DOE'S preferred corrective measure.**

3. **EPA Review end Approval of CMS Report.** DOE submits the draft CMS report to EPA for review and approval. After review of the draft CMS report, EPA may require DOE to conduct additional investigations or studies of other alternative corrective measures. The final, EPA-approved CMS report becomes the basis for the remedy selection process. it should also be noted that DOE's preferred corrective measure is not binding upon EPA. The selection of the corrective measure is solely the responsibility of EPA.

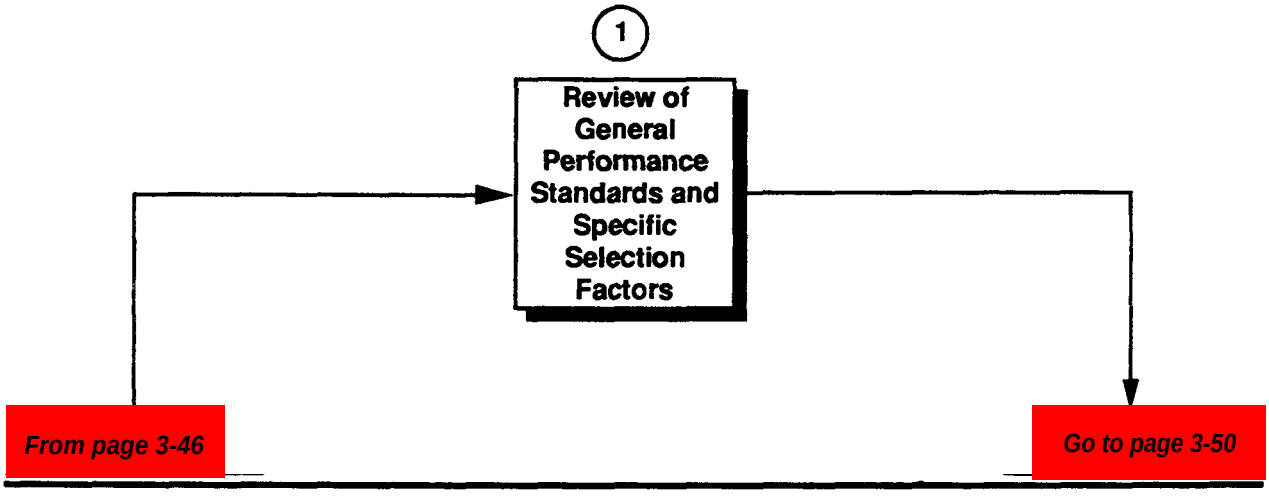


XVIII. CERCLA Feasibility Study: Detailed Analysis of Alternatives

1. **Detailed Analysis of Alternatives.** The detailed analysis of alternatives consists of examining information needed to make an informed selection in choosing a remedial action. During this stage of the RI/FS, each alternative is assessed against the nine evaluation criteria found in 40 CFR §300.430(e)(9) (iii) (see 3 below); the results-of this analysis are then compared with each of the other alternatives. The nine evaluation criteria are based on the CERCLA Section 121 statutory requirements.

2. **Statutory Requirements of Remedies.** CERCLA Section 121 statutory requirements are as follows:

- **Protect human health and the environment**
- **Attain ARARs or provide reasons for not achieving ARARs;**
- **Be cost effective:**
- **Utilize permanent solutions, alternative solutions, or resource recovery technologies to the maximum extent possible; and**
- **Satisfy the preference for treatment that reduces the toxicity, mobility, or volume of the contaminants as opposed to an alternative that provides only for containment.**



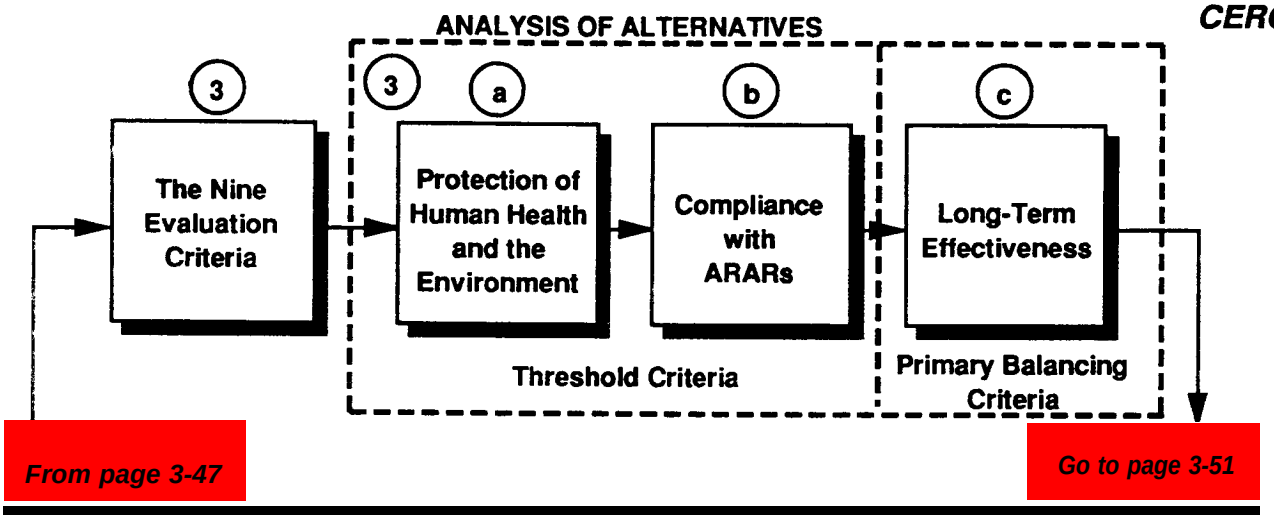
XIX. Selection of the RCRA Corrective Measure

1. General Performance Standards and Specific Selection Criteria for Corrective Measures. The CMS process provides a detailed evaluation of several alternatives for the corrective measure. The bases for this analysis are the general performance standards and specific decision factors for selecting the corrective measure for the SWMU or CAMU. The general performance standards of proposed 40 CFR §264.525(a) state a corrective measure must:

- **Provide protection of human health and the environment**
- **Attain final MCS**
- **Provide source control to reduce or eliminate further releases that may pose a threat to human health and the environment and**
- **Comply with the standards for management of wastes generated during the corrective measure.**

The specific decision factors of proposed 40 CFR §1264.525(b) that are used in selecting the final corrective measure include the following:

- **Long-term reliability and effectiveness;**
- **Reduction of toxicity, mobility, end volume of the hazardous waste or hazardous waste constituents:**
- **Short-term effectiveness, inocluding the risks associated with implementing the corrective measure;**
- **Implementability; and**
- **Cost.**



3. **The Nine Evaluation Criteria.** Based upon the statutory requirements for remedial actions, the NCP establishes nine evaluation criteria used to assess the merit of each remedial alternative. These criteria, found at 40 CFR §300.430(e)(9) (iii) and described in more detail in the EPA RI/FS guidance, require each remedial alternative be evaluated on the basis of the following:

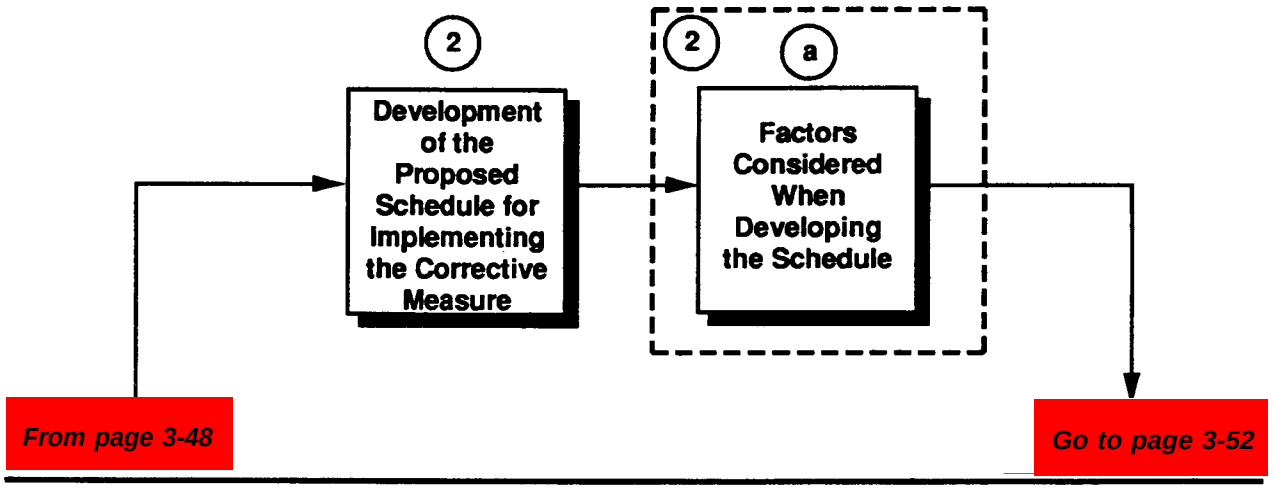
- **Threshold criteria –**
  - **overall protection of human health and the environment,**
  - **Compliance with ARARs,**
- **Primary Balancing Criteria –**
  - **Long-term effectiveness and permanence of the remedy;**
  - **Reduction of the toxicity. mobility, and volume of the contaminants present at the site**
  - **Short-term effectiveness of the remedy (i.e., protectiveness during implementation);**
  - **implementability of the remedy;**
  - **Cost of the remedy:**
- **Modifyinng criteria –**
  - **State acceptance of the selected alternative, and**
  - **Community acceptance of the selected alternative.**

a. Under the first evaluation criteria, the ability of each alternative to provide ***protection of human health and the environment*** *is* assessed. This criterion draws on the baseline risk assessments (i.e., human health and ecological) and the evaluations of other criteria, especially the long- and short-term effectiveness evaluations.

b. ***Compliance with ARARs*** requires evaluation of the ability of each alternative to comply with chemical-specific, action-specific, and location-specific ARARs, as well as other criteria, advisories, and guidelines. If an alternative cannot achieve compliance, justification for a waiver of the ARAR must be developed.

c. The ***long-term effectiveness*** evaluation assesses the residual risk posed by the site following the remedial action. This assessment also considers the reliability and adequacy of the remedial action in providing a ***long-term solution*** to the contamination at the site.

SELECTION OF THE CORRECTIVE MEASURE



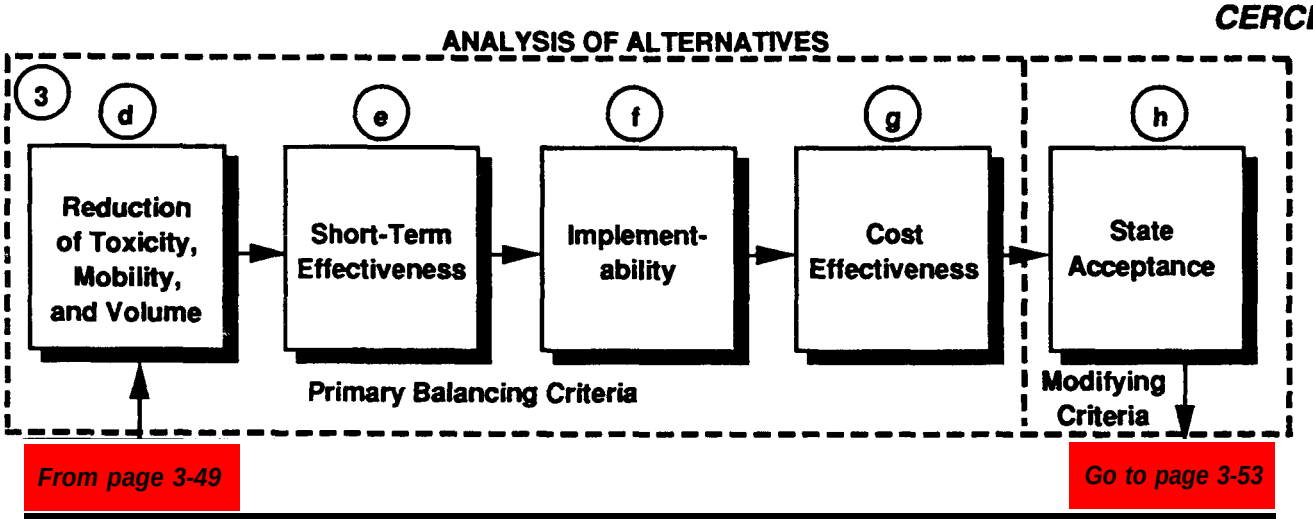
2. **Schedule for Implementing the Corrective Measure.** Under Section §264.525(c) of the proposed Subpart S rule, EPA specifies the schedule for implementing the corrective measure. The schedule is determined as part of the corrective measures selection process. DOE has the opportunity to influence schedule development through the conclusions of the RFI and CMS reports, through negotiation and discussion with EPA, through use of the public comment period.

a. In developing the schedule, EPA considers several factors. These include:

- **The extent end nature of the contamination;**

  The capabilities of the alternatives for the corrective measure to achieve MCS and other objectives (e.g., source control, compliance with applicable waste management requirements] of the RCRA Corrective Action program:

- **The availability of treatment or disposal capacity for wastes resulting from implementation of the corrective measure;**
- **The desirability of using an emerging technology:**
- **The risk posed to the surrounding area arising from exposure before implementation and completion of the corrective measure; and**
- **Other factors that EPA may considae pertinent.**



d. ***Evaluation of how the remedy acts to reduce the toxicity, mobility, and volume of the contamination.*** This involves assessment of the treatment process, the materials being treated, the effectiveness of the treatment, and the quantity of contaminated material remaining following the remedial action.

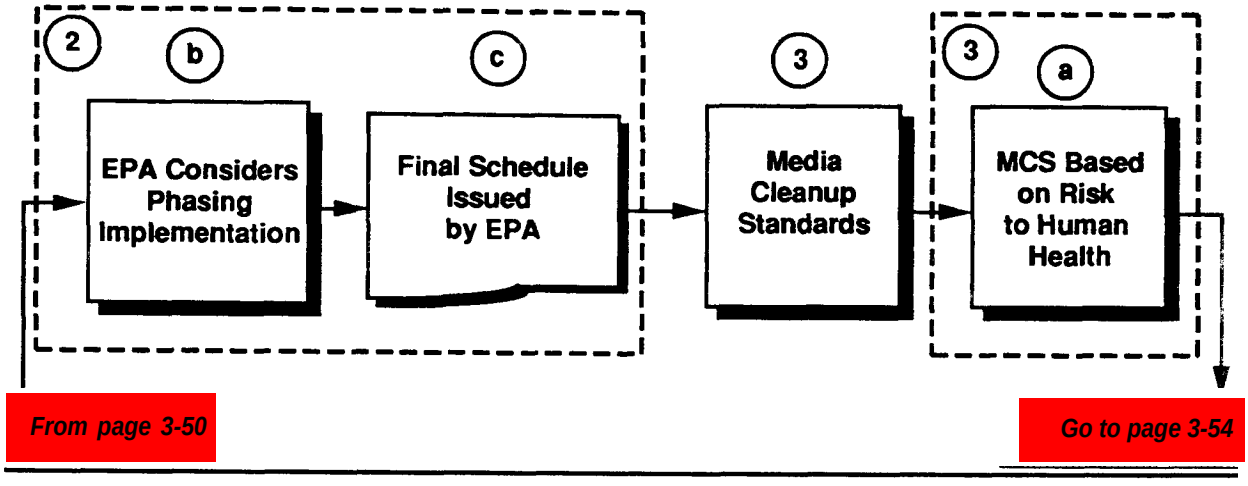
e. The ***short-term effectiveness*** criterion addresses the risks posed by each remedial alternative during construction and implementation, up to the time the remedial action objectives are achieved. Under this criterion, each alternative should be evaluated to determine the degree of protection afforded the surrounding community during the remedial action, the degree of risk posed to workers during implementation, the adverse environmental impacts arising from construction and implementation, and the time required to achieve the remedial action objectives.

f. The ***implementability*** criterion assesses both the technical and administrative feasibility of implementing each remedial alternative. Included in this assessment are (1) consideration of the availability of the necessary resources to construct and implement the remedy, (2) an assessment of the reliability of the technology, and (3) the ease of undertaking other remedial actions at the site once the alternative is implemented. Another aspect of this assessment is the determination of the requirements for interaction with other Federal, State, or local agencies. For example, this assessment may require determining any necessary permits for off site activities.

9. CERCLA requires that any remedy selected be ***cost effective.*** The evaluation of this criterion requires assessment of direct and indirect capital costs, as well as the operating and maintenance costs, associated with the remedial action. Operation and maintenance costs are usually a significant portion of the overall costs of a remedial action. This process should also consider the costs of any long-term liability associated with implementing the remedy.

h. Assessment of ***State acceptance*** of the selected remedial alternative is difficult at this point in the RI/FS; however, the Streamlined Approach for Environmental Protection (SAFER) recommends that all “stakeholders” (e.g., the State and community) be brought into the scoping and selection process as soon as is practicable, preferably at the start of the RI/FS. Usually this occurs following issuance of the draft ROD for the site. However, through discussions and negotiation with EPA and the State, DOE can begin to assess the degree of State support of the proposed remedial alternatives.

SELECTION OF THE CORRECTIVE MEASURE



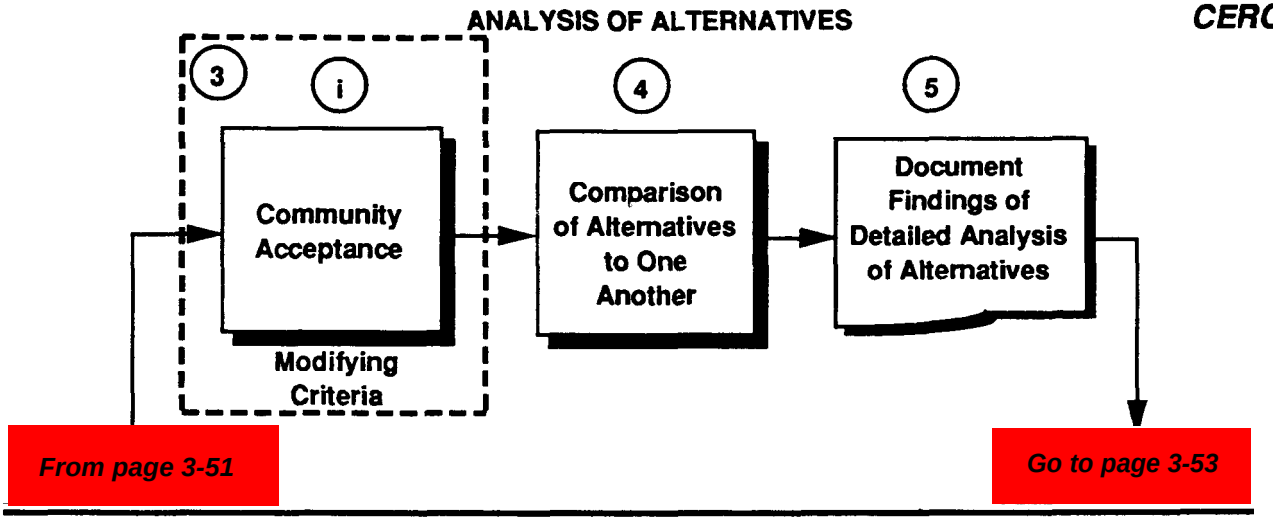
b. In developing the schedule, EPA also evaluates the potential benefits of a phased implementation of the corrective measure. A phased corrective measure consists of any logically connected series of actions performed sequentially at the same SWMU or simultaneously or sequentially at different SWMUs within the facility. A phased corrective measure is most likely to be selected when a single action is incapable of remediating all the SWMUs within a facility.

c. The final schedule issued by EPA becomes an enforceable part of the permit for the facility. If problems arise with maintaining compliance with the schedule, the proposed rule requires DOE to seek a schedule modification (a minor permit modification) before becoming non-compliant. During development of the schedule, DOE should request inclusion of provisions allowing flexibility in the schedule. Adequate flexibility should minimize the number of modifications to the schedule.

3. **Media Cleanup Standards.** MCS, described in detailed in the preamble to the proposed Subpart S rule (55 FR 30825), are media-specific concentrations of hazardous waste constituents which are determined by EPA to be protective of human health and the environment. Reduction of the concentration of hazardous waste constituents at the point of compliance to the MCS is the primary objective of the implemented corrective measure.

The final MCS are different from action levels and target MCS. Action levels are media-specific contaminant concentrations determined by EPA to be protective of human health and the environment, but are not cleanup goals. Rather, action levels serve as the triggering mechanism for a CMS. If, during the RFI, sampling determines that hazardous waste concentrations exceed action levels, a CMS is usually required at that SWMU. Target MCS are preliminary cleanup goals established during the CMS to provide a benchmark for evaluating the effectiveness of the alternatives for the corrective measure. Target MCS and action levels can differ significantly from the final MCS established for the corrective measure.

a. Developing the MCS is a two-step process. The first step establishes the MCS based upon the risk to human health. This protectiveness standard sets the range for an acceptable risk from exposure to carcinogenic compounds at an excess lifetime cancer risk of 1 additional case of cancer in 10,000 persons to 1 additional incidence of cancer in 1,000,000 persons (i.e., 10^{-4} to 10^{-6} excess lifetime cancer risk). The standard for systemic toxicants is that concentration to which human populations (including sensitive subgroups) can be exposed on a daily basis without appreciable risk of deleterious effects during a lifetime of exposure.

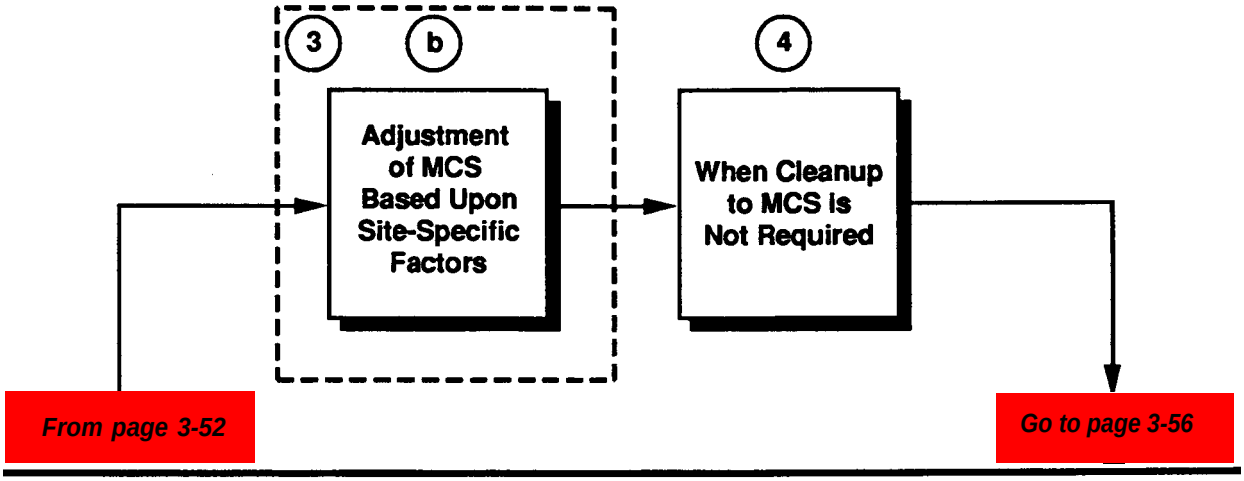


i. The final evaluation criterion, ***community acceptance,*** is also assessed following release of the draft ROD. However, much in the same way that it is possible to determine State acceptance of the proposed remedial alternatives, the community relations program should be seeking input from the public on community acceptance of the remedial alternatives that have been evaluated during the FS.

4. **Comparison of Alternatives.** Once each alternative has been subjected to the evaluation process, the remedial alternatives are compared to one another using the same nine evaluation criteria to determine the trade-offs among them (see Section XXI, *CERCLA Remedy Selection, Identifying a Preferred Alternative,* page *3-57).* For example, two alternatives may provide equal protection but have widely differing costs, On this basis, the less costly, equally protective alternative would be preferred over the more costly alternative.

5. **Document Findings of Detailed Analysis.** DOE should document the findings of the detailed analysis of remedial alternatives. This document should include a discussion of each alternative and the combination of alternatives evaluated. This document will become the basis for the FS report (discussed in the next section).

SELECTION OF THE CORRECTIVE MEASURE



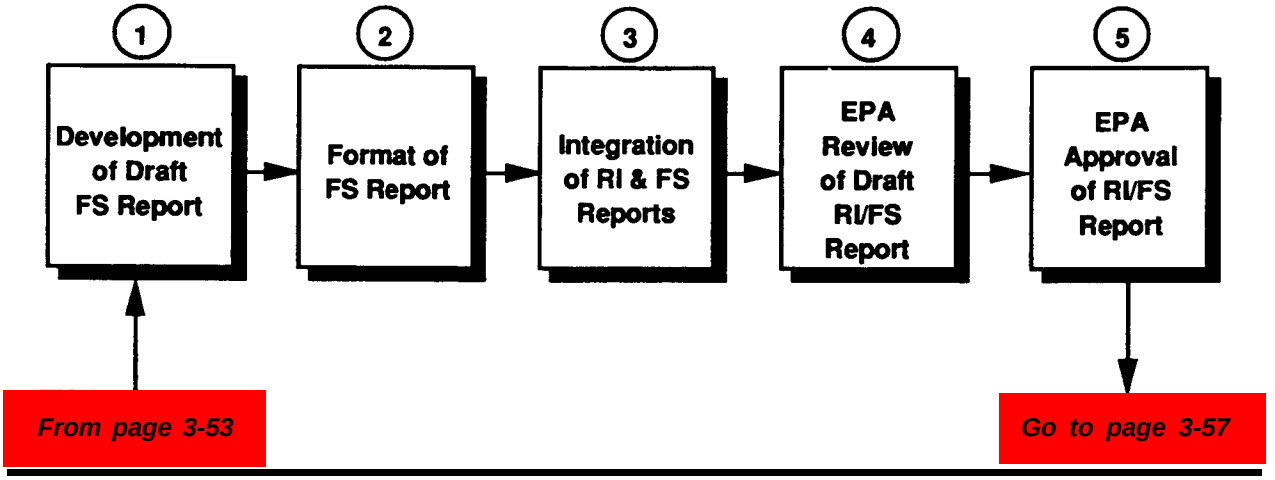
b. The second step in setting the MCS involves adjusting the MCS to be more or less stringent based on other factors including the following:

- **The effects of exposure to multiple contaminants;**
- **The impact to environmental receptors;**
- **The cumulative risk arising from other exposures not directly related to the release; end**
- **The effectiveness, practicality, raliability, and other factors related to the alternatives for the corrective measure end the ability of the corrective measure to achieve the MCS.**

4. **When Cleanup to MCS Is Not Required.** Pursuant to proposed 40 CFR §264.525(d)(2), under certain conditions DOE may not be required to clean up a release to MCS levels. These conditions include the following:

- **If, in broadly contaminated areas, the risk posed by a release from a single SWMU is trivial compared to the risk posed by the entire area;**
- **Implementation of a corrective measure will not significantly reduce any risk to human health and the environment**
- **If en aquifer can be shown not to be a potential or actual source of drinking water and the contamination present does not exceed action levels; or**
- **If the cleanup of a release is technically impractical due to engineering feasibility and reliability considerations.**

DOE is responsible for developing the evidence to support any request to waive the cleanup requirements. DOE should carefully assess the cost of, and potential for, successfully supporting such an assertion. EPA retains the authority to require source controls or other measures to limit further releases or release migration from the SWMU.



XX. Development of the CERCLA FS Report

1. **Development of Draft FS Report.** Once the detailed analysis of the remedial alternatives is complete, a draft FS report should be developed. This report, along with the RI report discussed previously, will become the basis for the selection of the remedy.

2. **Format of FS Report.** There is no specific format for an FS report; however. according to the EPA guidance on conducting an RI/FS, the elements of an FS report include the following:

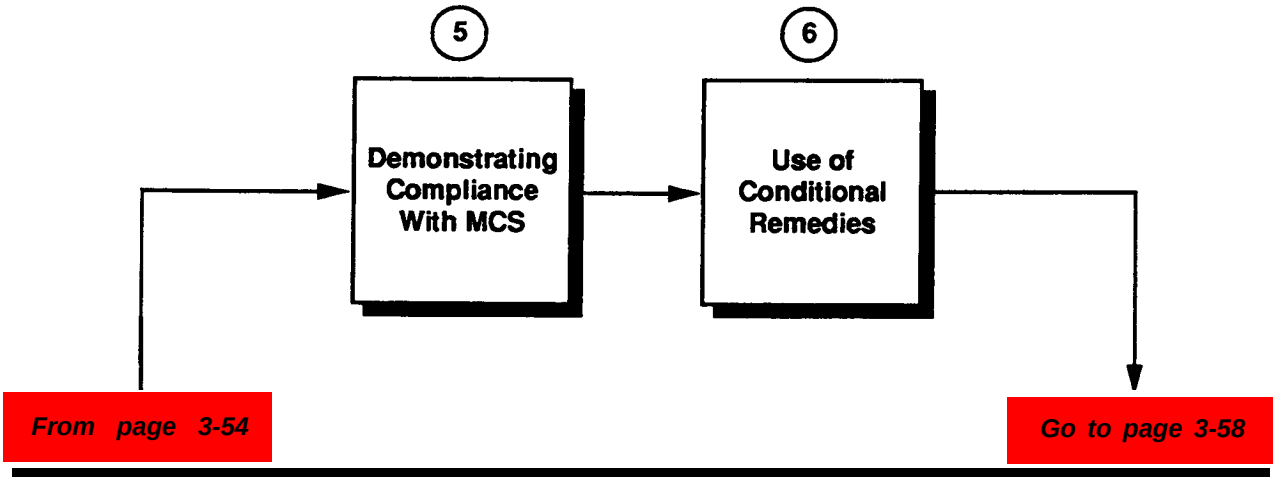
- **Introduction-discussion of the site background, the nature and extent of contamination, and findings of the baseline risk assessment;**
- **Identification and screening of technologies - discussion of the remedial action objectives, the general categories of response actions considered, and identification end screening of specific technologies and process options;**
- **Development and screening of alternatives - the development of the alternatives, the screening process conducted, and the alternatives eliminated from further consideration;**
- **The detailed analysis of alternatives - analysis of individual alternatives and the comparison of alternatives; end**
- **Appendices-supporting information.**

3. **Integration of RI and FS Reports.** The RI report, the results of treatability investigations, and the FS report are then integrated to make a draft RI/FS report. DOE will develop this document and submit it to EPA for review and approval.

4. **EPA Review of Draft RI/FS Report.** Upon review of the draft RI/FS report, EPA may require that additional studies or investigations be conducted.

5. **EPA Approval of RI/FS Report.** If EPA approves the draft RI/FS report, the next phase of the CERCLA response process is to select the remedial action and develop the ROD.

SELECTION OF THE CORRECTIVE MEASURE

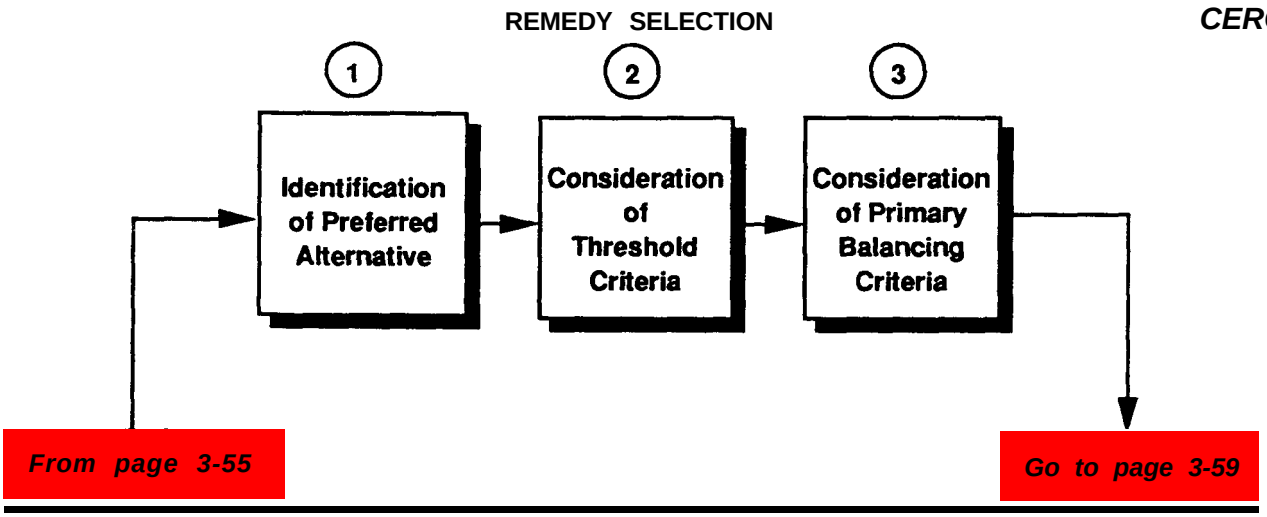


5. **Demonstration of Compliance with MCS.** EPA specifies the requirements for demonstrating compliance with MCS in the facility permit. These requirements include:

- Establishing the points where DOE demonstrates compliance for each environmental media (known as the point of compliance [POC]);
- The acceptable sampling. analytical, and statistical methods; and
- The period over which the facility will demonstrate compliance.

Ending the requirement for conducting a RCRA Corrective Action at the facility hinges upon the demonstration of compliance with the MCS established in the facility permit. Therefore, developing the requirements for demonstration of compliance requires close scrutiny by the facility and, if necessary, negotiation.

6. **Conditional Remedies.** In the preamble to the proposed Subpart S rule (55 FR 30833), EPA states that conditional remedies are expected to be common at Federal facilities due to the large number of SWMUs at most Federal facilities, technical limitations such as the availability of treatment technology, and the unique constraints of the Federal budget process. Adoption of a conditional remedy allows DOE to phase in a corrective measure over a specified period, providing certain conditions are met during implementation.

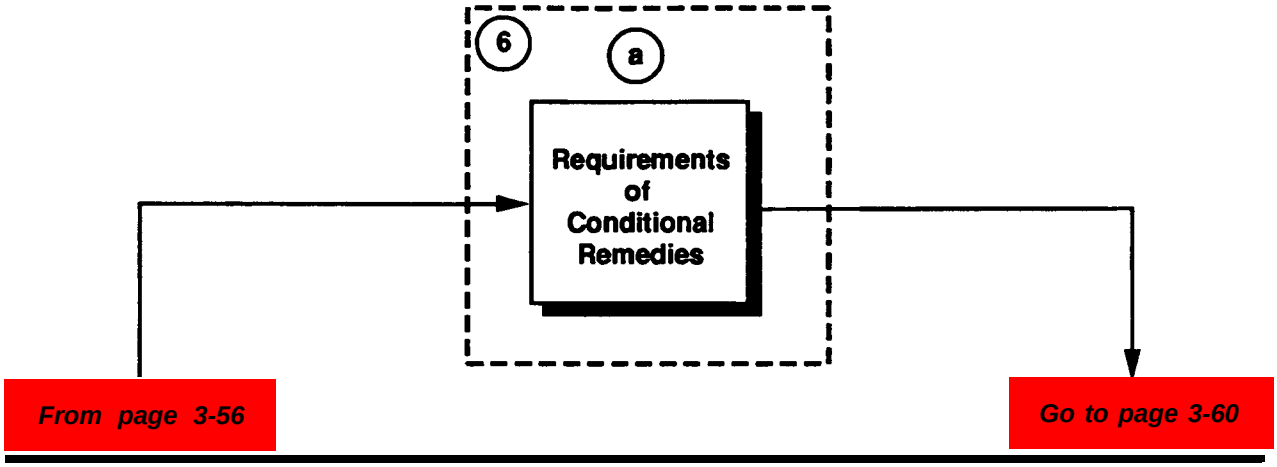


XXI. CERCLA Remedy Selection, Identifying a Preferred Alternative

1. **Identification of Preferred Alternative.** Following the detailed analysis and feasibility studv of remediation alternatives, DOE identifies a preferred alternative for the remedial action that best meets the five statutory requirements discussed previously (Section XVIII):

2. **Consideration of Threshold Criteria.** In identifying a preferred alternative, DOE must weigh each alternative against the nine criteria. Among these criteria, *overall protection of human health and the environment and compliance with ARARs are considered "threshold criteria."* Each alternative must meet these criteria in order to be eligible for consideration as the preferred alternative. Any alternative that does not meet the threshold criteria is eliminated from further consideration.

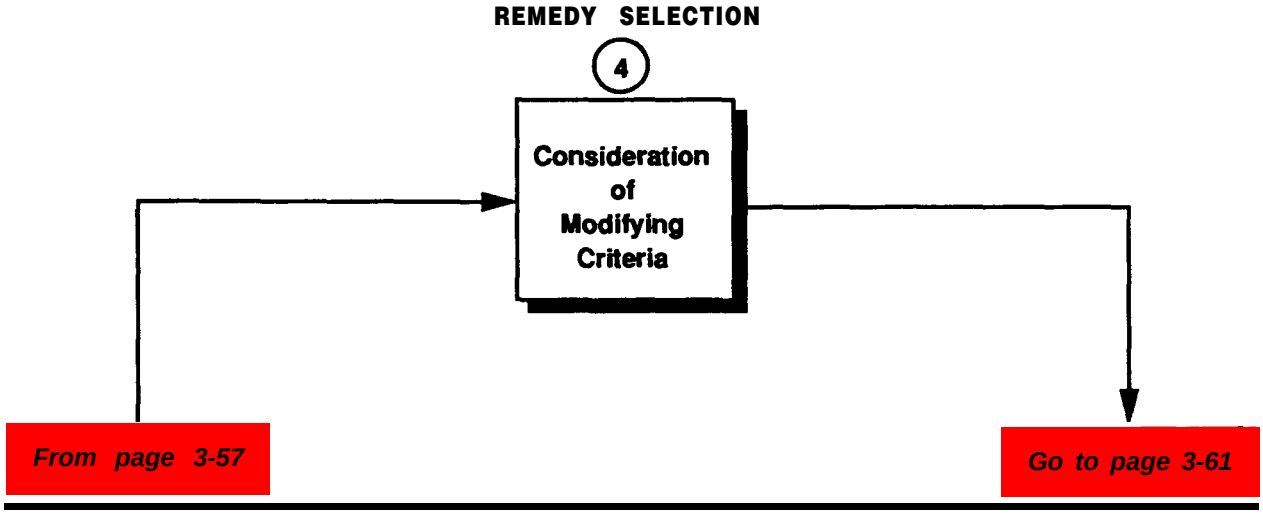
3. **Consideration of Primary Balancing Criteria.** Next, trade-offs among alternatives that pass the threshold criteria test are evaluated and weighed against the five "primary balancing criteria" discussed in Section XVIII, Step 3, p. 3-49.



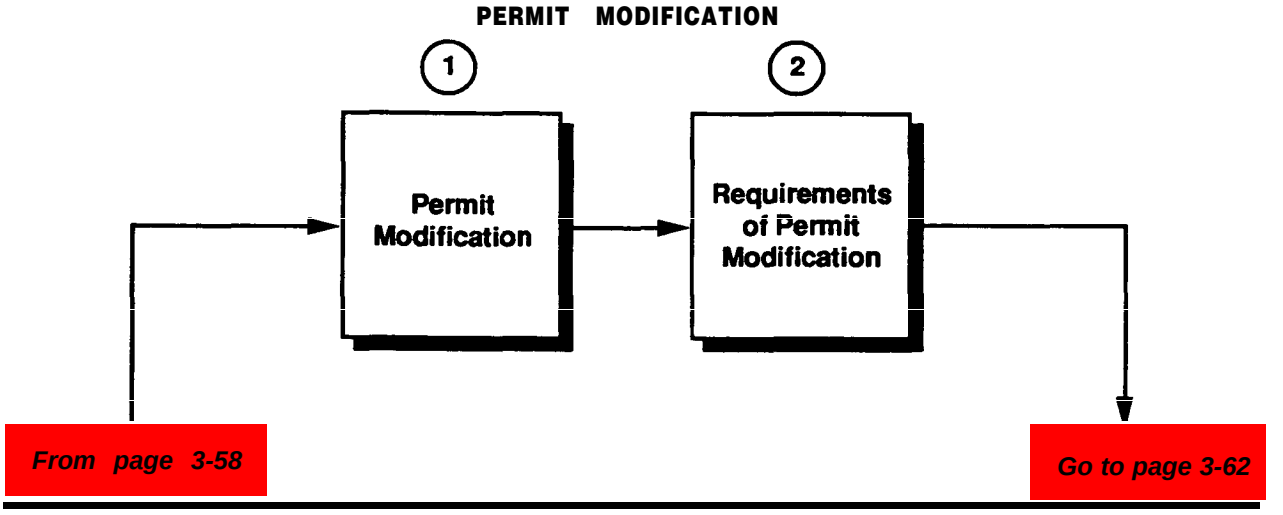
a. Under proposed 40 CFR §264.525(f), a conditional remedy *must* do the following:

- **Be protective of human health and the environment**
- **Achieve all MCS beyond the facility boundary as soon as practicable:**
- **Prevent further significant migration of releases within the facility as soon as practicable;**
- **Control the source(s) of release(s) by using treatment or other necessary engineering methods as soon as practicable;**
- **Institute effective institutional or other controls to prevent exposure to hazardous wastes;**
- **Continue monitoring of releases to determine if significant environmental degradation does occur;**
- **Provide financial assurances (not applicable at Federal facilities); and**
- **Comply with the waste management standards for waste generated during corrective actions.**

There is one important feature and one important caveat to conditional **remedies.** The important feature of a conditional remedy is that contaminants can remain at an operating facility if (1) DOE implements source controls that prevent offsite migration; (2) the risk of exposure, additional releases, or further migration is low; and (3) there is remediation of offsite contamination to MCS (as soon as practical). The caveat is that conditional remedies are not necessarily final remedies. Remediation of all contamination at the facility is a potential requirement to release facilities from their obligation to conduct RCRA Corrective Action.



4. **Consideration of Modifying Criteria.** State and community acceptance are "modifying criteria" that are also considered. If the degree of State and community acceptance is unknown, the criteria are considered later in the remedy selection process.

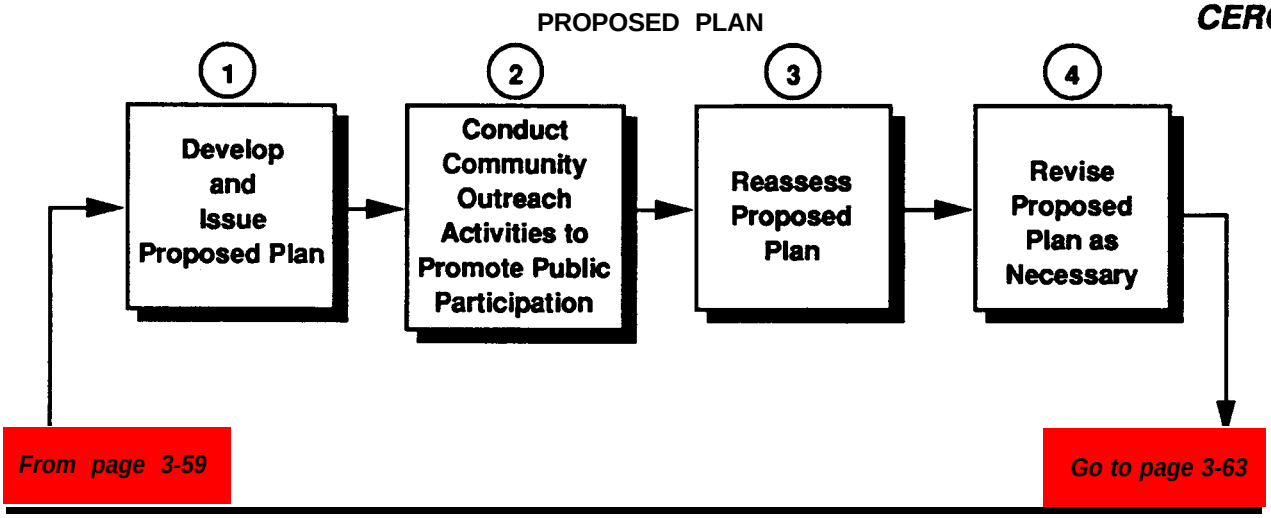


XXII. RCRA Permit Modification

1. **Permit Modification.** A modification to an existing facility permit (or RCRA 93008[h] Order) requiring implementation of the corrective measure is the final step in the selection of the corrective measure.

2. **Requirements for the Permit Modification.** If a permit modification is required, it follows the process for a "major" permit modification as described in 40 CFR 5270.41. This process requires development of a draft permit or permit modification meeting specific requirements, and a public review and comment period. The draft permit or permit modification and Statement of Basis are the documents that are made available to assist the public in understanding the RCRA Corrective Action activities atthefacility. The specific elements required in the draft permit or permit modification are as follows:

- **A description of the technical features of the corrective measure necessary for ac!deving the standards for the corrective measure;**
- **A listing of all MCS, by environmental media, established for the corrective measure;**
- **The requirements for demonstration of compliance;**
- **Specific requirements for the management of waste generated during implementation of the corrective measure;**
- **The procedural for decontamination, removal, or closure of any units or structures used during implementation of the corrective measure;**
- **A detailed schedule for implementing all the major technical features of the corrective measure; and**
- **Any requirements for submission of periodic progress reports.**



XXIII. CERCLA Remedy Selection and the Proposed Plan

1. **Develop and Issue Proposed Plan.** The preferred alternative identified by DOE is presented to the public in the Proposed Plan. A Proposed Plan is required under 40 CFR §330.430(f)(2) and is described in detail in the EPA document titled *Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment.* The Proposed Plan, a document intended for a general audience, describes the remedial alternatives analyzed, identifies the preferred alternative, and discusses the rationale for its selection. It supplements the R1/FS report and is released for public comment along with the R1/FS report, providing the public an opportunity to examine and comment on remediation alternatives (including the preferred alternative) and participate in the remedy selection process as required under 40 CFR §300.430(f)(3).

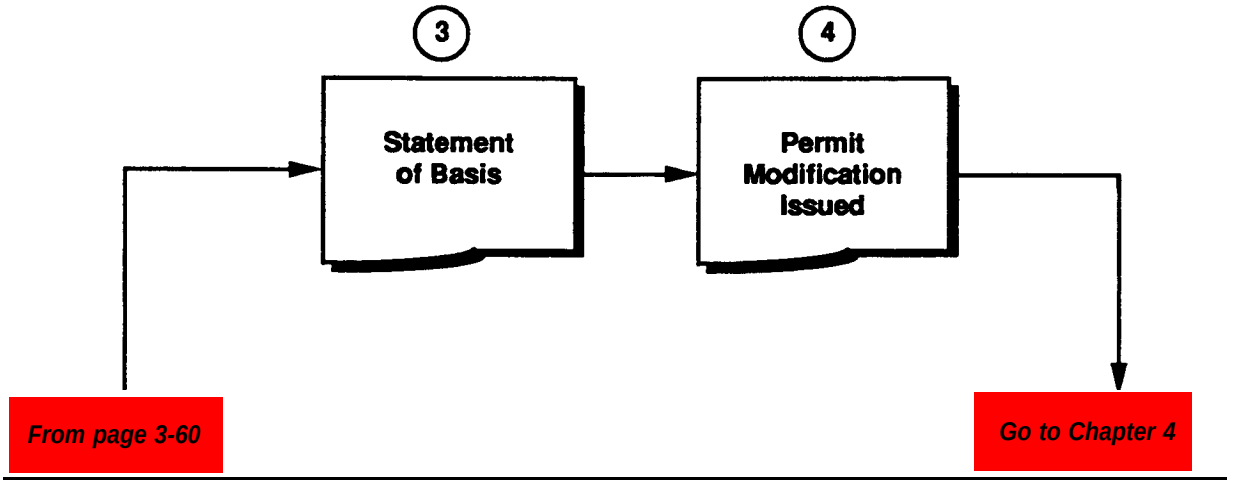
2. **Conduct Community Outreach.** DOE should conduct a variety of community outreach efforts to achieve the CERCLA §121 requirements for promotion of public participation in the remedy selection process and to comply with the requirements of 40 CFR §300.430(f)(3). These outreach efforts include the following:

- **Publishing a notice of the availability of the Proposed Plan,**
- **Making the Proposed Plan and the supporting analyses available to the public,**
- **Holding a public hearing near the site to discuss the preferred alternative, and**
- **Providing a minimum 30-day period for public comment on the Proposed Plan.**

3. **Reassess Proposed Plan.** Following public comment, DOE must reassess the preferred alternative in light of any new information developed during, or obtained as a result of, the public comment process. The purpose of this review is to determine whether the preferred alternative remains the most appropriate. The “modifying criteria” of State and community acceptance may enter the evaluation at this point. The preferred alternative may then be adopted or modified, or a different alternative may be identified as the preferred alternative.

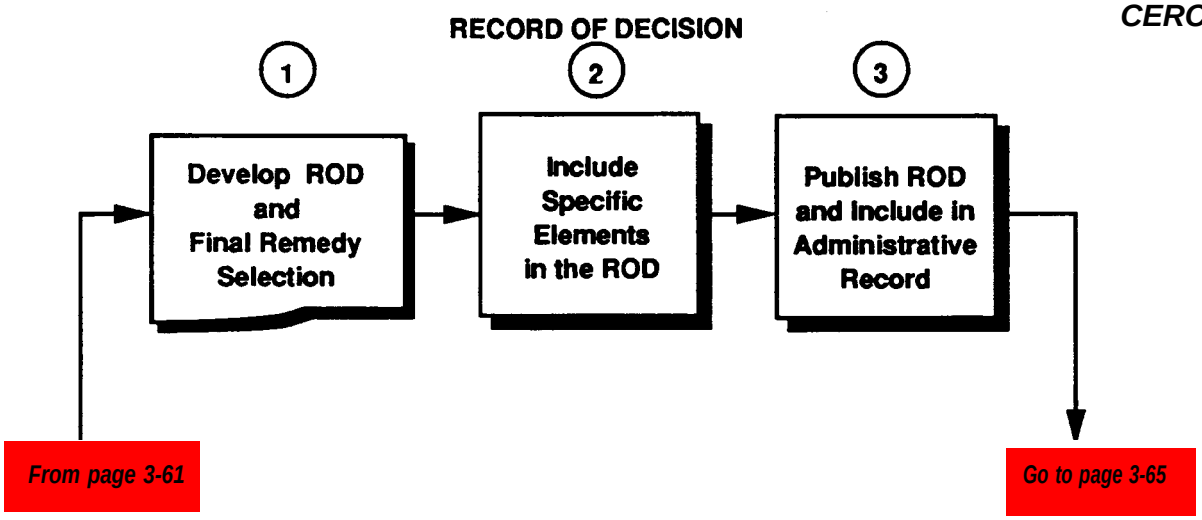
4. **Revise Proposed Plan as Necessary.** If there are significant changes to the scope, performance, or cost of the preferred alternative as a result of this process, it may be necessary to issue a revised Proposed Plan and solicit further public comment. This is necessary only if the changes are so dramatic that they could not have reasonably been anticipated based on information available during the public comment period. Selection of a new preferred alternative not previously evaluated is one example; however, selection of a new preferred alternative already evaluated in the Proposed Plan would not trigger the need for further comment.

PERMIT MODIFICATION



3. **Develop Statement of Basis.** The Statement of Basis (analogous to a ROD under CERCLA) provides general information about the corrective measures selected by EPA, and also provides an explanation of the process and selection criteria. For additional information on the Statement of Basis, consult the EPA document *RCRA Corrective Action Decisions Documents Guidance (1990).*

4. **Permit Modification Issued.** The selected corrective measure and a schedule for implementing the corrective measure required under the permit modification become enforceable parts of the facility permit. Chapter 4 of this document discusses the actual design and implementation of the corrective measure.



XXIV. CERCLA Remedy Selection and the Record of Decision

1. **Develop ROD end Finel Remedy Selection.** When the final remedy is selected, 40 CFR §300.430(f) requires that the decision be documented in the ROD. The ROD is a formal, legal mechanism for documenting the remedy selection process and the analyses and policy determinations that support selection of the final remedy. Under 40 CFR §300.430(f)(5), the ROD must describe the following:

- **How the remedy is protective of human health and the environment, and how it eliminates, reduces, or controls exposure to hazardous substances, pollutants, and contamiants:**
- **The Federal and State ARARs the remedy will attain, those that will not be met and the justification for waivers;**
- **How the remedy is cost effective; and**
- **How the remedy uses permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.**

For DOE facilities, remedy selection is a joint responsibility of DOE and EPA. If agreement on the remedy cannot be reached, and the dispute resolution process fails, under 40 CFR §300.435(f)(4) EPA has the authority to unilaterally select the remedy.

2. **Include Specfic Elements of the ROD.** The ROD must also include a written summary of significant comments received through the public participation process, along with responses. Significant changes to the remedy, as compared to the preferred alternative presented in the Proposed Plan, must also be discussed. The ROD should discuss the goals the remedy is expected to achieve and describe whether hazardous substances, pollutants, or contaminants will remain onsite above levels that permit unlimited use and unrestricted exposure. If so, mechanisms must be emplaced to review the remedy not less than every 5 years after initiation.

3. **Publish ROD and Include in Administrative Record.** DOE must publish notice of availability of the ROD, include it in the administrative record for the site, and make it available for public inspection.

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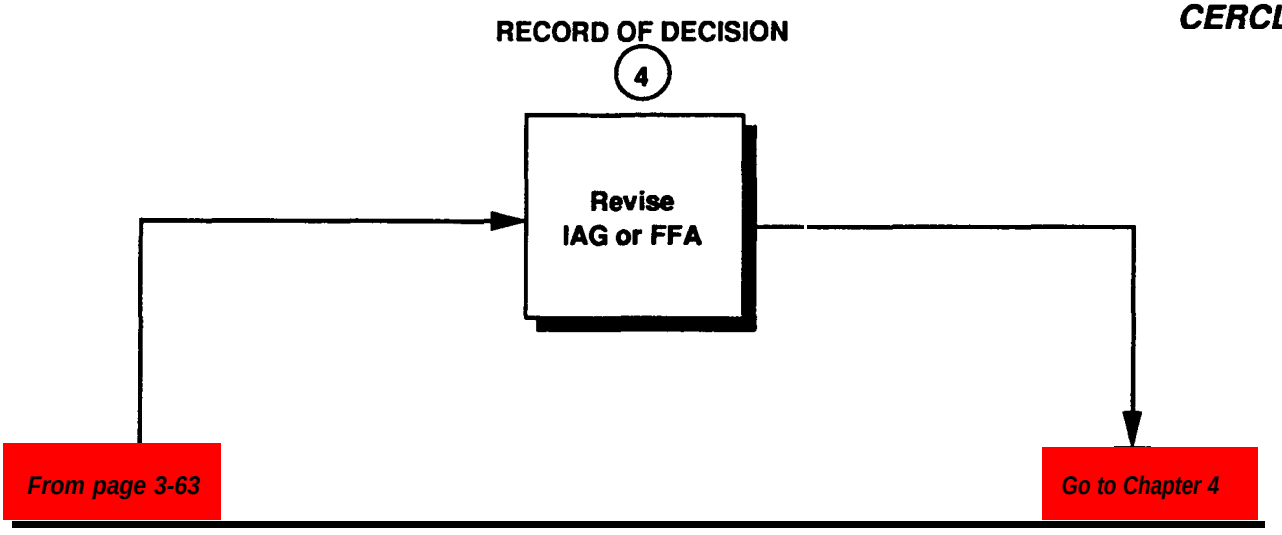

4. **Revise IAG or FFA.** CERCLA §120 imposes certain schedule demands on Federal agencies. Among these is a requirement for the lead agency to enter into an Inter-Agency Agreement (IAG) or Federal Facility Agreement (FFA) with EPA within 180 days of EPA's acceptance of the RI/FS. The IAG or FFA identifies the selected remedy, provides a schedule for completion, and describes arrangements for long-term operation and maintenance. Completion of the ROD must conform with this schedule. CERCLA §120 also requires that "substantial continuous physical on-site remedial action" begin within 15 months after RI/FS completion. Current DOE practice is to include these provisions in the IAG or FFA developed before the RI/FS is conducted and to amend the IAG or FFA to reflect these requirements once the RI/FS and remedy selection process is complete.

Summary

Topic	RCRA
Purpose of the RFI and the CMS	The RFI is a detailed assessment of the extent, nature, and risk posed by a release of hazardous wastes from SWMUs at a permitted or interim status TSDF. The CMS is the process for the development, testing, and analysis of alternatives for the cleanup of the release. The RFI/CMS process leads to an informed risk management decision regarding the cleanup of contamination at the facility.
Simultaneity of Investigations	The RF I is not conducted concurrently with the CMS. A CMS is usually required only when contaminants are found in excess of action levels determined to be protective of human health and the environment.
Scoping and Planning the RFI	The steps in scoping an RFI include the following: • Reviewing existing information about the facility, • Establishing CAMUs, • Setting the RFI objectives and preparing planning documents, • Scoping an interim *CMS* (if required), and • Developing the RFI plan.
Conducting the RFI	Conducting an RFI is primarily a matter of implementing the RFI plan. This process usually involves sampling and other data collection efforts.
The RFI Report	A specific format may be required by EPA. The report must document all findings and should support a decision either that no further action is required or that a CMS must be conducted.
Requirement for a CMS	A CMS is required when the RFI determines that contamination resulting from a release from an SWMU is present in environmental media and is in excess of action levels, and that the release poses a real or potential threat to human health or the environment.
Scoping a CMS	Scoping the CMS involves the following: • Reviewing information about contamination at the facility, • Phasing the CMS and/or establishing CAMUs, • Streamlining the CMS to focus the evaluation process, • Developing the objectives of the CMS, • Establishing the evaluation process and criteria, • Selecting and screening candidate corrective measures, and • Developing a CMS plan and supporting documents.
Conducting the CMS	Conducting a CMS involves implementation of the CMS plan, conducting treatability investigations, and assessing the effectiveness of each candidate corrective measure.
The CMS Report	EPA may require that the CMS report follow a specific format. The CMS report must discuss the findings of the evaluation of each candidate corrective measure.
Selection of the Corrective Measure and Permit Modification	The selection of the corrective measure is based on the ability of each measure evaluated to (1) provide protection of human health and the environment, (2) attain final MCS, (3) provide source control; and (4) comply with waste management requirements. Based upon the findings of the CMS, EPA will select the corrective measure for the facility. The facility permit will go through a Class Ill permit modification, or a RCRA §3008(h) Order will be issued, to require implementation of the selected corrective measure.

Summary

Topic	CERCLA
Purpose of the RI/FS	The RI/FS is the methodology used to characterize the extent, nature, risk, and alternatives for cleanup of releases of hazardous substances. The RI/FS process leads to an informed risk management decision regarding the cleanup of contamination at the site.
Simultaneity of Investigations	A CERCLA RI is conducted concurrently and in an iterative fashion with the FS.
Scoping and Planning the RI/FS	The steps in scoping an RI/FS include the following: • Reviewing existing information about the site to develop a conceptual model and understanding of conditions at the site and to establish operable units, • Establishing the remedial objectives and determining the remedial options available for use at the site, • Identifying ARARs for consideration during the RI/FS, and • Preparing the RI/FS work plan and supporting documents.
Conducting the RI/FS: Site Characterization	The first step in conducting an RI involves site characterization to determine the source, extent, and nature of the contamination of environmental media. This information is then used to conduct the baseline risk assessment.
The RI Report	A specific format is not required by EPA. The RI report documents all findings of the site characterization and baseline risk assessment.
Conducting the RI/FS: Development and Screening of Alternatives	The first phase of the FS, conducted concurrently with site characterization, is development and screening of the remedial alternatives for the site. This process focuses the RI/FS on collection of data to allow evaluation of viable remedial alternatives.
Conducting the RI/FS: Treatability Studies	Conducting treatability studies is the second phase of the RI. During this phase, the remedial alternatives are subjected to bench- and/or pilot-scale testing to assess their effectiveness under actual conditions. The findings of the treatability studies are summarized in a report which supports the last phase of the FS, the detailed analysis of the remedial alternatives.
Conducting the RI/FS: Detailed Analysis of Remedial Alternatives	In this, the second phase of the FS, each remedial alternative is evaluated against the nine criteria for remedial actions. This phase uses the findings of both the RI and the treatability studies to determine which alternative provides the greatest benefits while at the same time maximizing the use of available resources (i.e., funding).
The RI/FS Report	The findings of the detailed analysis of alternatives are summarized in the FS report. The RI report, the treatability studies report, and the FS report are then integrated into the final RI/FS report. This report becomes the basis for the selection of the remedial action for the site.
Remedy Selection and the Record of Decision	Upon completion of the RI/FS report, DOE will develop a Proposed Plan outlining the preferred alternative and the reasons for the selection of that alternative. This document is released for public review, and a response and comment period is required. Following review of the Proposed Plan and the RI/FS report, DOE, EPA, and the State select the remedial alternative to be implemented, and document the reason for this selection in an ROD.

References

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act (SARA)). 42 USCA §9601 et seq.

The National Oil and Hazardous Substances Pollution Contingency Plan. (40 CFR Part 300).

The Resource Conservation and Recovery Act (RCRA) (as amended by the Hazardous and Solid Waste Amendments [HSWA]. 42 U.S.C. §6901 et seq.

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Chapter 4
RCRA Corrective Measures Implementation
and
CERCLA Remedial Design/Remedial Action

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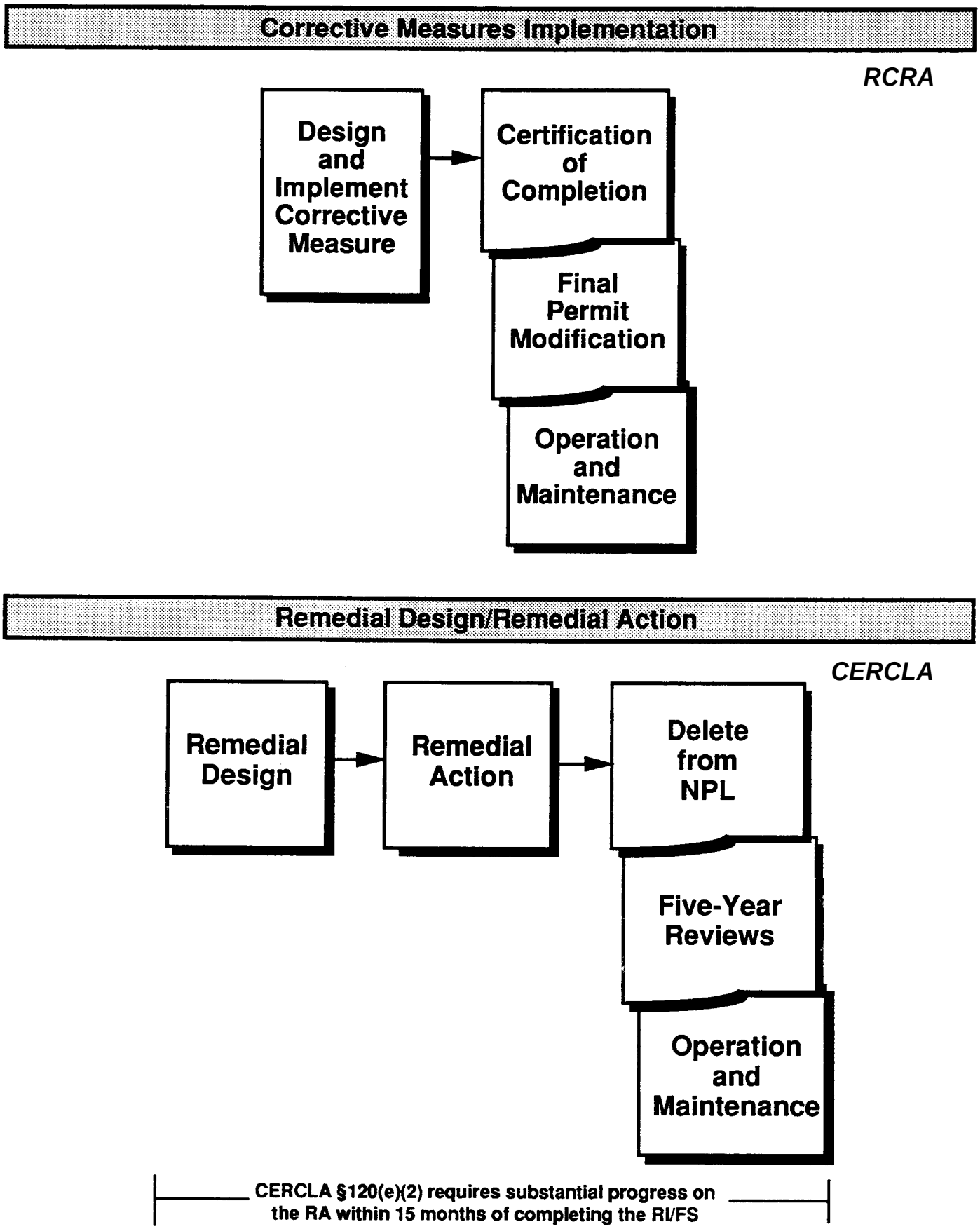
Corrective Measures Implementation
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Chapter 4
RCRA Corrective Measures Implementation
and
CERCLA Remedial Design/Remedial Action

1. Introduction

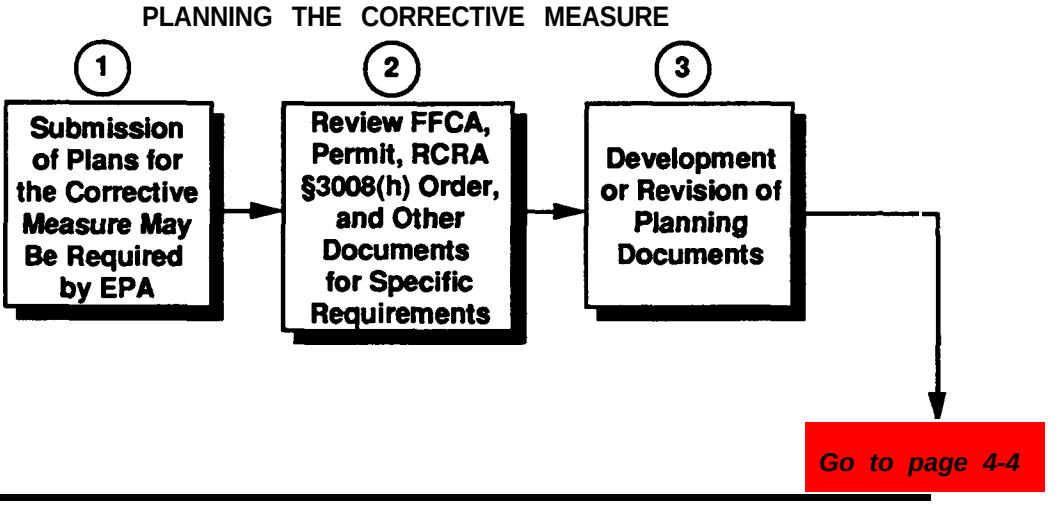
The discussion of the RCRA Corrective Action process in this chapter addresses the design, construction, implementation, operation, and process for demonstrating completion of the corrective measure. This entire process is collectively referred to as Corrective Measures Implementation (CM I). The purpose of the CMI is to address, through a combination of source control and remedial activities, a release of hazardous wastes or hazardous waste constituents from solid waste management units (SWMUs) at RCRA permitted or interim status treatment, storage, or disposal facilities (TSDFs). The discussion also addresses the final permit modification process, which discharges the facility's obligation to conduct RCRA Corrective Action once the corrective measure is completed.

The discussion of the CERCLA Remedial Process addresses the remedial design and remedial action (RD/RA) process. Similar to the CMI, RD/RA is the implementation of the remedy selected following the remedial investigation/feasibility study (RI/FS). The discussion also addresses the process for deleting the site from the National Priorities List (NPL), and the requirements for 5-year reviews of the effectiveness of the RA at sites with residual contamination.

The specific topics discussed in this chapter include the following:

- The process and requirements for the design of the corrective measure,
- The process and requirements for the remedial design,
- Typical activities to be conducted durng the construction and implementation of the corrective measure or remedial action,
- The mechanism end requirements for demonstrating completion of the corrective measure or remedial action,
- The final permit modification process ending a facility's obligation to conduct RCRA Corrective Action,
- The process for NPL deletion end the 5-year review requirement, and
- The requirements for long-term operation and maintenance of the corrective measure or remedial action.

Figure 4-1 on the preceding page is a graphic representation of the sections discussed in this chapter.



II. RCRA Corrective Measures Implementation: Design of the Corrective Measure

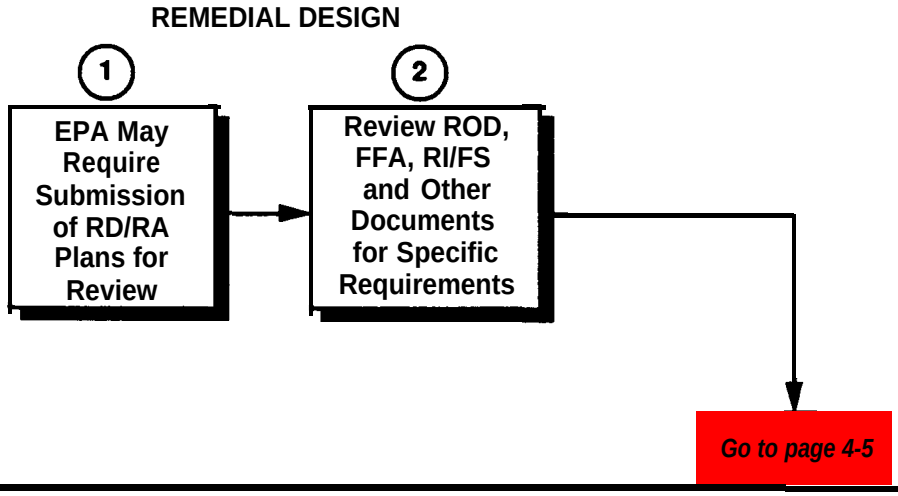
1. **Submission of Detailed Plans for the Corrective Measure.** Under proposed 40 CFR §9264.527, EPA may require DOE to submit detailed plans that include design and performance specifications, complete construction drawings, and operational plans for the corrective measure. Such a requirement usually appears in the facility schedule of compliance in the modified permit or in the Federal Facility Compliance Agreement (FFCA).

2. **Review Existing Documents.** The first task in developing a work plan for the implementation of the selected corrective measure is a review *of all documents* related to the facility, the unit, and the release. These documents include the following:

   - **The facility permit RCRA §3008(h) Order, and/for FFCA for the facility which specifies the corrective measure for the unit, the requirements for demonstrating compliance, the media cleanup standards (MCS], and any other requirements placed on the facility and**
   - **The reports of investigation already conducted at the facility including the CMS report, the RFI report. the RCRA Facility Assessment (RFA) report, reports of interim measures, and notices of releases.**

   DOE should review these documents for information on conditions at the facility, the specific requirements of the permit, and the alternative selected for implementation. This step is extremely important when those responsible for implementing the corrective measure have not been involved in the previous RCRA Corrective Action activities at the facility.

3. **Development or Revision of Plans or Other Documents.** EPA has not promulgated regulations that provide specific requirements for the plans to implement the corrective measure. However, CMI planning typically involves development of, or revisions to, several documents, discussed in the following steps.



III. CERCLA Remedial Design

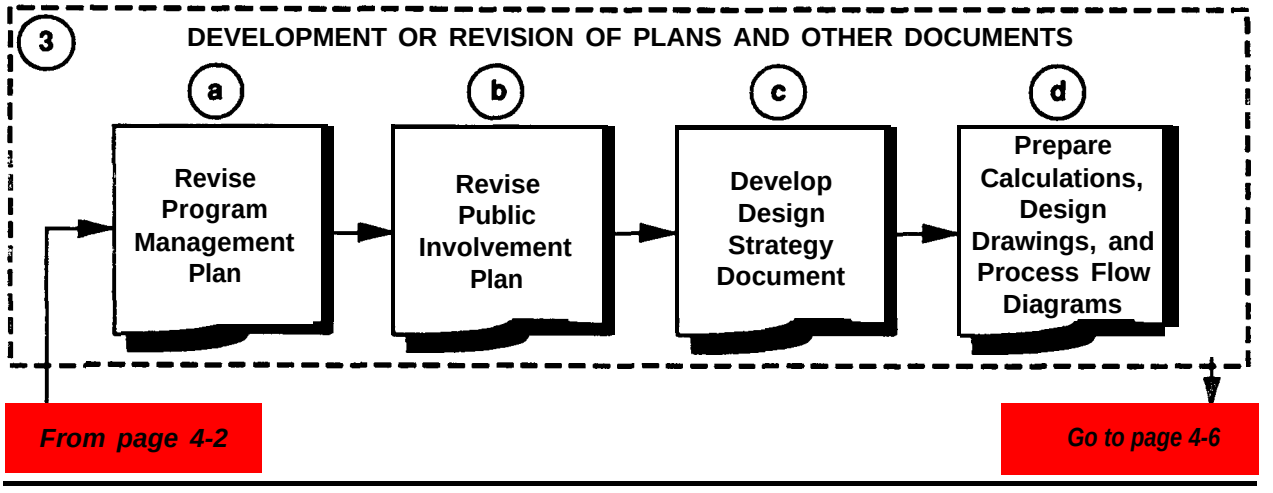
1. **Submission of RD/RA Plans.** Once the remedy is selected and the ROD is completed, DOE will begin the design of the full-scale remedy. Under 40 CFR §300.435(b)(2), EPA may require DOE to submit detailed plans of the remedy, including design and performance specifications, complete construction drawings, and operational plans for conducting the remedial action (RA). Requirements for submission of the design and planning documents usually appear in the schedule established in the Consent Agreement for the RA or in the Federal Facility Agreement (FFA).

2. **Review Existing Documents.** The first task to conduct during RD is to review all documents related to the facility, the operable unit(s), and the release. These documents include the following:

- **The ROD and the FFA, which specify the RA activities that must be conducted; the requirements for demonstrating that the RA is completed; end any additional requirements; and**
- **The reports of investigations and actions already conducted at the facility, with particular attention being paid to the RI/FS report, any interim remedial action reports, end the accompanying interim RODS.**

DOE should review these documents for information on conditions at the facility, the specific requirements of the FFA, and the alternative selected for implementation. This step is extremely important, especially when the RD/RA contractor has not been previously involved in the activities at the site.

PLANNING THE CORRECTIVE MEASURE



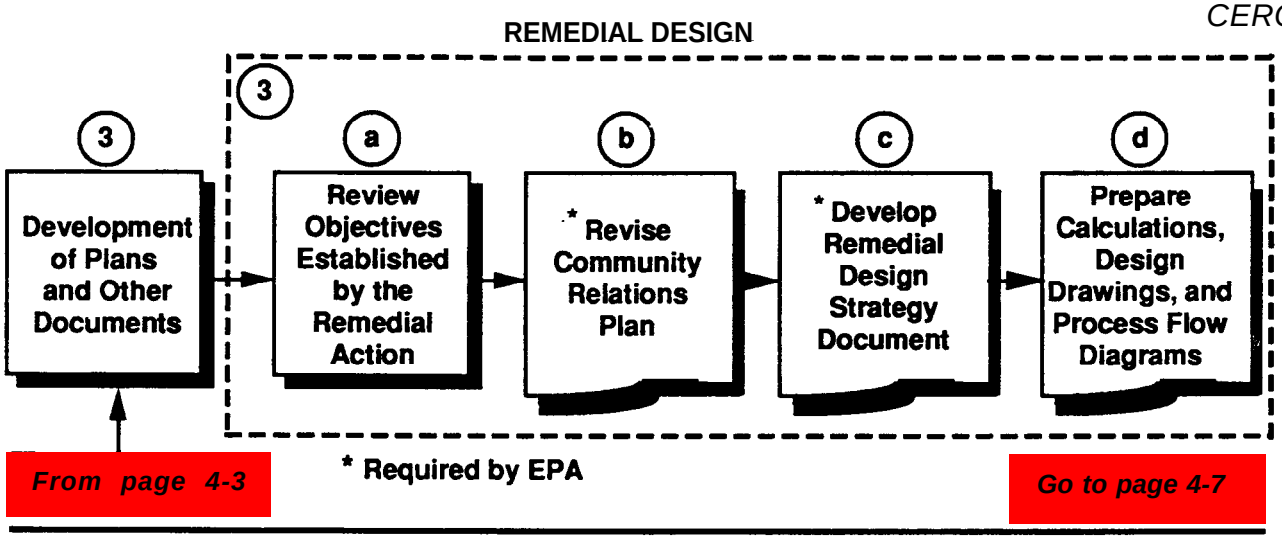
a. The ***program management plan (PMP) developad during the RF1/CMS phase may need to be revised*** to describe the overall management strategy for implementing the corrective measure, to establish roles and responsibilities of the personnel involved in the project, and to provide a description of the qualifications of the personnel assigned to the project.

b. ***The public involvement plan (PIP) may need to be updated*** to reflect the need to keep the public abreast of progress and/or problems as the CMI proceeds. Upon completion of the engineering plans and design, the facility should prepare and distribute an updated fact sheet and may wish to conduct an informal public hearing to discuss the implementation of the corrective measure. Preparation and distribution of additional fact sheets and regularly scheduled informal public hearings should be conducted throughout the implementation process. This additional effort will keep the public aware of the progress in implementing the corrective measure. DOE has developed a guidance document titled *Public Participation in Environmental Restoration Activities* which provides specific information on the elements of a PIP.

c. As described in the *RCRA Corrective Action Program Guide,* DOE should ***prepare a design strategy document*** describing the manner and methods to meet the requirements of applicable Federal, State, and local regulations for performance and construction; minimize environmental and community impacts; address the technical factors related to the design; account for assumptions made in developing the design; and account for possible sources of error in the design process.

The design strategy document bears a strong relationship to the ROD prepared as part of conducting an environmental impact statement (EIS). The facility may wish to consider developing the ROD for the EIS (if NEPA compliance is required) in a manner that will allow the ROD to be used to fulfill the requirements for the design strategy document.

d. Once the review and planning phases are completed, DOE should ***prepare a complete set of detailed construction drawings, document all engineering calculations, and prepare a complete set of process flow diagrams for the corrective measure.*** These drawings should show the entire process of the corrective measure and should include details on both onsite and offsite treatment systems.



3. **Development or Revision of Planning Documents.** EPA has not promulgated regulations that provide specific requirements for the plans developed during the RD phase of a CERCLA response. Because each RA is unique to the site conditions, development of specific requirements for RD would be difficult. However, RD is essentially an engineering project; thus, there are some common elements to most RDs. In addition to these common elements, RD may also involve development of, or revisions to, documents prepared during the preceding activities. The RD process is discussed in more detail in the following steps.

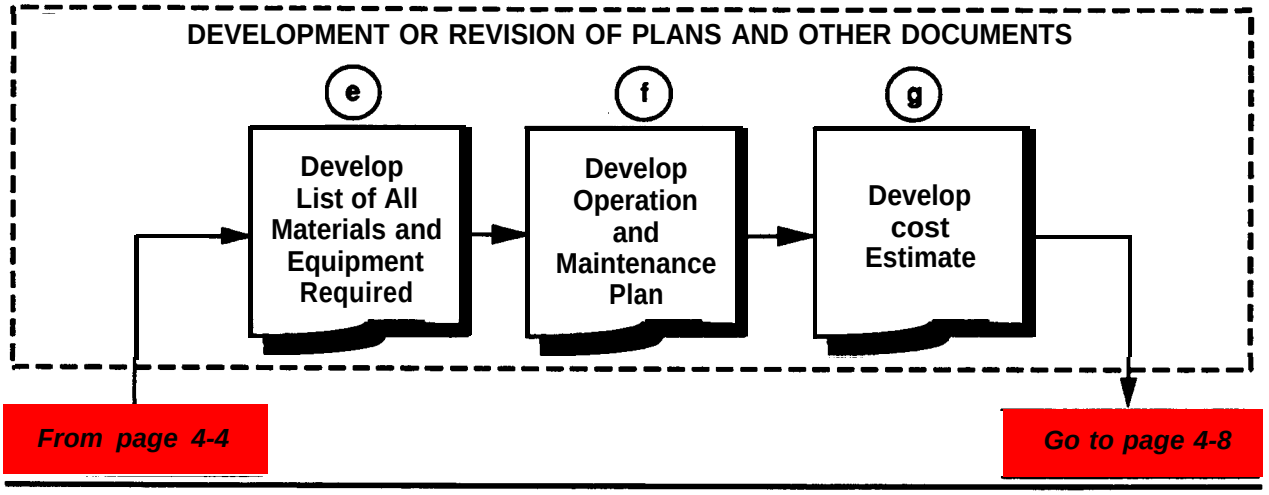
a. The first step in the RD is to ***review the objectives established for the RA.*** Preliminary remedial action objectives were established during the Ri/FS, and specific health, ecological, and ARAR-based cleanup goals were identified during the risk assessment and feasibility study. These objectives are often included in the FFA or Consent Order. These objectives form the basis for the design of the RA.

b. ***The CRP may need to be updated*** to reflect the need to keep the public abreast of progress and/or problems as the RD/RA proceeds and to ensure compliance with 40 CFR §300.435(c). Upon completion of the engineering plans and design, DOE should prepare and distribute an updated fact sheet and conduct a public briefing to discuss the RA. Preparation and distribution of additional fact sheets and regularly scheduled informal public hearings should be conducted throughout the implementation process. This additional effort will keep the public aware of progress in conducting the RA.

c. A recommended practice is to prepare ***an RD strategy document*** to describe the manner and methods to meet the requirements of applicable Federal, State, and local regulations for performance and construction (i.e., Applicable or Relevant and Appropriate Requirements [ARARs]); to minimize environmental and community impacts; to address the technical factors" related to the design; to account for assumptions made in developing the design; and to account for possible sources of error in the design process. A design strategy document bears a strong relationship to a ROD or Environmental Assessment or Environmental Impact Statement (EIS). DOE may wish to consider developing the ROD for the EIS (if NEPA compliance is required) in a manner that will allow the ROD to be used to fulfill the requirements for this document.

d. Once the review and planning phases are completed, DOE should prepare ***a complete set of detailed construction drawings, document all engineering calculations. and prepare a complete set of process flow diagrams for the RA.*** This document should include details on both on- and offsite treatment systems. In the case of offsite disposal of hazardous wastes, this document should reflect the EPA off-site final rule requirement that a RCRA Facility Assessment be conducted at any RCRA hazardous waste TSDF that receives hazardous wastes generated during the RA (see 58 FR 49200).

PLANNING THE CORRECTIVE MEASURE

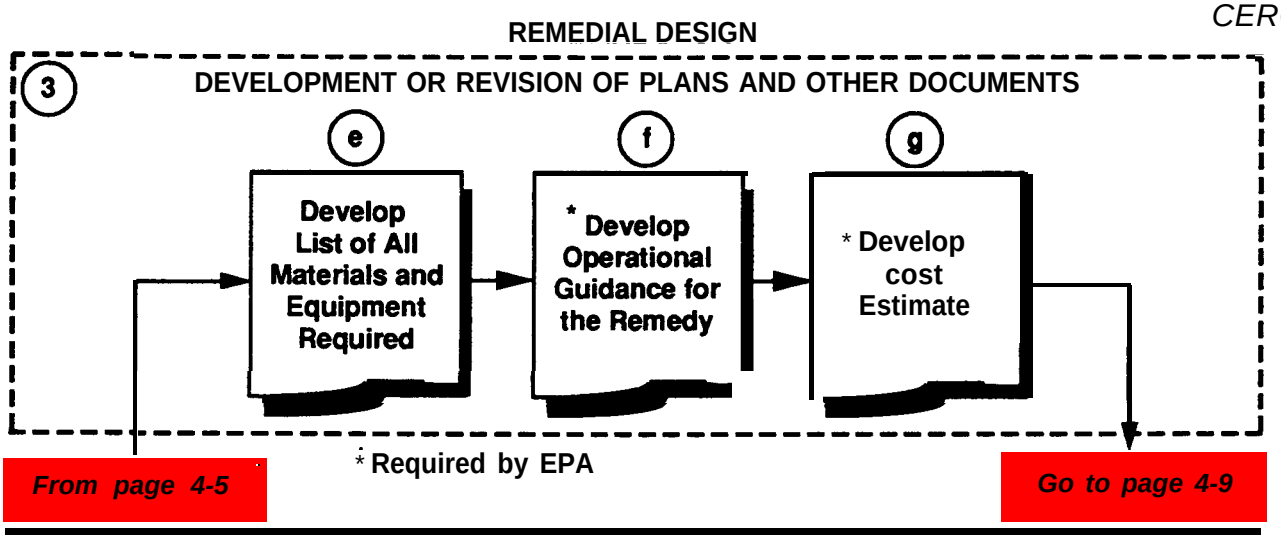


e. ***A list of, and specfications for, all equipment and materials*** required to implement the corrective measure should be prepared. Included in this list are all equipment required to ensure employee health and safety (specified in the Health and Safety Plan [HASP]); all materials required for construction of the corrective measure, including materials and specifications for prefabricated sections; all construction equipment required to implement the corrective measure (such as heavy equipment, special tools, and special materials handling devices) and the source and availability of this equipment; and a summary of specifications for the materials and equipment required for implementation of the corrective measure. These items should be included in the construction quality assurance plan (CQAP).

f. DOE will need to ***prepare an operation and maintenance plan (O&MP)*** for the corrective measure which describes (1) normal operation and maintenance procedures, (2) potential problems and anticipated solutions to such problems, (3) routine monitoring or testing procedures, (4) safety procedures, (5) equipment related to the corrective measure, and (6) record keeping and reporting procedures and requirements.

g. The next task in planning the corrective measure is ***development of a cost estimate.*** This estimate should reflect the fully loaded cost of the corrective measure. Fully loaded cost includes all short- and long-term costs and estimates of the extent of all long-term liabilities. Examples of information to include in the cost estimate are as follows:

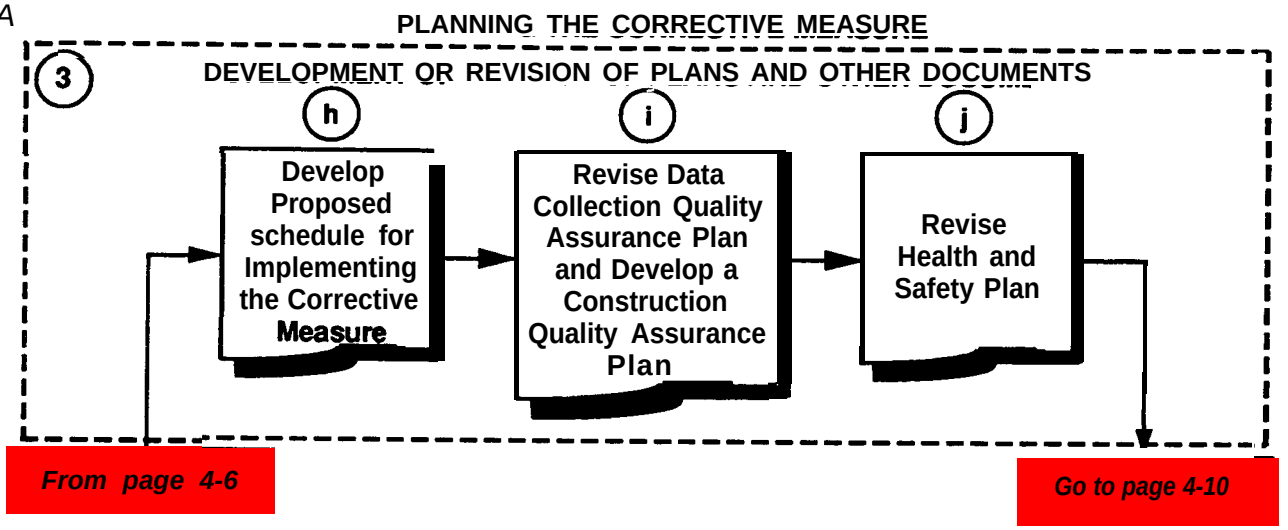
- **The cost of all materials required to construct the corrective measure;**
- **The costs associated with the manpower required to implement the corrective measure, including salaries, insurance, required contributions (e.g., Social Security), health monitoring, and specialized training;**
- **Costs for overhead, operations, and profit; and**
- **The cost of offsite waste disposal, including costs for long-term liabilities related to waste disposal.**



e. Once the basic design of the RA is completed, ***a list of and specifications for, all equipment and materials required to implement the RA should be prepared.*** Included in this list is all equipment required to ensure employee health and safety (specified in the HASP); all required construction materials and vendor-supplied devices (including materials and specifications for vendor-supplied equipment); all construction equipment required to implement the remedy (i.e., heavy equipment, special tools, special materials handling devices), and the source and availability of these materials or equipment. In addition, DOE should consider developing a summary of the specifications for the materials and equipment required for the RA and include this summary in the construction quality assurance plan (CQAP).

f. DOE will then need to prepare ***operation/guidance*** for the remedy. This guidance should discuss normal operational procedures, potential problems and anticipated solutions to such problems, all routine monitoring or testing procedures, safety procedures, information on all equipment or devices related to the remedy, and the record keeping and reporting procedures and requirements. Related to this portion of the RD process is development of training materials for the personnel who will be involved in operation of the RA.

g. Once the design, materials, and operational guidance are complete, DOE should develop a ***cost estimate*** for the RA. The cost estimate should reflect the capital costs for implementing the RA and the present net worth of the RA. Present net worth reflects the total cost over the entire period of the RA, and includes all direct and indirect costs (including long-term liabilities) of the RA.

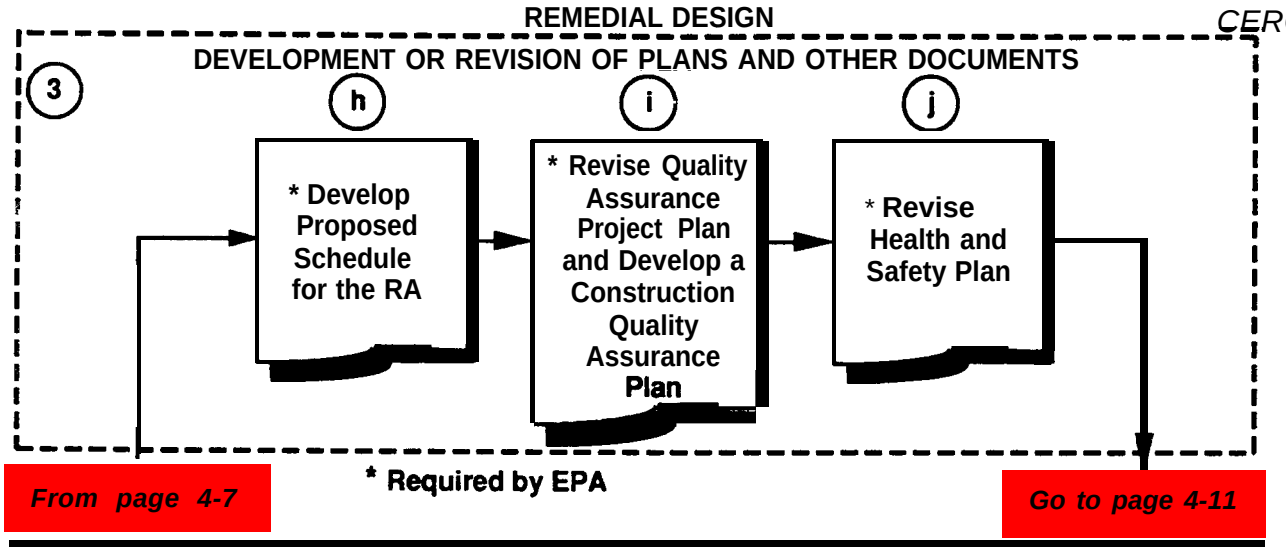


h. DOE must develop ***a proposed schedule*** for implementing the corrective measure which includes the following:

- **Any reporting requirements established in the permit, RCRA §3008{h) Order, or FFCA, such as implementation progress reports or monitoring and sample analysis reports;**
- **A critical path analysis highlighting extremely critical functions, activities, or decisions which, if not met, would force the facility to request a modification of the schedule of compliance; end**
- **Identification of the significant milestones of the implementation process such as the completion of important phases in the construction, dates for conduct and completion of acceptance testing, dates for actual implementation of the corrective measure. and dates for progress reviews, inspections, or other functions related to implementing the CQAP or date collection quality assurance plan (DCQAP).**

i. As a corrective measure requires sampling and analysis to demonstrate compliance with MCS, DOE will need to ***revise the DCQAP*** used during the RFI and CMS. In conjunction with the revision of the DCQAP, proposed 40 CFR §264.527(a)(4) requires DOE to ***develop a CQAP*** for the construction activities in the implementation process. While a CQAP is different in nature and scope from a DCQAP, DOE may elect to use the same format for preparing the CQAP document. The CQAP will specify testing methods to ensure that materials meet specifications, establish an inspection program, and provide the details for acceptance testing of the corrective measure.

j. ***The Health and Safety Plan (HASP)*** used during the RFI and CMS will also need revision to reflect the need for employee protection during the CMI. It may be possible to incorporate these revisions into the facility's HASP.

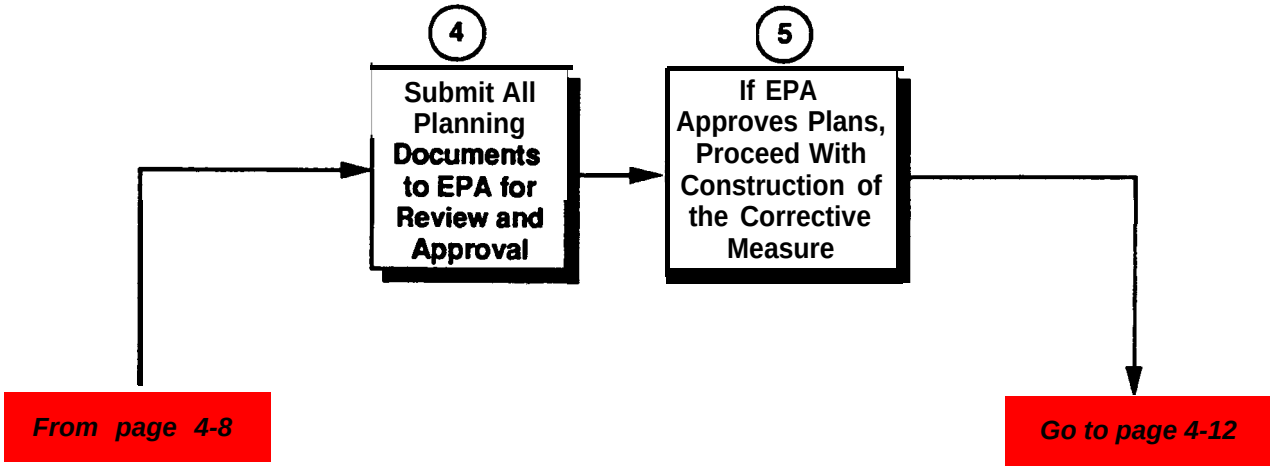


h. Once the preceding RD activities are completed, DOE should develop a ***proposed schedule*** for the RA and compare it to the schedule in the ROD or FFA. If there are discrepancies, a modification of the schedule set forth in the ROD or FFA will need to be negotiated and prepared in accordance with 40 CFR §300.435(c)(2). The schedule for the RA should reflect any required reporting requirements, such as implementation progress reports or monitoring and sample analysis reports. A useful tool in the schedule planning is a critical path analysis that identifies extremely critical functions, activities, or decisions which, if not met, would force the facility to request a modification of the schedule. Finally, the schedule should identify significant milestones of the implementation process.

i. Remedial actions require sampling and analysis to demonstrate the effectiveness of the implemented remedy. Because sampling and analysis is an integral part of the RA, DOE should revise the ***QAPP*** developed for the RI/FS. In conjunction with the revision of the QAPP, DOE should develop a CQAP for the construction activities in the implementation process. While a CQAP is different in nature and scope from a QAPP, DOE may elect to use the same format for preparing the CQAP document. The CQAP will specify testing methods to ensure materials meet specifications, establish an inspection program, and provide the details for acceptance and performance testing of the implemented remedy.

j. The ***HASP*** used during the RI/FS will also require revision. These changes should reflect the need for employee protection during the construction, testing, and operational life of the remedy.

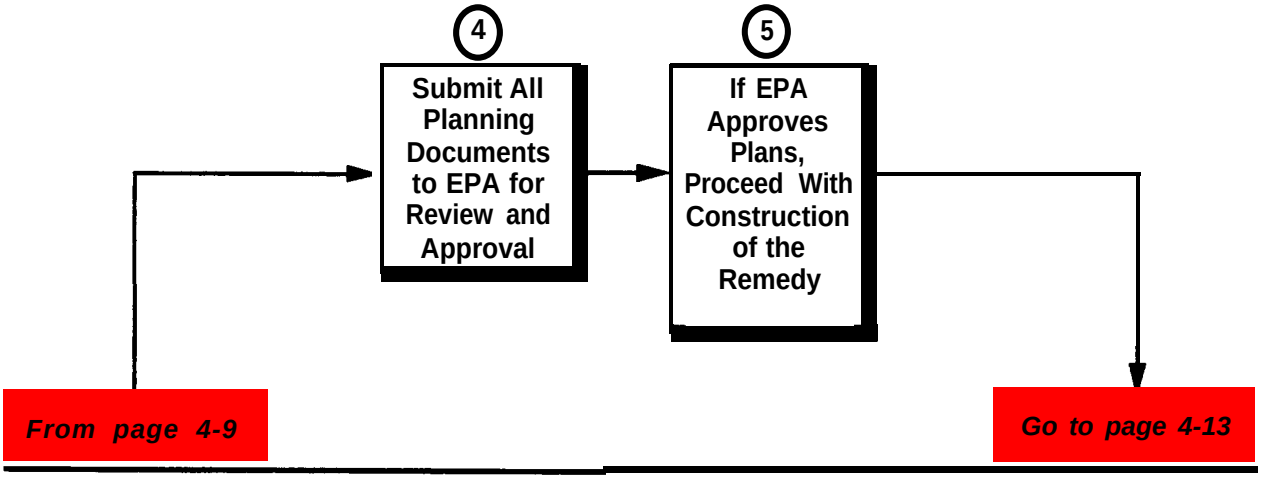
PLANNING THE CORRECTIVE MEASURE



4. **EPA Review of Planning Documents.** Once the required documents are completed, DOE submits them to EPA for review and approval. The facility permit or FFCA will usually contain the specific requirements for document submission.

5. **EPA Approval of Planning Documents.** EPA will review and either approve or reject the documents submitted by DOE. If the documents are unacceptable to EPA, DOE should request a meeting with EPA to discuss and negotiate any revisions before revising the documents. DOE should recognize that under the proposed Subpart S rule, discussion and negotiation of any revisions are a discretionary action by EPA. EPA could, within its authority, unilaterally revise the document and require the facility to implement the revised plan. Once these discussions and negotiations are complete, the facility should revise and resubmit the documents to EPA. Only when EPA has approved the documents should construction and/or implementation of the corrective measure begin.

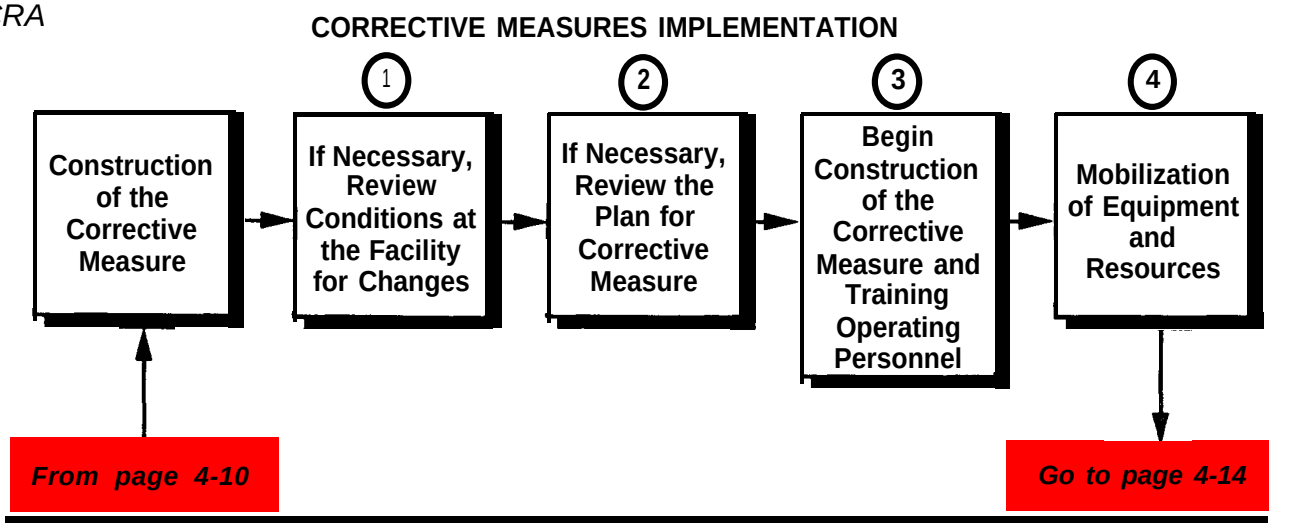
REMEDIAL DESIGN



4. **Submit All Planning Documents to EPA.** Once the RD process is completed, DOE should submit to EPA all documents that EPA wishes to review. These documents are usually identified in the FFA or Consent Agreement. These documents will include:

- **The Community Relations plan.**
- **The RD strategy,**
- **The operational guidance,**
- **The cost estimate,**
- **The proposed schedule for the RA,**
- **The QAPP and CQAP, and**
- **The HASP.**

5. **Proceed with Construction of Remedy.** EPA will review and either approve or reject the documents submitted by DOE. If the documents are unacceptable to EPA, DOE should request a meeting with EPA to discuss and negotiate any revisions before revising the documents. Once these discussions and negotiations are complete, the facility should revise the documents and resubmit them to EPA. Only when EPA has approved the documents should actual construction of the remedy begin.



IV. Construction of the RCRA Corrective Measure

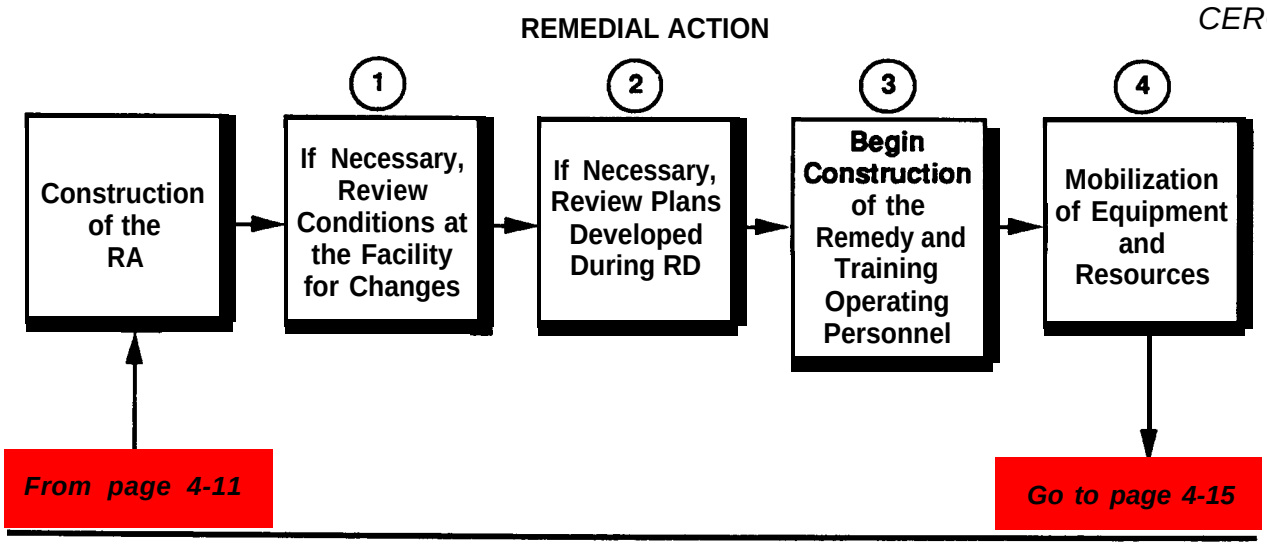
As mentioned previously, implementing the corrective measure is a two-phase process. The first phase involves the design, specifications, and planning for CMI. This discussion focuses on the second phase of CM I and involves construction, acceptance testing, and operation of the corrective measure.

1. **Verify Site Conditions.** The first task in the preliminary phase of implementation is to verify the conditions at the facility through review of the RCRA Facility Investigation (RFI) report, the Corrective Measures Study (CMS) report, and the facility permit and Statement of Basis. This step is required only if those implementing the corrective measure are unfamiliar with the conditions at the facility.

2. **Review Implementation Plans.** The next phase of the preliminary implementation is to review the implementation plans, drawings, and calculations. Again, this step is required only if those implementing the corrective measure are unfamiliar with the design and specifications for it.

3. **Begin Construction of Corrective Measure.** If the plans, drawings, and other documents are satisfactory, construction of the corrective measure can begin. Concurrent with the construction of the corrective measure, DOE should ensure that the personnel who will be responsible for the operation and maintenance of the corrective measure are properly trained.

4. **Mobilize Equipment and Resources.** The initial phase of construction is mobilization of the necessary equipment, personnel, and resources. Mobilization of resources is often a complex process and can take many months to complete. Included in mobilization is the acquisition of any equipment, tools, materials, prefabricated structures or devices, and the hiring and training of the personnel required for construction of the corrective measure.



V. CERCLA Remedial Action: Construction of the Remedy

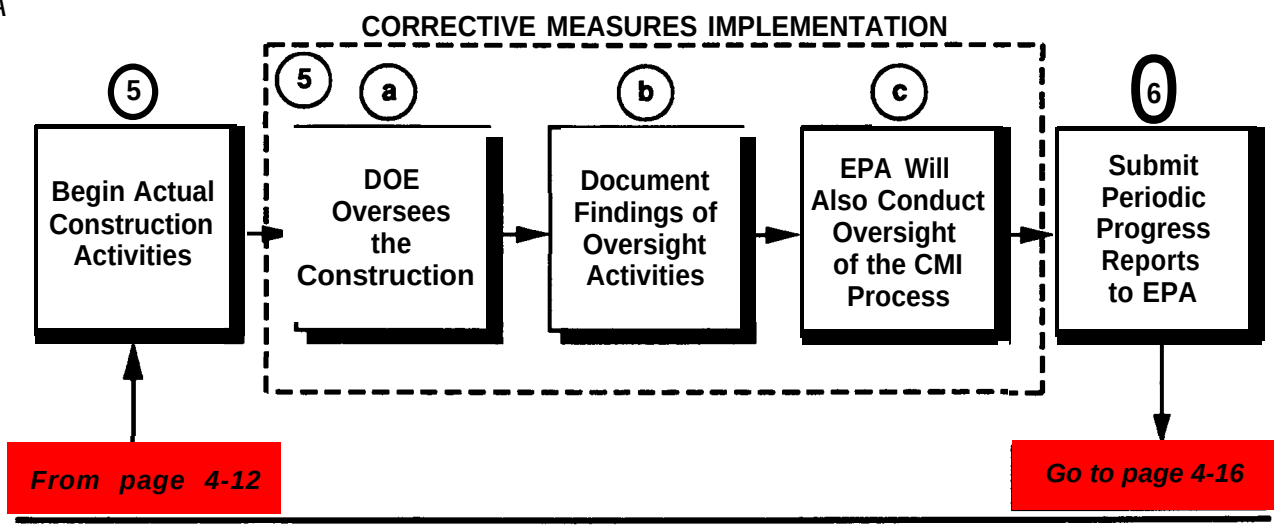
Implementing the remedy is a two-phase process. The first phase involves the actual construction and operation of the remedy, and the second involves the operation of the remedy until all remedial objectives are achieved at the site.

1. **Verify Site Conditions.** The first task in constructing and implementing the remedy is to verify the conditions at the site through review of the RI/FS, ROD, Consent Agreement, and/or FFA. This step is required only if the contractor constructing and implementing the remedy is unfamiliar with the conditions at the site.

2. **Review Plans Developed During RD.** The next phase of the preliminary implementation is to review the implementation plans, drawings, and calculations developed during the RD. Again, this step is required only if those constructing or implementing the remedy are unfamiliar with the design and specifications for the remedy.

3. **Begin Construction and Training of Operating Personnel.** If the plans, drawings, and other documents are satisfactory, construction can begin. Concurrent with the construction and implementation of the remedy, DOE should ensure that personnel who will be responsible for the operation of the remedy are properly trained.

4. **Mobilize Equipment and Resources.** The initial phase of construction is mobilization of the necessary equipment, personnel, and resources. Mobilization of resources is often a complex process and can take many months to complete. Included in mobilization is the acquisition of any equipment, tools, materials, prefabricated structures or devices, and the hiring and training of the personnel required for construction of the remedy.



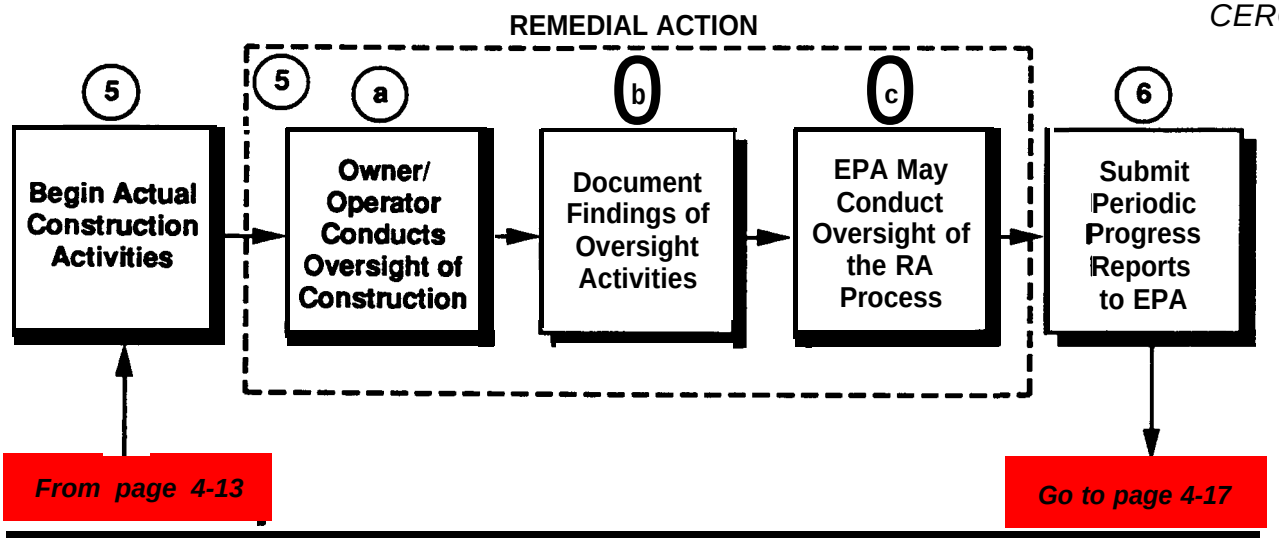
5. **Begin Construction Activities.** Actual construction of the corrective measure is the next step in the process. The construction process includes conducting necessary quality assurance procedures and inspections, and preparing reports.

a. DOE must ***oversee all phases of implementation*** including the construction and acceptance testing activities. This function ensures that the construction of the corrective measure complies with the specifications and requirements detailed in the planning process for implementation, the terms of any contracts for construction or operation, and the applicable requirements of the CQAP and DCQAP.

b. DOE should ***document the findings of ail oversight activities.*** Such reports are valuable for developing periodic progress reports for submission to EPA, providing information on the effectiveness of the corrective measure when attempting to demonstrate compliance with the terms of the permit or RCRA §3008(h) Order, and substantiating any claims of "reasonable effort" if the facility requests a determination of technical impracticability.

c. Under proposed 40 CFR §264.529, ***EPA will conduct periodic inspections*** to assess the progress in implementing the corrective measure. In performing this function, EPA will review the periodic progress reports submitted by the facility, and may also conduct onsite inspections and oversight of the design, construction, operation, and maintenance of the corrective measure.

6. **Submit Periodic Progress Reports to EPA.** While construction is under way, DOE will need to prepare and submit any periodic progress reports required by the permit, RCRA §3008(h) Order, or FFCA. An example would be a report on the progress of constructing a particular treatment unit, including information on the progress of construction, the results of inspections and acceptance testing, and success in adhering to the schedule of compliance.



5. **Begin Construction Activities.** Actual construction of the remedy is the next step in the process. The construction process includes conducting necessary quality assurance procedures and inspections and preparing periodic reports on the progress of construction.

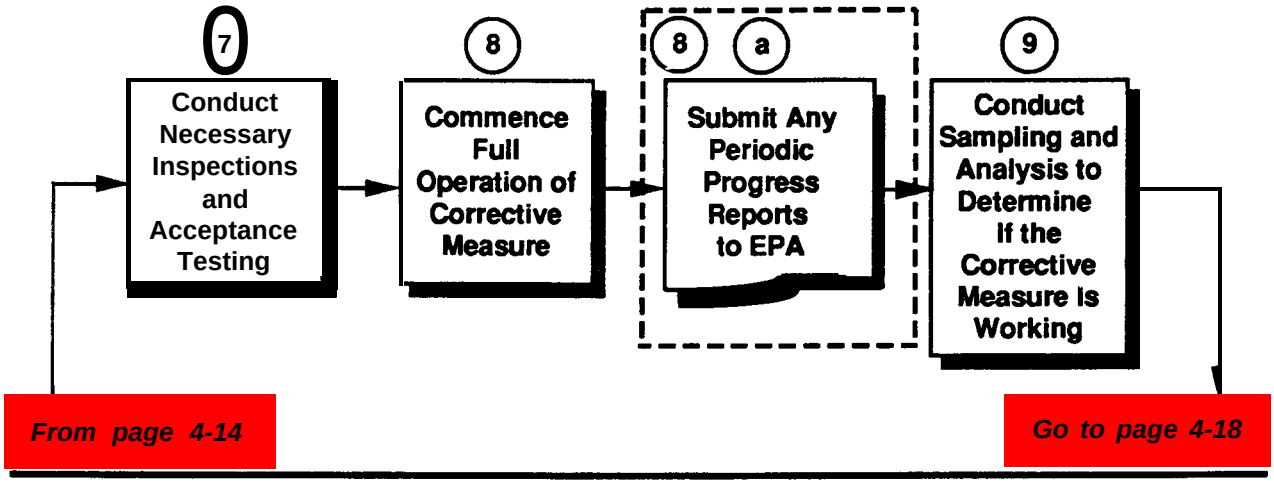
a. DOE must ***oversee all phases of implementation*** including the construction and acceptance testing activities. This function ensures that the construction of the remedy complies with the specifications and requirements detailed in the planning process for implementation, the terms of any contracts for construction or operation, and the applicable requirements of the CQAP and QAPP.

b. DOE should ***document the findings of all oversight activities.*** Such reports are valuable for developing periodic progress reports for submission to EPA and providing information on the effectiveness of the remedy at addressing the contamination at the site. This information will be important when attempting to demonstrate achievement of the RA objectives.

c. The NCP does not specifically state that ***EPA will conduct periodic inspections*** of the RA process; however, such inspections may be conducted to assess the progress of the RA. In performing this oversight function, EPA may review the periodic progress reports submitted by DOE, and may also conduct onsite inspections and oversight of the design, construction, operation, and maintenance of the remedy. These activities are likely in cases where a facility was not required to obtain a permit (e.g., an NPDES permit) for a particular remedy that would normally require one.

6. **Submit Periodic Progress Reports to EPA.** While construction is under way, DOE will need to prepare and submit any periodic progress reports required under the FFA. An example would be a report on the progress of constructing a particular treatment unit, including information on the progress of construction, the results of inspections and acceptance testing, and success in adhering to the schedule set forth in the ROD.

CORRECTIVE MEASURES IMPLEMENTATION



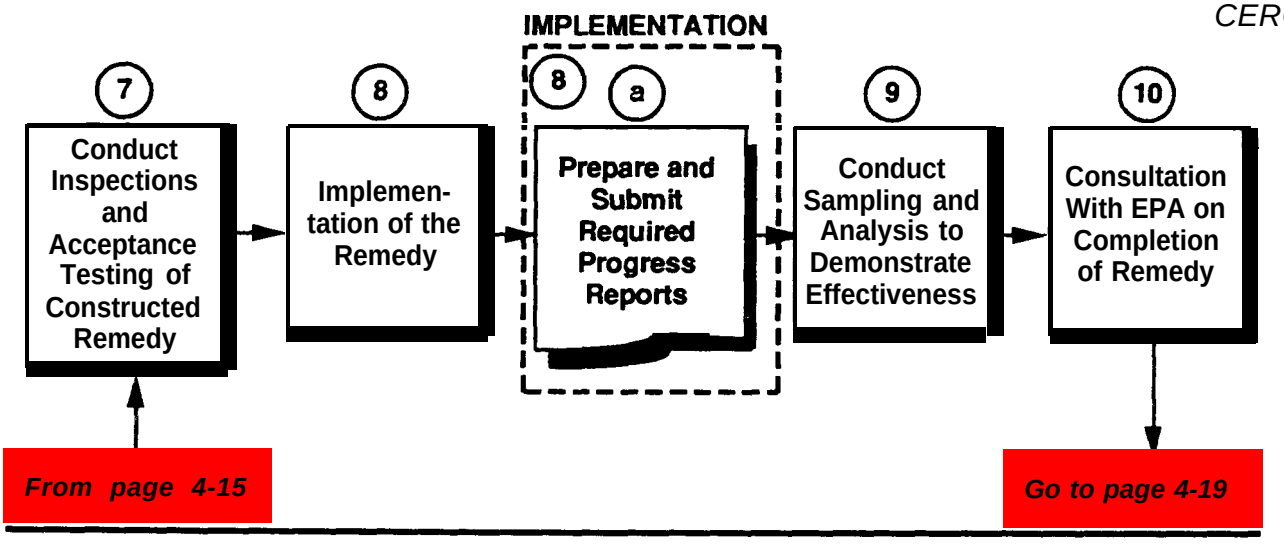
7. **Conduct Inspections and Acceptance Testing.** Upon completion of any phase of the construction of the corrective measure, DOE needs to conduct the inspections and acceptance testing specified in the CQAP. This process will ensure that the corrective measure meets the specifications and performance standards established for the corrective measure.

VI. Operation and Maintenance of the RCRA Corrective Measure

8. **Commence Full Operation of Corrective Measure.** Once the corrective measure construction and acceptance testing is completed, DOE begins the operations and maintenance process. This consists of implementing the operations and maintenance plan and conducting the sampling and analysis required to demonstrate compliance. The sampling and analysis must conform to the requirements of the DCQAP developed during the planning process.

a. During the operation of the corrective measure, DOE needs to ***prepare and submit any progress reports*** required under the permit or FFCA.

9. Conduct **Sampling to Determine Effectiveness of Corrective Measure.** At the completion of each round of sampling and analysis, the results are compared against the media cleanup standards (MCS) established in the facility permit. Once the contamination concentrations are at or below the MCS set forth in the facility's permit, Order, or FFCA, the period over which the facility must demonstrate compliance begins.



7. **Conduct Inspections and Acceptance Testing.** During the construction of the remedy, DOE needs to conduct inspections and acceptance testing. The requirements and procedures for these inspections should be specified in the CQAP. While this process is not a specific requirement of the RA process, it does help ensure that the remedy meets specifications and performs to the required standards.

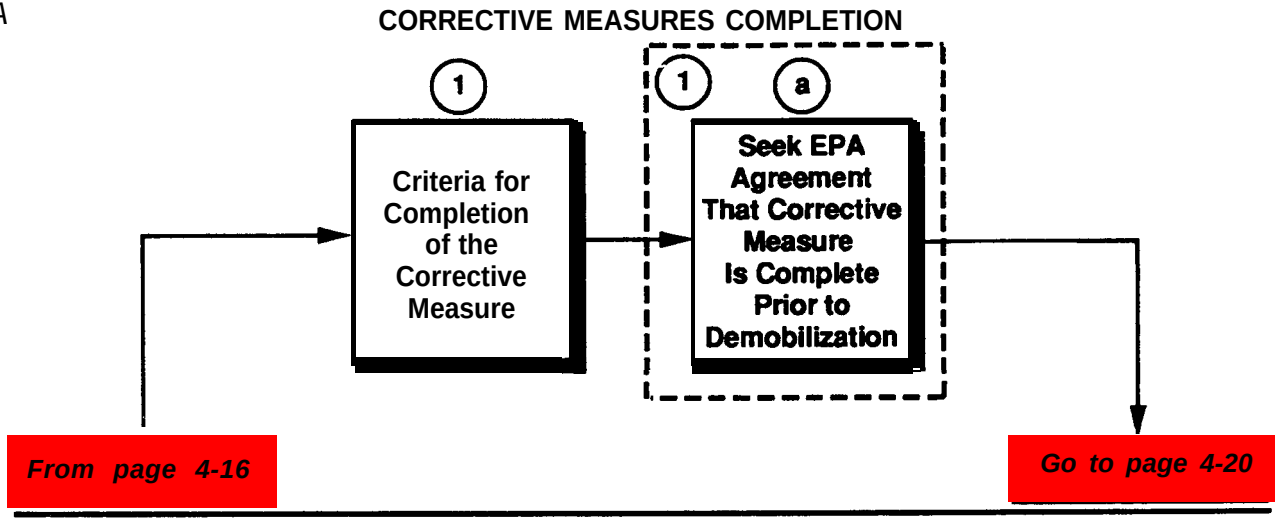
VII. Implementation of the CERCLA Remedy

8. **Implementation of the Remedy.** Once the construction and acceptance testing of the remedy is completed, DOE begins its implementation. This involves implementing the operational procedures developed during RD and conducting the sampling and analysis required to demonstrate the effectiveness of the remedy. The sampling and analysis must conform to the requirements of the DCQAP developed during the planning process.

a. While the remedy is operational, DOE needs to ***prepare and submit to EPA any periodic progress reports*** required under the Consent Order or FFA. These reports are also useful in the community relations activities undertaken to keep local interest groups apprised of progress on the RA.

9. **Conduct Sampling end Analysis to Demonstrate Effectiveness.** While the remedy is operational, DOE should conduct sampling and analysis to determine its effectiveness. Upon completion of each round of sampling, the results will be analyzed to determine if the remedy has achieved the remedial objectives set for the site. Once the contamination concentrations achieve specified remedial objectives, performance can begin.

10. **Consultation with EPA.** Once compliance with the remedial objectives is demonstrated for the required performance period, DOE should consult with EPA to determine if the RA has met the requirements for certification of completion of the remedy.

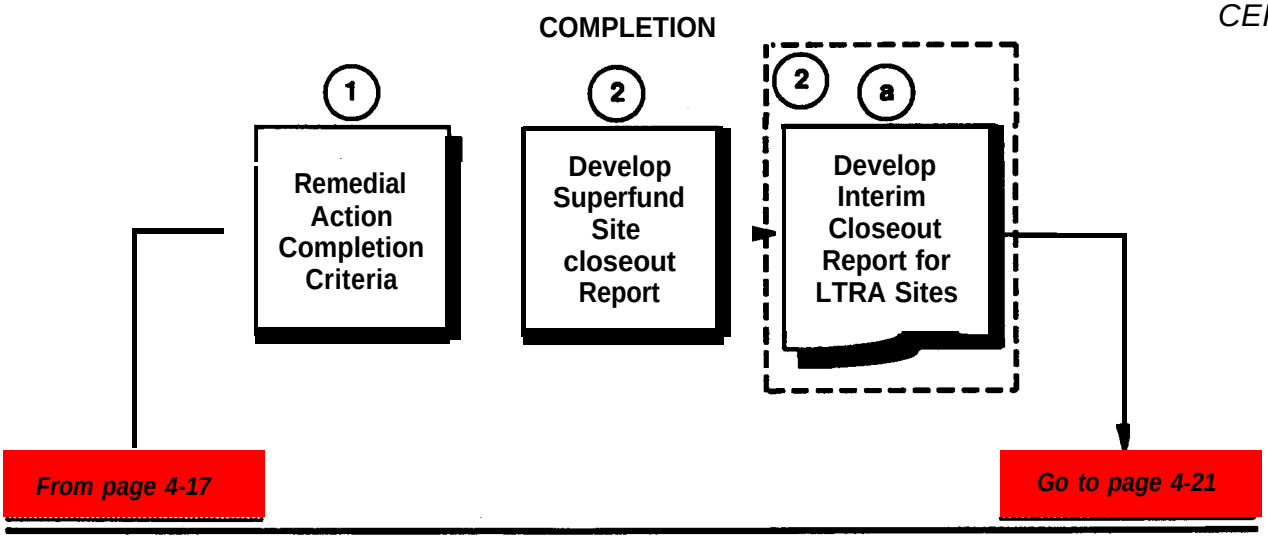


VIII. Completion of the RCRA Corrective Measure

1. **Criteria for Completion of the Corrective Measure.** Under proposed 40 CFR §264.530(a), a corrective measure is complete when the following criteria are met:

- **DOE demonstrates compliance with all MCS specified in the facility permit, for the required performance period, at all points of compliance specified in the facility permit**
- **All source control measures specified in the facility permit are completed;**
- **The removal or decontamination (often referred to as demobilization) of all units, equipment, devices, or structures required to implement the corrective measure is completed; and**
- **DOE can provide information demonstrating compliance with the requirements for management of the wastes generated during the corrective measure.**

a. Although the proposed Subpart S rule requires completion of demobilization before the facility can discharge the requirements for corrective action, DOE should seek an official statement from EPA that the requirements for demonstrating compliance specified in the facility permit, RCRA §3008(h) Order, or FFCA have been met before engaging in demobilization.



IX. Completion of the CERCLA Remedial Action

1. **Remedial Action Completion Criteria.** The EPA guidance document *Procedures for Completion and Deletion of National Priorities List (NPL) Sites* states that a CERCLA remedial action is considered complete when the following criteria are met:

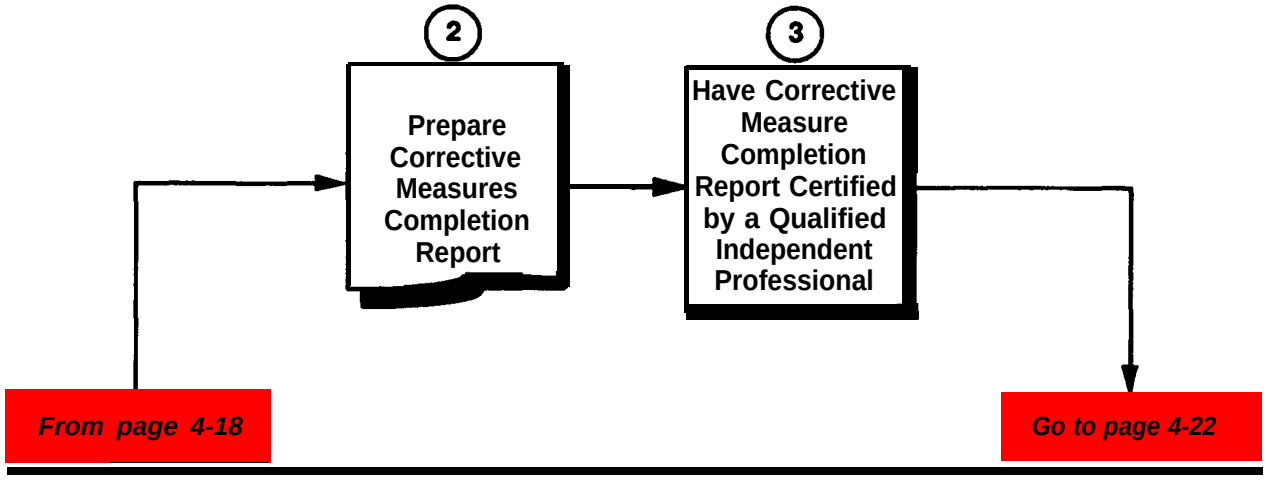
- **The contamination of all exposure pathways at the site is remediated to levels deemed protective of human health and the environment,**
- **The specific cleanup levels set forth in the ROD are achieved and all remedial activities specified in the ROD are completed,**
- **The constructed remedy is fully operational and performing to design specifications, and**
- **The only remaining activities at the site involve operation and maintenance.**

2. **Develop Superfund Site Closeout Report.** Once these requirements are met, DOE prepares a Superfund Site Closeout Report justifying completion of the RA and including:

- **A summary of site history and conditions,**
- **Demonstration that all QA/QC requirements have been met,**
- **A determination that sufficient monitoring results have been collected to demonstrate compliance with the cleanup levels set forth in the ROD or FFA,**
- **Assurances that the operations and maintenance requirements for the remedy are capable of being successfully implemented, and**
- **Documentation that the site has been remediated to levels deemed protective of human health and the environment.**

a. In the case of long-term remedial action (LTRA) sites, an ***interim closeout report is developed.*** LTRAs are sites where achieving the remedial objectives requires continuous operation of the remedy over several years. When the cleanup levels are achieved, a final closeout report will be developed and submitted for EPA review and approval.

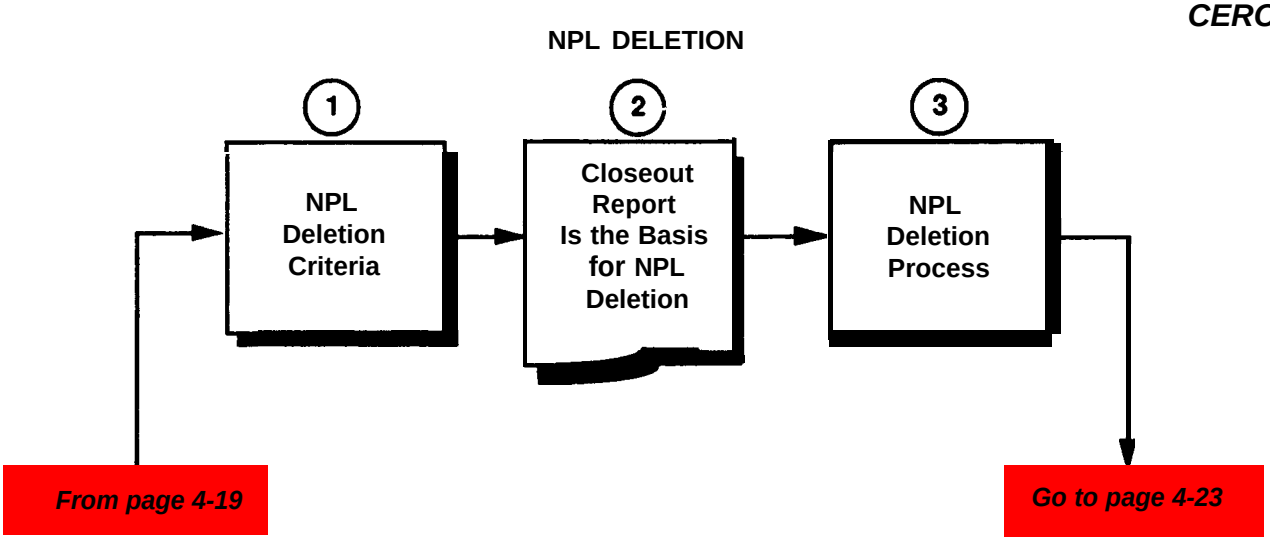
CORRECTIVE MEASURES COMPLETION



2. **Prepare Corrective Measures Completion Report.** When these requirements are met, DOE will prepare a Corrective Measures Completion Report (required under proposed 40 CFR §264.530[b]) which provides all the information necessary to support the claim that the corrective measure is complete. This report should include a discussion of the following areas:

- **A brief discussion of the history of the facility, including a discussion of the RCRA Corrective Action activities taken at the facility;**
- **A summary of the findings of the RFA, the RFI, and the CMS:**
- **A discussion of any interim measures conducted at the facility;**
- **A discussion of the corrective measure selected for the facility;**
- **A list of all MCS established for the facility;**
- **A discussion of the implementation of the corrective measure;**
- **A summary of the requirements for demonstrating compliance;**
- **Documentation that all MCS have bean achieved;**
- **Documentation that all source control measures have been successfully implemented; end**
- **Documentation of this removal or decontamination of all equipment, structures, and units used to implement the corrective measure.**

3. **Completion Report Certification by Independent Professional.** Under proposed 40 CFR §264.530(b), the facility will need to have this report reviewed and certified by one or more independent professionals with the appropriate technical expertise. The proposed Subpart S rule provides no information on how to select such a professional, stating that this will vary depending on the types of problems at the facility.



X. National Priorities List Deletion for a CERCLA Site

1. **NPL Deletion Criteria.** Upon completion of remedial action at a site, the site becomes eligible for deletion from the National Priorities List (NPL). The NPL deletion process is described in 40 CFR §300.435(e). The key criterion for NPL deletion is determination that no further CERCLA response action is required at the site. EPA will consider deleting a site from the NPL when the following criteria are met:

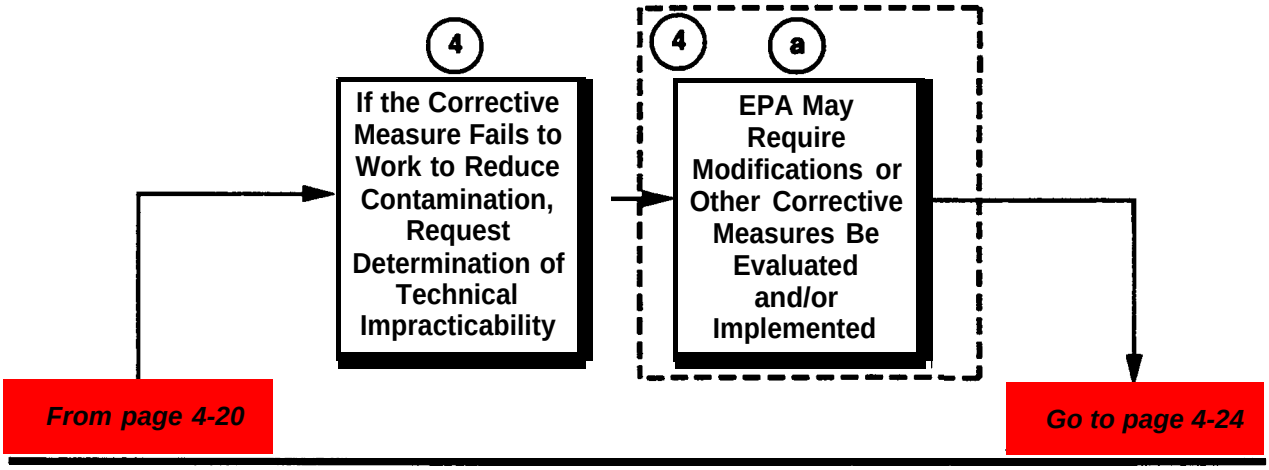
- **EPA, in consultation with DOE and the State, determines that all required response actions have been implemented at the site; and**
- **The site has been remediated to levels deemed protective of human health and the environment.**

2. **Closeout Report Is the Basis for NPL Deletion.** The Superfund Site Closeout Report is the basis for a site's deletion from the NPL. The NPL deletion process begins once the Closeout Report is approved by the EPA Regional Administrator and DOE submits to the EPA Regional Administrator a request for deletion from the NPL.

3. **NPL Deletion Process.** The deletion process has three steps, summarized as follows:

- **Initiation of the process involves receipt of a request for deletion from DOE, consultation with and concurrence from the State, EPA's compiling the deletion docket, end development of a Notice of Intent to Delete.**
- **The second step in the process is publication of a Notice of Intent to Delete the site from the NPL, a local notice of intent to delete, and the opening of a 30-day public comment period.**
- **The final step in the process is the development of a responsiveness summary to address the public comments received during the comment period, and publication of the Notice of Deletion.**

DETERMINATION OF TECHNICAL IMPRACTICABILITY



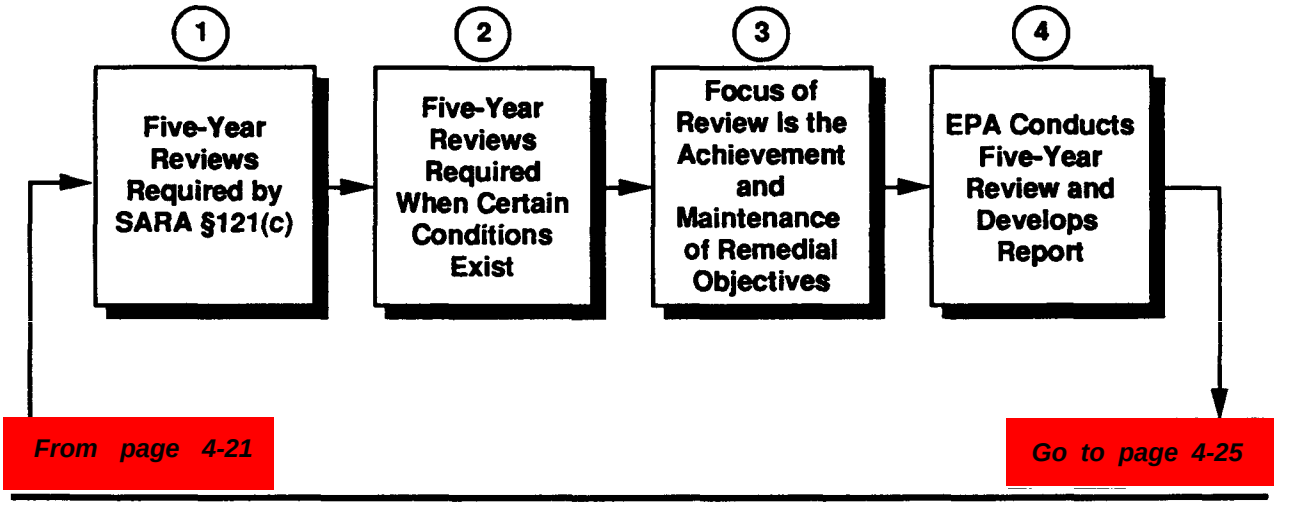
XI. Determination of Technical Impracticability for a RCRA Corrective Action

4. **Determination of Technical Impracticability.** If, after a "reasonable effort" (which includes active efforts to achieve all requirements of the permit for a RCRA Corrective Action), DOE demonstrates the corrective measure is incapable of meeting a given performance standard of the modified permit, then, under the provisions of proposed 40 CFR §264.531, DOE may request a Determination of Technical Impracticability. It is the responsibility of DOE to provide EPA with all evidence and documentation to support such a determination. Following review of the information, EPA may require DOE to conduct an evaluation of additional alternatives, in a process similar to the CMS. The evaluations may focus on assessment of means to improve the effectiveness of the selected corrective measure, further assessment of alternatives already evaluated in the CMS, or assessment of alternatives not yet considered.

The Determination of Technical Impracticability represents a finding that remediation of the release is not feasible from a technical standpoint. Such a determination does not represent a discharge of the requirement to conduct RCRA Corrective Action, nor does it discharge DOE from its obligation for ultimate cleanup of the facility. EPA reserves the authority to require additional efforts if advances in technology provide a corrective measure capable of remediating the contamination at the facility.

a. Based upon these studies, EPA will issue either a modification to the permit requiring implementation of another corrective measure or, if all possible options for the corrective measure are completely impractical, a Determination of Technical Impracticability. A Determination of Technical Impracticability may include additional requirements to protect human health and the environment.

FIVE-YEAR REVIEW



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XII. Five-Year Reviews Under CERCLA

1. **Required by SARA §121(c).** Section 121 (c) of CERCLA requires EPA to conduct a review of the effectiveness of the RA every 5 years at certain sites. The purpose of these reviews is to determine if the RA continues to provide protection to human health and the environment. A 5-year review is not a condition for deletion from the NPL.

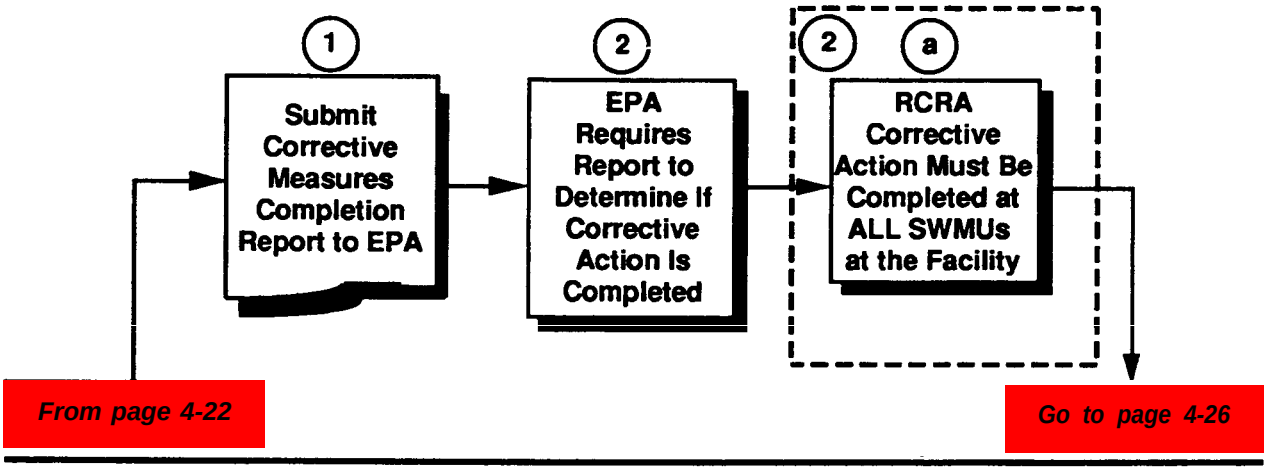
2. **When Certain Conditions Exist.** EPA conducts reviews at sites where:

   - **Attainment of the cleanup levels specified in the ROD will not allow unlimited use or unrestricted access; and**
   - **Hazardous substances will remain at levels onsite that prevent unlimited use or unrestricted access, and attainment of acceptable levels will take more than 5 years (e.g., LTRA sites).**

3. **Achievement end Maintenance of Remedial Objectives.** The focus of the review will depend upon the original remedial objectives and the specific remedy implemented at the site. For example, for those remedies where protectiveness is ensured through the limiting of exposure, the review will focus on the mechanisms and institutional controls used to prevent exposure. For LTRA sites, the review will focus on the effectiveness of the technology and the ability of the remedy to achieve the specific performance objectives established in the ROD.

4. **Five-Year Review and Report.** According to CERCLA §121, EPA is required to prepare and publish a report of the findings of the 5-year review. If the findings indicate that the site has achieved cleanup levels that allow for unlimited use and unrestricted access, there will be no requirement for additional reviews. If the review finds that the site is not remediated to levels allowing unlimited use or unrestricted access, another review will be conducted in 5 years.

PERMIT MODIFICATION



XIII. Permit Modification Ending RCRA Corrective Action

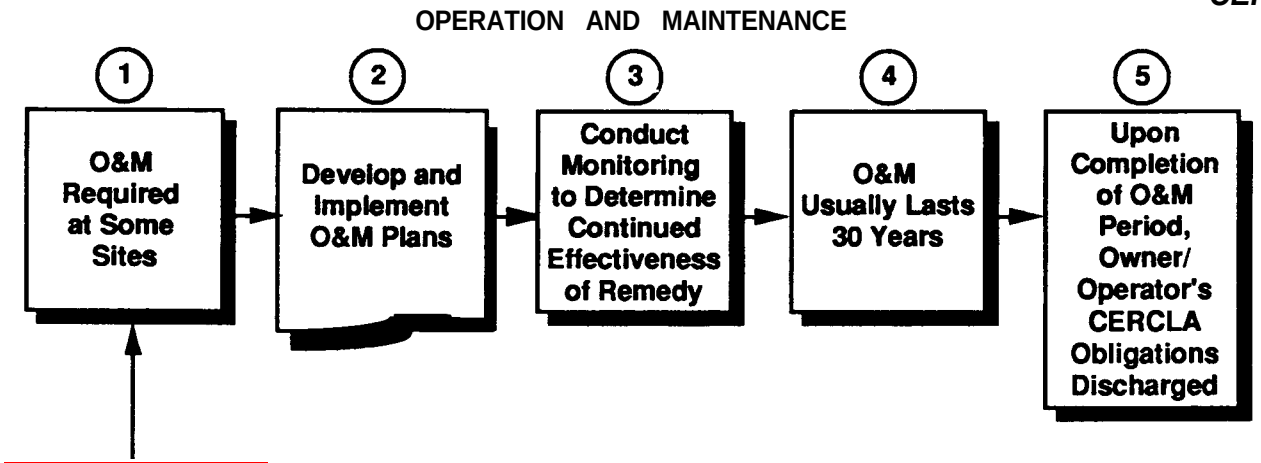
1. **Submit Completion Report to EPA.** DOE submits to EPA the report demonstrating completion of the corrective measure (certified by a qualified independent professional) claiming completion of the corrective measure.

2. **EPA Review of Completion Report.** EPA will review the evidence supporting the claim of completion. The specific factors EPA will assess include the following:

- **Demonstration of compliance with the MCS established in the modified permit**
- **Demonstration that all permit requirements for actions addressing the source of the release are satisfied: and**
- **Demonstration of compliance with the procedures specified in the permit for the removal and/or decontamination of all equipment, devices, or structures used in conducting the corrective measure.**

a. EPA will also determine if ***all*** RCRA Corrective Action requirements are completed at all units at the facility. Completion of RCRA Corrective Action occurs only upon completion of ***all*** corrective action activities at the facility. However, in the case of a completed corrective measure at a unit widely separated from and affecting different media than the other units at the facility, DOE may request a partial release from the RCRA Corrective Action program.

NOTE: All implementation and reporting requirements established in the permit remain in effect until ***all*** RCRA Corrective Action activities at the facility are completed. Failure to continue required actions such as monitoring or reporting, even if the corrective measure at an SWMU is complete, may represent noncompliance with the facility permit.



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XIV. Operation and Maintenance of CERCLA Remedial Actions

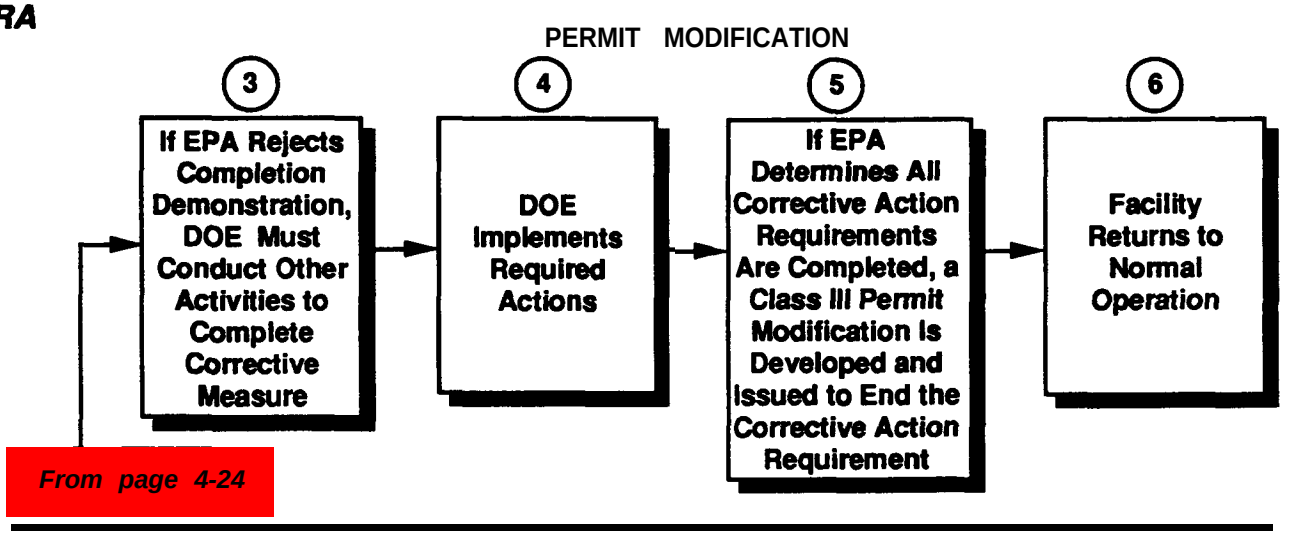
1. **O&M Required at Some Sites.** At sites where the remedy involves a permanent structure used to contain the contaminated materials, DOE, will be required to continue to operate and maintain the remedy. An example would be a requirement to maintain a cap covering an area of contaminated soils.

2. **Develop and Implement O&M Plans.** DOE will be required to develop O&MPs. An O&MP discusses the specific operation, maintenance, and monitoring activities for the remedy. In addition, an O&MP may include contingency plans that provide guidance on addressing problems that might arise over time.

3. **Conduct Monitoring to Determine Continued Effectiveness of Remedy.** As part of O&M, DOE may elect to conduct occasional sampling or other environmental monitoring activities to assess the effectiveness of the remedy. If such monitoring is to be conducted, DOE should develop a QAPP to provide specific guidance on these activities.

4. **O&M Usually Lasts 30 Years.** The O&M period is generally 30 years following completion of the remedy; however, EPA may revise this figure up or down to address site-specific conditions. The cost of the O&M operations should be included when developing cost estimates for the remedy.

5. **Obligations Discharged.** Following the completion of the O&M period, DOE would be released from its obligation to conduct CERCLA response. However, if future developments so dictate, EPA may require additional actions that are deemed necessary to protect human health and the environment.



3. **Addtional Action May Be Required.** If EPA determines that all RCRA Corrective Action requirements are not completed, EPA will reject the request and provide DOE with information on the actions required to complete the corrective measure. It is incumbent upon DOE to discuss any deficiencies with EPA before undertaking action to comply. DOE should negotiate with EPA to establish the actions required to complete the corrective measure and should insist that these requirements be made part of the facility permit, RCRA §3008(h) Order, or FFCA.

4. **Implement Addtional Action.** DOE will undertake the agreed-upon measures to complete the corrective measure.

5. **Once All Requirements Are Met, Permit Modified to End Corrective Action.** If EPA determines all requirements of the facility permit have been met, the request is processed as a Class III DOE-requested permit modification. A Class III permit modification requires the following:

- **Notification of all parties on the facility mailing list and the appropriate State and local governmental entities,**
- **Publication of a newspaper notice of the request,**
- **A 60-day comment period,**
- **A public hearing on the request, and**
- **A copy of the proposed modification and supporting documents being placed in a location accessible to the public.**

The requirements for Class III permit modifications are found at 40 CFR §270.42(c).

6. **Return to Normal Operations.** Once the final permit modification releasing the facility from the RCRA Corrective Action process is complete, DOE may continue normal operations.

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Summary

Topic	RCRA
Designing the Corrective Measure/Remedy	Under corrective action, the design of the corrective measure is part of CMI.
Submission of planning documents	Under proposed Subpart S, submission of planning documents for EPA review may be required as part of the facility's permit, §3008(h) Order, or FFCA.
Planning Documents Required or Recommended	• Program management plan; • Public involvement plan; • Design strategy document; • Engineering calculations, drawings, and process flow diagrams; • List of materials/equipment; • Operation and maintenance plan; • Training materials; • Cost estimate; • Schedule and critical path analysis; • Data collection quality assurance plan; • Construction quality assurance plan; and • Health and safety plan.
Sequence of Activities	• Design the corrective measure, • Construct the corrective measure, • Implement the corrective measure, • Operation and maintenance, • Monitor the corrective measure, • Demonstrate compliance with MCS, and • Permit modification ending corrective action.
Community Relations Required	Required as part of the permit modification process, but recommended throughout CMI.
EPA Oversight	EPA may conduct periodic inspections and reviews of CMI progress.
Cleanup Levels	Called media cleanup standards, these levels are based on informed risk management decisions and are specified in the facility's permit, §3008(h) Order, or FFCA.

Summary

Topic	CERCLA
Designing the Corrective Measure/Remedy	Under CERCLA, the design of the remedy (i.e., remedial design) is considered a separate activity from implementing the remedy.
Submission of Planning Documents	Under NCP, the submission of RD plans to EPA is not specifically mentioned; however, EPA may require submission of plans as part of the Consent Agreement or FFA.
Planning Documents Required or Recommended	• Community relations plan; • Remedial design strategy; • Engineering calculations, drawings, and process flow diagrams; • List of equipment and materials; • Operational guidance and training materials; • Cost estimate; • Schedule and critical path analysis; • Quality assurance project plan; • Construction quality assurance plan; and • Health and safety plan.
Sequence of Activities	• Remedial design; • Remedial action; - Construct the remedy, - Implement the remedy, and - Monitor the remedy; • Demonstrated compliance with cleanup levels set in the ROD; • NPL deletion; • Five-year reviews; and • Operation and maintenance.
Community Relations Required	Extensive community relations activities required under CERCLA and the NCP.
EPA Oversight	Not specified under the NCP, but likely to occur during RA.
Cleanup Levels	Derived from ARARs under the NCP, the cleanup levels represent an informed risk management decision and are specified in the Consent Agreement or FFA.

References

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act [SARA]). 42 USC §9601 et seq.

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Appendices

Glossary of Terms and Acronyms . . . . . Appendix 1
Bibliography . . . . Appendix 2

Appendix 1
Glossary of Terms and Acronyms

The appendix provides definitions for many of the important terms used in this document.

Action Level – Under the 40 CFR §264.521 of the Subart S rule, action levels are media-specific health and environmental-based contaminant concentrations determined by EPA to be protective of human health and the environment. Action levels are established for each environmental medium, including groundwater, and serve as the trigger for the requirement to conduct a RCRA Corrective Measures Study (CMS). If the RFI determines that hazardous constituent concentrations in groundwater, surface water, soils, or air exceed an action level, a CMS is usually required. If actions levels are not exceeded, the facility may request a "Determination of No Further Action, " ending the corrective action requirements at that unit.

Alternate Concentration Level (ACL) – Under 40 CFR Part 264- Subpart F, an ACL is a concentration limit for a hazardous constituent in groundwater that the EPA Regional Administrator finds will not pose a substantial present or potential hazard to human health or the environment as long as that concentration is not exceeded. 40 CFR §264.93(b) details the specific factors that the EPA Regional Administrator must consider when establishing an ACL.

Applicable or Relevant and Appropriate Requirements (ARARs) – "Applicable" requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal 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. "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 by a State in a timely manner and that are more stringent than Federal requirements may be applicable.

Area of Concern (AOC) – Any suspected release of a hazardous waste or hazardous waste constituent that is not associated with a solid waste management unit.

Cleanup – Actions undertaken during RCRA Corrective Action or CERCLA response to physically remove or treat a hazardous substance or hazardous waste that poses a threat or potential threat to human health and welfare and the environment and/or real or personal property. Sites are considered cleaned up when EPA has no further expectation or intention of returning to the site and threats have been mitigated or do not require further action.

Community Relations Plan (CRP) – A plan for all responses lasting longer that 45 days, which addresses local citizens' and officials' concerns about a hazardous waste release and for integrating community relations activities into the technical response at the site. The CRP should help prevent disruptions and delays in response actions and partially fulfill the National Environmental Policy Act (NEPA) requirements for public notification and participation.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 (42 U.S.C. §9601 et seq.).

Comprehensive Environmental Response, Compensation end Liability Information System (CERCLIS) – EPA's comprehensive data base and management system that inventories and tracks releases addressed or needing to be addressed by the Superfund program. CERCLIS contains the official inventory of CERCLA sites and supports EPA's site planning and tracking functions.

Conditional Remedy – Under the Subpart S proposed rule, a conditional remedy is a type of corrective measure where contamination is allowed to remain within the facility boundary, provided the facility takes action to meet certain conditions. These conditions include (1) protection of human health and the environment; (2) achievement of all media cleanup standards (MCS) beyond the facility boundary, as soon as is practical; (3) prevention of further environmental degradation through source controls and the use of engineered measures (i.e., groundwater extraction and treatment systems to prevent contaminant migration) to prevent further migration of the release within the facility boundary; (4) implementation of management and institutional controls to prevent exposure to hazardous wastes at the facility; (5) continuation of environmental monitoring to determine if additional environmental degradation occurs; (6) provision for financial assurances (not applicable to Federal facilities); and (7) compliance with standards for waste management for wastes generated during the corrective measure.

Construction Quality Assurance Plan (CQAP) – A written document that specifies the quality assurance requirements and performance specifications for the construction of the corrective measure.

Corrective Action Management Unit (CAMU) – A CAMU, as defined in the CAMU and TU final rule (58 FR 8658), is an area within a facility that is designated by Regional Administrator under 40 CFR §264- Subpart S, for the purpose of implementing corrective action. A CAMU shall only be used for the management of remediation wastes pursuant to implementing such corrective action requirements at the facility.

Corrective Measure (CM) – The fourth phase of the RCRA Corrective Action process. The corrective measure encompasses all activities related to the long-term remediation of a release of hazardous waste or hazardous waste constituents from an SWMU.

Corrective Measures Study (CMS) – The third phase of RCRA Corrective Action in which alternatives for the corrective measure are evaluated on the basis of performance, practicality, implementability, and cost. This phase is similar to a feasibility study (FS) under Superfund.

Data Collection Quality Assurance Plan (DQAP) – A written document, associated with all RCRA Corrective Action sampling activities, that presents in specific terms the organization, objectives, functional activities, specific quality assurance (QA) and quality control (QC) activities and sampling and analytical practices designed to achieve the data quality objectives established for the project or operation.

Date Management Plan (DMP) – A document that details the data reduction, reporting, and validation procedures for RCRA Corrective Action sampling and analysis activities.

Data Quality Objectives (DQOs) – Qualitative and quantitative statements that are developed before sampling begins to identify the quality of data that must be collected during Superfund actions.

Discovery – Discovery refers to the notification, observance, or detection of a release or substantial threat of release or discharge of a hazardous substance, hazardous waste, hazardous waste constituent, or oil into the environment. A discovery may be made through notification or investigation in accordance with statutory requirements, incidental observation by government agencies or the public, notifications by permit holders, or inventory efforts conducted by Federal, State, or local agencies.

Disposal – The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste into or on any land or water so that such solid waste or hazardous waste or constituent of such waste may enter the environment or be emitted to the air, or discharged into the water, including groundwater.

Engineering Evaluation/Cost Analysis – A comparative analysis of the engineering feasibility, the cost, and the benefits of options for non-time-critical removals.

Environment – (1) The navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States, and (2) any other surface water, groundwater, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States. The term includes air and water quality, land disturbances, ecology, climate, public and occupational health and safety, and socioeconomic (including non-availability of critical resources and institutional, cultural, and aesthetic considerations) normally referred to as environmental, health, and safety considerations.

Environmental Assessment (EA) – A limited-scope analysis of the environmental impact of a Federal action, typically conducted to determine if an Environmental Impact Statement (EIS) is required.

Environmental Impact Statement (EIS) – A document that presents the findings of an analysis of the environmental impact of a major Federal action. Under the National Environmental Policy Act (NEPA) an EIS is required for all major Federal actions. Typically these documents include evaluation of environmental, human, and socio-economic impacts of the action.

Facility – (1) All contiguous lands and property under the control of the owner/operator, including any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (2) any site or area where a hazardous substance, hazardous waste, or hazardous waste constituent has been deposited, stored, disposed of, or placed, or otherwise come to be located but does not include any consumer product in consumer use or any vessel.

Feasibility Study (FS) – A study undertaken by the lead agency to develop and evaluate options for remedial action. The feasibility study emphasizes data analysis, implementability of alternatives, and cost analyses, as well as compliance with mandates to protect human health and the environment and attain regulatory standards of other laws. The FS is generally performed concurrently and in an interactive fashion with the RI, using data gathered during the RI.

Federal Facilities Compliance Docket – Officially known as the "Federal Agency Hazardous Waste Compliance Docket," it is commonly referred to as "the Docket." The Docket is a list of all federally owned or operated facilities (1) requiring submission of a notification of ongoing RCRA activities under RCRA §3010 or a RCRA permit or interim status under RCRA §3005, (2) for which a RCRA §3016 report is required, or (3) requiring reporting under CERCLA §103. All sites listed on the first Docket were required to have had a preliminary assessment conducted within 18 months of October 17, 1986, and the final National Priorities List (NPL) listing decision reached within 30 months of October 17, 1986. Current EPA policy is that all sites listed on the fourth Docket Update (September 27, 1991) must have a Preliminary Assessment (PA), and if warranted a Site Inspection (SI), completed within 18 months.

Federal Facility Compliance Agreement (FFCA) or Federal Facilities Agreement (FFA) – A formal agreement among a Federal agency, EPA, and/or a State that establishes the procedural and technical requirements for resolving non-compliance with environmental laws and regulations at a Federal facility.

Field Sampling Plan (FSP) – An FSP provides a detailed discussion of the sampling objectives, methods, frequency, and rationale for field operations. The elements of an FSP are discussed in Volume 4 of the EPA document *Test Methods for Evaluating Solid Waste, 3rd Edition (SW-846).* The basic requirements of an FSP include discussion of site background, sampling objectives, sampling point location and sampling frequency, sample identification, sampling equipment and procedures, and sample handling and analysis.

Hazard Ranking System (HRS) – A scoring system used to evaluate relative risks to public health and the environment from releases or threatened releases of hazardous substances. EPA and States use the HRS to calculate a site score, from O to 100, based on the actual or potential release of hazardous substances from a site through air, surface water, groundwater, or soil exposure and the potential effects of exposure to such releases on people, the food chain, or sensitive environments. This score is the primary factor used to decide if a hazardous waste site should be placed on the National Priorities List (NPL).

Hazardous Substance – As defined by CERCLA, means (1) any substance designated pursuant to Section 311 (b)(2)(A) of the FWPCA; (2) any element, compound, mixture, solution, or substance designated pursuant to section 102 of this Act; (3) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (SWDA) (but not including any waste the regulation of which under the SWDA has been suspended by Act of Congress); (4) any toxic pollutant listed under Section 307(a) of the FWPCA; (5) any hazardous air pollutant listed under Section 112 of the CAA; and (6) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 7 of the Toxic Substances Control Act (TSCA). The term does not include petroleum (or crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under sub-paragraphs [1] through [6] of this paragraph) and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

Hazardous Waste – A solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (1) cause, or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Under RCRA Corrective Action this term means any solid waste which (1) meets the definition of hazardous waste provided above; (2) is a listed waste; (3) demonstrates a characteristic of a hazardous waste; (4) or is mixed with a hazardous waste, provided it is not specifically excluded from the definition of a hazardous waste. Under the proposed Subpart S rule, EPA also intends to include all hazardous waste constituents listed in 40 CFR §261 Appendix Vlll and the compounds listed in 40 CFR §264 Appendix IX in the definition of hazardous waste.

Hazardous Waste Constituent – Under RCRA Corrective Action, hazardous waste constituents are those compounds listed in 40 CFR §261 Appendix Vlll and the compounds listed in 40 CFR §264 Appendix IX.

Interagency Agreement (IAG) – A written agreement, enforceable by law, between EPA and another Federal agency, where goods and/or services are provided, whether or not in exchange for monetary reimbursement, or where policy agreements are delineated. IAGs for CERCLA activities may function both as obligating documents and as reporting documents necessary for EPA financial and program management.

An IAG usually is a comprehensive document that addresses all hazardous waste activities that will be conducted at a Federal facility or with another Federal agency (e.g., Corps of Engineers), from the RI/FS through the implementation of the remedial action. An IAG formalizes the procedures and timing for submittal and review of documents and establishes a mechanism to resolve disputes.

Interim Measures – Under corrective action, interim measures are actions taken to mitigate actual or potential threats while a long-term, comprehensive corrective action strategy is being developed.

Interim Status – The period during which a hazardous waste treatment, storage, or disposal facility, which was in existence as of November 19, 1980, may continue to operate without an approved RCRA permit. To qualify for interim status, a facility must have filed a Part A of the RCRA permit application. New facilities are, by definition, ineligible for interim status.

Long-term Remedial Action Sites – LTRA sites are CERCLA sites where achieving the remedial objectives requires continuous operation of the remedy over several years.

Media Cleanup Standards (MCS) – Specific contaminant levels established for each medium, determined by EPA to be protective of human health and the environment, which the corrective measure must achieve.

National Contingency Plan (NCP) – Officially known as the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR §300), the NCP outlines the responsibilities and authorities for responding to releases into the environment of hazardous substances and other pollutants and contaminants under the statutory authority of CERCLA and Section 311 of the CWA.

National Priorities List (NPL) – EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response. The list is based primarily on the score a site receives on the Hazard Ranking System (HRS). EPA is required to update the NPL at least once a year.

Notice of Noncompliance (NON) – A formal notification from EPA to a Federal facility that specifies areas where the facility is noncompliant with Federal environmental statutes or regulations.

Operation and Maintenance (O&M) – Activities conducted at a site after a response action occurs, to ensure that the cleanup or containment system is functioning properly.

Phased Remedy – Analogous to an operable unit under CERCLA, a phased remedy under RCRA Corrective Action is when EPA approves the sequential implementation of a corrective measure without placing any conditions on the implementation (for a discussion of the conditions imposed, see the definition of conditional remedy); such actions are referred to as a "phased remedy."

Point of Compliance – For regulated units, the vertical surface located at the hydraulically downgradient limit of the waste management area that extends down to the bottom of the uppermost aquifer. For corrective action, the point where the facility must demonstrate compliance with the cleanup standards set for the corrective measure.

Pollutant or Contaminant – As defined under CERCLA §101 (33), includes, but is not limited to, any element, substance, compound, or mixture, including disease-causing agents, which, after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term "pollutant or contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas or pipeline quality (or mixtures of natural gas and such synthetic gas).

Preliminary Assessment (PA) – The process of collecting and reviewing available information about a known or suspected release of a hazardous substance. EPA and States use this information to determine if the site requires further study. If further study is needed, a site inspection (SI) is undertaken.

Program Management Plan (PMP) – A document that details the mission of the program, the delegations of authority, and other information specific to the environmental restoration activities at a given facility that is not specific to a given unit or site.

Proposed Plan – A public participation requirement of SARA in which EPA summarizes for the public the preferred cleanup strategy, the rationale for the preference, the alternatives presented in the detailed analysis of the remedial investigation/feasibiiity study, and any waivers to cleanup standards of Section 121 (d)(4) which may be proposed. This may be prepared either as a fact sheet or as a separate document. In either case, active solicitation of public review and comment on all alternatives under agency consideration is required.

Public involvement Plan (PIP) – Under corrective action, a PIP is a formal plan developed and implemented by the facility for the dissemination of information to the public regarding investigation activities and results.

Quality Assurance Project Plan (QAPP) – A QAPP describes the policy, organization, functional activities, and quality assurance and quality control (QA/QC) protocols necessary to achieve the DQOs.

RCRA §3008(h) Order – An administrative order to compel compliance with the applicable regulations which is issued by EPA to a facility operating under interim status.

RCRA Facility Assessment (RFA) – The first step in the RCRA Corrective Action process. The RFA is a preliminary evaluation to determine if there are actual or potential releases of hazardous wastes or hazardous waste constituents from SWMUs at a RCRA permitted or interim status facility.

RCRA Facility Investigation (RFI) – The second step of the RCRA Corrective Action process. The RFI is a focused investigation of SWMUs with identified actual or potential releases of hazardous wastes or hazardous waste constituents. The RFI is intended to characterize the extent and nature of these releases, to evaluate the risk posed by the release, and to determine if a Corrective Measures Study is required.

RCRA Permit – A permit issued by EPA to any facility that treats, stores, or disposes of hazardous wastes. The RCRA permit consists of two parts. The Part A application discusses general information about the facility. The Part B application is a detailed discussion of how the facility intends to comply with the applicable regulations.

Record of Decision (ROD) – A public document that explains which cleanup alternative(s) will be used at NPL sites. The ROD is based on information and technical analysis generated during the RI/FS and consideration of public comments and community concerns.

Regulated Unit – Regulated units are land-based units used to manage hazardous waste (e.g., surface impoundments, land treatment units, waste piles, landfills) that received hazardous wastes after July 26, 1982.

Release – As defined by CERCLA, means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant); but excludes

- Any release that results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons;
- Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine; and
- Release of source, by-product, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act (AEA), if such release is subject to requirements with respect to financial protection established by the (NRC) under Section 170 of such Act, or, for the purpose of Section 104 of CERCLA or any other response action, any release of source.

Under RCRA Corrective Action, the term “release” applies only to releases of hazardous wastes or hazardous waste constituents.

Remedial Design (RD) – An engineering phase that follows the Record of Decision (ROD) when technical drawings and specifications are developed for the subsequent remedial action at a site on the NPL.

Remedial Investigation (RI) – As defined under CERCLA, the RI is a process undertaken by the lead agency to determine the nature and extent of the problem presented by a release. The RI emphasizes data collection and site characterization, and is generally performed concurrently and in an interactive fashion with the feasibility study. The RI includes sampling and monitoring, as necessary, and includes the gathering of sufficient information to determine the necessity for remedial action and to support the evaluation of remedial alternatives.

Remedial Investigation/Feasibility Study (RI/FS) – Investigative and analytical studies usually performed at the same time and in an interactive, iterative process, and together referred to as the “RI/FS. ” They are intended to the following:

- Gather the data necessary to determine the type and extent of contamination at a Superfund site,
- Establish criteria for cleaning up the site,
- Identify and screen cleanup alternatives for remedial action, and
- Analyze in detail the technology and costs of the alternatives.

Remedy or Remedial Action (RA) – Those actions consistent with a permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection using dikes, trenches, or ditches, clay cover, neutralization, cleanup of released hazardous substances and associated contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, on-site treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to ensure that such actions protect the public health and welfare and the environment.

Remove or Removal – The cleanup or removal of released hazardous substances from the environment; such actions as may be necessary in the event of the threat of release of hazardous substances into the environment; such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under Section 104(b) of CERCLA, and any emergency assistance which may be provided under the Disaster Relief and Emergency Assistance Act.

Reportable Quantity (RQ) – The quantity of a hazardous substance that, if released into the environment, may present substantial danger to the public health or welfare or the environment and must be reported to either the National Response Center or EPA. RQs are set forth in 40 CFR §302.

Resource Conservation and Recovery Act (RCRA) – The Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments (HSWA) (42 U.S.C. §6901 et seq.).

Sampling and Analysis Plan (SAP) – A sampling and analysis plan (SAP), is required for a remedial investigation/feasibility study (RI/FS) by 40 CFR §430(b)(8). A SAP has two parts: the quality assurance project plan (QAPP) and the field sampling plan (FSP).

Site Inspection (SI) – An onsite investigation to determine whether there is a release or potential release of a hazardous substance and the nature of the associated threats. The purpose is to augment the data collected in the preliminary assessment and to generate, if necessary, sampling and other field data to determine if further action or investigation is appropriate and to provide detailed data used to score the site with the Hazard Ranking System (HRS).

Solid Waste – Any material (other than those specifically exempted or granted a variance) that is discarded, abandoned, recycled, or inherently waste-like.

Solid Waste Management Unit (SWMU) – Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous wastes. Such units include any area at a facility where solid wastes have been routinely and systematically released.

Stabilization – Under the EPA use in corrective action, “stabilization” describes any short-term strategy or action taken to control releases or prevent further spreading of contamination until a long-term solution can be implemented. EPA considers stabilization to be a *goa/* and interim measures to be the *tool* to achieve that goal.

Temporary Unit (TU) – A temporary unit, as set forth in the CAMU and TU final rule (58 FR 8658), is a tank or container storage unit intended for the short-term (up to one year) management of remediation wastes generated during a RCRA Corrective Action.

Treatability Studies – A treatability study conducted under CERCLA involves testing each alternative for the remedial action to determine the effectiveness of the alternative under actual conditions. Testing can be either bench or pilot scale, depending upon the nature of the technology under evaluation and the level of detail required for the evaluation.

Treatment, Storage, or Disposal Facility (TSDF) – Any facility (other than those facilities exempted) where hazardous wastes are treated, stored, or disposed of.

Work Plan – The work plan documents the decisions and evaluations made during the review of existing information about the site, and describes in detail the tasks required to complete the remedial investigation/feasibility study (RI/FS). A detailed work plan also provides necessary information to develop a schedule for, and to estimate the cost of, the RI/FS.

Acronyms

AEA	Atomic Energy Act
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
CAA	Clean Air Act
CAMU	Corrective Action Management Unit
CERCLA	The Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
CPF	Carcinogenic Potency Factor
CQAP	Construction Quality Assurance Plan
CRP	Community Relations Plan
CWA	Clean Water Act
DCQAP	Data Collection Quality Assurance Plan
DMP	Data Management Plan
DNFA	Determination of No Further Action
DOE	U.S. Department of Energy
DQO	Data Quality Objective
EA	Environmental Assessment
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FFCA	Federal Facility Compliance Agreement
FS	Feasibility Study
FSP	Field Sampling Plan
HASP	Health and Safety Plan
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendments
IAG	Inter-Agency Agreement
I DW	Investigation-Derived Waste
LDR	Land Disposal Restrictions
LTRA	Long-Term Remedial Action
MCL	Maximum Contaminant Level
MCS	Media Cleanup Standards
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFRAP	No Further Remedial Action Planned
NON	Notice of Noncompliance
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
O&MP	Operation and Maintenance Plan
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PIP	Public Involvement Plan
PM P	Program Management Plan
POC	Point of Compliance
PR	Preliminary Review
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control

ACRONYMS

RA	Remedial Action
RCRA	The Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RFA	RCRA Facility Assessment
RfD	Reference Dose
RFI	RCRA Facility Investigation
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RQ	Reportable Quantity
SACM	Superfund Accelerated Cleanup Model
SAFER	Streamlined Approach for Environmental Restoration
SAP	Sampling and Analysis Plan
SEA	Site Evaluation Accomplished
SI	Site Inspection
SV	Sampling Visit
SWMU	Solid Waste Management Unit
TSDF	Treatment, Storage, or Disposal Facility
TU	Temporary Unit
UST	Underground Storage Tank
VSI	Visual Site Inspection

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Appendix 2
Bibliography

This appendix provides an annotated list of guidance documents related to the RCRA corrective action program and to the CERCLA remedial program. These documents can be ordered from either:

National Technical Information Service (NTIS)
5258 Port Royal Road
Springfield, Virginia 22161
(703) 487-4650

U.S. Department of Energy
Office of Scientific and Technical Information (OSTI)
P.O. Box 62
Oak Ridge, Tennessee 37831
(615) 576-1309

A Compendium of Superfund Field Operations
December 1987
NTIS: PB-88-181557 – OSWER Directive No. 9355.0-14

A consolidated reference to all remedial field procedures used by EPA.

A Guide to Developing Superfund Proposed Plans
November 1989
NTIS: PB-90-273855 – OSWER Directive No. 9335.03-02FS-2

Outlines the major components to a Superfund Proposed Plan; a requirement of all RI/FSs.

A Guide to Developing Superfund Records of Decision
November 1989
NTIS: PB-90-273848 – OSWER Directive No. 9335.3-02FS-1

Outlines the major components of a Superfund ROD.

A Guide to Selecting Superfund Remedial Actions
April 1990
NTIS: PB-90-273863 – OSWER Directive No. 9335.0-27/FS

Describes the statutory requirements for CERCLA remedies and the process established in the NCP to meet these statutory requirements.

CERCLA Compliance with Other Laws Manual, Part I and Part II
Part I – August 1988, Part II – August 1989
NTIS: PB-90-272535 and PB-148461 – OSWER Directive Nos. 9234.1-01 and 9234.1-02

Provides guidance on the selection of remedies to meet ARARs under various Federal and State environmental statutes.

Community Relations in Superfund: A Handbook (Interim Guidance)
June 1988
NTIS: PB-90-180830 – OSWER Directive No. 9230.O-03B

Provides information on requirements for coordinating activities at Superfund sites and additional techniques that can be used to enhance a basic community relations program.

Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities (Proposed Rule)
55 FR 30798, July 27, 1990

This proposed rule will create a new Subpart S under 40 CFR Part 264. These regulations will apply to all facilities seeking a permit under RCRA §3005 (c), and will establish the procedures and technical requirements for corrective action under RCRA §3004(u) and (v).

Corrective Measures for Releases to Groundwater from Solid Waste Management Units
August 1985
NTIS: PB-88-185251

Evaluates the relative success or failure for various technologies used for groundwater corrective measures.

Corrective Measures for Releases to Soil from Solid Waste Management Units
August 1985
NTIS: PB-88-185277

Provides guidance for the selection and implementation of corrective measures for releases to soil.

Corrective Measures for Releases to Surface Water from Solid Waste Management Units
August 1985
NTIS: PB-88-185251

Discusses various corrective measures useful in addressing releases to surface water.

Data Quality Objectives for Remedial Response Activities: Volumes 1 and 2
March 1987
NTIS: PB-90-272634 – OSWER Directive No. 9355.O.07B

Provides guidance for developing DQOs for site specific remedial investigation/feasibility studies (RI/FS). Sets forth a procedure for developing sampling and analytical plans to achieve the high-quality, cost-effective data collection.

Executive Order 12088: Federal Compliance with Environmental Laws
October 13, 1978

Delegated responsibility for compliance with pollution control laws to heads of the various Federal agencies, established requirements for pollution abatement plans and reports, and required Federal agencies request funding for pollution abatement projects.

Executive Order 12580: Superfund Implementation
January 23, 1987

Delegates to various Federal officials the responsibilities for implementing CERCLA which were vested in the President by the Superfund Amendments and Reauthorization Act (SARA).

Federal Facilities Hazardous Waste Compliance Manual
January 1990
PB-90-188749 – OSWER Directive No. 9992.4

Provides information to other Federal agencies on the requirements for environmental compliance at Federal facilities.

Guidance for Conducting Preliminary Assessments Under CERCLA
September 1991
EPA/540/G-91-103

Provides an overview of, and general procedures for, conducting a PA. Revises and supersedes the guidance on PAs issued in 1988.

Guidance for Conducting Remedial Investigation/Feasibility Study (RI/FS) Under CERCLA
October 1988
PB-89-184626 – OSWER Directive No. 9355.3-01

Provides an overview of, and general procedures for, conducting an RI/FS. Revises and supersedes the two-volume guidance on the RI and the FS which was published in 1985.

Guidance on Expediting Remedial Designs and Remedial Actions
August 1990
PB-90-273871 – OSWER Directive No. 9355.5-02

Examines ways to speed the RD/RA so that cleanup activities can be completed quickly.

Guidance on Public involvement in RCRA §3008(h) Actions
May 1987
OSWER Directive No. 9901.3

Provides guidance on public involvement in actions under RCRA §3008(h).

Guide for Conducting Treatability Studies Under CERCLA (Interim Final)
December 1989
PB-90-249772 – OSWER Directive No. 9380.0-27

Describes a step-by-step approach for conducting treatability studies to determine the effectiveness of remedial technologies under consideration for use at a CERCLA site.

Hazard Ranking System: Appendix A of the National Contingency Plan
December 14, 1990
55 FR 51532

The final rule establishing the Hazard Ranking System for CERCLA sites. The HRS is the primary mechanism used to list sites on the NPL.

Health and Safety Roles at Remedial Sites
July 1991
PB91-921362/CCE – OSWER Directive No. 9285.1-02
Defines the major components of the health and safety programs required for remedial sites.

Interim Guidance on Preparing Superfund Decision Documents: The Proposed Plan; The Record of Decision; Explanation of Significant Differences; and The Record of Decision Amendment
June 1987
EPA 540/G-89/007

Provides guidance on developing all Superfund decision documents.

Procedures for Completion and Deletion of National Priorities List Sites
October 1988
OSWER Directive No. 9320.2-03A

Discusses the requirements for deleting sites from the National Priorities List.

Public Participation in Environmental Restoration Activities
November 1991
USDOE EH-0221

Provides detailed guidance on community relations activities required as part of environmental restoration projects.

RCRA Corrective Action Decision Documents Guidance
February 1991
PB91-201756 – OSWER Directive No. 9902.6

Provides guidance on the development of the Statement of Basis and other public participation elements of the RCRA corrective action program.

RCRA Corrective Action Interim Measures Guidance
June 1987
0SW:530/SW-88-029 – OSWER Directive No. 9902.4

Provides guidance on decision criteria used to determine the need for an interim measure as well as a model scope of work and strategy for the investigation, design, and implementation of the interim measure.

RCRA Corrective Action Plan
November 1986
0SW:530/SW-88-028 – OSWER Directive No. 9902.3

Provides guidance for developing corrective action requirements in RCRA permits pursuant to RCRA §3004(u) and (v), and corrective action orders issued pursuant to RCRA §3008(h). Also provides a model for developing site-specific compliance schedules for corrective action by laying out model scopes of work for the RFI, CMS, and CMI phases of the corrective action process.

RCRA Corrective Action Program Guide (Interim Guidance)
May 1993
USDOE Office of Environmental Guidance

Provides a detailed discussion of all phases of the RCRA corrective action program under the proposed Subpart S rule.

RCRA Facility Assessment Guidance
October 1986
0SW:530/SW-86-053

Provides guidance on conducting a RCRA facility assessment. The guidance focuses on identifying releases requiring further action, screening SWMUs for further investigation, collecting initial data on contamination levels, and using media-specific investigation techniques.

RCRA Facility Investigation Guidance
May 1989
0SW:530/SW-89-031 – OSWER Directive No. 9502.6C

Provides detailed guidance to owner/operators for performing a RCRA facility investigation. This document identifies the critical steps, describes methods, and presents a general strategy for characterizing releases and the environmental setting of the facility.

RCRA Groundwater Monitoring Compliance Order Guidance
August 1985
NTIS:PB87-155 057/AS

A companion document to the Technical Enforcement Guidance, which presents EPA's strategy for correcting releases to groundwater at interim status facilities.

RCRA Groundwater Monitoring Technical Enforcement Guidance Document
OSWER Directive No. 9933.1
September 1986

A guide to groundwater characterization during an RFI. Provides guidance on site characterization, well design and location criteria, sampling strategy, and data collection requirements.

Superfund Federal-Lead Remedial Project Management Handbook
December 1986
PB-87-183133 – OSWER Directive No. 9355.1-01

Defines the role of the remedial project manager at Federal-lead remedial sites, including project management techniques and a resources available to RPMs at Federal lead sites.

Superfund Remedial Design/Remedial Action (RD/RA) Guidance
PB-88-107529 – OSWER Directive No. 9355.O-04A

Assists agencies and individuals who plan, administer, and manage RD/RAs at Superfund sites.

Superfund Removal Procedures: Revision Number Three
February 1988
PB-90-192055 – OSWER Directive No. 9360.O-03B

Gives step-by-step guidance on conducting removal actions consistent with the NCP, including information on preparation of necessary documents.

Technical Guidance for Corrective Measures – Subsurface Gas
March 1985
NTIS: PB88-185285

Provides an overview and methods used to assess the generation, migration, and risks posed by subsurface gases at SWMUs.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act (SARA))
42 U.S.C.A. §9601 et seq.

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300)

Provides the organizational structure and establishes the procedures for preparing for and responding to a release or a threat of a release of oil, hazardous substances, pollutants, or contaminants.

The Resource Conservation and Recovery Act (RCRA) (as amended by the Hazardous and Solid Waste Amendments [HSWA] 42 U.S.C. §6901 et seq.

Update to the "Procedures for Completion and Deletion of National Priorities List Sites" Guidance Document Regarding the Performance of Five-Year Reviews
December 1989
PB-90-264556 – OSWER Directive No. 0320.2-03B

Incorporates the EPA 5-year reviews conducted prior to deleting sites from the NPL into the guidance document "Procedures for Completion and Deletion of National Priorities List Sites. "

USDOE Order 5400.3: Hazardous and Radioactive Mixed Waste Program
February 1989

Provides information on the requirements for DOE facilities with radioactive, hazardous, and mixed waste management responsibilities.

USDOE Order 5400.4: The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
October 6, 1989

Establishes and implements DOE CERCLA policies and procedures as prescribed and provided by the NCP and Executive Order 12580.

Use of Corrective Action Authorities at Closing Facilities
March 1988
OSWER Directive No. 9502.00-7

Provides guidance on the use of Section 3008(h) authorities and post-closure permits to address corrective action at closing interim status facilities.