A PROPOSED APPROACH FOR PREPARATION OF REMEDIAL DESIGN WORK PLANS FOR USDOE SITES

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ABSTRACT

Following the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments of October 17, 1986, federal facilities were required to prepare and submit Preliminary Assessments and Site Investigations (PA/SI) to determine if the facility should be placed on the Federal Agency Hazardous Waste Compliance Docket. As a result, in December, 1989 the Department of Energy's Oak Ridge Reservation (DOE-ORR) was placed on the National Priority List (NPL). The critical decision-making component of the CERCLA process is the Record of Decision (ROD). After a ROD is signed, the next major milestone is the submittal of a Remedial Design Work Plan (RDWP) that outlines the engineering design process that will translate the objectives of the ROD into an implementable Remedial Action (RA). The RDWPs for DOE-OR sites must therefore comply with CERCLA. This paper presents an approach and format for preparation of RDWPs at DOE sites that address both these regulatory requirements as well as the applicable portions of the DOE Remediation Project Process.

BACKGROUND

In 1985, President Reagan signed an Executive Order requiring DOE facilities to comply with state and federal environmental regulations. Prior to this time, DOE Orders were used as the guidance for Environmental Restoration (ER) Program activities at DOE sites. The remedial design engineering components were specifically performed according to DOE Order 4700.1, Project Management System, and 6430.1A, General Design Criteria. When the DOE-ORR sites were placed on the NPL in December, 1989, the primary regulatory driver for their environmental activities changed from Resource Conservation Recovery Act (RCRA) to CERCLA (P.L. 96-510), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (P.L. 99-499). Subsequently, a Federal Facility Agreement (FFA) was entered into by the DOE, the U.S. Environmental Protection Agency (EPA), Region IV and the Tennessee Department of Environment and Conservation (TDEC).

The CERCLA process encompasses all phases of hazardous waste site remediation from preliminary assessment through the selected remedial action to the final preparation and approval of the post construction report (Fig. 1).

Remedial Design (RD) is defined by 40 CFR 300.5 as technical analysis and procedure which follow the selection of remedy for a site and result in a detailed set of plans and specifications for implementation of the RA. The purpose of a RDWP is to ensure that the selected remedy being designed is protective of public health and the environment and the RD is prepared in compliance with CERCLA. According to the DOE-ORR FFA, the RDWP is a primary report that "the DOE shall complete and transmit to EPA and TDEC for review and comment" (1).

As most of the engineering staff at the DOE-ORR sites are more familiar with the DOE Orders than the existing EPA CERCLA guidance documents (2)(3)(4), that do not specifically address federal facility actions, an effort was undertaken by DOE-ORR this past year to develop a guidance document for the preparation of RDWPs. An annotated outline was developed as a guide to ensure compliance and consistency in the RDWPs to be prepared by the DOE-ORR Environmental Restoration (ER) Programs. This paper presents a brief description of this RDWP annotated outline that other DOE sites may find useful.

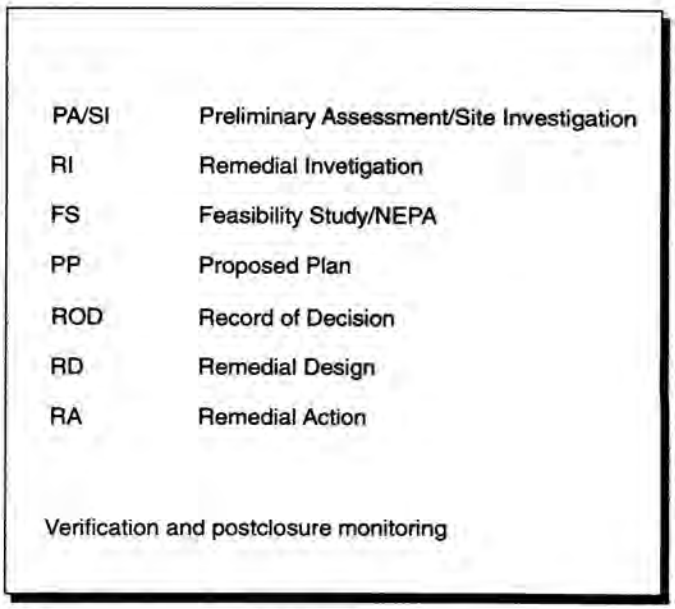

Fig. 1. CERCLA process.

INTRODUCTION

The annotated outline organizes the RDWP into the following six sections:

- Executive Summary
- Introduction
- Technical Approach to Remedial Design
- Remedial Design Planning
- Remedial Design
- Remedial Design Schedule

The guidance document presents not only direction on the technical contents for each section with references to applicable EPA guidance and DOE Orders, but also a recommended format with some examples of generic text. Most of the requirements for the RDWP can be found within the requirements of the Design Criteria Report (DCR) and the Statement of Work (SOW) for Architect/Engineer selection (5). If these DOE Project Management documents have already been prepared, excerpts from both could be used to prepare the EPA RDWP.

Since this annotated outline was prepared to address all the possible components of an RDWP as presented in the various EPA guidance documents, preparers of project specific RDWPS must be careful to only use those sections which are applicable and customize the generic text given the site specific conditions and the selected remedy. In the event that the RD does not require the extensive documentation that is usually associated with CERCLA projects, a modified outline could be developed, using this annotated outline as guidance. The Table of Contents of this annotated outline is provided in Fig. 2.

COMPONENTS OF THE REMEDIAL DESIGN WORK PLAN

To identify the recommended components for each of the six sections, excerpts from the RDWP annotated outline and brief descriptions of the proposed contents are provided below.

Executive Summary

The Executive Summary should be 1-2 pages and include a summary of the remediation project and associated remedial design activities so that the management of DOE, EPA and applicable state agencies have the essential information required to understand the scope of work addressed in this document. It should include a brief description of the site, operational and regulatory history of the project specific facilities, applicable CERCLA activities, selected remedy, the remedial design approach, and an explanation of what is presented in the RDWP.

Introduction

This first section should include a brief introduction to the project, authorization of the work, identification of who prepared the RDWP, guidance for preparation of the RDWP, and organization of the document.

Subsection 1.1 should describe the scope of work, specifically the design and predesign tasks required to meet the SOW, and restate the preferred remedial alternative that was presented in the ROD. It should address all applicable or relevant and appropriate regulations (ARARs) that have been reviewed prior to execution of any design/engineering activities. Identify the major project components based on site specific conditions, and convey an understanding of the purpose of the RD for which the RDWP is being written.

It should briefly describe the approach for each stage of the remedial design process in Subsection 1.2, identifying EPA approved methods for project phasing and fast-tracking to meet negotiated schedule agreements and contingent action(s).

The specific roles and responsibilities of each of the participating project team member organizations should be defined in Subsection 1.3. An organizational chart could be inserted.

Fig. 2. Table of contents for remedial design work plan.

Subsection 1.4 should provide the location (maps of project specific facilities), general site description, existing background information, and a brief environmental and operational history of the facilities associated with the remediation project. A summary discussion should be included about the contaminants of concern and their impacts on human health and environment that the RA is expected to mitigate. The introduction should also include a brief description of the topography, hydrogeology, soils, surface water/groundwater patterns, location of existing monitoring wells, and other environmental factors identified in the Remedial Investigation (RI) or Feasibility Study (FS) as they are applicable to the design approach.

Technical Approach to Remedial Design

The second section should include the RD design objectives and specific project approach, regulatory considerations, and the design criteria and assumptions that form the basis for the engineering tasks.

As the RDWP is a primary document for agency review, close attention should be given to the presentation of the design objectives in Subsection 2.1 so that they clearly convey the end result of each design task, stage or phase. The design objectives should also directly relate to the project milestones in the remedial design schedule and specific design documents that can be used to implement the remediation and to procure and install the necessary equipment/system components.

Subsection 2.2 should contain a description of the proposed design approach to meet the project objectives and schedule. If a phased approach is selected, include descriptions of each phase in sufficient technical detail to show how the RD objectives and project milestones will be accomplished.

In Subsection 2.3, the regulatory requirements that will be considered during the RD should be identified; specifically, detailed discussions of how the RD will fulfill the alternative specific ARARs and applicable permitting requirements, standards and guidances as they relate to the performance of remediation technologies.

Finally in Subsection 2.4, the design criteria and critical assumptions that have been used in the development of the RD work scope should be listed, as they establish the boundaries within which the design tasks are conducted.

Remedial Design Planning

The Remedial Design Planning section fulfills the requirements of Section 11 of the EPA Model CERCLA RD/RA Consent Decree (2), that requires plans and schedules for implementation of all remedial design and predesign tasks as outlined in the ROD. The following applicable project planning activities that were initiated before or will be during the design process should be discussed:

- Kickoff meeting,
- Site walkdown,
- Acquisition and evaluation of existing data,
- RD scoping meeting, and
- Preparation of secondary RD support plans.

The purpose of a project kickoff meeting is to bring together the participating team members to introduce, discuss, and agree upon the design criteria and overall schedule for the proposed RD effort, identify deliverables and establish channels of communication. As this meeting usually occurs before the RDWP is prepared, a synopsis of the meeting objectives, action items and other pertinent data should be documented in Subsection 3.1.

A site walkdown typically follows the kickoff meeting to assess site specific conditions and any possible conflicts with the proposed RD objectives. During this walkdown, special access requirements such as security clearances, rights-of-way, or logistics with facilities operations, and proposed locations for decontamination facilities and contractor's staging areas are discussed. If this planning step was conducted, then the information gathered should be documented in Subsection 3.2.

All applicable documentation, such as the RI and FS reports and other studies regarding the project and previous site activities, should be evaluated to establish a design database and to determine if adequate engineering data is available. The findings should be summarized in Subsection 3.3.

Subsection 3.4 presents a synopsis of the RD scoping meeting, if held, for the purpose of reaching an agreement on the basis for the design approach, design constraints, specific design tasks, project deliverables and schedule.

A discussion of Secondary RD Support Plans associated with the RDWP, that specifically address the technical aspects of the project's design, should be included in Subsection 3.5. The RDWP document should contain the sequence of events and total scope of work for the development and completion of the RD; however, there are also RD support plans that apply or could apply to the RD effort as a whole. The Engineering Quality Assurance Plan is mandatory under DOE Orders, whereas the Engineering Data Collection Plan, Treatability Studies, and Engineering Data Collection Health and Safety Plan are deemed optional. As secondary documents (as defined in the FFA, Section XX1.D) these plans should be transmitted for agency review and comment, either as separate submittals or as an appendix, but are not approved separately from the RDWP.

- The Engineering Quality Assurance Plan describes how the RD activities are to be performed in accordance with applicable DOE Orders.
- If during the evaluation of existing data and the scoping process, data gaps crucial to the design of the selected remedy are identified, then an Engineering Data Collection Plan should be prepared.
- Treatability studies are typically required to determine the performance of potential treatment technologies, identify critical and cost sensitive parameters and develop design criteria for the chosen alternative.
- The Engineering Data Collection Health and Safety Plan is developed to support collection of additional engineering data in the field or for treatability studies.

Remedial Design

EPA Model CERCLA RD/RA consent decree VI, paragraphs b, c, d, e, and f (2) requires a series of design phases from preliminary to intermediate to prefinal/final. Each of these design phases have specific guidelines and requirements as recommended by the EPA. Comparable design phases in the DOE Remediation Project Process are identified in DOE

Order 4700.1. A comparison of DOE and EPA terminology with respect to these deliverables and the percent complete is presented in Fig. 3.

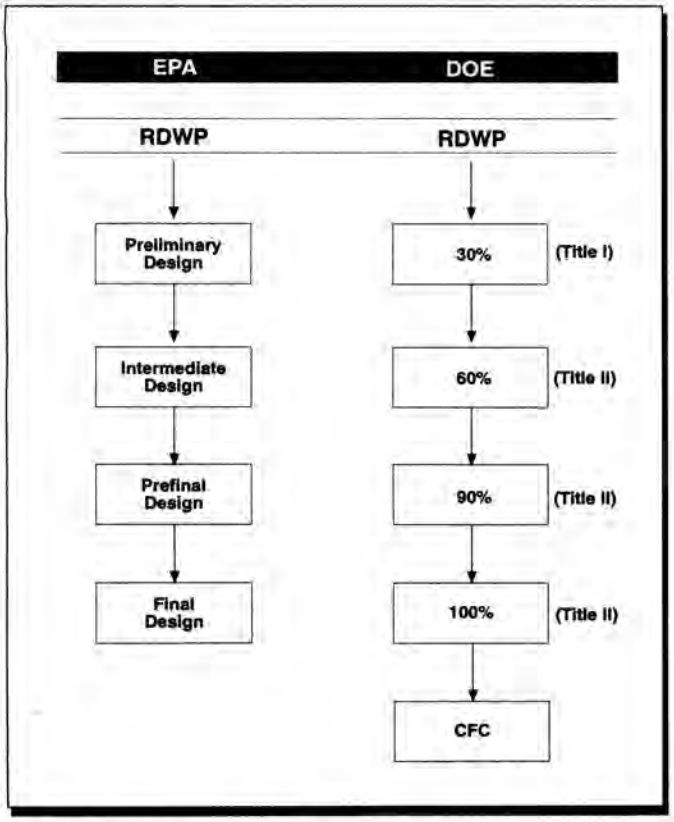

Fig. 3. Comparison of DOE vs EPA remedial design terminology.

Subsection 4.1 should contain a description of the preliminary (Title I, 30%) design package with the major elements of the project deliverables identified and the associated drawings and specifications by discipline listed. The preliminary design should be initiated with the development of major elements of the selected remedy and continue until the design is approximately 30% complete. The following deliverables are typically prepared and reviewed by DOE as established in the SOW. Whether the Title I design will be submitted to regulatory agencies and when is established during project negotiations.

- The proposed contents of the Basis of Design Report should be identified. It usually includes a discussion of existing site information, major design data and criteria, results of treatability studies (if any performed), and results of additional field sampling and predesign work (if any performed).
- The drawings to be developed during the preliminary phase of the RD, which contain the major design parameters (e.g. site plan, general arrangement, and process flow diagram) should be described.
- Specifications define the qualitative requirements for products, materials, and workmanship upon which the construction contract will be based or the specific equipment and installation methods. The proposed specifications to be developed during the RD (e.g. construction, performance, and/or equipment) should be identified.
- The preliminary calculations to be performed in support of design should be identified.
- The proposed Basis of Estimate, Work Breakdown System elements and level of detail for the preliminary cost estimate should be briefly presented.
- A description of how the preliminary construction schedule will be developed for the RA, including phased activities as well as the regulatory milestones should be provided.
- The following components of the preliminary construction package that will become deliverables at the completion of the final design stage should be introduced:
  - Operations and Maintenance Plan (*REQUIRED*)
  - Field Sampling Plan (*REQUIRED*)
  - Site Safety Plan (*REQUIRED*)
  - Construction Quality Assurance Plan (*REQUIRED*)
  - Monitoring Plan (*OPTIONAL*)
  - Construction Contingency Plan (*REQUIRED*)
  - Other Plans (*OPTIONAL*)

  The plans marked *REQUIRED* should be included as per the EPA Model CERCLA RD/RA consent decree (2) Section VI, paragraph 11f. The plans marked *OPTIONAL* should only be included on a case by case basis as negotiated with the regulators before preparing this section of the RDWP.

Subsection 4.2 should identify whether an intermediate (Title II, 60%) design package will be required for either internal DOE and/or regulatory agency review. For complex sites or projects that will be using new or complex remediation technologies, a review at the intermediate stage is critical to ensure that the design is proceeding properly and the intent of the ROD will still be achieved, especially if additional field data or treatability studies were conducted during the preliminary design phase. However, for fairly simple or well characterized sites and projects using established remediation technologies, this intermediate review may be not be warranted. Preparation of this design phase for review should be established during negotiations with the regulators.

If an intermediate design package is to be prepared, this subsection should include a discussion of all the efforts necessary to prepare plans and specifications to approximately 60% completion. During this phase, changes due to comments on 30% design package are incorporated; and input on constructibility, bidability, claims *prevention*, operability, and environmental control are addressed. The specific subsections for the intermediate drawings, specifications, calculations, cost estimate, construction schedule, and construction package should describe the anticipated level of detail that will be achieved by the 60% design stage.

Subsection 4.3 should detail the efforts required to achieve the prefinal (Title II, 90%) and final (Title II, 100%) and Certified for Construction (CFC) design phases. During the prefinal phase, changes due to comments on the 60% design package, if prepared, and the detailed engineering

aspects of the final calculations and supplementary analyses are incorporated into the drawings, specifications, cost estimate, construction schedule, and the various plans included in the construction package. The specific subsections should describe what will be included in the 90% design stage.

The prefinal design package is submitted to DOE for review and comments. Upon resolution of all outstanding issues, a final design (Title II, 100%) package will be prepared and forwarded to the regulatory agencies for review. The final package should also include an RD Report that contains a project description, an explanation of the final remedial design approach and key technical components, and a list of the drawings, specifications, important calculations, and plans included in the construction package.

The agency comments on the final design should then be incorporated to prepare the CFC design documents that will be used for R A procurement and construction. The CFC design package should be signed, sealed, and dated by the appropriate discipline professional engineers licensed to practice in the particular state.

Remedial Design Schedule

This section should contain the detailed schedule for performing the RD activities. A description of the network logic that was used to present the RD phases, major design activities, and milestones should be included as well as the key assumptions made with regard to durations and attainment of negotiated dates for FFA compliance.

As both the RDWP and the RD Report are identified in the FFA as primary documents, the established review cycle protocol for these documents must be reflected in this schedule. Figure 4 depicts the maximum negotiated durations for the various components of a primary document review cycle. DOE-ORR has labeled the three critical deliverables in this cycle as: "DO", the document stage submitted to DOE-ORR and DOE-HQ for review; "D1", the draft document submitted to regulatory agencies for review; and "D2", the final document that incorporates all comments for approval.

SUMMARY

In summary, a RDWP is a primary document required by the DOE-ORR FFA to establish and present the proposed framework for initiating, preparing and finalizing the RD for implementing a RA that meets the intent of the ROD. This annotated outline for a RDWP was developed as a guide to ensure compliance and consistency in the RDWPs to be prepared by the DOE-ORR ER Programs.

REFERENCES

1. Federal Facility Agreement for the Oak Ridge Reservation, December 1991.

2. EPA Model CERCLA RD/RA Consent Decree, Federal Register 56 FR 30996, July 8, 1991.

3. CERCLA Remedial Design and Remedial Action Guidance, June 1986.

4. Interim Final Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER Directive 9355.5-1, February 1990.

5. Program Management Strategies for Following EPA Guidance for Remedial Design/Remedial Action at DOE Sites; J.B. Hopper, WEMCO, J.R. Chew and T.E. Kowalski, Theta Technologies, Inc., September 1991.

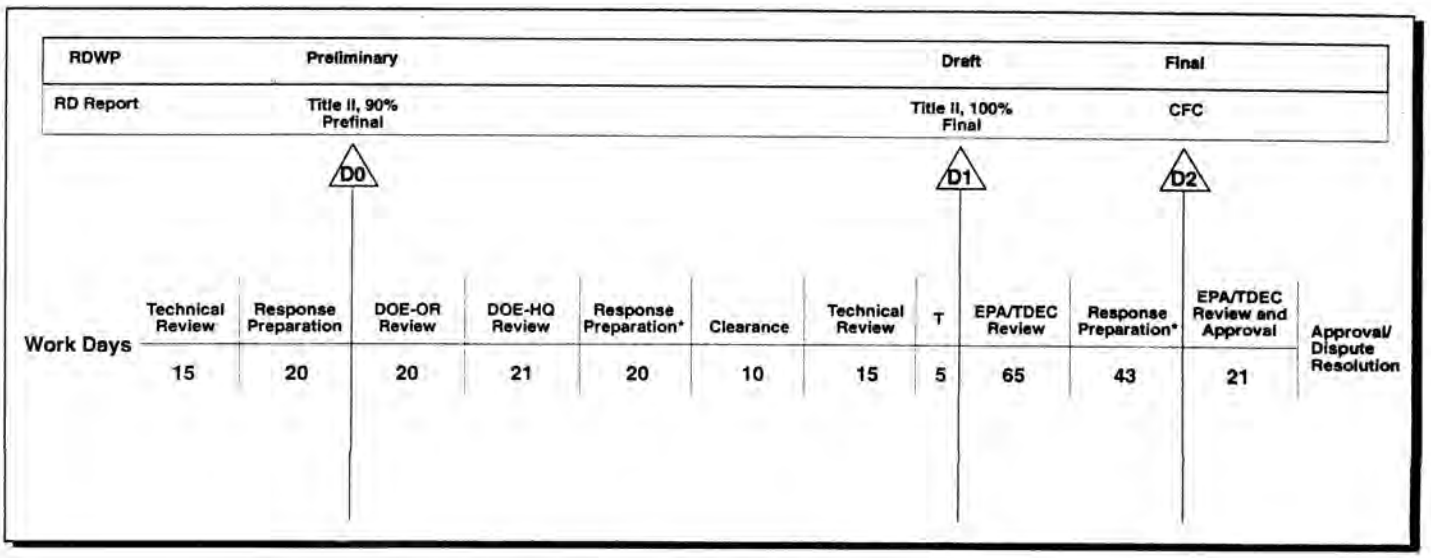

Fig. 4. Review cycle protocol for FFA primary documents.