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MEETING THE REQUIREMENTS

FOR A DOE

ENVIRONMENTAL RESTORATION PROJECT

THE FERNALD STRATEGY

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INTRODUCTION

Environmental Restoration (ER) of five Operable Units (OU) at the Fernald Environmental Management Project (FEMP) includes compliance with the requirements of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Resource Conservation Recovery Act (RCRA), National Environmental Policy Act (NEPA), and DOE Orders (and other Federal and State laws, and regulations not relevant to this paper). Each of the regulatory drivers has differing procedural requirements for documenting the calculations, decisions, and actions involved in site cleanup. Integration of documentation and avoidance of duplication can save both time and money at Fernald. Such savings are being achieved by OU specific application of a number of supporting studies, revised procedures, and guidance documents. Also, each OU is seeking appropriate opportunities to produce single documents (usually those mandated by CERCLA, the primary regulatory driver) that simultaneously fulfill the important requirements of the other regulations and DOE Orders. These opportunities are evaluated at all successive phases of decision making, remedial design, and remedial action.

The three essential processes that precede environmental restoration/remedial action at a DOE site or project are:

- Completion of the decision-making documents required by the governing or applicable statutes; e.g., CERCLA, RCRA, or NEPA (note that all of these are applicable at Fernald).

- Completion of important scientific and engineering analyses of the remedial alternatives, and the design and implementation of the remedial solution established in the CERCLA Record of Decision (ROD).

- Preparation of DOE-mandated documentation to record the engineering evaluations and cost estimates that are required for budgeting, decision making, and project management.

The methodology and requirements for each of these processes have developed from long and successful practice, but each process has developed independently of the others. FERMCO, as the new DOE contractor at Fernald and the first Environmental Restoration Management Contractor (ERMC), is committed to a process of Continuous Performance Improvement (CPI). Accordingly, we have undertaken a major reevaluation of the documentation and processes that are needed to support environmental decision-making and the design of cleanup activities to remediate the five OUs at the FEMP.

At the outset, we note that the primary regulatory driver at the FEMP is the CERCLA process. This, in essence, sets the stage or leads the process for meeting the regulatory requirements of the RCRA process and other regulations as part of the compliance strategy. This paper describes the first phase of the process as FERMCO seeks to identify more cost effective and efficient ways to meet the needs of site restoration. We describe how this continuing process begins by examining procedures and methods adopted at other DOE sites and projects. We have identified a number of significant opportunities to reduce the duplication inherent in producing multiple documents required for the different processes dictated for environmental restoration design and construction. Next we describe proposed standard operating procedures (SOPs) and guidance documents to be compiled by careful and detailed examination of the current processes at the FEMP. These revised SOPs enable the OU

managers to select appropriate and relevant procedures for implementation within their areas of responsibility.

Finally, this paper describes the way in which the five OUs are currently complying with the full range of federal and state laws, regulations, and the DOE Orders to which the FEMP is subject, including but not limited to CERCLA, RCRA, NEPA, and DOE Order 4700.1.

BACKGROUND

The FEMP was the first ER Major System Acquisition (MSA) in the DOE complex to have an approved Project Plan. The approval of the Project Plan by the Assistant Secretary for Environmental Restoration and Waste Management marked a major achievement in the cleanup effort at the FEMP. The Project Plan provided an approved framework for integration of environmental and regulatory documents required by the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the State of Ohio EPA that are to be followed to accomplish work at the site.

Remedial activities at the Fernald site are primarily governed by the requirements of CERCLA and RCRA. These activities require oversight and concurrence by the DOE, the EPA, and the State of Ohio EPA. The steps in the remedial process require the use of specific formats as defined by each agency; however, the documentation format for one is not necessarily acceptable to another, and the schedules for document deliverables do not always correspond. The varying schedules and additional manpower required to reformat similar information results in reduced efficiency in the completion of a remedial activity or removal action and higher resource requirements to complete the effort.

FERMCO is attempting to integrate the processes that drive project activities on site. This integration includes processes required by DOE Order 4700.1 (Project Management System), the CERCLA Remedial Investigation/Feasibility Study (RI/FS), the CERCLA Remedial Design/Remedial Action (RD/RA) process, and the CERCLA Removal Action process. RCRA monitoring and closure and NEPA/CERCLA activities are also included.

FERMCO has actively pursued the integration of NEPA with CERCLA and RCRA requirements. These integration activities seek to combine or expand certain elements from one process or requirement to meet the intent of other processes, while still complying with the intent of all legal requirements. (See Figure 1.) For example, an effective method has been developed for using CERCLA documentation and review requirements to meet those of NEPA, particularly for generating an EIS. This method requires only minor augmentation of the appropriate CERCLA documentation to meet the requirements of the NEPA EIS.

METHODS AT OTHER SITES

Other DOE sites pursuing similar environmental restoration activities were visited to establish a benchmark within the DOE complex. The following is a very brief description of methods used at the other sites and how they are complying with CERCLA, RCRA, NEPA, and DOE Order 4700.1 as applicable, while attempting to reduce duplicate and redundant requirements.

The Uranium Mill Tailings Remedial Action (UMTRA) Project

This project involves remediation of uranium mill tailings and groundwater at 24 sites in 10 states. NEPA is applicable and EIS or Environmental Assessments (EA) are compiled for all environmental restoration activities. The cognizant federal agency is the Nuclear Regulatory Commission (NRC), and DOE Orders are relevant and are followed. However, the program is not subject to either CERCLA or RCRA.

Engineering support of NEPA evaluations includes the completion of substantial technical work that is documented in a draft Remedial Action Plan (dRAP) usually published at the same time as the EIS/EA. The dRAP is a NEPA EIS reference document and also simultaneously documents the requirement for the DOE Order 4700.1 Conceptual Design Report (CDR). The dRAP, in addition to meeting the CDR requirements, constitutes the Remedial Design Work Plan and the design instructions for compilation of Title I/II design. In effect, one report fulfills multiple regulatory and DOE purposes and functions. The final Remedial Action Plan contains the Title II design and is the review and concurrence document preceding remedial action.

Weldon Spring Site Remedial Action Project (WSSRAP)

This project involves the sister plant to Fernald and the remediation activities in progress for the past five years. Environmental restoration of two of the four site OUs is in progress. Excavation of quarry waste and decontamination and demolition (D&D) of the many site buildings is underway. Preparation of the Title II design for an onsite waste disposal cell is also about to begin. The site is subject to CERCLA, NEPA and DOE Orders. (RCRA is not applicable, but is considered as an Applicable or Relevant and Appropriate Requirement). Preparation of an FS/Proposed Plan(PP)-EIS and a very brief CDR preceded cleanup of the Quarry OU. The CDR was not extensive because all important issues had been dealt with and settled as part of the integrated CERCLA/NEPA process.

Demolition of the buildings is proceeding under the CERCLA removal action authority based on the completion of concentrated Engineering Evaluation and Cost Analysis (EE/CA) Reports. An integral RI/FS and EIS (and associated technical and engineering documents) for the Chemical Plant OU established that the best solution was D&D of the buildings and encapsulation in an on site facility. About 40 supporting studies were completed as part of the evaluation and validation of onsite disposal. The supporting study reports generated from this effort were used as reference documents to the integrated CERCLA/NEPA FS/PP-EIS. The first draft of a CDR was compiled concurrent with preparation of the final draft of the FS. The ROD has been approved and the final draft of the CDR is being compiled. The scope of the CDR was established to comply with DOE Order 4700.1, but many additions were made. These include:

- Giving considerable attention to the identification and evaluation of alternatives
- Paying particular attention to unknowns and areas where variations from reasonably anticipated conditions might mandate changes during design and construction as formally implemented via the Observational Method Approach (Ref. 1)
- Doing detailed development of selected alternatives to the point where the final CDR serves also as the Title I Design Report
- Providing careful documentation of the work to be done to compile the Title II design so that the CDR serves also as the CERCLA Remedial Design Work Plan and the Title II Design Criteria Document

Nevada Test Site (NTS)

Diverse construction, testing, and waste disposal operations are in progress at the NTS. The site is subject to RCRA, NEPA, and DOE Orders. A RCRA Part B application permit is being completed for waste management operations and an EA is currently under review by DOE HQ. DOE Order 4700.1 compliance is documented in CDRs and Title I/II Design reports for all relevant activities. Depending on the nature of the project, the CDR is combined with the Title I report, or combined Title I/II Design documentation.

Westinghouse Savannah River Company (WSRC)

Westinghouse Savannah River Company completed a Process Optimization for Environmental Restoration Projects Study in December, 1992 (WesTIP). This study revealed, without consideration to DOE Order 4700.1:

- Redundant processes mandated by RCRA/CERCLA
- Time limitations imposed by regulators
- Performance requirements set by regulators and not WSRC
- Multi-stage design processes not sensible for ER Projects

The results of the study indicated that significant savings could be made if the recommendations were incorporated into a specific project.

An ER project team was formed to investigate these recommendations using a pilot project. The team input all specific project information into a Critical Path Method (CPM) schedule with the idea that DOE Order 4700.1 was on the critical path and no consideration was given to environmental restoration project considerations. The result was a minimal savings of time because of the duality of effort between the DOE Project Management System and RCRA/CERCLA requirements.

The team revised their approach and used all recommendations from the WesTIP study consolidating and integrating DOE & EPA/South Carolina Department of Health & Environmental Control processes, using one vs. two submittals of CERCLA documentation, and formalized document review to the appropriate RCRA/CERCLA tasks. The results of the study showed a remarkable improvement to the project schedule, reducing the duration of a planned eight year project by approximately four years. The real significance of this pilot project is that this was the first time an environmental restoration schedule was put into a CPM process using actual project parameters at WSRC. The results caused a re-evaluation of where time and money were being spent and refocused attention on environmental restoration project concerns as compared to DOE Order 4700.1 project processes. This study process would be a good model for all environmental restoration projects to consider as they begin future Feasibility Studies.

GENERAL APPROACHES AT FERNALD

The FERMCO ER organizational structure includes five OUs with the responsibility of managing all activities leading to the cleanup. Technical and service divisions are responsible for providing technical support services to the OUs. These technical service divisions include Engineering,

Construction, Environmental, Regulatory Programs, Recycling and Technology Programs, and Remediation Support Operations.

The authors of this paper are in the Systems Integration and Assessment (SIA) Division. This division is responsible for assuring that efficient, consistent, appropriate programs are implemented to comply with all requirements. Additional technical support was provided by the OUs, Regulatory Programs Division, and the Engineering Division. Requirements may be defined as DOE Directives (i.e., Orders, implementation guidance, standards, etc.), laws, regulations, or any document that requires FERMCO to perform a particular part of its activities in a specific way.

The services provided by SIA include assisting with the interpretation of the requirements and compilation of new procedures and technical approaches for compliance with DOE Orders. We are now compiling the procedures, guidance documents, and technical approaches as described below. These may be used as appropriate by the OUs to meet the goals of our Mission Statement of "the safe, least-cost, earliest, final clean-up of the Fernald site, within applicable DOE Orders, regulations and commitments, and in a manner which addresses stakeholder concerns."

FERMCO Standard Operating Procedure

We propose to create a new FERMCO Standard Operating Procedure (SOP) that describes alternative methods for demonstrating compliance with the applicable DOE Orders while supporting integrated CERCLA, RCRA, and NEPA decision making. This SOP includes any or all of the alternative courses of action as described below. The decision regarding the approach to take must be documented and ratified by both FERMCO management and the DOE.

DOE Order for Environmental Restoration Engineering

We propose that a new DOE Order be drafted to cover the engineering design and project management requirements that specifically support the environmental remediation/restoration/regulatory decision-making process. This new DOE Order is needed to formalize the guidelines that apply to compiling and supporting engineering work that has already been significantly completed in major decision-making documents. Further, the new Order should establish responsibilities and provide appropriate guidelines for all environmental projects, as well as meeting the primary objectives of the original DOE Order 4700.1. These objectives as stated are "to assure the application of sound management principles to provide a disciplined, systematic, and coordinated approach to project management resulting in efficient planning, organization, coordination, budgeting, management, review, and control of DOE Projects." The authors of this paper are in total agreement with the proposal to revise DOE Order 4700.1 per the DOE Headquarters Directives Management Document issued on August 17, 1993.

This new DOE Order should be based on the standard principles of Total Quality Management (TQM), CPI, and the appropriate criteria specified in DOE Order 5700.6C Quality Assurance, and ANSI/ASQC-E4 (draft) Quality Assurance Program Requirements for Environmental Programs. It should also provide the flexibility to use various approaches when producing reports that describe alternatives evaluation and the decision-making process in selecting engineering options to remediate a site. Those options under development at Fernald, are described in further detail below.

Guidelines on Supporting Studies

Supporting studies, as previously described, are used with considerable success by other DOE sites and projects to document technical studies, evaluations, and decisions. Based on the lessons learned and the successful use of supporting studies at other DOE sites, we are compiling a guidance document that establishes procedures and format requirements for FERMCO supporting studies. The primary content requirements for FERMCO supporting studies include consideration of a single topic, focused on a limited range of issues. Ideally, the supporting study report should contain no more than 20 to 30 pages of text, and 10 to 15 pages of figures or tables. The combined report length should not exceed about 40 to 50 pages. It should be written in a style that is easy to read by technical and interested lay persons.

The supporting study effort may include a review of alternative technical procedures; it may report on and expand the deliberations of a value engineering session; it may record original testing, or conceptual design evaluations. Generally, however, it should examine alternatives, compare them to appropriate criteria, and make recommendations for further work to advance the decision-making process that is ultimately documented in the FS/PP-EIS or EA and ROD.

Guidelines for Expanded Feasibility Studies

We have compiled guidelines for producing an expanded FS that meets all the legal requirements of CERCLA, RCRA, NEPA, and DOE Order 4700.1. These guidelines emphasize the importance of CERCLA requirements because a multi-purpose FS that meets those requirements, is in theory, the most cost effective option. The multi-purpose FS includes more technical engineering details and a more in-depth analysis of technical engineering alternatives than the conventional FS.

Revision of the Conceptual Design Report Guidance Document

The CDR was originally intended by DOE to support capital projects that normally required a NEPA EIS or EA. The CDR was not necessarily intended to cover environmental restoration projects. CDRs produced for different DOE projects at different times for environmental restoration purposes have varied from brief to extremely detailed. A guidance manual for the production of CDRs, titled "Conceptual Design Report Preparation Guide" was produced at Fernald in October 1991. This guidance document was based entirely on the practice of DOE Order 4700.1 prevalent at that time for the preparation of capital project CDRs not associated with ER.

We propose revising the "Conceptual Design Report Preparation Guide" to identify the required information for the generation of CDRs in situations that require the preparation of documents to comply with the CERCLA/RCRA/NEPA processes. This document eliminates duplication of facts, figures, etc., already adequately documented in the FS and provide guidance for further reduction of the scope and cost of CDR compilation for situations in which the CDR is preceded by a series of supporting studies. These supporting studies used as reference documents to the CDR, may significantly reduce the effort and expenditure involved in the preparation of CDRs. This is particularly appropriate when the supporting studies have been used to identify and compare alternatives, becoming in fact mini focused CDRs on a single topic or important issue.

Table of Contents for Integrated Report

A single document has been produced at some DOE sites to fulfill simultaneously the requirements of the CERCLA Remedial Design Work Plan, the Title I design, and the CDR as described above.

An integrated document such as this is both cost effective, timely, and key to advancing the planning and implementation of site ER.

This document covers engineering and relevant scientific aspects of the cleanup. It focuses on justifying detailed technical alternative selection and possible deviations for conditions likely to be encountered during design and construction. The need for adopting and implementing TQM and CPI methods in compiling this integrated document will be taken into account in compiling the table of contents. This document makes provisions for proper use of value engineering, peer review, and the observational method approach.

EXAMPLE POTENTIAL OPERABLE UNIT APPLICATION AT FERNALD

Operable Unit 1: Waste Pit Area.

Waste pits 1-6, clearwell, burnpit, berms, liners and soil within the OU boundary. Application of the ideas and procedures described in this paper to OU1 includes the following:

- Production of six supporting studies including reports on waste excavation, onsite disposal, offsite disposal, waste transport, and site restoration.

- Preparation of an expanded FS/PP-EIS or EA that also establishes and demonstrates compliance with the important requirements of DOE Order 4700.1 and NEPA.

- Production of an integrated CDR, Title I design, CERCLA RD Work Plan, and Title II design criteria document.

Operable Unit 2: Other Waste Units.

Flyash piles, other south field disposal areas, lime sludge ponds, solid waste landfill, berms liners, and soil. Application of the ideas and procedures described in this paper to OU2 includes the following:

- Preparation of supporting studies on applying process technology to aid in selecting the preferred remedial alternative.

- Production of an expanded FS/PP-EIS or EA to document compliance with the important requirements of DOE Order 4700.1 (e.g., an enhanced cost estimate) and NEPA requirements.

- Preparation of a CERCLA RD Work Plan that also serves as the Design Criteria and Title I design report.

Operable Unit 3: Production Area.

Production area and production-associated facilities and equipment. Application of the ideas and procedures as described in this paper to OU3 includes the following:

- Preparation of a Proposed Plan for Interim Remedial Action that meets the appropriate NEPA requirements, and establishes that all buildings will be demolished.

- Preparation of several condensed supporting studies that strengthen the Remedial Design Work Plan. These supporting studies pertain to groups of similar D&D issues, techniques and similar buildings.

- Reliance on the OU5 ROD to establish waste disposal alternatives for soils.

Operable Unit 4: Silos 1-4.

Silos 1, 2, 3, and 4, berms, decant tank system, and soil within the OU boundary. Application of the ideas and procedures as described in this paper to OU4 includes the following:

- Completion of detailed supporting studies on the treatability of Silos 1, 2, & 3 residues, and a Pilot Plant study for Remedy Screening and Selection in support of the FS/PP-EIS.

- Reliance on the OU5 ROD to establish the remedial waste disposal alternatives for soils, and the OU3 ROD to establish the remedial alternative(s) for demolition debris.

- A detailed FS that effectively establishes compliance with DOE Order 4700.1 CDR requirements.

Operable Unit 5: Environmental Media.

Groundwater, soil not included in the definitions of OUs 1-4, sediments, flora, and fauna. Application of the ideas and procedures as described in this paper to OU5 includes the following:

- Engineering designs documented in drawings, calculations, cost estimates, and supporting study reports that could include perched water.

- An expanded FS/PP-EIS or EA that also establishes compliance with DOE Order 4700.1. (Soil and ground water CDRs have been scaled back)

- RD/RA documents that also function as Title I and Title II designs.

CONCLUSIONS

Based upon experience at the FEMP and visits to other DOE sites, this paper provides recommendations and guidance for a variety of procedures for reducing duplication of documentation that is required by CERCLA, RCRA, NEPA, and DOE Order 4700.1. The primary approach recommended to reduce costs and project schedules is using the RI/FS/PP/ROD of the CERCLA process, with selected supporting studies, to provide the majority of the required information. At the same time, the FS may include the information that would otherwise be included in a DOE Order 4700.1 CDR. The requirements of DOE ORDER 4700.1 can be met by producing the mandatory CERCLA documents with a format that enables them to serve simultaneously as the DOE Order 4700.1 CDR, Title I or Title II design criteria document at or subsequent to the ROD.

These proposals will reduce the combined documentation required to support both the CERCLA and the DOE Order 4700.1 processes, reduce the time necessary to complete reviews of required documentation, and reduce paperwork and improve efficiency while providing substantial cost benefits in the pursuit of the environmental ER.

References

1. J. Dunnicliff & D.U. Deere, Judgement in Geotechnical Engineering, John Wiley & Son 1984

ACRONYMS

CDR	Conceptual Design Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Title 42)
CFR	Code of Federal Regulations
CPI	Continuous Performance Improvement
CPM	Critical Path Method
D&D	Decontamination and Demolition
DOE	Department Of Energy
dRAP	Draft Remedial Action Plan
EA	Environmental Assessment
EE/CA	Engineering Evaluation and Cost Analysis
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERMC	Environmental Restoration Management Contract
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FS	Feasibility Study
MSA	Major Systems Acquisition
NEPA	National Environmental Policy Act
OU	Operable Unit
PP	Proposed Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act, 1976 (Title 42)
RD	Remedial Design
RDWP	Remedial Design Work Plan
RI	Remedial Investigation
ROD	Record of Decision
SOP	Standard Operating Procedure
TQM	Total Quality Management

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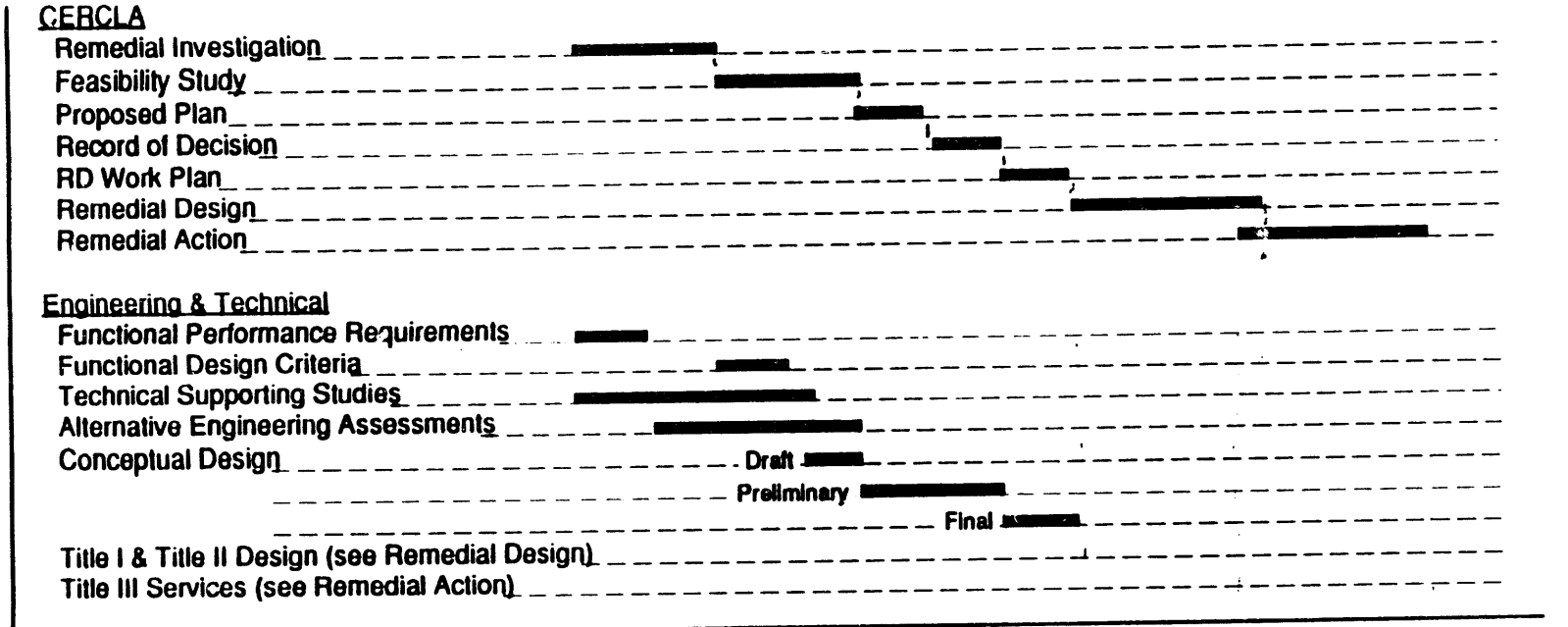
FERMCO INTEGRATION OF SYSTEMS ENGINEERING LOGIC

Generic Schedule for CERCLA/DOE Order Compliance



CERCLA/DOE Process

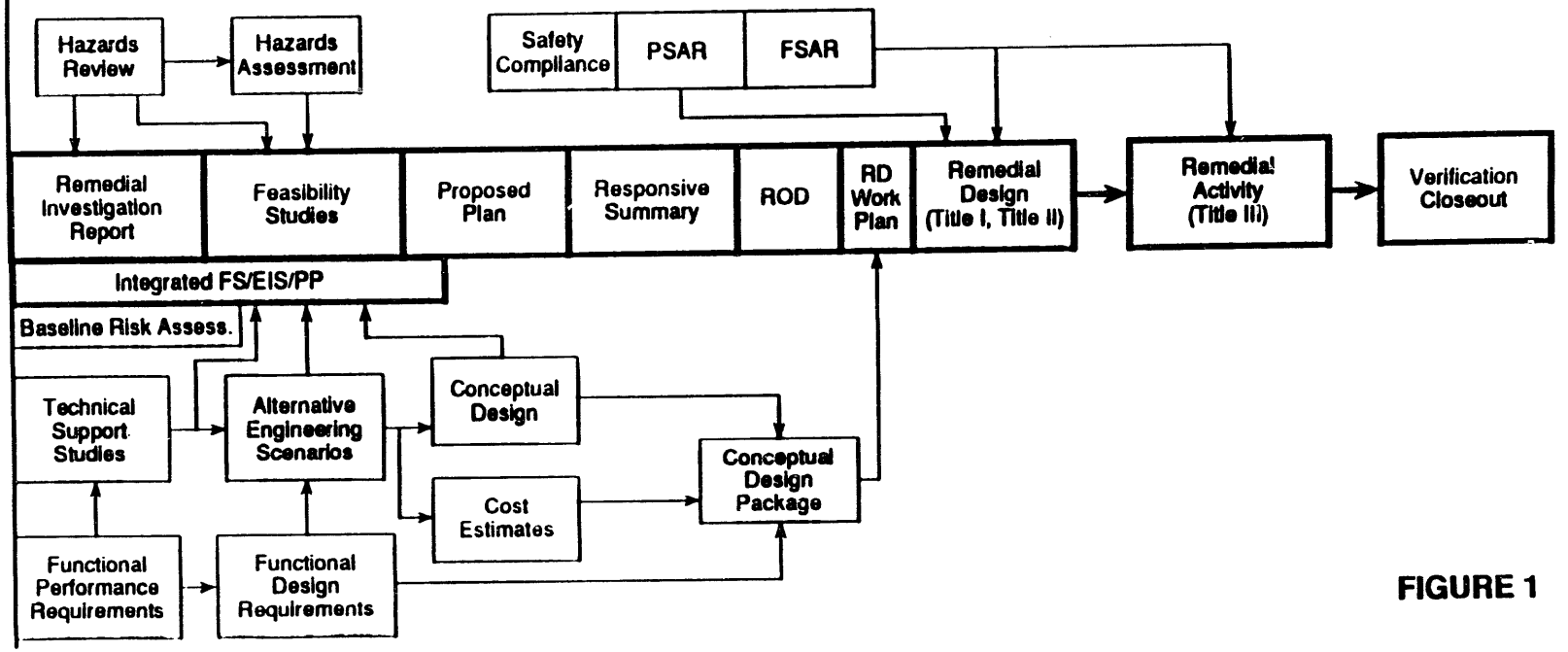


FIGURE 1

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