THE STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION

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This paper represents the fundamentals of the U.S. Department of Energy's Streamlined Approach for Environmental Restoration (SAFER) process. The process is a marriage of primary components of the Data Quality Objective process and the Observational Approach to environmental restoration. Implementation of SAFER at hazardous waste sites throughout the DOE complex offers an excellent opportunity for better, faster, cheaper, and safer completion of projects.

INTRODUCTION

As part of the effort to meet the U.S. Department of Energy's stated goal of remediating all DOE hazardous waste sites within 30 years, DOE has been investigating a variety of opportunities to perform the environmental restoration process in a better, faster, cheaper, and safer way. One of the most promising opportunities developed to date is the Streamlined Approach for Environmental Restoration (SAFER). Three DOE offices have been instrumental in providing the financial and technical resources for developing SAFER. The offices are the Office of Environmental Guidance (EH-23), the Office of Program Support within the Office of Environmental Restoration (EM-43), and the Office of Special Projects within the Office of Technology Development (EM-56).

The SAFER process is a integration of the major tenets of two important initiatives developed by the U.S. Environmental Protection Agency to plan and conduct environmental restoration more effectively. The initiatives are the Data Quality Objective (DQO) process developed by the Quality Assurance Management Staff (1) and the Observational Approach (OA) for environmental restoration developed by the Hazardous Site Control Division (2). DOE has recognized the benefits of each of the methods and the potential strength of a combined process.

The DQO process identifies the problem and the required action, defines the quality and quantity of data needed to resolve the problem, and offers a mechanism for determining "how clean is clean." The OA establishes the operational framework for managing the inherent uncertainty encountered from site characterization through remediation and the inherent uncertainty encountered during planning activities. By combining the two approaches, the SAFER process meets the following objectives:

- Increase focus on planning and scoping
- Link data collection directly to decision-making needs
- Explicitly recognize and manage uncertainty
- Learn as planning and remediation proceed
- Converge early on a remedy
- Ensure participation and consensus of key stakeholders

APPLICATION

The SAFER process is divided into three major components: planning, assessment and selection, and implementation (see Fig. 1). Below is an overview of the process.

Planning

The first, and probably most important, step of any project is planning. Often, this step is described as a necessary evil, but experience has shown that poor planning will lead to poor project execution and the consequent wasting of time and resources. The first step in planning is to develop a conceptual model of the site. The model is a summary snapshot of the site that will frame and guide the remedial process. Development of the model enables the project manager to document preliminary understanding of the site and to begin identifying uncertainties about the site. The remedial objectives that focus on the probable conditions of concern then are developed, and a preliminary evaluation of risk is performed.

Throughout the planning process, the project manager will continue narrowing the focus of the study to the probable (i.e., most likely) conditions that need to be addressed. The other site conditions, or deviations, that may arise and change the view of the problem also are identified, and possible contingencies for addressing these deviations are developed.

For ensuring that site decisions are properly framed and that data collection is aligned with decision-making needs, a decision rule is established for each project decision. At sites with reliable existing data or relatively straightforward conceptual models, a comprehensive decision rule - i.e., one that fully incorporates remedial objectives as well as characterization needs-can be developed at the planning stage. In this way, the SAFER process can accomplish one of the key goals embedded in EPA's Super-fund Accelerated Cleanup Model

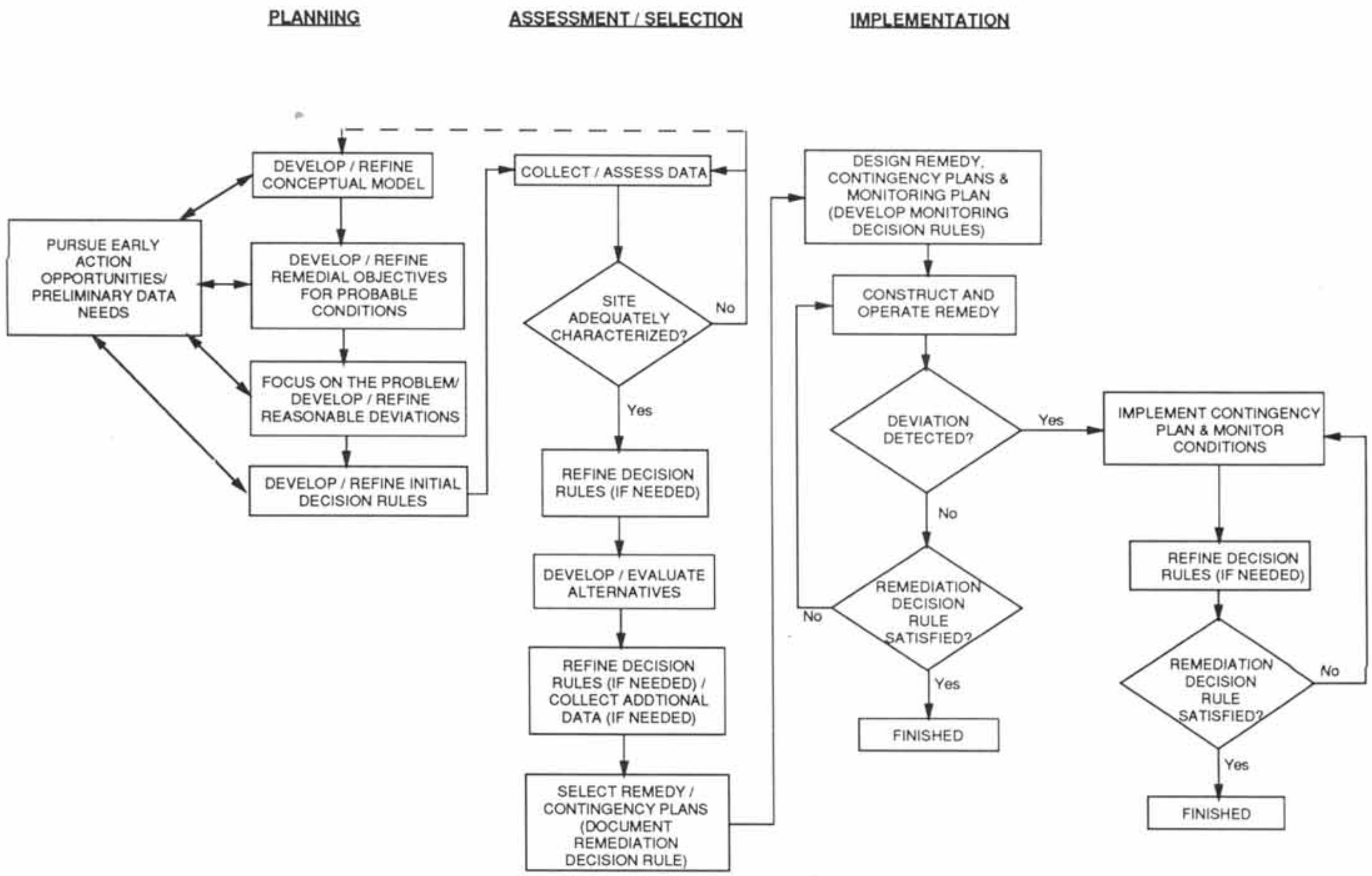

Fig. 1. Safer framework.

(SACM): a single pass at data collection. The opportunity to build a comprehensive decision rule is one of the primary streamlining opportunities offered by SAFER.

At sites where there are major uncertainties and a complex conceptual model, a single data-collection effort will not be feasible. At those locations, the initial decision rule is likely to focus only on site characterization; decision rules and data collection for technology selection and remediation will be addressed during the assessment and selection phase.

In each case, the decision rule is an action-oriented statement ("If-Then") that defines data needs and shows how the data will be used to make decisions. During planning, the decision-making stakeholders must establish the acceptable uncertainty they are willing to live with for each decision. Decision-error tolerances then are quantified, and the decision performance criteria are translated into data quality requirements. Plans for optimal data collection then are developed to meet the performance and budgetary constraints of the decision-makers.

The opportunities for early action are evaluated continually throughout the SAFER process. The actions can be initiated to reduce risk at the site, or they may take the form of limited field investigations designed to address topics such as confirming the problem statement, estimating the likelihood of deviations, or increasing the understanding of the distribution of contaminants.

Assessment and Selection

After the work plan is developed and approved, field activities are initiated. Sampling and analyses are performed as specified in the work plan. The primary goal of this field activity is not the traditional "full characterization" of the nature and extent of contamination. The focus now is on collecting sufficient data to support an informed risk-management decision on which remedy appears to be most appropriate for the site (3). The question of data adequacy versus data completeness is defined by the series of decision rules developed during planning.

As data are collected and evaluated, the determination of whether sufficient data have been collected to address each decision rule and whether the appropriate decision rules have been developed must be made. Evaluation of the data will allow the conceptual model to be refined and will confirm the appropriateness of the decision rules. If changes to the decision rules are required, the project manager will need to reconsider the appropriate planning steps.

As data are evaluated, the project team must continually focus on the next set of decisions that have to be made. Decision rules initially are focused on data collection, and as more is learned about the site, rules are developed for technology evaluation (e.g., treatability studies) and remediation (cleanup levels). The appropriate data collection activities for each additional decision also are established. Specific actions resulting from each decision then are identified, and the acceptable uncertainty in these decisions are established to assist in designing data collection.

Remedial technologies then are evaluated, and a narrowed set of remedial alternatives is developed. A detailed analysis of the alternatives is performed. A report focusing on the probable conditions at the site, which also includes a discussion of reasonable deviations and associated contingency plans, is prepared. The appropriate decision-makers then select a remedy, including conceptual contingency plans.

Implementation

After the preferred remedial alternative is selected, the remedy, the associated contingency plans, and the monitoring plan are developed. Additional data may be required at this point and may include bench and pilot studies or sampling to confirm the selected monitoring parameters. A design based on the identified probable conditions is completed, and an appropriate level of design for each contingency is determined according to 1) probability of occurrence, 2) lead time for implementation, 3) effect of occurrence, and 4) cost of separate development.

Extremely important is developing a monitoring system that enables the project manager to determine if cleanup criteria have been met and to evaluate technology performance and site conditions. During the operation of the remedial system, a properly designed monitoring program will enable the project manager to determine if remediation has been completed and if a deviation has been detected, thus causing a contingency plan to be implemented.

FUTURE ACTIVITIES

DOE Headquarters is continuing efforts to educate the field offices about the benefits of applying the SAFER process at sites at their facilities. Several training sessions are scheduled at sites throughout the complex. A training team from Headquarters will hold a two-day workshop that presents the concepts of SAFER in an interactive - *lecture and* case-study format for DOE, contractor, and regulator staff. The training team also will work with site project personnel to assist them in applying the SAFER process at specific operable units at their facilities.

DOE and EPA also are planning to participate in several pilot studies. Candidate sites will be chosen by EPA regional state staff and DOE field staff. DOE will provide technical support staff for each pilot-site to assist in such activities as scoping, technical review of documents, and communicating the SAFER process to interested community participants. DOE and EPA also will develop measures of success to assist them in determining the exact benefits derived from implementing the SAFER process.

REFERENCES

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