THE ENVIRONMENTAL ASSESSMENT PROCESS IN PROJECT PLANNING

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ABSTRACT

The planning activities associated with remedial actions at 24 inactive uranium mill sites are discussed in relation to the preparation of the environmental assessments required by the National Environmental Policy Act (NEPA). The standards for the project include long-term stability, protection of water quality, radon control, and cleanup of land and structures. Design considerations, data and analyses requirements, alternatives selection procedures, and how these activities are fully integrated into the NEPA documents are discussed.

INTRODUCTION

The Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 DOE-designated inactive uranium mill sites and at several thousand associated contaminated properties (e.g., open lands, residences)[2]. The 24 sites are located in 10 states and on the Navajo and Hopi Indian reservations (Fig. 1).

Fig. 1. Locations and Remedial Action Priorities for Uranium Mill Tailings Remedial Action Project Sites.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner. Pursuant to the requirements of UMTRCA, selection and performance of the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA-40 CFR 192)[2].
- With the concurrence of the Nuclear Regulatory Commission (NRC).

In compliance with UMTRCA, the remedial actions are to be completed by March 7, 1990, seven years after the effective date of promulgation of the EPA standards.

Further, UMTRCA requires the DOE to establish cooperative agreements with the affected states and tribes. These agreements establish the procedures to be followed by the DOE and the states or tribes for selection, performance, and payment of the remedial action. The Federal government shall pay 90 percent of the remedial action costs and the state shall pay 10 percent. With respect to sites on Indian tribal lands, 100 percent of the costs for remedial actions will be borne by the Federal government.

Before the remedial actions can be initiated, DOE must complete the environmental investigations, documentation, and public review as required by the National Environmental Policy Act (NEPA), as well as the necessary investigations and documentation (i.e., Remedial Action Plan) for selection of the remedial action. The DOE responsibility for complying with NEPA and the planning, coordination, and conduct of remedial actions at the processing sites and associated properties (i.e., vicinity properties) is delegated through the Assistant Secretary for Nuclear Energy and assigned to the Uranium Mill Tailings Remedial Action (UMTRA) Project Office at the DOE Albuquerque Operations Office. The Technical Assistance Contractor (Jacobs-Weston Team) is under contract to the DOE to assist in the conduct of these responsibilities.

This paper discusses the project planning process and the role of the environmental assessment (EA) in this process.

PROJECT PLANNING PROCESS

The process for selecting the remedial action to be implemented at a processing site involves a series of comprehensive and interrelated steps consisting of:

- o Early site assessment.
- o Identification of alternatives.
- o Site characterization.
- o Conceptual design (Remedial Action Plan).
- o Environmental Assessment (EA) with preferred alternative.
- o Final engineering design.
- o Accomplishment of remedial action.

This process requires the successful completion of each step to allow for the completion of each succeeding step. While the EA step listed above might imply otherwise, actually all steps up to that point must be carefully coordinated to assure that when incorporated in the EA, the proposed alternatives are technically adequate and include at least one alternative that will be accepted by the public, state, Federal agencies, or other interested parties.

Historically, within the UMTRA Project, this was not always the case. Prior to the promulgation of the final EPA standards, and because of the seven-year limitation in UMTRCA, several preliminary EAs were prepared for remedial actions at various mill sites. The alternatives were not well defined in that they did not convincingly demonstrate compliance with the then interim standards. Because of this lack of alternatives detail, impacts analyses were not as quantitative as desirable. Early review comments from the reviewing agencies (i.e., NRC, state, tribe) noted this dilemma and requested additional design details as well as more thorough, quantitative impacts assessment.

As a result, the DOE decided to fully integrate the conceptual designs and supporting analyses into the EAs. The EA, thus, became the document that "drives" the UMTRA Project planning process in the selection of the remedial action. Completion of the EA and agency agreement with its preferred alternative is now the critical path to remedial actions. Because compliance with NEPA is the critical path, schedules for completion of all previous activities must be planned sequentially and with sufficient milestone intervals to allow for vagaries in the overall process (Fig. 2).

Since the activities are so highly integrated, the remainder of this paper is devoted to those key issues that may affect the planning process.

EARLY SITE ASSESSMENT

As the first step in the process, the Early Site Assessment (ESA) is intended to identify potential contraints to site utilization and to identify outstanding field data needs. The two principal areas of the ESA are (1) identification of potential constraints, either singular or cumulative, that could preclude site utilization, and (2) identification of site studies required to characterize the site relative to meeting longevity criteria and/or significant impact to the environment. Should it be determined that the present site is not suitable as a disposal site, then identification and characterization of alternate disposal sites are required.

ALTERNATE SITE SELECTION

The second step in the process requires the selection of alternate disposal sites. The selection process may vary depending upon the state or tribe and the likelihood of relocating the tailings to another site. Typically, the alternate site selection process consists of four phases: Phase I--designation of a search region; Phase II--preliminary screening of the designated search region; Phase III--preliminary screening and evaluation of potential areas; and Phase IV--identification and evaluation of candidate sites.

In essence, technical factors are applied during each phase to reduce the number (i.e., area) of candidate areas acceptable for tailings disposal. Phase I defines the criteria for selecting the designated search region. Phase II applies the regional screening guidelines used to eliminate areas within the search region from further evaluation. Phase III screens and evaluates potential areas for detailed review in the selection process. Phase IV further reduces the areas to small parcels of land (i.e., sites) and ranks the selected sites.

Although the specifics of each phase may vary, the results of the selection process are fully documented in the EA.

SITE CHARACTERIZATION AND SITE DESIGN

The design considerations for selecting a disposal site are identified prior to alternate site selection, with the site characterization efforts based upon those data required for demonstrating

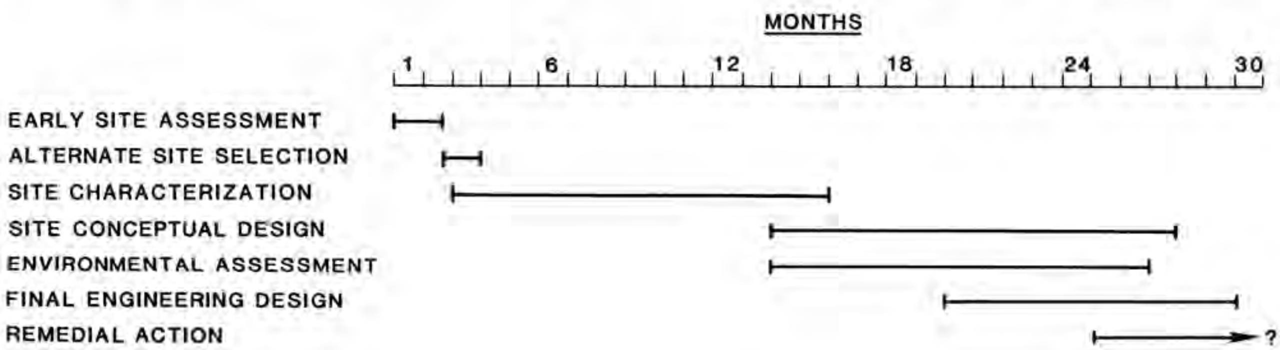

Fig. 2. Remedial Action Time Line

suitability. The time required for and costs associated with data gathering and interpretation are so significant that early identification of possible design problems, public acceptance problems, or other environmental issues is very desirable.

The standards for disposal site design address the general classifications of long-term stability, radon control, water-quality protection, and cleanup of land and structures. The general matter of the standards relating to long-term stability and protection of water quality required further interpretation. These interpretations as agreed to by the implementing agencies are discussed below. A more thorough presentation can be found in UMTRA-DOE/AL-38[3] and UMTRA-DOE/AL-163[4].

Long-Term Stability

The EPA standards establish a design-life objective of 1000 years to be met wherever reasonably achievable and, in any case, a minimum design-life of 200 years. Conformance with this standard is to be accomplished primarily through the use of passive controls requiring minimal maintenance and repair. In addition to resisting disruption and dispersion by natural erosive forces, the design should discourage human intrusion and misuse of contaminated materials.

The major categories of potential disruption of stabilized tailings include:

- o Regional and local erosion affecting the stability of the embankment foundation.
- o Stream channel migration and encroachment on the embankment foundation.
- o Seismic damage.
- o Wind and water erosion of the embankment.
- o Embankment failure.
- o Flood damage.
- o Human intrusion.
- o Other intrusions.

The potential consequences of extreme events are evaluated and the remedial actions are designed to withstand these events to the extent practicable within the current state of the practice. Events to be evaluated include the Probable Maximum Precipitation (PMP); the Probable Maximum Flood (PMF); and the Maximum Credible Earthquake (MCE), in areas where seismic activity is a concern. Where a design to protect any proposed disposal site against these extreme events is found to be impractical, the costs and effectiveness of alternative designs are evaluated based on the probability and potential impact of less severe events. In such cases, DOE consults with the state or tribe and the NRC in selecting appropriate design features. It is the objective of the design, in all cases, to prevent the release of tailings as a result of the maximum postulated event.

Radon Control

The EPA standards call for remedial actions to be designed to reduce radon emissions (flux) to an average of less than 20 pCi/m^2sec above background, averaged over the disposal site. The calculated emissions are to be averaged over the entire surface of the disposal site over at least a one-year period. EPA also established an alternative standard of 0.5 pCi/l annual average Rn-222 concentration in air (above background) at or above any location outside the disposal site. The standards are framed as design standards with compliance to be determined on the basis of predicted rather than measured emission rates and concentrations. As appropriate, DOE intends to perform post remedial action monitoring for the purpose of improving radon control design at other sites.

Protection of Water Quality

The EPA standard calls for the protection of current and future beneficial uses of ground-water and surface-water quality. Decisions based on a site-specific assessment are required rather than a water-quality numeric standard. Analyses to date indicate that stabilized UMTRA Project sites will not have significant impacts on surface-water quality. However, contaminants have been identified in ground water in the vicinity of a number of sites and current and anticipated impacts on ground-water quality and beneficial use require careful study.

Consistent with the EPA guidance, a field investigation of each site is conducted to establish the presence of ground water and to determine the degree of present and potential contamination of ground and surface water. After characterizing the adjacent streams and ground water in terms of quantity and quality, the state or tribe is consulted to identify current and potential future beneficial uses and the anticipated impact of the stabilized tailings on these uses is evaluated. If adverse effects are predicted, alternate remedial measures both as to their costs and their effectiveness are evaluated.

The results of the site characterization and resulting site conceptual design ultimately become the preferred alternative as described in the EA. Design calculations are summarized and construction scenarios are developed. This information is then used for impact assessment.

LESSONS LEARNED

Environmental Assessments or Environmental Impact Statements have been completed for four of the 24 sites with others under preparation. Delays in the planning process and EA acceptance have occurred for several reasons, some of which will be briefly discussed.

The standards for the program as presented above have required the implementing agencies (DOE, NRC, states, and tribes) to provide further interpretation as to how the standards were to be implemented (UMTRA-DOE/AL-163)[4]. For example, little guidance on ground-water protection was provided. This, along with the "common understanding" that few, if any, ground-water problems existed at the sites, led to a less than adequate site ground-water characterization program at the first few sites. During the agency's review of the planning documents, it became apparent that a considerable effort was expected to define any subpile contamination and to understand the hydrology and geology such that predictive modelling could be performed. Therefore, additional drilling, water sampling, and modelling were required.

The design-life objective of 1000 years for stability created several differing interpretations as to what destructive events were to be used as a design basis. Discussions among the interested Federal, state, and tribal agences were required where the basic approaches were better defined. Since designing for 1000 years is somewhat speculative, widely differing attitudes on margins of safety in the design had to be negotiated.

The radon control and cleanup of land and structures requirements in the EPA standards were better defined. The RAECO model[5] for predicting flux through a cover had widespread acceptance and has been used successfully without much comment. The data requirements for accurately specifying the impact parameters, however, required developing a large data base on the first few sites so that the statistical behavior of such parameters as tailings radium concentration, emanating fraction, porosity, and diffusion coefficients could be understood so that a statistically valid sampling program could be developed for the other sites. The only difficulty with the standards for cleanup of land and structures was in developing monitoring procedures for demonstrating compliance with the standards.

Another major scheduling problem arises if, late in the planning process, it becomes apparent that the alternatives presented do not include an alternative that is acceptable to a government agency or local group. The time required to obtain the data to assess the suitability of the option, as well as the impacts analysis, may delay the project for a year or more.

The work to date has resulted in a better definition of the standards as well as the data and analytical procedures necessary to design alternatives that are technically defensible. In addition, better working relationships between implementing agencies and with local groups have resulted in greater general acceptance of the EAs and other planning documents.

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REFERENCES

1. Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901, November 8, 1978, 95th Congress of the United States of America, Washington, D.C. (1978).

2. 40 CFR Part 192, Standards for Remedial Actions at Inactive Uranium Processing Sites, FR Vol. 48, No. 31, January 5, 1983, p 590, Washington D.C. (1983).

3. UMTRA-DOE/AL-38, Vicinity Properties Management and Implementation Manual, U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico (1983).

4. UMTRA-DOE/AL-163, Plan for Implementing EPA Standards for UMTRA Sites, U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico (1984).

5. Rogers et al. (V. C. Rogers, G. M. Sandquist, and K. K. Nielson), Radon Attenuation Effectiveness and Cost Optimism of Composite Covers for Uranium Mill Tailings, UMTRA-DOE/ALO-165, prepared by Rogers & Associates Engineering Corp., Salt Lake City, Utah, for the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico (1981).