

NRC HIGH LEVEL WASTE REPOSITORY LICENSING PROGRAM

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ABSTRACT

Three important activities that are part of the U. S. Nuclear Regulatory Commission's (NRC) high-level waste repository licensing program are prelicensing consultations with the U. S. Department of Energy (DOE), promulgation of regulations, and quality assurance (QA) programs. Public prelicensing consultations have as their purpose the avoidance of an unnecessarily protracted licensing process by early identification and, to the extent practicable, resolution of potential licensing issues. Six points have been raised with the DOE which should maximize the effectiveness of these consultations. Final regulations have been published which establish procedures and technical criteria for the licensing of high-level waste repositories. However, the Nuclear Waste Policy Act of 1982 (NWPA) made modifications and additions to those regulations either necessary or desirable. QA programs are a vital part of the overall management system needed to achieve quality and to be able to demonstrate in the licensing process that quality has, in fact, been achieved. A number of challenges face the DOE in implementing a QA program and the NRC in reviewing the DOE's program.

INTRODUCTION

This paper addresses the U.S. Nuclear Regulatory Commission's (NRC) High-Level Waste (HLW) Repository Licensing Program. It focuses on three areas: prelicensing consultations between the NRC staff and the U. S. Department of Energy (DOE), current rulemaking activities, and quality assurance (QA) programs. Each will be discussed in turn, starting with prelicensing consultations.

PRELICENSING CONSULTATIONS

The purpose of the ongoing, prelicensing consultations is to avoid an unnecessarily protracted licensing process by identifying potential licensing issues as early as possible and, to the extent practicable, resolving them. Where such issues cannot be resolved early, it is the aim of these consultations to establish agreement on what information will be needed in the license application to resolve them. The prelicensing consultation process is open to states, tribes and the general public. The paragraphs below touch on six points that have been raised with DOE which, when settled, should maximize the effectiveness of the public, prelicensing consultation process. The six points and their status are:

(1) Meet with NRC staff to lay out milestones and schedules for timely NRC/DOE consultation on planned activities through site characterization. DOE has committed to meet with the NRC staff to lay out milestones and schedules for its plans and activities through site characterization to provide a detailed and systematic basis for determining the appropriate points for timely NRC/DOE consultation.

However, DOE has yet to agree to a specific date for the initial meeting.

- (2) Develop a Licensing Support System (LSS) to accomplish a three year, or shorter, time period for a construction authorization decision. An LSS would manage the enormous data and information base that will be developed by DOE and others to provide the basis for a licensing decision -- either pro or con. NRC and DOE have agreed that the LSS would be a joint NRC/DOE effort for use by DOE, NRC, States, Indian Tribes, and other parties to the repository licensing hearings. DOE will have the responsibility of designing and implementing the LSS, incorporating on-line, full-text storage and retrieval techniques. NRC will participate jointly with DOE in defining the requirements for and procedures for operation of the system. NRC will carry out a pilot project to demonstrate document storage and retrieval capabilities and processes that could lead to an interim system for use within NRC until the full LSS is implemented by DOE. The experience gained from the pilot project will be made available to DOE for use in expediting the definition of requirements for the LSS.
- (3) Implement an effective quality assurance program before site characterization begins. DOE has committed to have a fully qualified QA program in place prior to submittal of the site characterization plans (SCP's). DOE is currently developing headquarters and project level QA programs. NRC will continue its review of DOE's development of QA programs and provide appropriate guidance to help assure that agreed-upon QA measures are in place prior to the submittal of the SCP's.

- (4) Adopt a conservative approach in treating uncertainties in geotechnical investigations. In several NRC/DOE meetings, the NRC staff has raised to DOE the need to take a conservative approach in the treatment of uncertainties in their planned geotechnical investigations for site characterization. A conservative approach by DOE to its technical work is one of the keys to maintaining the aggressive schedules outlined in the Mission Plan. The NRC staff will not know to what extent DOE has taken a conservative approach until DOE makes available its test plans for site characterization activities. Such test plans will be the subject of pre-SCP technical meetings with DOE.
- (5) Establish performance goals for the repository at an early date. In recent technical meetings, DOE has made commitments that performance goals for repository subsystems will be set in the SCP's to guide site characterization. These performance goals will, by necessity, be subject to revision as site characterization activities, repository design and performance analysis work proceed. The NRC staff will not know to what extent DOE establishes performance goals until DOE makes available its test plans for site characterization activities. Such test plans will be the subject of pre-SCP technical meetings with DOE.
- (6) Resolve major State and Indian Tribe contentions at an early stage. DOE has committed to continue an open program of involving the States, Indian Tribes and outside parties in the program activities and of making readily available data and information pertaining to the sites. DOE also indicated that it plans to address and resolve to the extent possible, technical and institutional concerns that are identified by outside parties prior to issuance of the license application. It is premature to judge what DOE's performance will be in this area.

CURRENT RULEMAKING ACTIVITIES

The second of the three areas addressed in this paper is the status of current rulemaking activities. Regulations of the NRC governing disposal of HLW in geologic repositories are codified in part 60 of title 10 of the code of federal regulations (10 CFR Part 60). This regulation was promulgated in two separate rulemaking proceedings. The first related to the procedural aspects of 10 CFR Part 60 and was issued as a final rule on February 25, 1981 (46 FR 13971). The second related to technical criteria for HLW disposal in geologic repositories and was issued as a final rule on June 21, 1983 (48 FR 28194).

Although these rules have been finalized and are not generally subject to change, the Nuclear Waste Policy Act of 1982 (NWSA) has necessitated some amendments to the existing rules. I will now describe the status of the specific amendments to 10 CFR Part 60 that are now underway. These include (1) procedures concerning site characterization and the participation of States and Indian Tribes; (2) consideration of modifying the definition provided in the NWSA; and (3) conformance with the EPA standard.

Site Characterization - State/Tribal Participation

The existing procedural portion of 10 CFR Part 60 was developed in February 1981, well before enactment of the NWSA. It included provisions dealing with site

characterization and participation of States and Indian Tribes in the process of siting, licensing, and developing a geologic repository. These existing procedural regulations were written in the absence of any comprehensive legislation. Consequently, at the time the procedural rule was finalized, only 10 CFR Part 60 specified opportunities for State, Tribal, or public participation with NRC being the focal point for these activities. The regulation required, among other things, that (1) NRC issue a draft site characterization analysis for public comment, (2) NRC answer questions from States and Indian Tribes pertaining to DOE's site characterization report, and (3) NRC provide DOE documents to interested parties. It further requires that a site characterization report submitted by DOE contain information on site selection which the Commission would use in making National Environmental Policy Act (NEPA) determinations. The regulation has detailed provisions describing how States and Indian Tribes may submit proposals to NRC for participation in the licensing process.

While the NWSA, in large part, was consistent with the requirements of 10 CFR Part 60, there were several statutory changes. An express purpose of the NWSA was to define the relationship between the federal and state governments with respect to disposal of high-level waste. Thus, the NWSA now defines the roles and responsibilities of NRC and DOE with respect to one another, the states, tribes, and the general public. The NWSA requires that DOE consult and cooperate with the states and tribes at specified points throughout the repository siting and development process. It requires, for example, that DOE issue its SCP's for public comment and directs DOE to hold public hearings during a mandated siting process. It requires DOE to provide funding to states and tribes to support their participation in the repository siting process, including support for providing information to state residents regarding activities of the Commission. The NWSA establishes a series of steps for DOE to follow in site selection and characterization. The NWSA specifies the content of the SCP's, with some differences from what is required by 10 CFR Part 60. In particular, the SCP's would not include site selection information. Instead, the NWSA specifies that DOE prepare an environmental assessment (EA) for each site nominated for characterization and specifies the content of these EA's to include the type of site selection information previously required by 10 CFR Part 60.

Thus, with the passage of the NEPA, it became necessary to amend Part 60 to (1) conform its procedures to the site selection process specified by the NWSA; (2) provide for state, tribal and public participation consistent with the NWSA; and (3) avoid duplication of effort. In addition, some changes are desirable to reflect the pre-licensing consultation process as it has evolved since the licensing procedures were promulgated.

A proposed rule amending the Part 60 licensing procedures was published for comment on January 17, 1985 (50 FR 2579). The public comment period ended on March 18, 1985. Based on comments received, the NRC staff prepared a final rule and submitted it to the Commission. It is expected that the Commission will act on the staff's proposal this month and a final rule should be issued in April 1986.

Definition of High-Level Waste

The definition of high-level radioactive waste in the NWSA differs from earlier formulations, including the one that appears in 10 CFR Part 60. The NWSA

continues to include reprocessing wastes in the "high-level waste" category, but only if such wastes contain "fission products in sufficient concentrations," further, it includes an additional category of "other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation." The Commission is initiating a rulemaking to determine whether or how the definition of high-level waste in Part 60 should be revised in the light of differences between it and language in the NWSA.

Recent enactment of the Low Level Waste Policy Amendments Act also influences the Commission's actions regarding any revised definition of HLW. Among other things, this amendments act establishes a federal government responsibility for disposal of what are called "above class C" wastes and directs the DOE to conduct a study of the sources, characteristics, and potential means for disposal of those wastes. During the next few months, the NRC staff will work closely with DOE to coordinate the NRC's rulemaking effort with DOE's study of wastes and disposal methods. As these efforts proceed, the NRC staff will reassess the need for a revised definition of high-level waste and the best means for developing a new definition if one is needed.

Conformance with the EPA Standard

The NWSA directs the Environmental Protection Agency (EPA) to "promulgate generally applicable standards for protection of the general environment from offsite releases from radioactive material in repositories" (Sec. 121). The Final EPA Standard--40 CFR Part 191-- was published on September 19, 1985 (50 FR 38066). The NWSA also directs NRC to insure that its regulations "not be inconsistent with any comparable standards promulgated by EPA" (SEC. 121). The staff has analyzed the Final EPA Standard and determined that some modifications to Part 60 are necessary. The principal modifications have been discussed with the EPA staff.

Some of the necessary modifications to Part 60 include (1) changes in certain definitions to achieve consistency between the Standard and the Rule, (2) addition of a requirement that estimates of cumulative releases over 10,000 years from all anticipated and unanticipated processes and events be incorporated into an overall probability distribution of cumulative releases, to the extent practicable, (3) requiring information on a program for post-permanent closure monitoring of the repository, (4) replacing the current Part 60 language which requires compliance with "such generally applicable environmental standards for radioactivity as may have been established by the Environmental Protection Agency" with the specific limits promulgated by EPA, (5) incorporation of provisions of the "Assurance Requirements" where appropriate, (6) adding the individual dose limits which are found in the Standard and (7) incorporating the special sources of groundwater protection requirements which are found in the Standard.

The staff expects to submit these proposed changes to the Commission for approval in March 1986. If the Commission approves the proposed modifications, a proposed rule will be issued in July for public comment.

QUALITY ASSURANCE PROGRAMS

The last of the three areas on which this paper focuses is Quality Assurance (QA) programs.

Many tasks will need to be performed in the repository program over the coming decades, but few will be as important as establishing effective QA programs. QA programs are a vital part of the overall management system needed to achieve quality and be able to demonstrate in the licensing process that quality has in fact been achieved, the QA program required by the regulatory process provides a structured system for this demonstration of quality.

NRC's regulations contain a formal definition of QA. Briefly, though, a QA program is a management tool for planning, checking, and documenting work that helps to achieve the necessary quality and be able to demonstrate that quality has been achieved.

A number of challenges face the DOE in implementing a quality assurance program and the NRC in reviewing the DOE's program. These are discussed in the paragraphs below.

Challenges for DOE

Six difficult challenges that face DOE are the following:

- (1) Schedules. The U. S. Congress has established aggressive schedules for development of a high level waste repository. By 1998, DOE is required by the NWSA to begin emplacing waste. DOE has established intermediate milestones and schedules for meeting this date which are similarly aggressive. Site characterization for three sites is to be completed, such that by about 1991, DOE can submit a license application to the NRC for a first repository. Three years are allotted both for review by the NRC staff and for the NRC licensing hearings. Five additional years are scheduled for construction of the repository. It is important that quality not be sacrificed to meeting schedules. DOE has committed to making quality its first priority, even if schedules must be slipped, but the schedules imposed by the Congress will make difficult the task of completing the necessary work on time with acceptable quality.
- (2) Size of the program. Another challenge faced by DOE is the management challenge created by the overall size of the program. There are well over 100 organizations participating in the DOE high level waste program. DOE headquarters has overall responsibility for the repository program, and four separate project offices are involved in developing programs for potential sites. Within each project, numerous participating organizations are often spread out geographically. The task of communicating requirements for QA programs to all of the participants, and to overseeing the implementation of the QA programs in all of the various organizations is a formidable one.
- (3) Uniqueness of the repository program. Unlike the reactor program, which has numerous industry standards and practices which have been established over many years of design and construction experience, the repository is a first-of-a-kind program. Many of the technical issues that need to be addressed, will involve tests that are state-of-the-art and that have no well-defined requirements. As a result, the standard checking of work against well established acceptance criteria will not often be possible. Peer reviews of state-of-the-art tests and data analysis will instead be necessary.

(4) Inexperience of the project participants. The DOE and its contractors have many years of experience in designing, constructing, and operating nuclear facilities. In the repository program, however, DOE must, for the first time, have a major project licensed by the NRC. As many nuclear utilities have learned, the successful practices employed for non-licensed facilities are not necessarily sufficient for a licensed facility. The NRC requirements for demonstrable quality subject to lengthy staff and licensing board scrutiny present a test DOE has not faced before. Many of the scientists and engineers working in the DOE program have successfully performed their duties for years and will want to continue with the same practices. To meet NRC requirements, some changes in how these practices are documented may be necessary. For a licensed facility, work practices must lead to quality products and fit into an overall QA program which can provide a demonstration of quality. Where work practices do not do so, inconsistent methods, inadequate documentation, and questionable results can occur. DOE has a large task in educating the various elements of its program regarding the requirements for a licensed facility and for ensuring that they are properly implemented.

(5) Qualifying existing data. When DOE begins its site characterization program, it expects to have formal QA programs fully established. Thus, data collected and analyzed after that time should be defensible in a licensing proceeding if the QA programs are satisfactorily implemented. But there will also be a large amount of data collected before these QA programs will have been established which DOE will likely use to support its license application. A challenge facing DOE is how to qualify that data, that is to review it and determine if the necessary demonstration of its quality can be made for licensing. For example, information collected on hydrology and geology by oil companies in the vicinity of a potential repository site may be relevant in determining the suitability of that site. It is important that DOE establish methods by which these data may be reviewed and begin the task of processing existing data.

(6) Use of the QA program as a management tool. Previous reactor projects have in some cases viewed the QA programs as just another regulatory requirement with little benefit to the project. With the large number of participants in the DOE program who are inexperienced with formal QA programs, such an attitude is possible. DOE must overcome the tendency to view QA programs only as a regulatory requirement. The QA programs should be a part of the system for keeping management apprised of problems and corrective actions taken.

Challenges for NRC

Finally, two significant challenges that face the NRC are the following:

(1) Stability in QA requirements. A major part of the site characterization program will involve scientific investigations for which it will not always be appropriate to apply the same QA programs used for reactors. Conventional features of programs designed for engineered facilities will need to be tailored to address

the work at hand. For example, such elements as inspections by QA personnel, use of non-conformance reports for exploratory tests, and reviews of designs and performance assessments will need to be fitted to the specific activity. It is important that acceptable approaches for applying QA to the repository work be agreed upon early between the DOE and NRC. Experience has shown that changing requirements throughout the development of a program can cause major perturbations.

(2) NRC oversight programs. A primary problem with reactor QA programs was that problems were not identified early in the program and accordingly corrective actions were not always implemented in a timely manner. To avoid a repetition of this problem, both the DOE and NRC have agreed that NRC audits of the DOE QA programs will be needed before site characterization work begins so that DOE, NRC, and others have confidence that data collected during site characterization will be defensible in licensing. The NRC staff is now in the process of developing a comprehensive audit plan for assessing the overall QA programs for each project. One of the biggest challenges is to determine the effectiveness of a large program when only a portion of the program can be audited. The staff is planning to focus on those areas of the program which are expected to have problems. For example, the staff is considering the experience of the organizations in the programs and will concentrate on those which have never operated under a formal QA program. The QA program is designed to help achieve quality in addition to providing evidence of quality, and the NRC assessment of its effectiveness will include an assessment of the quality produced. Such early involvement of the NRC may highlight problems during the early phases of the program, but it is far better to uncover problems early and obtain corrective action now rather than wait until formal licensing begins.

CONCLUSION

This paper has addressed three key areas in the repository licensing program: prelicensing consultation, NRC's current rulemaking activities, and QA programs. It attempts to convey the importance and status of each. Success in each of these areas is essential for public acceptance of the repository program. States, Tribes, interest groups, other federal agencies, the technical community, and private individuals all will participate in the licensing process. The process demands that the DOE be not only technically correct, but that it also be able to demonstrate this correctness. While the process is demanding, if its requirements are fully understood from the beginning and accounted for in early planning and implementation, there is reason to expect that it can be completed in an orderly and predictable manner.