

REGULATION OF SPENT FUEL AND HIGH-LEVEL WASTE

DISPOSAL IN GEOLOGIC REPOSITORIES

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ABSTRACT

The Department of Energy (DOE) is authorized under the provisions of the Nuclear Waste Policy Act of 1982 (PL 97-425) to site, design, construct, operate and close geologic repositories for the disposal of civilian spent fuel and high-level wastes. The Office of Civilian Radioactive Waste Management (OCRWM) is responsible for the geologic repository program.

The regulation of spent fuel and high-level waste disposal in geologic repositories involves numerous Federal agencies, among them the DOE, the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Department of Transportation (DOT). The EPA is responsible to promulgate generally applicable standards for the management and disposal of spent nuclear fuel, high-level and transuranic radioactive wastes (40 CFR Part 191). The EPA standards are to be implemented and enforced by the NRC. The NRC regulation for disposal of high-level radioactive wastes in geologic repositories is promulgated in 10 CFR Part 60. In 10 CFR Part 60, the NRC has adopted the EPA standard as the overall system performance objective for the geologic repository after permanent closure (§60.112). In addition, the NRC has established subsystem performance objectives for the waste package, the engineered barrier system, and the natural barriers (geologic setting). Other NRC regulations, such as their standards for protection against radiation (10 CFR Part 20), are also applicable.

In addition, there will be State and local requirements that must be addressed in the licensing process. These requirements and the involvement of the responsible Federal, State, and local agencies in enforcing the requirements play an important role in the protection of public health and safety, the protection of the environment, and the implementation of a disposal solution that considers the views of the States, affected Indian tribes and the public. The DOE is committed to conducting its activities in accordance with the applicable Federal, State, and local requirements.

The DOE has already taken initial steps toward meeting this responsibility and commitment. In December, 1984, the DOE issued general guidelines, as required by the Nuclear Waste Policy Act (the Act), for use in evaluating the suitability of sites for the development of geologic repositories (10 CFR Part 960). The DOE also published draft Environmental Assessments (EA's) for public comment in December, 1984. The Department will issue final EA's, which support the nomination of at least five sites as suitable for site characterization and the recommendation to the President of three sites for site characterization, in mid 1985.

This paper briefly describes the licensing process for the first geologic repository; and, the paper identifies several major areas of uncertainty in the licensing process. These include the definition, if any, between reasonable assurance at various steps in the licensing process, and, the requirements for a licensing data base management system.

Licensing Requirements

The Department of Energy is authorized under the provisions of the Act to site, design, construct, operate, and close geologic repositories for the disposal of civilian spent fuel and high-level wastes. The regulation of spent fuel and high-level waste disposal involves numerous Federal agencies, among them the Department, the EPA, the NRC, and the DOT. In addition, there may be numerous requirements imposed by the affected States and local units of government. These will, in some cases, include requirements which flow down from Federal regulations and are applied at the State or local level.

The Department is currently identifying all such requirements as part of developing regulatory compliance plans for the three sites proposed in the draft EA's for detailed site characterization; and, the Department is committed to conducting its activities in accordance with applicable Federal, State, and local requirements. While stressing that position, it is important to note that the Department will review existing and proposed requirements in order to identify any State or local requirements that may conflict with the Department's responsibilities under the Act. In the case of these State requirements, the Department intends to establish a formal issue-resolution mechanism in the consultation and cooperation (C&C) agreements and will seek to resolve matters in a way that will enable

repository activities to proceed within the framework of the affected party's concerns.

The remainder of this paper will focus on 1) the licensing process laid out in the Act and 10 CFR Parts 2 and 60, and 2) several major areas of uncertainty in licensing interactions between the Department and the NRC.

Licensing Process

With respect to the licensing process laid out in the Act and 10 CFR Parts 2 and 60, I will only briefly mention recent accomplishments, since they are covered in more detail in other Department papers. I will focus on upcoming pre-licensing and licensing activities. The Department published general guidelines for the recommendation of sites for nuclear waste repositories (10 CFR Part 960) on December 6, 1984 and draft EA's for each of the nine potentially acceptable sites for the first geologic repository on December 20, 1984. When finalized, the EA's will support the nomination of five sites as suitable for site characterization and the recommendation of three of those sites to the President for his approval for detailed site characterization. Once Presidential approval is received, the Department will publish Site Characterization Plans (SCP's) for each of the three sites. The SCP's will be issued to the public, State and local governments, affected Indian tribes, the NRC and other Federal agencies for review and comment. Our present plans are to provide a 90-day review and comment period and to hold public hearings about midway through the comment period. Start of the exploratory shafts will be initiated after the comment period and consideration of comments.

Environmental Field Action Plans (EFAP's) and Socioeconomic Field Action Plans (SFAP's), while not part of the SCP process, will also be issued for each of the three sites. The site characterization studies will be performed to develop the information needed to more fully demonstrate the suitability of the site, design the repository, and support the license application for construction authorization. The environmental and socioeconomic studies will be performed to provide a basis for estimating impacts arising from repository construction, operation, and closure, and prepare the Environmental Impact Statement (EIS) which will support the selection of one site for development as a geologic repository. The Act stipulates that the EIS shall, to the extent practicable, be adopted by the NRC. A more thorough discussion of the activities, schedules, and major assumptions used in planning these activities is presented in the paper authored by J. W. Bennett, Department of Energy.

During the period of site characterization, the Department will publish semi-annual progress reports for the SCP's and will prepare and publish a draft EIS proposing the recommendation of one site for development as a geologic repository. After holding public hearings and receiving comments on the draft EIS, the Department will analyze the

comments received, revise the EIS as appropriate, and publish a final EIS which will accompany the Site Selection Report (SSR) to the President. After Presidential approval of the selection of one site for development as a geologic repository, the President will submit the site recommendation to Congress. Once the site designation takes effect, assuming either no notice of disapproval from the host State or affected Indian tribe or a Congressional override of any such notice of disapproval, the Department will submit a license application for construction authorization to the NRC. The NRC review of the license application will consist of the same steps as used in the review of an application for a construction permit for a nuclear power plant, with the noteworthy exception that the Act mandates a final decision approving or disapproving the issuance of a construction authorization not later than 3 years after the date of the submission of such application. The NRC may extend such deadline by not more than 1 year.

The Department currently plans a two-stage geologic repository, with the first stage licensed to receive small amounts of spent fuel in 1998 for emplacement in the repository. Stage 2 will consist of the construction of the remaining facilities needed to develop the repository to its full-scale capacity. Construction of these phases will be carried out in parallel. Construction of the Stage 2 facilities will continue, but be physically separated from, active waste emplacement operations in the Stage 1 facility.

Once the construction of Stage 1 facilities are substantially complete, the Department will amend the application for the license to receive and possess the waste, i.e. operate the repository at the Stage 1 capability. Once construction of Stage 2 facilities are sufficiently completed to permit operation of the repository at its full-scale capability, the Department will apply to amend the license in order to operate at the Stage 2 capability. Construction of additional underground workings for emplacement of wastes during the repository lifetime will continue in parallel with, but physically separated from, the disposal operations. Additional amendments to the license during the period of repository operation are not anticipated.

Licensing Uncertainty

With respect to major areas of uncertainty in the licensing process, there are several areas which are currently drawing much attention. These include the distinction, if any, between reasonable assurance at the times the NRC makes licensing decisions on construction authorization, Stage 1 operation, and Stage 2 operation; the requirements for a licensing information management system which will provide storage and ready retrieval of licensing materials; finalization of the EPA standard; adequacy of the Department's Quality Assurance programs; development of a safety classification system; design information needed in the SCP and the license application

for construction authorization; and, continuation of underground testing during NRC review of the license application for construction authorization.

The Department and the NRC have had frequent interactions on the definition of the term "reasonable assurance" and on the concept that reasonable assurance may change with time. These interactions have taken place in workshops on technical subjects or licensing and in the review and comment on generic and site-specific technical positions prepared by the NRC. The concept that reasonable assurance may consist of differing levels of certainty at different stages in the licensing process is integral to 10 CFR Part 60, in that the Department is expected to proceed from site selection and construction authorization based on the limited scale and duration of site characterization investigations, to a license to receive and possess wastes based on the larger scale of underground workings exposed in construction, to a license amendment to permit closure based on full-scale excavation of the underground workings and completion of emplacement, to finally the termination of the license after successful closure of the repository. The uncertainty appears to hinge on the question of "how much is enough" rather than on the issue that reasonable assurance may consist of differing levels of certainty at different stages in the repository program. Resolution of the question "how much is enough" will be first addressed during the NRC review of the SCP's and subsequent semi-annual progress reports. The Department will make every effort, through the use of an issues hierarchy and testing plans in Chapter 8 of the SCP's and subsequent progress reports, to define its position as to what information is needed and how much information the Department believes is enough.

The Department and the NRC are also coordinating activities leading to the establishment of a licensing information management system to facilitate storage and retrieval of key licensing and supporting documents. Each agency is currently performing a requirements study of what such a system should consist of, applicable hardware and software, users, data entry and control, and interaction with other data bases. A conceptual design of the Department's system should be completed in mid 1985.

With respect to finalization of the EPA standard, the Civilian Radioactive Waste Management program (OCRWM) is required to meet the radiation protection standard for the management and disposal of spent nuclear fuel, high-level waste, and transuranic wastes which the EPA will promulgate under 40 CFR Part 191. The Department, as well as many others, has provided comments on that standard and are awaiting both the final standard and any subsequent amendments to 10 CFR Part 60 in order to finalize many activities, among them the development of a regulatory compliance plan and a requirements hierarchy.

The adequacy of the Department's quality assurance program has also been an issue

drawing considerable attention as the Department proceeds with planning for and implementation of major pre-licensing and licensing activities such as the SCP's. The Department has developed a Quality Management Policies and Requirements document, Quality Assurance Plans, numerous quality implementing procedures, internal training for quality assurance, and a program for auditing the Project offices for compliance to applicable quality management requirements. In addition, the Department has benefited significantly from a series of public presentations by the NRC to OCRWM staff, at Headquarters and in the Project offices, on quality assurance and licensing. The NRC has also made visits to the Project offices to review the quality management activities underway. The Department is also mindful of the Ford report (NUREG-1055) and the lessons learned.

The Department is currently involved in activities leading to the development of a safety classification system for those systems, structures and components which are important to safety and waste isolation. The Department will need to interact with the NRC on this safety classification system in order to gain agreement on those features of the geologic repository, both surface and subsurface, which will require higher levels of quality management during their planning, design, and testing. In addition, these features will require a higher degree of completion of design in the license application for construction authorization, and accordingly, they will have to be identified in the SCP and referenced to the testing program so that the Department and the NRC can determine that the site characterization program will provide sufficient data to resolve any related issues such that the design of these features will be substantially complete in the license application.

Finally, the Department and the NRC have had several discussions at workshops and on draft technical positions prepared by the NRC concerning the underground testing needed to support the license application for construction authorization. Unresolved issues include types of testing (especially coupled tests), duration of testing, and continuation of testing and supplementing the license application during NRC review. The NRC has in the past taken the position that the testing needs to be substantially complete prior to submittal of the license application. The Department agrees with the NRC's position as it pertains to safety-related matters. However, the Department does plan to continue testing to support the design and expand the data base during the NRC review of the license application.

The Department and the NRC will continue to discuss these major areas of uncertainty in the licensing process in order to facilitate the preparation of a complete, high-quality license application which is responsive to the needs of the regulatory agency. The time and effort expended by both agencies in these public discussions are viewed by both agencies as a significant and necessary investment in

meeting the mandated schedule for license application and review.

Summary

The repository program has primarily focused on the licensing process mandated in the Act and 10 CFR Parts 2 and 60. The Department is currently looking at other

Federal, State, and local requirements as part of developing regulatory compliance plans for each of the three sites recommended for site characterization. The Department is committed to conducting its activities in accordance with the applicable Federal, State, and local requirements.