

REPOSITORY DEVELOPMENT: STATUS AND SCHEDULE

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ABSTRACT

The primary objective of the geologic repository program is safe and environmentally acceptable disposal of high-level radioactive wastes. It must be accomplished in a manner which is credible and responsible to the States, Indian tribes and the public; cost effective with the costs fully recoverable from the nuclear utility industry and the defense program; and in accordance with the process and schedule mandated by Congress in the Nuclear Waste Policy Act of 1982 (the Act). The selected method of disposal consists of deep, mined geologic repositories wherein a defense-in-depth approach, relying upon a series of multiple engineered and natural barriers, can be demonstrated with reasonable assurance to provide isolation of the radioactive wastes from the accessible environment for thousands of years. Within that timeframe, the radioactive wastes will have decayed to a level comparable with the naturally-occurring uranium ore from which the radioactive waste originated.

As you are aware, the Environmental Protection Agency (EPA) has the responsibility to establish generally applicable standards for the management and disposal of high-level radioactive wastes in geologic repositories, and, the EPA published 40 CFR Part 191 this past summer. The Nuclear Regulatory Commission (NRC, the Commission) has the responsibility to apply and enforce these general standards, and the NRC has promulgated 10 CFR Part 60 to define the procedures, performance objectives and technical requirements that they will use in regulating the disposal of high-level radioactive wastes in geologic repositories. The U.S. Department of Energy (DOE, the Department), in turn, is responsible under the provisions of the Act to site, design, obtain a license, construct, operate and close the geologic repositories.

The Act has established a siting process and a firm schedule for the development of the nation's first geologic repository and the receipt of wastes for disposal in 1998. The Act also established a funding mechanism for full payment of disposal costs by those who benefit from the nuclear utility industry. The Department has signed disposal contracts with the utilities which provide 1 mill per kilowatt-hour into the Nuclear Waste Fund. In addition, the contracts provided for payment of a one-time fee for nuclear-generated electricity prior to April 7, 1983. Currently, the one-time fee has generated \$1.425 billion. In addition, as of December 31, 1985, \$800 million in ongoing fees has been paid into the Nuclear Waste Fund. Finally, the Act laid out an extensive system of checks and balances, through the involvement of States, Indian tribes and the public, to ensure accountability, consultation, and cooperation between the Department and the numerous and varied parties affected by, and involved in, the geologic repository program.

CURRENT STATUS OF THE GEOLOGIC REPOSITORY PROGRAM

The safe disposal of spent nuclear fuel and high-level radioactive waste has been a national concern in the United States since the first civilian nuclear reactor began generating electricity in 1957. To date, about 3,300 million net kilowatt-hours of electricity have been generated by commercially owned nuclear generating stations. This has resulted in the accumulation of approximately 11,000 metric tons (MTU) of spent fuel in storage pools at the nuclear generating stations and at central storage facilities. In addition, a small quantity (600 MTU) of liquid high-level radioactive wastes was generated during commercial reprocessing of spent fuel at West Valley, New York, and significant quantities (8,000 MTU) of defense high-level radioactive wastes have been produced by atomic energy defense programs and are currently stored at DOE sites in South Carolina (Savannah River Plant), Idaho (Idaho National Engineering Laboratory) and Washington (Hanford Site).

These wastes, and additional high-level radioactive wastes that will be generated and stored prior to availability of the geologic repository, will result in a projected backlog of 36,000 to 45,000 MTU prior to start of waste emplacement in the first geologic repository. Under the authorized waste management system (which assumes that a second geologic repository is authorized by Congress and becomes operational in 2008), the backlog of commercial spent fuel in pools peaks approximately in 2005 at 51,900 MTU and is not fully worked off until 2030. Under the improved performance waste management system (which assumes that Congress authorizes the Monitored Retrievable Storage facility (MRS) and a second geologic repository), the backlog of commercial spent fuel peaks approximately in 2005 at 38,600 MTU and is fully worked off in 2030. As described in the MRS proposal, the MRS would not receive any wastes for processing and storage until the first geologic repository receives a construction authorization; and, the MRS would not store more than 15,000 MTU of commercial spent fuel prior to receipt of wastes for disposal at the first geologic repository.

In either case, there is a definite and continued need for at-reactor storage of spent fuel for significant periods. With existing storage technology, spent fuel inventories at nearly half of the commercial nuclear generating stations will exceed the projected storage capabilities for on-site spent fuel storage by 1998, with some reaching their storage limit as early as the mid-1980's. The Act addressed this problem by providing for research to expand existing on-site storage and by providing an option for Federal interim storage while utilities implement programs for expanding on-site storage.

PROGRAM STATUS

The status of the program can be described as five program phases that will lead to the issuance of a license to receive and emplace waste in a geologic repository by 1998:

- o Nomination and recommendation of sites for characterization.
- o Characterization of sites.
- o Selection and approval of one site for development as a geologic repository.
- o Licensing and construction authorization for the approved site.
- o Construction and performance confirmation testing for the geologic repository.

Phase I - Nomination and Recommendation of Sites for Characterization

Following the issuance of the Siting Guidelines (10 CFR Part 960) on December 6, 1984, the Department published the draft Environmental Assessments (EAs) on December 20, 1984 for nine potentially acceptable sites for the first repository. The identification of these sites was based on site screening efforts that had been underway at the time the Act was passed. The draft EAs provided a description of the sites, an evaluation of each site against the Siting Guidelines, and a comparison of the sites, guideline-by-guideline, against each other.

Based on these evaluations and the inter-comparisons, the Department proposed in the draft EAs to nominate five sites as suitable for site characterization. The proposed sites are:

- o Davis Canyon site (bedded salt) in Utah,
- o Deaf Smith County site (bedded salt) in Texas,
- o Richton Dome site (domal site) in Mississippi,
- o Hanford site (basalt) in Washington, and
- o Yucca Mountain site (tuff) in Nevada.

Of these five potential sites, the Department proposed in the draft EAs to recommend to the

President three sites for detailed site characterization: Deaf Smith, Hanford, and Yucca Mountain.

Early last year, the Department held numerous formal briefings around the country to acquaint the public with the draft EAs. The Department also held public hearings to receive comments on the draft EAs. We also received over 20,000 comments during the formal comment period which will be addressed in a comment-response document and incorporated in the final EAs as appropriate.

The final EAs are expected to be published in April 1986. At that time, the Department will recommend three sites for characterization to the President. The recommendation will include a description of the decision-aiding methodology used and the basis for selection of the three sites to be recommended to the President. The decision-aiding methodology will be a more formal, rigorous application of the multi-attribute, utility estimation methodology than contained in the draft EAs. This decision-aiding methodology is being developed by the Department, with independent review by the National Academy of Sciences Board on Radioactive Waste Management.

The Act provides for up to 60 days for Presidential approval of the recommendation of three sites for site characterization. The Department will make a preliminary determination of site suitability for development as a geologic repository. The purpose of the preliminary determination is to provide assurance that the three sites recommended for characterization have a high probability of being found acceptable after characterization.

Following Presidential approval of three sites for characterization, the Department will enter into negotiations on consultation and cooperation (C&C) agreements with the States and Indian tribes, hold scoping hearings on the environmental impact statement (EIS) to support selection of one site in 1990 for development as the first geologic repository, implement necessary activities for permitting of site characterization activities, and acquire land or land rights needed for site characterization.

Phase 2 - Characterization of Sites

The Department is required under the provisions of the Act and 10 CFR Part 60 to issue site characterization plans (SCPs) describing the testing to be performed during the site characterization program prior to sinking the exploratory shafts and mining an underground testing facility. The objectives of the testing include providing the data needed for: demonstrating the suitability of the site, aiding the selection of one site for the development as a geologic repository, advancing the repository and waste package designs, advancing the performance assessment capabilities needed to demonstrate long term isolation, and supporting the EIS and license application for construction authorization. Based on an April release date for the final EAs, the SCPs for recommended

federal site(s) will be issued in late 1986 or early 1987, and, the SCP(s) for any salt site(s) will be published approximately one year after Presidential approval of the recommendation of the three sites for site characterization.

The SCPs will describe the site, the conceptual design of the repository, and the waste package development program. They will also identify issues to be resolved during the testing and discuss the plans for testings at each of the sites. The plans will also include a preliminary performance allocation between the various repository subsystems. An annotated outline for the SCPs, based on the NRC's Regulatory Guide 4.17, has been developed by the Department and approved by the NRC. The SCPs will be submitted to the NRC, the affected States and Indian tribes, and the public for review and comment. Public hearings will be held in the vicinity of each candidate site to inform area residents of the plan and to receive their comments on the SCPs.

The Department will also issue Environmental and Socioeconomic Monitoring and Mitigation Plans. These plans will note the environmental and socioeconomic monitoring to be performed to identify impacts attributable to site characterization and the actions available to mitigate the impacts.

Following Presidential approval of the recommended sites, the Department will conduct surface-based geologic and hydrologic testing. After public review of the SCP and consideration of comments, the Department will construct two exploratory shafts and a connecting underground testing facility at each site for the site characterization program. These shafts will be to a depth of about 1,000 to 4,000 feet (300 to 1200 meters). Shaft construction at the three sites will take approximately two years. In-situ tests are planned for late 1987 through mid 1990. Throughout the site characterization period, the Department will issue semi-annual progress reports that will identify issues resolved, new issues identified, previous issues that no longer require resolution, and change in the in-situ testing program. Many of the in-situ tests will continue, as part of the performance confirmation program, through the period of time the NRC reviews the license application for construction authorization and beyond into the construction phase of the repository development.

Site characterization activities are currently projected to cost nearly five hundred million dollars at each of the three sites through 1990. Studies performed in parallel, such as advancement of repository design, development of the waste package, and enhancement of performance assessment capabilities are expected to cost approximately another five hundred million dollars per site through 1990. The Department is currently evaluating the extent to which the exploratory shafts can be incorporated into the repository; and, the Department is permitted under the provisions of the Act to include the two characterized sites

which are not selected for the first geologic repository in the second repository program.

Phase 3 - Selection and Approval of One Site for Development as Geologic Repository

The activities undertaken during the site characterization will serve as the basis for the recommendation to the President of one site for development as the first repository. This recommendation will be accompanied by an Environmental Impact Statement (EIS) that will have been prepared in accordance with the Act and the National Environmental Policy Act requirements.

When the President recommends the site for the first repository to Congress, the host State Governor or legislature may issue a notice of disapproval within 60 days of the President's recommendation. The disapproval can be overridden only by a resolution of both Houses of the U.S. Congress. If the disapproval is not overridden by Congress, the President must submit another site recommendation to Congress within 12 months.

If no disapproval is submitted, or if the disapproval is overridden, then the site designation is effective and the Department will submit a license application for construction authorization to the NRC within 90 days.

The Department is fully committed to work with the public, local units of government, States, and affected Indian tribes to identify and resolve, to the extent practicable, their concerns. The Department is currently funding State and Indian tribal participation in the review of the program. The Department will enter into negotiations for formal consultation and cooperation (C&C) agreements with the affected States and Indian tribes as a means to define the Department and State or tribal relations. A significant feature of these C&C agreements will be an issue-resolution mechanism. The Department has every intention to work closely with the affected States and Indian tribes to provide an understanding of the repository program and the siting process and to provide for their meaningful participation in the repository program and the siting process.

Major milestones for Phase 3 include:

Issuance of draft EIS for public comment	June 1990
Issuance of final EIS	December 1990
Site Selection Report	January 1991
Presidential recommendation of site to Congress	March 1991
Site designation becomes effective	May 1991
Submittal of license application for construction authorization to NRC	May 1991

Phase 4 - Licensing and Construction Authorization

Phase 4 begins with the submittal of the license application for construction authorization to the NRC in May 1991. The Act allows the NRC a three year review period, and authorizes the NRC to extend its review by one year if needed. The NRC has indicated that three years is the minimum licensing period required unless effective steps are taken to identify and resolve potential licensing issues during phases two and three. The Department believes that licensing issues can be identified and resolved efficiently by ongoing, closure and extensive interaction between the Department and the Commission.

To achieve this objective, the Department now has in place an ongoing program to keep the NRC regularly informed of the Department's plans and progress regarding site characterization, repository design, and waste package development. Additionally, the NRC has issued several generic technical positions and detailed site-specific technical positions that provide early guidance on the issues that need to be addressed during site characterization and the types of information required in the SCPs and license application for construction authorization. The Department and the NRC are also coordinating activities leading to the establishment of a regulatory data base management system to facilitate storage and retrieval of key licensing and support documents. Continued and enhanced technical communication of these types should enable the Department to submit a high-quality license application immediately upon the site designation becoming effective and should facilitate an expedited licensing review by the NRC.

Phase 5 - Construction and Performance Confirmation Testing for the Geologic Repository

Upon receiving construction authorization, the Department will begin construction of the surface and subsurface facilities. Performance confirmation testing will continue throughout this period. In addition, the Department will complete any necessary pre-operational testing in order to receive a license to accept waste and operate the facility.

The Department will construct the repository in two stages. Stage 1 consists of the construction of the surface and subsurface facilities that are required to allow the Department to accept small quantities of spent fuel in 1998. Stage 2 consists of the construction of the remaining facilities needed to develop the repository to its full-scale capacity. It is estimated that the Stage 1 facilities will be able to emplace 50 to 400 metric tons of commercial spent fuel per year. The Stage 2 facilities will be able to receive and dispose of 3,000 metric tons of spent fuel and high-level waste per year.

A two-stage repository has been adopted because it provides a mechanism for the initial

acceptance of waste by 1998. It also offers the advantage of beginning with a slower rate of waste acceptance to allow transportation and operator experience levels to mature at a reasonable pace.

SECOND REPOSITORY

Although the Act does not authorize the construction of a second repository, it does require the Department to carry out siting and development activities essential to preparation for such a facility. National surveys identified for further study 235 near-surface and exposed crystalline rock formations in three regions covering 17 States. The results of these surveys, the Regional Geologic Characterization Reports and Regional Environmental Characterization Reports (RCRs) were published in August 1985. In addition, a Screening Methodology document was published in April 1985 that described the methods to be used in identifying a smaller number of candidate areas to be studied in further detail.

On January 16, 1986, a draft Area Recommendation Report (ARR) was issued that used the results of literature studies, the RCRs and the Screening Methodology to identify and document the selection of areas for further field testing and study. The draft ARR proposed 12 potentially acceptable sites and eight backup candidate areas in seven States: Georgia, Maine, Minnesota, New Hampshire, North Carolina, Virginia, and Wisconsin. A series of 72 public briefings and hearings, extending from February 10 to mid-April, are being held to inform the public of the report and to gather comments for consideration in finalizing the report. The final ARR should be released in the summer of 1986. An Area Characterization Plan (ACP) that identifies the scope of data collection and field work to be conducted at the potentially acceptable sites is expected to be issued in late 1986 or early 1987.

STATE, INDIAN TRIBAL, AND PUBLIC INTERACTIONS

The Department has made considerable progress during the past year, particularly in the area of interactions with the States, Indian tribes, and public. The Department has instituted quarterly meetings among OCRWM management and State and Indian tribal officials, invited the States and Indian tribes to participate in the Institutional/Socioeconomic and Environmental Coordinating Groups, established a State desk officer system at DOE-Headquarters to improve direct communications with the States and Indian tribes, provided briefings on major program documents such as the draft Area Recommendation Report for the second repository program, created an electronic bulletin board to improve the flow of program information from the Department to the States and Indian tribes, and set up an electronic mail system.

In addition, the Department has continued to fund first repository States and Indian tribes, with \$6.98 million awarded in FY86 in grants (\$22.46 million to date), and second repository

States and Indian tribes, with \$2.34 million awarded in FY86 grants (\$7.59 million to date). The funding to Indian tribes in the second repository program in FY86 was the first time that the Department had provided them grants (\$30,000 for review of the draft Area Recommendation Reports).

These activities, building upon previous efforts to increase the participation of the States and Indian tribes in the geologic repository program, demonstrate OCRWM's commitment to the consultation and cooperation provisions in the Act. The Department

anticipates an even greater degree of interaction with the States and Indian tribes over the next year, as major milestones - such as the negotiation of formal consultation and cooperation agreements, development of environmental and socioeconomic monitoring and mitigation plans, issuance of applicable State and local permits, solicitation of scoping comments on the EIS, and solicitation of comments on the SCPs during the public comment period - are met. The ability to provide meaningful participation for the States, Indian tribes, and public will continue to support the progress of the repository program in the next year and beyond.