

REPOSITORY PLANS/ANTICIPATED PROGRESS AND PROBLEMS WITH SITING

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ABSTRACT

The geologic repository program within the Office of Civilian Radioactive Waste Management has made considerable progress during 1984 in implementing the site selection process mandated in the Nuclear Waste Policy Act of 1982. Major milestones attained during the year included publication of a draft Mission Plan, Siting Guidelines, draft Environmental Assessments for each of the nine potentially acceptable sites under consideration for the first geologic repository, draft Regional Geologic Characterization Reports and Draft Environmental Characterization Reports for each of the three regions covering 17 States under consideration for the second geologic repository, and a draft screening methodology document for screening the approximately 250 crystalline rock bodies in the region-phase studies to a more workable number in the area-phase studies for the second geologic repository.

In addition, the Department has made considerable progress in promoting public interaction and implementing the consultation and cooperation process with the affected States and Indian tribes. Major activities in these areas included multiple reviews of the Siting Guidelines, public meetings with the Nuclear Regulatory Commission (NRC) to resolve NRC concerns leading to NRC concurrence on the Siting Guidelines, periodic program information meetings with the first and/or second repository States and affected Indian tribes, negotiation of a draft consultation and cooperation agreement with the State of Washington, grants to the affected States and Indian tribes to participate in the review of the program, and publication of draft Environmental Assessments in advance of the nomination and recommendation of sites for detailed site characterization.

The progress made in 1984 demonstrates that the Department is well along in the first of five major program phases, which I described at WASTE MANAGEMENT '84 last year, leading to licensing of the Department to receive spent fuel in 1998 for emplacement in the geologic repository. The phases include: 1) recommendation of sites for characterization; 2) characterization of sites; 3) selection and approval of one site for development as a geologic repository; 4) construction authorization for that site; and 5) construction and performance confirmation testing for the geologic repository. The Department remains firmly committed to, and has entered into disposal contracts based on, receipt of spent fuel in 1998 for emplacement in a geologic repository for permanent isolation from the biosphere.

In this paper, I will describe the status and management strategy associated with each program phase, discuss major milestones associated with each program phase, and highlight those opportunities or obstacles which have the potential to accelerate or delay the achievement of program goals.

INTRODUCTION

The Nuclear Waste Policy Act of 1982 (the Act) authorizes the Department of Energy to site, design, construct, operate, and close geologic repositories for the disposal of civilian spent fuel and high-level wastes. The Act lays out a detailed siting process and schedule; and, the Act mandates a comprehensive process for public interaction and consultation and cooperation (C&C) between the Department and the affected States and Indian tribes. Considerable progress has been made in each of these areas. Where balancing the priorities between the two areas has been necessary, the Department has consistently placed more importance on public interaction, particularly with the affected States and Indian tribes, while still recognizing the need to achieve the mandated goal of receiving and emplacing wastes in the geologic repository by 1998. To date, the balancing of priorities has contributed to delays in meeting the near-term schedule and has placed pressure on longer-term milestones due to schedule compression.

In this paper, I will describe the status and management strategy associated with each of five program phases leading to issuance of a license to receive and emplace wastes in the geologic repository. I will discuss major milestones associated with each program phase; and, I will highlight those opportunities or obstacles which have the potential to accelerate or delay the achievement of program goals (including schedule).

Program Phases

The major program phases leading to licensing of the Department to receive wastes in 1998 for emplacement in a geologic repository are:

1. Recommendation of sites for characterization,
2. Characterization of sites,
3. Selection and approval of one site for development as a geologic repository,
4. Construction authorization for that site, and
5. Construction and performance confirmation testing for the geologic repository.

The Department considered a wide variety of scheduling possibilities, as detailed in the draft Mission Plan, that might lead to the completion of the tasks within each program phase and the achievement of the overall goal of safe and environmentally-acceptable disposal of wastes in a geologic repository by 1998. After analyzing these alternative schedules, the Department adopted a "reference schedule" for achieving this schedular objective for the first geologic repository. This reference schedule can be characterized as optimistic and success-oriented, and major assumptions used in developing the reference schedule will be presented in the following discussion.

Phase 1. Recommendation of Sites for Characterization

The Department promulgated general guidelines for the recommendation of sites for the nuclear waste repositories on December 6, 1984. These Siting Guidelines (10 CFR Part 960) are described in detail at this conference in a separate paper authored by Carol Hanlon, Department of Energy. In summary, the Siting Guidelines establish the technical criteria and the process, consistent with the Act and NRC requirements, which are the basis for repository siting. The Department published draft Environmental Assessments (EA's) for each of the nine potentially acceptable sites for the first geologic repository on December 20, 1984 for public comment period. The draft EA's provide 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-comparison, the Department proposed in the draft EA's to nominate five sites as suitable for site characterization. These are the Davis Canyon site in Utah, the Deaf Smith County site in Texas, the Richton Dome site in Mississippi, the Hanford site in Washington, and the Yucca Mountain site in Nevada. The Department also proposed in the draft EA's to recommend to the President three sites for detailed site characterization. These are the Deaf Smith County site in Texas, the Hanford site in Washington, and the Yucca Mountain site in Nevada. The draft EA's are described in detail at this conference in a separate paper authored by Ellison Burton, Department of Energy.

The 90-day public comment period on the draft EA's expired on March 20, 1985. The Department is now in the midst of the massive job of reviewing and categorizing the comments received to date. Comments received after March 20 will be considered, to the extent possible, in preparing the final EA's. Subsequent milestones for Phase 1 include:

Issuance of final EA's, nomination, and recommendation of sites for characterization to the President	September, 1985
Presidential approval of recommended sites	November, 1985

Key assumptions used in developing this schedule include: 1) no extension of the public comment

period, 2) key comments are received on time, 3) the volume of comments received is not major, 4) major rewrites of the EA's are not needed to address the comments received, and 5) final EA's are prepared for only the five nominated sites. The Department should be in a better position to assess the feasibility of achieving this schedule after the critical review of the comments received has been completed and resultant revisions required to prepare the final EA's have been identified.

The Department is committed to a thorough evaluation and consideration of the comments received on the draft EA's; and, the Department will include an appendix in the final EA's which discusses the comments received, the resolution of the comments, and changes made in the final EA's in response to the comments. In addition, the Department will hold meetings with Federal agencies, affected States and Indian tribes during the finalization process to clarify the intent of their comments and to discuss the Department's resolution of the comments.

However, the Department fully recognizes that issuance of the final EA's, the nomination and recommendation, and Presidential approval are needed prior to starting certain critical-path activities in Phase 2 of the program.

Phase 2. Characterization of Sites

After Presidential approval of the recommended sites for characterization, the Department will issue Site Characterization Plans (SCP's) in accordance with the provisions of the Act and 10 CFR Part 60. The SCP's 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 testing in each of these areas. Site characterization will consist of surface-based testing and underground testing at the projected depth of the geologic repository in order 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. In addition, environmental and socioeconomic field studies will be performed in order to quantify the impacts of site characterization, 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.

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 the repository design, development of the waste package, and performance assessment, are expected to cost another five hundred million dollars through 1990. Site characterization will include construction of two exploratory shafts, underground connections between the shafts, and testing rooms at the projected repository depth in order to perform in-situ tests under realistic conditions and scales of dimension and time. There will also be surface-based construction needed to support the

underground construction and testing, as well as to support any surface-based testing included in the SCP's.

Support activities and reports to be incorporated into the SCP's have been underway for some time; for example, agreement was reached with the NRC on an annotated outline for the SCP's on February 13, 1985. Issues to be addressed in the SCP's have been the subject of workshops with the NRC, DOE studies, and NRC technical position papers over the past several years.

Major milestones for Phase 2 include:

Issuance of SCP's:

Basalt	December, 1985
Tuff	December, 1985
Bedded Salt	October, 1986

Start of site preparation:

Basalt	Completed
Tuff	December, 1985
Bedded Salt	December, 1986

Start of construction of first exploratory shaft:

Basalt	April, 1986
Tuff	June, 1986
Bedded Salt	May, 1987

Completion of first exploratory shaft:

Basalt	October, 1987
Tuff	September, 1987
Bedded Salt	November, 1988

Start of construction of second exploratory shaft:

Basalt	February, 1987
Tuff	September, 1987
Bedded Salt	May, 1987

Completion of underground connections between shafts:

Basalt	October, 1988
Tuff	January, 1988
Bedded Salt	February, 1989

This schedule for site characterization milestones is based on certain key assumptions, among them: 1) the Department will proceed with site preparation and construction of exploratory shafts during NRC review of the SCP's, 2) NRC comments on the SCP's will be addressed in the semi-annual progress reports, 3) land acquisition and State or local permits will be accomplished in a timely manner, 4) the process is not delayed by lawsuits, and 5) the preliminary determination of site suitability will be made shortly after Presidential approval of the recommendation of three sites for site characterization.

This latter assumption should be explained in more detail. The Department is required in the Act, as part of the NEPA compliance process, to make a

preliminary determination as to the suitability of the three sites for development as a geologic repository. The Department interprets the Act to mean that the preliminary determination of site suitability can be made, based on the Siting Guidelines and the same information used in the EA's to nominate and recommend the sites, shortly after Presidential approval of the recommendation. The Department fully expects all three sites will survive site characterization and be found suitable for development as a geologic repository. However, it is the Department's position that if a site is found to be unsuitable during or after site characterization, the Department can nonetheless proceed with a recommendation to the President of one of the other characterized sites for development as a geologic repository. In other words, all three sites do not have to survive site characterization in order to have an adequate set of alternatives to consider in the NEPA process. The Department believes that the characterization of multiple sites, while providing alternatives, was based primarily on the need to have at least one site survive site characterization and keep the program moving forward within the schedule mandated in the Act.

The Department disagrees with the view that the selection of one site for development as a geologic repository can only be made from a field of three fully-characterized sites which have been found suitable for a geologic repository. In that case, a finding of unsuitability for a site would cause a delay in excess of five years during which time another site must be recommended (necessitating an EA to support the recommendation) and characterized (necessitating an SCP, design and construction of exploratory shafts and underground workings, and public interaction with an additional affected State).

The Department also disagrees with the view that more than three sites should be characterized in order to assure that three fully-characterized sites are available as alternatives during the selection of one site for development as a geologic repository. The inclusion of an additional site would add nearly one billion dollars per site to the cost of the repository program, yet would provide very little, if any, benefit to the repository program, public health and safety, or the environment.

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

During Phase 2, the Department will issue semi-annual progress reports on the site characterization as mandated by the Act and 10 CFR Part 60. These semi-annual progress reports will identify issues resolved, new issues identified, or previous issues which no longer require resolution. The issues will be tied, through an issues hierarchy, to the performance objectives in the EPA standard (40 CFR Part 191) and the NRC rules (10 CFR Part 60). Design of the repository, including the waste package and the underground facility, will advance to a level needed to support a license application for construction authorization. Environmental and socioeconomic field studies will establish a basis for estimating impacts of repository construction, operation, and closure. Performance assessment capabilities will be advanced to the position of

being able to confidently predict overall system and subsystem performance using numerical techniques and codes which have been adequately documented, benchmarked, and validated.

These activities and others performed during the period of site characterization will serve as the basis for an Environmental Impact Statement (EIS) and Site Selection Report (SSR) supporting the recommendation of one site to the President for development as a geologic repository. 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

Key assumptions used developing this schedule include: 1) the underground testing will be sufficiently complete to adequately demonstrate site suitability, support design of the repository, and support the license application for construction authorization, 2) the SSR will not be issued draft for public comment, 3) the President approves the recommended site within 60 days, 4) the site designation becomes effective within 60 days, and 5) the host State or any affected Indian tribe do not file a notice of disapproval with Congress.

With respect to the first assumption, the Department has adopted a position, consistent with 10 CFR Part 60, that underground testing can be broken into phases, with that needed for construction authorization substantially completed during site characterization and the NRC review of the license application for construction authorization. Additional underground testing and continuation of the underground testing started during site characterization will be performed as part of the performance confirmation program during the construction of the repository and the NRC review for the license to receive and emplace wastes in the repository.

The Department published its position on underground testing in March, 1984; and, the Department has just completed commenting on a draft technical position on underground testing published by the NRC. The Department and the NRC will continue to discuss the underground testing required during site characterization to support the license application for construction authorization and during performance confirmation to support the application for a license to receive and possess wastes for disposal in the geologic repository.

With respect to the notice of disapproval by the host State or any affected Indian tribe, 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 is also looking towards negotiating formal C&C agreements with the affected States and Indian tribes. A significant feature of these C&C agreements will be a formal issue-resolution mechanism. Public interaction is described in detail at this conference in a separate paper authored by Barry Gale, Department of Energy. 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 in order to minimize the likelihood that they will file a notice of disapproval with Congress.

Phase 4. Construction Authorization

The Department will begin Phase 4 by submitting a license application for construction authorization to the NRC in May 1991. The Act allows the NRC a three-year review period. Further, it authorizes the NRC to extend its review by one year if needed. It should be pointed out, however, that the reference schedule would require the NRC to complete its review in less than three years if the 1998 date is to be met.

The Department believes that the review time may be shortened and unnecessary delays can be avoided if the NRC and the Department effectively use the 5 to 6 years of interaction between the Department and NRC to systematically identify and resolve potential licensing issues. Through the use of semi-annual progress reports on site characterization and frequent technical meetings between the two agencies, the NRC will be continuously informed of the Department's plans and progress regarding site characterization and repository design.

Additionally, the NRC has issued several generic technical positions and detailed site-specific technical positions which provide early guidance on the issues that need to be addressed during site characterization and the types of information required in the SCP's and the license application for construction authorization. The Department is currently evaluating the use of topical reports to solicit NRC review and comment on specific technical aspects of the program. 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 supporting 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, as assumed in the reference schedule.

Whereas I have focused this discussion on receiving construction authorization from the NRC, the regulation of spent fuel and high-level waste disposal in geologic repositories involves numerous

federal agencies, among them the Department, the EPA, the NRC, and the Department of Transportation, and numerous State, Indian tribal and local requirements which must be addressed in the licensing process. This subject is discussed in more detail at this conference in a paper authored by Ralph Stein, Department of Energy. The Department is committed to conducting its activities in accordance with applicable Federal, State, Indian tribal, and local requirements.

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

Upon 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 underground facilities that are required to allow the Department to accept small quantities of spent fuel beginning in 1998. Stage 2 consists 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.

It is estimated that the Stage 1 facilities will be able to emplace 50 to 400 metric tons of commercial spent fuel per year; however, no special consolidation or packaging will be possible at the limited-capability facilities. The Stage 2 facilities will be able to receive and dispose of 3000 metric tons of spent fuel and high-level waste per year, with full capability to consolidate and package spent fuel. It will also be capable of receiving and handling other waste forms, such as DHLW and solidified high-level waste from the West Valley, New York, facility.

The Department has adopted a two-stage repository because it provides a mechanism for the initial acceptance of waste by January 1998. It also offers the advantage of beginning with a slower rate of waste acceptance, thereby allowing transportation and operator experience levels to mature at a comfortable pace. This should enable the workers to cope more expertly with the full-scale acceptance workload of Stage 2.

Reference Schedule - Second Repository

Although not included in the previous discussion, I would be remiss if I did not acknowledge the significant progress made in the crystalline studies and describe the current status and strategy of studies leading to the selection of a site for the second repository. In 1984, the Department published draft Regional Geologic Characterization Reports (RGCR's) and draft Regional Environmental Characterization Reports (RECR's) for each of the three regions, covering 17 States, under consideration. In addition, a draft screening

methodology document for screening the approximately 250 crystalline rock bodies in the region-phase studies to a more workable number in the area-phase studies was published.

Currently, however, the crystalline rock program is dealing with approximately 250 crystalline rock bodies covering tens to hundreds of square miles in 17 different States in the eastern United States. After finalization of the RGCR's, the RECR's, and the screening methodology document, the Department will screen the crystalline rock bodies to identify a smaller number (15-20) of candidate areas undoubtedly in fewer States. The Department will issue draft Area Recommendation Reports (ARR's) for the States to review in late 1985.

Area characterization plans will be issued for the States to review; and, field investigations in the recommended areas will begin in fall 1986. Field investigations will be completed in the fall of 1989 and candidate sites for nomination will be identified in late 1990.

Thereafter, the process of siting and developing the second repository will be very similar to that of the first repository, i.e. EA's will be prepared to support the nomination and recommendation of sites for site characterization and SCP's will be prepared describing the detailed site characterization program. The second repository will not use the two-stage approach. Instead, the current strategy is to proceed with construction of the full-scale repository facilities without any intermediate steps. Subsequent major milestones for the second repository are:

- Issue final Environmental Assessments June 1991
- Nominate and recommend sites for site characterization July 1991
- Request Congressional authorization for construction of a second repository March 1993
- President recommends site for second repository to Congress December 1997
- Submit license application for construction authorization to NRC February 1998
- Receive construction authorization from NRC and begin construction May 2000
- Begin emplacement of radio-active waste March 2006

CONCLUSION

The Department is committed to beginning the operation of the first geologic repository in 1998. The Act clearly requires a best effort by the Department to meet the 1998 date. The Department acknowledges that the 1998 date is dependent upon meeting an aggressive schedule, is optimistically

stated, and requires the cooperation of the public, local units of government, affected States and Indian tribes, and other Federal agencies, particularly the NRC.

The Department will work to eliminate or minimize delays, particularly for those activities which are under its control. If delays are encountered, the Department will pursue, if appropriate, alternatives that allow future phases of the program to be

completed in less time than is assumed in the reference schedule. Substantial progress was made in both the first and second repository programs in 1984; however, the pace of the programs and the workload to be accomplished must pick up markedly in 1985 in order to provide assurance that the overall goal of a safe and environmentally-acceptable geologic repository on-line in 1998 can be met.