

JUL 31 1989

Mr. Sam Rousso, Acting Director
Office of Civilian Radioactive Waste Management
U. S. Department of Energy
Washington, D. C. 20545

Dear Mr. Rousso:

The Nuclear Regulatory Commission's (NRC) regulations for disposal of high-level radioactive wastes in geologic repositories (10 CFR 60.16) require that the Department of Energy (DOE) submit a Site Characterization Plan (SCP) before proceeding to sink shafts at a site and to defer sinking of such shafts until such time as there has been an opportunity for Commission comments to have been solicited and considered by DOE. On December 28, 1988, DOE submitted the SCP for the Yucca Mountain Nevada site, supplementing that submittal with the Exploratory Shaft Facility (ESF) Design Acceptability Analysis (DAA) on February 9, 1989.

The NRC staff has reviewed the SCP and DAA; our concerns are identified in this letter and in the enclosed staff's analysis of the SCP, which is called the Site Characterization Analysis (SCA). We have organized our concerns into three categories. These categories are: (1) objection, which is a matter of such immediate seriousness to a particular area of the site characterization program that NRC would recommend DOE not start work in that area until it is satisfactorily resolved; (2) comment, which is a concern with a particular program area or areas that would result in a significant adverse effect on licensing if not resolved, but that would not cause irreparable damage if activities in those areas were started prior to resolution; and (3) question, which is a concern with the presentation of the program in the SCP that precludes understanding an important program area well enough for the NRC staff to be able to completely evaluate that area. A question identifies a concern that could result in a significant adverse effect on licensing if not resolved, but that would be unlikely to cause irreparable damage if activities in that area were started prior to resolution.

The NRC considers all concerns identified in this letter and in the SCA to be serious and encourages DOE to give full attention to each in an attempt to resolve them early during site characterization. In particular, DOE should give early priority to addressing those concerns which may most significantly impact the determination regarding site suitability. In accordance with 10 CFR 60.18(g), DOE should discuss modifications in the site characterization program made to address NRC's SCA concerns in its semiannual site characterization progress reports.

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Overall the SCP shows improvement over the Consultation Draft Site Characterization Plan (CDSCP). Nevertheless, the staff still has many major concerns and raises two objections. These objections involve the need to implement a baselined quality assurance (QA) program before beginning site characterization, and the need for DOE to demonstrate the adequacy of both the exploratory shaft facility (ESF) design and the design control process.

The NRC staff raised a concern regarding QA in its review of the CDSCP because a program meeting NRC requirements was not then in place. That is still the case and thus the concern remains. However, as you are aware, NRC and DOE have agreed on a step-by-step approach for resolution of this concern. Several of the agreed upon steps necessary to resolve this concern have already taken place. Once the agreed upon steps have been satisfactorily accomplished, for each of the participants involved in a given area, the NRC has no QA related concern with DOE proceeding with that area of its site characterization program while it continues to complete the steps needed for other areas of the site characterization program. At a July 6, 1989 NRC-DOE QA meeting, the approach to resolution of this QA concern was discussed and reaffirmed.

The ESF concern arises because the SCP and the ESF Design Acceptability Analysis (DAA) do not demonstrate the adequacy of the design control process under which the ESF design presented in the SCP (Title I design) was developed or the adequacy of the design itself. This concern is based on the fact that the ESF will become part of the repository itself if the site is found to be acceptable. To resolve this concern, DOE needs to demonstrate the adequacy of both the design control process and the design which will ultimately be used for the ESF. An important part of that strategy needs to be timely interactions with the NRC staff as the design control process and design are developed. During a meeting on July 6-7, 1989, the DOE and NRC staffs took the first steps toward a mutually acceptable approach whereby the NRC staff can gain an early understanding of the adequacy of the ESF design control process and of the ESF design, so that this concern can be resolved in parallel with completion of the final ESF design.

With regard to the second category of concerns, NRC has a number of comments on various site characterization program areas. NRC staff offers specific recommendations for approaches to resolve each comment through improvements which should be made early in the ongoing site characterization program. These improvements should advance attainment of our mutual goal of a site characterization program which will result in sufficient information for early identification and resolution of issues and, if the site is found to be acceptable, a complete and high quality license application. Particularly important comments requiring DOE management attention are highlighted below.

- (1) Total system performance assessments need to be conducted periodically, starting at an early date. Such assessments should be used to decide whether the 10 CFR Part 60 requirements, including those which implement the EPA environmental standards, will be satisfied. NRC staff also considers the use of total system performance assessments to be very important to integrate data gathering activities during site characterization. In particular, total system performance assessments need to be used together with subsystem (10 CFR 60.113) performance assessments to provide an early and ongoing evaluation of whether any of the potentially adverse conditions (10 CFR 60.122) significantly affect the ability of the site to meet the 10 CFR Part 60 performance objectives and whether data being gathered are adequate to make this determination.

- (2) Investigations associated with tectonic phenomena should receive early attention. At the Yucca Mountain site, thorough understanding of tectonic phenomena such as volcanism, faulting, and seismicity is critical to the identification of potentially disqualifying conditions. The NRC staff considers that a full range of tectonic models reasonably supported by the existing data base should be considered in planning the tectonics investigations. High priority should be given to conducting those investigations which can lead to a determination of whether the site is subject to an unacceptably high probability of disruption as a result of volcanism, faulting, or seismicity. These investigations need to be conducted as early as possible in site characterization.

The full spectrum of site characterization activities should proceed, with proper coordination and integration. This recommendation is not intended nor should it be interpreted to mean that there should be a delay in any other surface-based testing or in ESF construction.

- (3) The need for improved technical integration of the overall site characterization program is illustrated by both the performance assessment and tectonics concerns. Although many of the individual segments of the program are of high quality, it is unclear how they are being incorporated into a coordinated and integrated program. For example, there appear to be some situations related to tectonics investigations where geophysical and geological activities intended to gather data required as input to assessments of potentially adverse conditions, e.g., faulting, may not be carried out until well after those assessments have been initiated.

Other situations exist where it appears DOE plans to conduct intrusive activities, e.g., drilling and trenching, prior to, or without, conducting nonintrusive geophysical and geological activities that could provide information needed to optimize the locations of proposed drillholes and trenches. Likewise, it is not clear that data obtained from holes drilled for one investigation will be utilized as possible input into other investigations or, more importantly, that the number of boreholes has been minimized (hence minimizing potential damage to the site) by integrated planning to select borehole locations that could be used to obtain data for diverse investigations. Furthermore, the concern mentioned earlier regarding the need for total system performance assessments early in the site characterization program to integrate data gathering activities and guide evaluations of potentially adverse conditions also reflects a need for stronger coordination and integration.

- (4) The discussion of alternative conceptual models presented in the SCP is an improvement over that found in the CDSCP. While some potentially important models may have been overlooked, the range of models considered in the SCP appears sufficiently wide that essential investigations are unlikely to be precluded. Although the NRC staff considers the objection raised during the review of the CDSCP regarding the treatment of alternative models to be resolved to the extent that it is now in the comment category, this issue is central to a successful site characterization program and should be treated more effectively in an early site characterization progress report. The NRC staff continues to be concerned that the SCP does not reflect an understanding that the models and their alternatives must be systematically integrated across the various technical disciplines. Furthermore, it is unclear that the studies proposed will, in all cases, provide the data necessary to adequately differentiate among the various alternative models in question.

Based on the specific concerns identified in the SCA, NRC has a broad programmatic concern that the pressure to meet unrealistic schedule milestones may leave DOE insufficient time to plan and to execute proper technical information-gathering activities necessary to develop a sufficient understanding of the site, and to develop a complete and high-quality license application. The NRC pointed out this danger in its September 16, 1988 letter to DOE on the Draft 1988 Mission Plan Amendment in which it noted

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that the schedule for near term program activities, including in situ site characterization, was being compressed. Specifically, despite a delay in the start of both exploratory shaft construction and in situ testing, all the subsequent program milestones were unchanged. In the SCP, DOE has not demonstrated that its current schedules allow time for conducting the site characterization activities needed to support the license application. A recent development that illustrates this concern is DOE's decision to proceed with the ESF Title II design even though the baselined quality assurance (QA) program under which that design is to be developed has not been accepted by DOE. This appears to be driven by the attempt to meet milestones for construction of the ESF.

In closing, in order to ensure that DOE fully understands our concerns and to reach a mutually agreeable approach for resolving them, we stand ready to meet with you and your staff as necessary.

Sincerely,

Original signed by:

Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

Enclosure:
Site Characterization
Analysis

cc: R. Loux, State of Nevada
C. Gertz, DOE-NV/YMPO
D. Bechtel, Clark County
M. Baughman, Lincoln County
S. Bradhurst, Nye County

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
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Site Characterization
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