

5/06/91

MEMORANDUM FOR: Joseph Holonich, Acting Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management, NMSS

FROM: Ronald L. Ballard, Chief
Geosciences and Systems Performance Branch
Division of High-Level Waste Management, NMSS

SUBJECT: PHASE I REVIEW OF DOE STUDY PLAN 8.3.1.8.1.1 "STUDY
PLAN FOR PROBABILITY OF MAGMATIC DISRUPTION OF THE
REPOSITORY"

This memorandum transmits the results of a Phase 1 review of the Department of Energy's (DOE's) Study Plan 8.3.1.8.1.1. This review was conducted in accordance with the procedures provided in the Review Plan for NRC Staff Review of DOE Study Plans, Revision 1, dated December 6, 1990. Based on this review we conclude that we have no objections to this study plan, but would recommend that this Plan be subjected to a detailed review. The reasons for these conclusions are as follows:

Bases for No Objections

1. The Study Plan appears to be consistent with the NRC/DOE agreement on Level-of-Detail for Study Plans.
2. The objectives of this Study Plan appear consistent with the objectives of the Volcanism Investigation Plans presented in the Site Characterization Plan (SCP). As the primary purpose of this study plan is to provide probability values for inclusion in determining compliance with the overall system performance objective, the primary objective is necessary and technically defensible in the context of the overall site characterization program.
3. There is no field work associated with this plan; therefore:
 - a) There are no activities which could have a significant unmitigable impact on the waste isolation capabilities of the site;
 - b) There are no activities which could interfere with other site characterization activities; and
 - c) There will be no use of radioactive materials.
4. The Study Plan appears to have been developed under an acceptable Quality Assurance Program.

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ENCLOSURE 1

Bases for Recommendation for Detailed Technical Review

1. The subject matter of this Study Plan directly relates to several open items raised during review of the SCP (see, for example, SCA comments 45, 49, and 52). Resolution of any concerns raised during a detailed technical review of this Study Plan could also result in closing the SCP Study Plan open items.
2. The Study Plan states that "The major identified concern is whether or not there is any evidence of the presence of magma bodies in the crust beneath the Yucca Mountain region," and "we [the DOE] will evaluate ... [geophysical data] ... to make two decisions. First, are the data obtained sufficient to resolve questions of the possible existence of crustal magma bodies? Second, is evidence present from the geophysical studies that is indicative of the presence of crustal magma bodies. If the answer to either question is positive, we will develop a document ... [describing these additional studies which] ... will become an appendix to this Study Plan."

The DOE is in possession of teleseismic data which may indicate a magma body, and seismic lines which contain bright spots which may be a magma body. The NRC staff needs to review the Study Plan to determine if it is sufficient to resolve the open items in light of this information.

3. This Study Plan is one of the main plans for integrating the results of other volcanism study plans. Integration was a major concern raised during the SCP review, and review of this Study Plan could help partially resolve the concern. We note, however, that based on review of the DOE response to the NRC Site Characterization Analysis it may be necessary to review this plan in conjunction with the DOE Test and Evaluation Plan.
4. The preliminary evaluation conducted during the Phase 1 review suggests that the probability calculations and assessments presented in Section 3.4 of the Study Plan are not structured in a manner which is consistent with providing probability assessments which will demonstrate compliance with the EPA Standard. For example, formula 2 on page 30 lists 4 inputs to the conditional probability. E1 (the conditional probability of a volcanic event) and E2 (the probability of repository disruption given a volcanic event) appear to be conditional probabilities which should be included in the probability calculation. Some of the elements contained within E3 (the release probability) appear to be correctly assigned within the probability calculations, however, it appears that certain elements should be included in the calculation of consequences. E4 (the probability of exceeding the regulatory requirements) appears to be an extraneous value in relationship to the CCDF. The concern as to the appropriate end use of the information obtained from this plan needs to be addressed in the context of performance assessment. However, unless the probabilities obtained from this plan can be used in the demonstration of compliance,

the validity of the entire plan is in question. Evaluation of this concern will require significant input from the Performance Assessment Section.

- 5. The use of expert opinion, as outlined within this plan, is an area of concern which relates to several SCA comments and open items - especially comment 3. While this plan states that the exact procedures for the application of expert opinion have not yet been established (see page 40), the use of expert opinion related to volcanism investigations needs to be resolved in the context of the overall concerns related to expert opinion. This is especially important in the context of DOE's proposed use of expert opinion to weight the various models to obtain a probability distribution function. Evaluation of this concern will also require significant input from the Performance Assessment Section.

Should you have any questions, please contact John Trapp on X20509.

RS

Ronald L. Ballard, Chief
Geosciences and Systems Performance Branch
Division of High-Level Waste Management, NMSS

cc: K. Stablein, HLPD

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4. The preliminary evaluation conducted during the Phase 1 review suggests that the probability calculations and assessment presented in Section 3.4 of the Study Plan are not structured in a manner which is consistent with providing probability assessments which will demonstrate compliance with the EPA Standard. For example, formula 2 on page 30 lists 3 inputs to Pr, the conditional probability. E1 (the conditional probability of a volcanic event) and E2 (the conditional probability of repository disruption by a new volcanic center) appear to be conditional probabilities which should be included in the probability calculations. However, both of these conditional probabilities neglect the effect of disruption due to events at an existing volcanic center. E3 (the conditional release probability) contains elements which appear to belong in the probability calculations and elements which appear to belong in the consequence evaluation. Without further information describing how this value of E3 is to be used it would appear to produce a Pr value which could be misleading for evaluation of the CCDF. The concern as to the proper end use of the information gained from this plan needs to be addressed in the context of performance assessment. However, unless the probabilities obtained from this plan can be used in the demonstration of compliance, the validity of the entire plan is in question.