



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 25 1991

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

FROM: Ronald Ballard, Chief
Geology and Engineering Branch
Division of High-Level Waste Management

SUBJECT: -PHASE I REVIEW OF STUDY PLAN - ANALYSIS OF
THE PALEOENVIRONMENTAL HISTORY OF THE YUCCA MOUNTAIN REGION
(STUDY PLAN 8.3.1.5.1.4, REVISION 0)

As requested, we have completed the Phase I review of the Study Plan - Analysis of the Paleoenvironmental History of the Yucca Mountain Region (see Enclosure A). This review (see Enclosures B and C) was conducted using the Review Plan for NRC Staff Review of DOE Study Plans, Revision 1 (December 6, 1990).

The subject study plan consists of three activities: (1) modeling of soil properties in the Yucca Mountain region, (2) surficial deposits mapping in the Yucca Mountain area, and (3) eolian history of the Yucca Mountain region. Work described in the study will examine surficial deposits to determine climatic conditions and surficial processes throughout the Quaternary. The record of the past climatic changes provides input for predicting the possible range of future climate conditions in the Yucca Mountain region. The data will assist in evaluating the effects of future climates on surface water, unsaturated zone, and saturated zone hydrology, which is essential to address the objective of limiting radionuclide releases to the accessible environment. Dating surficial deposits will also constrain the ages and recurrence intervals of Quaternary fault movements.

The principal findings of this review are: (1) the document may be considered a candidate for a detailed technical review, and (2) the studies described will not have any adverse effect on repository performance, site characterization, or on characterization schedules. The first principal finding is based upon the study plan's: (1) relationship to a number of key site-related issues, (2) pertinence to a number of NRC open items, and (3) the use of unique state-of-the-art tests not having supportive history of providing data usable in licensing (see Enclosure B). For the multiple bases underlying the second principal finding see Enclosure B, pp. 2-3.

However, having identified the study plan candidacy for a detailed technical review, we note that 11 of the 28 technical procedures remain to be documented. They are now listed as "TBD" (to be determined). These undocumented procedures include key work activities to be conducted in the field, the laboratory and in computer modeling. For example, a sampling of the procedures "TBD" includes: (1) the determination of rates of soil development, (2) mineralogical analyses, and the dating of soils and other materials using (4) trace element

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geochemistry, (5) cation-ratio, (6) radiocarbon, and (7) thermoluminescence techniques. It is essential that the 11 procedures be completed before undertaking a detailed review of the study plan. We therefore recommended that a detailed technical review of the study plan not be performed until these important procedures are completed by the DOE. Since the study plan was prepared by the contractor, the U.S. Geological Survey in October, 1990, and submitted to the NRC on June 24, 1991, it may be that several, or all, of the 11 "TBD" procedures have been finalized during the October, 1990 - October, 1991 interim. This matter should be confirmed through contact with the DOE. If the 11 procedures have been finalized, we would recommend that the detailed technical review be initiated as soon as possible.

Before undertaking a detailed review, the following matter requires DOE clarification. The Review Plan indicates that the study plan specify test tolerance, accuracy, and precision. This is assumed to mean "as appropriate". With regard to this matter a number of tests (e.g., Sampling Airborne Dust, p. 3-3) indicate "no explicit requirements for tolerance, accuracy, or precision have been specified for this test". With no further explanation given, the meaning of the statement is not clear. For example, does it mean (1) that no requirements are necessary or (2) that requirements have yet to be determined? A detailed review of this study plan would require that such test parameters be identified, where required, and that, where not required, a definitive statement be made to that effect.

The use of as-of-yet-unqualified existing borehole data has been identified as a part of this study plan (Activity 8.3.1.5.4.2 - Surficial Deposits Mapping of the Yucca Mountain Area). DOE indicates (Section 3.2.3.3, p. 3-17) that such data "will be qualified as appropriate." Since many site characterization tests and analyses (in addition to those identified in the subject study plan) will rely heavily upon existing borehole-derived data, it is essential that a program aimed at qualification of existing borehole data be developed, initiated and accomplished by the DOE as soon as possible. This qualification process will require the utilization of considerable resources in terms of personnel, time and finances. The timing and use of such resources will have a considerable impact on the program schedule, especially if the qualification process determines that the data (some or all) can not be qualified. If this is the case, the redrilling of many boreholes, with the attendant negative impact on the overall site characterization schedule, may be considered necessary. Given the unavailability of qualified existing borehole data, the timing of study plan input and output as identified in this study plan, for example, would be moot. The DOE should be encouraged to develop an existing borehole data qualification program, the culmination of which can be shown to be compatible with the scheduling of site characterization activities identified in this, and previously submitted, study plans.

We also found the submittal of the study plan to be somewhat deficient because some references have not been provided to the NRC (see Enclosure B, p. 2). We request a copy of each of those references that are assumed not to be readily available and may request additional listed references to support future reviews or technical exchanges (see Enclosure D).

The review was conducted by Harold Lefevre of the Geology and Geophysics Section, HLGE and John Bradbury of the Hydrologic Transport Section, HLHP. Mr. Lefevre can be reached on extension 23464. Dr. Bradbury can be reached on extension 20535.



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Enclosures:

- A (Study Plan)
- B (Phase I Reviewer Report)
- C (Review Plan Considerations)
- D (References)

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