

August 30, 1993

NOTE FOR: William J. Boyle, Geotechnical Engineer

FROM: Shiann-Jang Chern, Geotechnical Engineer

SUBJECT: DOCUMENT REVIEW OF DOE's EXPLORATORY STUDIES FACILITY TECHNICAL
BASELINE (YMP/CM-0016)

I have completed the Scoping Review of the DOE's report entitled "Exploratory Studies Facility Technical Baseline" (YMP/CM-0016, November 23, 1992) according to the HLWM Document Review and Approval Procedure dated October 27, 1992. This reviewed document does not require a Detailed Technical Review (DTR). The reasons why the DTR is unnecessary are described in the attached document. However, there are several questions raised during this review. Those questions are listed in the general review comments.

DOCUMENT SCOPING SHEET

FILE NUMBER:

DOCUMENT: EXPLORATORY STUDIES FACILITY TECHNICAL BASELINE, YMP/CM-0016, by Yucca Mountain Site Characterization Project Office, Department of Energy, November 23, 1992.

REVIEWER: S. J. Chern
Geotechnical Engineer

DATE SCOPING COMPLETED: August 30, 1993

DATE APPROVED: August, 1993

REASON(S) WHY A DETAILED TECHNICAL REVIEW IS NOT NEEDED AT THIS TIME:

The reasons why a detailed technical review are not needed at this time for the YMP/CM-0016 document are based on the following technical judgements:

1. Does the document contain data and discussions of technical issues affecting the direction of the current DOE program?

The answer is no. This technical report is an overview and record summarization document for the completed Title I design for the ESF. Most technical information presented in this report was adopted from the ESF Design Requirements (DOE, 1992) and ESF Alternative Study (Dennis, 1991). It contains no data and discussions that will affect the direction of current DOE program.

2. Are there technical/programmatic concerns with the content?

There are no technical/programmatic concerns in this report. The second volume of this report contains the ESF design drawings. However, it is a good summarization but out of date document. DOE will update the technical baseline document as the ESF project proceeds. Therefore, I recommend this report does not need to go through a detailed technical review (DTR). However, some general comments generated from this review may be applicable to the next DOE/NRC ESF technical exchange meeting.

REPORT SUMMARY:

This report provides the summary of design information prior to the start of Title II (definitive design). It presents the Title I (preliminary design) concepts, proposed testing requirements, potential repository requirements within the ESF, and plans for ESF closure and decommissioning. The report also addresses the approach to the Title II definitive design, Title III construction and inspection, and operations and testing in the ESF. It also documented the major change of ESF configuration of the surface-to-underground access from two vertical shafts to a pair of declined ramps.

This is a two volume document. The first volume documented the overall site information, environmental aspects, design aspects, ESF design, ESF/potential

repository interface, ESF closure and decommissioning, Title II design, and ESF operations and testings. The second volume documented all the ESF design drawings. This report also contains ESF Title I design drawings, outline specifications, and cost and schedule information.

REVIEW COMMENTS:

General Comments:

1. The responsibility of the M&O contractor is not defined in this document.

The M&O contractor has been in the placed for more than two years. This document does not mention the role of the M&O contractor. It is not clear what is the M&O's responsibility regarding the ESF design. If the M&O will replace RSN as the ESF designer, DOE should address whether the ESF design will have some modifications.

2. This report does not address the impact to the ESF design if the slope of TS North ramp will be changed.

The DOE has proposed a changing design slope of TS North ramp, due to the transportation of multiple purpose containers (MPC). If the slope of the TS North ramp will be modified, then the total length of ramp will be different. DOE should fully evaluate the impact to the repository design and performance assessment due to slope change.

3. DOE does not address how to assess the damaged zone, if proposed controlled drilling and blasting techniques will be used to excavate the assembly chamber at the TS/CH ramp intersection.

This document states that "the chamber is excavated using controlled drilling and blasting techniques to achieve the angular turnout and specific dimensions desired". DOE should address the method to verify that the design can meet the Geologic Repository Operation Area (GROA) design criteria and performance objectives, if the controlled drilling and blasting techniques will be applied in underground excavation.

4. DOE does not address why discrete element method (discontinuum approach) was not selected in the thermo-mechanical numerical calculations.

This report states that fifteen reports or studies published to date on the thermo-mechanical calculations using finite-element method, boundary method, and tunneling-index methods. The finite-element and boundary element methods were based on the continuum theory. Jung (1992) concluded that "the continuum finite element models consistently predict less joint slippage than the corresponding discrete element analyses", because the continuum model averages the effects of the joints. If a slip zone will occur, the calculations performed by two approaches could have an order of magnitude difference. Therefore, it is suggested that DOE should compare the results calculated from discrete element and finite element methods for the Yucca Mountain project.

5. DOE does not address the impact of the potential large volume of water discharging into the ESF due to construction, fire fighting, and dust control.

This document does not address or analyze the potential impact if a large quantity of water will be discharged into ESF during the construction period.

6. DOE does not address whether the ESF design is flexible enough to take into account the possible changes of waste emplacement scheme and/or thermal loads.

DOE has proposed changes in the waste emplacement scheme and above-boiling and below-boiling thermal loads design concepts. This document does not address that the current ESF design is flexible enough to incorporate the changes.

7. A parameter described in this document is inconsistent with Reference Information Base (RIB).

The fracture frequencies of TSw3 described in this document are inconsistent with the parameter listed in the RIB.

REFERENCES:

Dennis, 1992, "Exploratory Studies Facility Alternatives Study Final Report". SAND91-0025, SNL, Albuquerque, NM, 1992.

DOE, 1992, "Yucca Mountain Site Characterization Project Exploratory Studies Facility (ESF) Design Requirements (ESFDR)". YMP/CM-0019, DOE, YMPO, Nevada, July 02, 1993.

Jung, J, 1992, "A Study of Discrete and Continuum Joint Modeling Techniques". LBL-32379, Volume 3 of 3, Presented at Fractured and Jointed Rock Masses Conference, June 3-5, 1992, Lake Tahoe, CA.