



Department of Energy  
Washington, DC 20585

DEC 24 1992

Mr. Joseph J. Holonich, Director  
Repository Licensing & Quality Assurance  
Project Directorate  
Division of High-Level Waste Management  
Office of Nuclear Material Safety  
and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Holonich:

Enclosed with this letter is a controlled copy of Study Plan 8.3.1.4.2.2, Revision 2 prepared by the U.S. Department of Energy (DOE) for the Yucca Mountain site. The study plan numbers correspond to the same numbers used in the Site Characterization Plan (SCP) for the Yucca Mountain site.

Number

Title

8.3.1.4.2.2, R2	"Characterization of Structural Features in the Site Area"
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DOE has reviewed the study plan for consistency with the content requirements for study plans, as given in Attachment B to the Summary of the DOE/U.S. Nuclear Regulatory Commission (NRC) meeting on the Level-of-Detail for the SCP (May 7-8, 1986). DOE is submitting this plan to NRC as agreed to in the meeting.

As discussed during the DOE/NRC meeting (December 15, 1988) on study plans, DOE has decided to control preparation and review of study plans as a quality activity. This study plan was reviewed under current Yucca Mountain Site Characterization Project Office (YMPO) and U.S. Department of Energy/Headquarters quality assurance (QA) procedures.

Study plans prepared under current procedures do not require detailed information on QA requirements. To satisfy the May 7-8, 1986, agreement to provide specific QA requirements, current study plans indicate that applicable QA criteria will be specified in Yucca Mountain Site Characterization Project QA Grading Reports, which are issued as separate controlled documents.

It should also be noted that there may be some inconsistencies in the milestone report titles and schedules given in this study plan and those in the SCP. Study plans, in general, represent a further evolution of the study in the areas related to schedules

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and milestones relative to the SCP, and as such, represent DOE's current plans.

Revision 2 of Study Plan 8.3.1.4.2.2 represents a thorough revision that incorporates DOE's current Exploratory Studies Facility (ESF) design configuration. The initial phase of ESF construction for the underground workings is expected to begin as early as April 1993, and the ESF geologic mapping activity of this plan will need to start concurrently. Therefore, DOE is requesting that the NRC advise DOE of the results of its Phase I review within 90 days after this plan is received by NRC.

DOE wishes to call to NRC's attention Site Characterization Analysis (SCA) Open Comment 36 and Question 5, which were directed to Study Plan 8.3.1.4.2.2. Enclosure 2 provides a discussion of how these open items are addressed in the study plan.

The Document Transmittal/Acknowledgement Record for your controlled copy of the study plan should be signed and dated and returned to the Document Control Center in Las Vegas, Nevada.

If you have any questions, please contact Mr. Chris Einberg of my office at 202-586-8869.

Sincerely,



*for*

John P. Roberts  
Acting Associate Director for  
Systems and Compliance  
Office of Civilian Radioactive  
Waste Management

Enclosures:

1. Study Plan 8.3.1.4.2.2, R2
2. Relation of Study Plan 8.3.1.4.2.2,  
R2, to NRC Open Items

cc: w\enclosures 1 and 2  
Alice Cortinas, CNWRA, San Antonio, TX

cc: w\enclosure 2

C. Gertz, YMPO  
R. Loux, State of Nevada  
T. Hickey, Nevada Legislative Commission  
M. Baughman, Lincoln County, NV  
J. Bingham, Clark County, NV  
B. Raper, Nye County, NV  
P. Niedzielski-Eichner, Nye County, NV  
G. Derby, Lander County, NV  
P. Goicoechea, Eureka, NV  
C. Schank, Churchill County, NV  
F. Mariani, White Pine County, NV  
V. Poe, Mineral County, NV  
E. Wright, Lincoln County, NV  
J. Pitts, Lincoln County, NV  
R. Williams, Lander County, NV  
J. Hayes, Esmeralda County, NV  
B. Mettam, Inyo County, CA  
C. Abrams, NRC

RELATION OF STUDY PLAN 8.3.1.4.2.2, R2, TO NRC OPEN ITEMS

**Comment 36:**

Open Comment 36 expresses concern that the perimeter drift of the ESF will be in the imbricate normal fault zones on the east side of the proposed repository and asks how studies will characterize the distribution and abundance of faults encountered in the ESF.

**Response:**

The ESF design no longer includes a perimeter drift as part of the current revision. Both the north and south ramps are located such that they will penetrate the projected trace of the imbricate normal fault zone near the north and south ends of the proposed repository block. Detailed mapping of the rock exposed in the ramps (Study 8.3.1.4.2.2.4) will provide extensive information about the lateral extent of and relative offsets along this zone. This study will measure fracture (including fault) characteristics as outlined in Table 2.4-1 on p. T-17 of the revised Study Plan (8.3.1.4.2.2, Revision 2). From these primary data, derived data will be developed from observations made in the ramps and drifts. The derived data will be made available to those doing the performance assessment.

**Open Question 5:**

Open Question 5 deals with the rationale for planning only vertical exploratory boreholes. Your letter requests we provide information on: (1) how the new ESF configuration will help in characterizing vertical and near-vertical structures; (2) what fracture data will be collected in the ESF; (3) how underground data will be related to the surface-fracture network studies; and (4) whether the underground data will be adequate to characterize high-angle fractures or whether additional data will be needed.

**Response:**

The ESF is composed of primarily low-angle (<8° grade), relatively large-diameter (18 to 30 ft) openings and should afford an excellent opportunity to observe vertical and near-vertical fractures.

Underground openings will provide access to a larger sampling of fractures and allow observation of more of the fracture extent than is possible in individual boreholes. Limited borehole examination of faults will be available in angled holes drilled along the ramp alignments. Mapping underground has the further advantage of allowing detailed observation of abutting relationships between fractures.

A large portion of the ESF drifts and ramps is oriented to encounter major features at nearly right angles allowing an accurate measurement of the thickness of fault zones. Additional smaller drifts will be excavated into selected fault zones (during excavation) to allow detailed studies to occur at those zones without the constraints of working in the main ramp excavations.

The primary fracture data to be collected underground are shown on Table 2.4-1 on p. T-17 of Study Plan 8.3.1.4.2.2, Revision 2. Data includes fracture orientation, aperture, roughness, infilling type and thickness, trace length, and abutting relationships and terminations. The data categories will be nearly identical to those gathered at the surface by Surface-Fracture Network Studies (8.3.1.4.2.2.2) and in boreholes by Borehole Evaluation of Faults and Fractures (8.3.1.4.2.2.3). A common database is planned to handle the data from all three activities, so the data can be manipulated in similar fashion for all three sources.

While the data produced from the ramps and drifts should provide an excellent representation of the structural regimes along the excavations, they may not be typical of fractures at areas of the proposed repository block where no excavations penetrate. In these areas (such as Solitario Canyon, at the southwest edge of the proposed repository block), information from surface-fracture and borehole studies will be necessary to supplement the data collected underground.