YMP-021-R1
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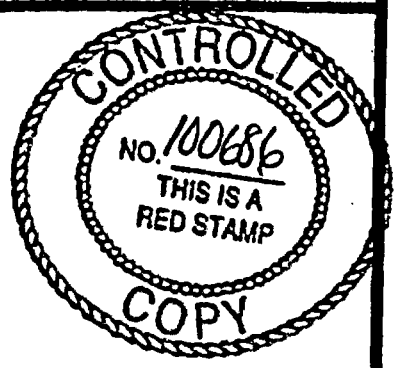
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
STUDY PLAN APPROVAL FORM



Study Plan Number 8.3.1.4.2.1

Study Plan Title CHARACTERIZATION OF THE VERTICAL AND LATERAL DISTRIBUTION OF STRATIGRAPHIC UNITS WITHIN THE SITE AREA

Revision Number 2

Prepared by: U. S. GEOLOGICAL SURVEY

Date: FEBRUARY, 1993

Approved:

J. Timothy Sullivan for 2/23/93
Director, Regulatory and Site Evaluation Division / Date

Effective Date: _____

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Some of the data necessary to determine rock correlation and spatial variability in this study plan is similar to data being collected at Los Alamos National Laboratory (Study 8.3.1.3.2.1, Mineralogy, petrology and rock chemistry of transport pathways; Study 8.3.1.3.2.2, History of mineralogical and geochemical alteration of Yucca Mountain). Likewise, geological interpretations from this study are essential for adequate characterization of the transport pathways being investigated elsewhere. Therefore, we envision close communication and information exchange with scientists at Los Alamos in areas of potential overlap (mineralogy, petrology and diagenesis) so that data sets collected by each group are unique and complimentary.

The information obtained in this study will be used to produce a comprehensive, three-dimensional characterization of the spatial extent and variability of rock units within and around the proposed repository site. Much of the work in this study plan is directed toward identifying and predicting vertical and lateral variations in stratigraphic units and rock properties in areas of the repository block where relatively few subsurface samples will be collected. These data are critical to development of a "rock unit geometry and properties" model component (Fig. 1.1-2), which along with "fracture geometry and properties" and "fault geometry and properties" components (Study 8.3.1.4.2.2), will be used to develop an integrated three-dimensional geological model of the Yucca Mountain site (Study 8.3.1.4.2.3). A well-defined, three-dimensional stratigraphy also provides an essential geological context for concurrent mineralogical and alteration studies at LANL (Studies 8.3.1.3.2.1 and 8.3.1.3.2.2) in terms of ignimbrite eruption, deposition, cooling, devitrification and primary permeability interpretations. In addition, further hydrological, geochemical and thermal/mechanical property characterization investigations (SCP sections 8.3.1.2, 8.3.1.3, and 8.3.1.15, respectively) are strongly dependent on this geological framework in order to most accurately quantify parameters required in each of these fields, for instance, quantification of potential permeable-flow pathways, groundwater travel times, sorptive capacities of natural barriers, ambient temperature distributions, and appropriate subdivision of stratigraphy in terms of thermal and mechanical units. Results from each of these property characterization studies (geological, hydrological, geochemical and thermal/mechanical) will ultimately be integrated into a physical property model which is directly linked to repository performance assessment. In addition, rock property data determined in this study are directly applicable to development of design criteria for the underground facility. shaft and borehole seals and waste package configuration.

Previous geological and geophysical studies of the Yucca Mountain region are summarized in Chapter 1 of the SCP and a comprehensive review of geophysical activities is given by Oliver, et al (1990). Although the stratigraphic, volcanological, structural, geophysical and tectonic interpretations included in these references are sufficient to provide a regional geological context into which the Yucca Mountain site can be placed, the quality of data for existing vertical and lateral distribution of stratigraphic units are inadequate to establish a three-dimensional model on a localized scale at the confidence level required by SCP

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RECOMMENDATION

DOE should consider modifying Formula 2 to reflect the requirements for demonstrating compliance with the overall performance objective.