



98 East Naperville Road
Westmont, IL 60559-1595

ENGINEERS INTERNATIONAL, INC.

Telephone: 312/963-3460
Facsimile: 312/968-6884
Telex: 280102 ICO OAKR
Cable: ENGINT

86 JUL ~~1~~ A3:41

27 June 1986
Ref. No. 1148-07-05
Letter No. 072

U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD 20910

Attention: Mr. John Buckley

Subject: Contract No. NRC-02-84-002, Task Order No. 007
"Technical Assistance for In Situ Testing"

Dear John:

Please find enclosed the document review requested by you on 29 April 1986. Please call if you have any questions.

Best regards,

Sincerely,

ENGINEERS INTERNATIONAL, INC.

Swapan Bhattacharya
Swapan Bhattacharya
Project Engineer

SB/bt

Enclosure

cc: Dr. Dinesh Gupta
Mr. David Tiktinsky

WM-RES
WM Record File
D1004
EI

WM Project 10, 11, 16
Docket No. _____
PDR ✓
LPDR ✓ (B, N, S)

Distribution:

Buckley

(Return to WM, 623-SS)

8607140368 860627
PDR WMRES EECENGI
D-1004 PDR

3163

EI DOCUMENT REVIEW

FILE NO: 1148-07

DOCUMENT: "Recommended Matrix and Rock Mass Bulk, Mechanical, and Thermal Properties for Thermomechanical Stratigraphy of Yucca Mountain", Sandia National Laboratories Keystone Document 6310-85-1, October 1984.

REVIEWER: Engineers International, Inc.

DATE APPROVED:

DATE REVIEW COMPLETED: 25 June 1986

SIGNIFICANCE TO NRC WASTE MANAGEMENT PROGRAM:

The rock properties data included in this document are expected to be used in geotechnical design and performance assessment calculations by the DOE. Therefore, it is important that the NRC evaluate the validity and representativeness of presented data.

BRIEF SUMMARY OF DOCUMENT:

The document provides summary tables of rock matrix and rock mass bulk, mechanical, and thermal properties of the various rock units occurring at the Yucca Mountain site. Formulas used to obtain the derived rock properties, such as Poisson's ratio, deformation modulus etc. are provided. These data are to be formally published in the Site Characterization Plan (SCP).

PROBLEMS, DEFICIENCIES OR LIMITATIONS OF REPORT:

1. The data for several rock properties appear to be different from those presented in Table 6-40, p. 6-326 of the final EA. This discrepancy may be due to additional test data included in this document that were unavailable during preparation of the final EA.
2. No details are provided on the number and types of tests from which the data have been derived. Also, the mean and standard deviations of data are not provided making it impossible to assess the variability of the properties and adequately account for the variability in design.
3. Some of the formulas used to derive rock properties such as angle of internal friction and tensile strength (p. 10) lack empirical validation and hence may be of questionable value. The basis for using only porosity data to derive such rock properties is debatable.

4. The definitions of the terms "lithophysal-rich" and "lithophysal-poor", used to describe portions of the Topopah Springs member, are not provided. The manner in which the lithophysal effect is taken into account in the rock mass properties is also not explained.