

July 26, 2004

Dr. Asadul H. Chowdhury, Manager  
Mining, Geotechnical, and Facility Engineering  
Center for Nuclear Waste Regulatory Analyses  
6220 Culebra Road P.O. Drawer 28510  
San Antonio, TX 78238-5166

Subject: REPOSITORY DESIGN AND THERMAL-MECHANICAL EFFECTS KEY  
TECHNICAL ISSUE INTERMEDIATE MILESTONE NO.20.06002.01.102.422,  
EVALUATION OF GEOTECHNICAL DATA AT YUCCA MOUNTAIN SITE-  
LETTER REPORT

Dear Dr. Chowdhury:

We have received and reviewed the subject Intermediate Milestone, "Preliminary Evaluation and Analyses of the U.S. DOE Geotechnical Data for the Waste Handling Building Site at the Potential YM Repository," by S. Gonzalez, J. Stamatakos, K. Murphy, and H.L. McKague dated June 2004. The report is a thorough evaluation and analysis of geotechnical data that are likely inputs to preclosure facilities' seismic safety assessments. The report identifies data most important to ground amplification, by fully utilizing the lithstratigraphic column, and linking geophysical characteristics with the stratigraphy. We have a few comments in the form of potential questions to the U.S. Department of Energy and to you which are attached to this letter.

The report shows the way to future definitive evaluations of geotechnical data for Waste Handling Building and other surface facilities. With the comments and suggestions discussed in the attachment, the subject Intermediate Milestone report is considered acceptable to fulfill the Center's contractual obligations. No further action is considered necessary on this report, however, more discussions may be needed on how the contents of the report will be used by the staff. Daniel Rom and Philip Justus of the U.S. Nuclear Regulatory Commission staff contributed to the review of this report. If you have any questions on the contents of this letter, please contact me at (301) 415-6695 or via e-mail at [msn1@nrc.gov](mailto:msn1@nrc.gov) or the above reviewers directly.

Sincerely,

/RA/

Mysore Nataraja, Program Element Manager  
Technical Review Directorate  
Division of High-Level Waste Repository Safety  
Office of Nuclear Material Safety  
and Safeguards

Enclosure:  
General Comments

## General Comments

1. Although the title of the Center for Nuclear Waste Regulatory Analyses report reflects the title used in the U.S. Department of Energy (DOE) report, the characterization work presented is for the entire surface facility envisioned at the time the study was planned, and not for the Waste Handling Building as stated in the report. The text should clarify this point. The Aging Facility was planned after the study was completed.
2. The report mentions the model showing all faults cutting through the Quaternary alluvium and the topography as a convenience in modeling, and not a statement indicating fault trace in the overburden alluvium. Did the scope of the review of the DOE report include a determination of whether the faults do show up in the overburden? Are the faults active and their trace visible at the surface? Do they need to be considered in the design of the foundations for the surface facilities? Is there enough evidence collected to make a statement on the absence of fracture traces in the overburden soil?
3. We understand that DOE is planning another geotechnical study of the surface facility area to complement the study presented in this report. There will be additional studies to characterize the overburden material. Therefore, to the extent possible, definitive statements on the acceptability and conclusions should be conditioned to the extent the data presented in the DOE report are representative of the site and data to be collected in the planned site characterization work.
4. The code "Proshake" assumes horizontal layering. Is it applicable for this site (see Figure 4-1 of the report) or is there a way of using the code for non-horizontal layers?
5. The modeling exercise resulted in identifying parameters which have significant impact on the results of the model.
6. The report is innovative in that it takes DOE's borehole stratigraphic data and builds a 3D geologic framework model of the WHB site vicinity. The model is then used to query the completeness of the BH data and of DOE's interpretation, because some anomalous structures - folds and structural highs - are a consequence of the model assumptions...and the consequences include the potential presence of otherwise undetected faults. The model (in EarthVision) shows that the WHB is on a wedge-shaped mass of alluvium, and that the bedrock foundation surface is very irregular (rough topography) due to the differential erosion of buried fault scarps, some of significant relief - 10s of meters.
7. Additional Information Needs. The preliminary modeling results can be the basis for your consideration of requests for additional information from DOE.

(A) The information sought concerns the potential sensitivity of seismic responses to the considerable range of thickness of alluvium at the site (near zero to max, due to the wedge geometry) and the potential for wave focusing, or other complex seismic responses to the high-relief interface (surface) of the alluvium - bedrock contact.

(B) A line of questions for DOE that I request you consider asking is based on the fact that DOE dug a 300meter-long trench from the North Portal southwesterly (1980's, by

ENCLOSURE

Geomatrix). That trench revealed bedrock faults and fractures in the suprajacent alluvium. Most of the fractures appeared to be extending from faults and fractures in the underlying bedrock (where they could be traced in the trench wall from alluvium to bedrock). The trace of the Midway Valley trench lies within DOE's figure 224 (same as Gonzalez, et al., figure 2-1 on p. 2-3 of the deliverable. The query regards DOE's intention to use the trench log as additional data for corroborating the location of the faults mapped and shown in the figure 2-1.

(C) The report provides a basis for querying DOE on potential drafting errors on fault displacement categorization and on the potential for buried faults in areas of bedrock high (see discussion concerning potential ramp at Fault 12).

(D) What is the level of confidence with the data on shear modulus and damping ratios of alluvium and tuff derived from only 1 and 18 samples, respectively (p. 3-13, et seq.). Does DOE consider them representative?

(E) Regarding the layer boundaries discovered: Qal/Pre-Ranier Mesa Tuff and Tiva upper lithophysal/Tiva middle non-lithophysal. What is the practical significance of this discovery. Should we expect similar distinction at the Topopah Spring ul/Topopah Spring mn? How important could that be to design or performance assessments?

July 26, 2004

Dr. Asadul H. Chowdhury, Manager  
Mining, Geotechnical, and Facility Engineering  
Center for Nuclear Waste Regulatory Analyses  
6220 Culebra Road P.O. Drawer 28510  
San Antonio, TX 78238-5166

Subject: REPOSITORY DESIGN AND THERMAL-MECHANICAL EFFECTS KEY  
TECHNICAL ISSUE INTERMEDIATE MILESTONE NO.20.06002.01.102.422,  
EVALUATION OF GEOTECHNICAL DATA AT YUCCA MOUNTAIN SITE-  
LETTER REPORT

Dear Dr. Chowdhury:

We have received and reviewed the subject Intermediate Milestone, "Preliminary Evaluation and Analyses of the U.S. DOE Geotechnical Data for the Waste Handling Building Site at the Potential YM Repository," by S. Gonzalez, J. Stamatakos, K. Murphy, and H.L. McKague dated June 2004. The report is a thorough evaluation and analysis of geotechnical data that are likely inputs to preclosure facilities' seismic safety assessments. The report identifies data most important to ground amplification, by fully utilizing the lithostratigraphic column, and linking geophysical characteristics with the stratigraphy. We have a few comments in the form of potential questions to the U.S. Department of Energy and to you which are attached to this letter.

The report shows the way to future definitive evaluations of geotechnical data for Waste Handling Building and other surface facilities. With the comments and suggestions discussed in the attachment, the subject Intermediate Milestone report is considered acceptable to fulfill the Center's contractual obligations. No further action is considered necessary on this report, however, more discussions may be needed on how the contents of the report will be used by the staff. Daniel Rom and Philip Justus of the U.S. Nuclear Regulatory Commission staff contributed to the review of this report. If you have any questions on the contents of this letter, please contact me at (301) 415-6695 or via e-mail at [msn1@nrc.gov](mailto:msn1@nrc.gov) or the above reviewers directly.

Sincerely,

**/RA/**

Mysore Nataraja, Program Element Manager  
Technical Review Directorate  
Division of High-Level Waste Repository Safety  
Office of Nuclear Material Safety  
and Safeguards

Enclosure:  
General Comments

**DISTRIBUTION: CNWRA 2004 0117**

HLWRS r/f	MBailey	FBrown	DBrooks	ACampbell	LCampbell
ECollins	DDeMarco	GHatchett	BJagannath	TKobetz	LKokajko
RLatta	BLeslie	TMatula	TMcCartin	BMeehan	WPatrick
CWReamer	BSagar	DSpitzberg	NKStablein	EWhitt	PJustus
Albrahim	DRom	YKim			

**ML042050032**

<b>OFC</b>	HLWRS	HLWRS
<b>NAME</b>	MNataraja	MBailey
<b>DATE</b>	07/26/04	07/26/04