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MEMORANDUM TO: Michael J. Bell, Chief
Engineering and Geosciences Branch
DWM/NMSS

THRU: Mysore Nataraja, Acting Section Leader *Raj*
Geosciences/Geotechnical Engineering Section
Engineering and Geosciences Branch
DWM/NMSS

FROM: Stephen McDuffie, Geologist *>1400 06/06/95*
Philip Justus, Sr. Geologist *Justus*
Harold Lefevre, Geologist *HL*
Geosciences/Geotechnical Engineering Section
Engineering and Geosciences Branch
DWM/NMSS

SUBJECT: TRIP REPORT FROM THE NRC-DOE SITE VISIT ON SURFACE-BASED
ACTIVITIES, YUCCA MOUNTAIN, NEVADA, MAY 17-18, 1995

On May 17-18, 1995, staff of the U.S. Department of Energy (DOE) and its contractors met with staff of the U.S. Nuclear Regulatory Commission and the Center for Nuclear Waste Regulatory Analyses (CNWRA), at the Yucca Mountain Field Operations Center (FOC), to discuss ongoing surface-based site characterization activities. Representatives of the State of Nevada and Affected Units of Local Government were present; an attendance list is attached. Tom Bjerstedt and Mark Tynan of DOE convened the meeting with some introductory comments, then Steve Beason of the U.S. Bureau of Reclamation discussed the ongoing mapping activities at the Exploratory Studies Facility (ESF). Beason outlined the four types of activities conducted by the mapping crew. These include stereophotography, full periphery mapping, a detailed line survey, and consolidated sampling. Beason then discussed some of the structural features in the ESF which mappers have observed to date. Dave Kessel of Sandia National Laboratories provided information on predicted rock quality in both the north ramp and the Topopah Spring main drift. He explained how actual rock quality data feed into ground support design.

Later on the 17th, the group departed for the drilling pad at UZ-7A to discuss the Ghost Dance fault (GDF). Rick Spengler and Warren Day of the U.S. Geological Survey (USGS) gave an overview of the fault zone, including some of the results from recent seismic reflection profiles conducted across the UZ-7A pad by Ernie Majer of Lawrence Berkeley Laboratories (LBL). Sherilyn Williams-Stroud/USGS discussed the fracture network in the hanging wall of the Ghost Dance fault at the UZ-7A pad. The group later hiked to the top of Whaleback Ridge to observe a trench across the GDF. Warren Day, Emily Taylor, and Dave Buesch of USGS discussed interpretations of this exposure. Current estimates give the GDF a width of about 250 feet on Whaleback Ridge, with approximately 90 feet of vertical offset. Quaternary offset on the GDF is still uncertain, though all Quaternary deposits trenched to date indicate no offset by the GDF. A future trench north of Whaleback Ridge, along with deepening and lengthening of trenches in Split Wash, may better resolve this issue.

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After descending Whaleback Ridge, the participants returned to the FOC for more presentations. Bob Elayer of Morrison-Knudsen reported on the status of repository design models. Such models are being constructed using the Lynx geologic modeling system, and they will likely be converted to the EarthVision system in the future. Dave Kessel followed with a brief presentation on logging the north ramp stratigraphy. Tom Brocher/USGS provided information on two recent seismic reflection lines. One extends from the southern tip of the proposed repository block across Crater Flat through Steve's Pass, and the other from west of the repository block to Fortymile Wash. Brocher gave some preliminary interpretations of the data. A final report on these reflection profiles is due in October 1995. Ernie Majer discussed three repository high-resolution seismic reflection lines. The initial data were of marginal quality but future tests, along the same lines using different equipment, are expected to yield much better information. Majer also discussed the reflection survey done across the GDF at the UZ-7A pad.

Mark Tynan gave an introduction to the 3-D geologic modeling effort, then Dave Jefferis/EG&G provided more detail. Jefferis has been working to create an easy conversion from the Lynx modeling system to EarthVision. Within a month or so, the EarthVision geologic model database will be accessible through the World Wide Web. Through an arrangement with the EarthVision vendor, anyone will be able to temporarily download EarthVision from EG&G. Therefore, users with Web access and Silicon Graphics hardware will be able to manipulate (in a read-only fashion) the model as they wish. The last presentation was by Dave Ferrill/CNWRA, who discussed CNWRA's recent finite element modeling of hanging wall deformation during listric faulting. The day concluded with an hour for participants to discuss work individually with Principal Investigators (PIs). Several PIs had poster displays of their recent findings, as did Dave Ferrill.

On May 18, the group reconvened at trench RV-4 on the Rock Valley fault. Jim Yount and Dennis O'Leary of USGS provided interpretations of this ongoing work. Trench RV-4 was placed across a photolineament, which is the south trace of the Rock Valley fault. The preliminary trench interpretations suggest one slip event at this trench, probably Holocene age, with perhaps 1 meter of left-lateral offset. Although samples have been collected for dating, no definitive ages were available. Trench RV-3 crosses the north trace of the Rock Valley fault. A Late Holocene unit here is not broken by the fault plane, but underlying units which are offset suggest 2-3 slip events. Further trenching is planned at this location.

The group next gathered at the Fran Ridge fracture pavement for a discussion of the fracture mapping recently completed by Don Sweetkind/USGS. His interpretations of fracture sets and interconnections will be useful for hydrologic modelers, as well as tectonic modelers trying to tie fractures to the regional stress history. Alan Flint (USGS) outlined the ways in which such fracture data are helpful to hydrologic modelers.

The next stop was on Yucca Crest near the Little Prow. Chris Potter discussed the Sundance fault, which theoretically would intersect the Solitario Canyon fault (SCF) in this area. However, no evidence of a northwest-trending,

right-lateral structure like the Sundance has been found in this area. The group walked to a trench (excavated circa 1980) across the SCF where it crosses the Little Prow. This trench exposes a breccia zone about 30 feet wide, as well as a basaltic dike which apparently injected along the SCF. Several in the group walked part way down into Solitario Canyon along the fault. Basalt and fault breccia were both visible downslope. A notable observation was the paucity of hanging wall deformation in this area, especially in comparison with the GDF hanging wall.

The afternoon was spent visiting trenches in Crater Flat. The first stop was trench CFF-T2A across the Crater Flat fault, where Jeff Coe/USGS provided interpretations. Coe believes three separate rupture events may be identified in this trench. He sees offset through Late Pleistocene stratigraphy, and possible Holocene displacement. Total offset is approximately 1 meter. A nearby trench across the same photolineament is said to have no observable offset; it was not visited. The group later visited trenches CFF-T1 and CFF-T1A. These trenches expose what is either the southern extent of the Crater Flat fault or a splay of the Windy Wash fault. Emily Taylor was in the early stages of logging CFF-T1 during the visit, so interpretations were highly speculative.

In summary, the site visit successfully apprised NRC and CNWRA staff of recent progress in surface-based investigations. Moreover, it was well orchestrated by DOE. If there are any questions regarding this report, McDuffie can be reached at 415-6684, Justus at 415-6745, and Lefevre at 415-6678.

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ATTACHMENT

NRC SITE VISIT 5/27/95

<u>NAME</u>	<u>ORGANIZATION</u>
Ralph Rogers	M30/WLFS
Chuck Weisenberg	USGS
Leon Pette	NWTRB
LARENCE M. SZYMANSKI	NWTRB
LARRY MCKAGUE	TRAC-NA, CNWRA
HAROLD E. LEFEVRE	NRC
Bill HINZE	NRC-ACW
Steve Beason	USGS/USBR
Ric Spengler	USGS
David Buersch	USGS
DON SWEETKIND	USGS
WARREN DAY	USGS
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Steve McDuffie	NRC
GERRY L. STREWALT	CNWRA
Debra Bryan	DOE/ANSL/LICENSING
Dan Dresser	Weston
Tim Hare	DOE
Ray Wallace	USGS/HQ
EVON TIESENHAESEN	CLARK COUNTY
Edal Aloun	NRC

NRC SITE VISIT 5/17/95

NAME

ORGANIZATION

Enië Majer	LBL
Tom Brocher	USGS/Menlo Park
JOHN STAMATAKOS	CNWRA
DAVID FERRILL	CNWRA
PHILIP S. JUSTUS	USNRC - HQ
Thomas Berstedt	DOE/4MSCO
MARK C. TYMAN	DOE/4MSCO
Emily Taylor	USGS
Tom Rogers	MDO/WCFS
DAVID JEFFERIS	EG&G/RSL
Chris Einberg	DOE/HQ
Robert Elayer	MDO/MK
Bill Nelson	MDO/PA.
Ken Skinner	DOE
John Savino	MDO/SAIC
Edmond O'Donnell	NRC
LE 'bud' Thompson	} MDO Geophysics
Howard Reel	
David Olson	
ROBERT CLAYTON	MDO/WCFS
Donna Sinks	USGS/SAIC
NORMAN I. SIMMS	MDO/DUKE
Christopher J. Potter	USGS
Sherilyn Williams-Stroud	USGS
Chris Menys	USGS