A0297

PDR-1
LPDR - WM-10 (2)
WM-11 (2)
WM-16 (2)



# Lawrence Livermore National Laboratory

NUCLEAR SYSTEMS SAFETY PROGRAM

L-196

July 28, 1987

87222702
WM Project: WM-10,11,16
PDR w/encl
(Return to WM, 623-SS)

WM Record File: A0297
LPDR w/encl

Mr. M. E. Blackford, MS-623ss
Project Officer
Technical Review Branch
Division of High-Level Management, NMSS
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Transmittal of Two Letter Reports

References:

(a). Letter Report on "Origin of Brine in the San Andres Formation, Evaporate Confining System, Texas Panhandle and Eastern New Mexico," (one page).

(b). Letter Report on "Stress Orientation Determination from Fault Slip Data in Hampel Wash Area, Nevada and Its Relation to Contemporary Regional Stress Field," (Two pages plus one map).

Dear Mr. Blackford:

The purpose of this letter is to transmit two Letter Reports (a) and (b) referenced above. We felt that studies reviewed in these letter reports have important implications for the seismotectonic and gelogic stability of the respective repository sites being characterized by DOE.

If you have any questions, please let us know.

Sincerely yours,

Dae H. (Danny) Chung
Project Leader

DHC/ic
Attachments as stated.

cc: Ms. C. Abrams, NMSS/WMGT
T. Cardone, NMSS/WMGT
J. Trapp, NMSS/WMGT

Wm-RES
WM Record File A0297
LLL

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

Distribution:
Blackford
(Return to WM, 623-SS)



3927

REVIEW OF THE SUBJECT DOE DOCUMENT

by

NRC Nuclear Waste Management Project Team
Lawrence Livermore National Laboratory, Livermore, California

---

SUBJECT: Origin of Brine in the San Andres Formation, Evaporite Confining System, Texas Panhandle and Eastern New Mexico, by A. R. Dutton, Geological Society of America Bulletin, v 99, p 103-112, July, 1987

Brine samples have been collected from the Unit 4 Carbonate (at the base of Salt Cycle 4, the potential repository horizon at the Deaf Smith site) from the SWEC J. Friemel #1 and Zeeck #1 test wells. General similarities between the chemical and isotopic compositions of the brine and Permian age fluid inclusions supports the explanation that the San Andres Formation brine originated as evaporatively concentrated sea water. Some modifications to the brine by dolomitization, clay diagenesis and loss of sulfate ions is indicated. The brine could have been generated from meteoritic water by a series of complex, unproved reactions that are plausible because of low porosity and low flow rates in the evaporite confining system.

Previous hydrogeologic studies suggest that there has been potential for ground water flow across the evaporite confining system in the Palo Duro Basin during the late Tertiary and Quaternary time. These studies may require revision in view of the brine composition data. The possibility that slow flow across the evaporite sequence has occurred and been largely confined to fracture systems not sampled in the SWEC J. Friemel #1 and Zeeck #1 test wells also exists.

Dutton regards the interpretations discussed in this paper as preliminary since, as he notes, the available data allows for alternative explanations. The study has important implications for the geologic and hydrogeologic stability of the repository site and it appears that further work of this type would be in order as a portion of site characterization for the Deaf Smith County repository site.

REVIEW OF THE SUBJECT DOE DOCUMENT

by

NRC Nuclear Waste Management Project Team
Lawrence Livermore National Laboratory, Livermore, California

---

SUBJECT: Stress Orientation Determination from Fault Slip Data in Hampel Wash Area, Nevada and its Relation to Contemporary Regional Stress Field , by Virgil A. Frizell, Jr. and Mary Lou Zoback, Tectonics, V. 6, No. 2, p 89-98

Hampel Wash is located in the northwest corner of the Camp Desert Rock quadrangle, Nevada (USGS, GQ 726) geologic map. The area under consideration is bounded on the northwest by the Rock Valley fault and on the southeast by a parallel left lateral fault (Fig. 1).

The authors collected fault-slip data from the area and analyzed it using the least squares iterative inversion technique of Angelier (J.R.G. 1984, 89, p 5835-5849). The data could be divided into four sets: (1) dip slip faults with N 30-35$^{o}$E strike, (2) strike slip faults with N to NNE strike and right lateral movement, (3) strike slip faults with NE (N 30-35$^{o}$E) strike and both right and left lateral displacement, and (4) strike slip faults with left lateral displacement and ENE strike. The analysis of the data indicates (1), (2) and (4) are consistent with a maximum horizontal stress orientation of about N30-35$^{o}$E and a least horizontal principal stress direction of N55-60$^{o}$W. Analysis of the data using Angelier's technique indicated a normal-faulting stress regime ($S_1$ vertical) with principal stress axes in approximately horizontal and vertical directions ($S_1$, trend = N19$^{o}$E and plunge = 82$^{o}$N; $S_2$, N30$^{o}$E and 8$^{o}$S; and $S_3$, N60$^{o}$W and plunge = 2$^{o}$E). The maximum horizontal stress $S_2$ was found to be intermediate between $S_1$ and $S_3$.

Set 3 was inconsistent in that nearly pure dip-slip and pure strike slip cannot be accommodated in a single stress regime. Superimposed striae on faults in Set 3 was interpreted as suggesting either temporal rotations of the regional stress field or local block rotation within the region of the fault zone.

In summary, the fault data:

1. Is consistent with other studies indicating the least horizontal principal stress orientation is about N50-60$^{o}$W.

2. Indicates a normal-faulting stress regime, with $S_1$ approximately vertical.

3. Local block rotation or temporal rotation of the regional stress field is suggested by superimposed sets of striae observed on some NE striking strike slip faults.

The study reviewed here has important implications for the seismotectonic and geologic stability of the NNWSI site and it appears that further work of this type would be in order as a portion of site characterization for the NNWSI site.

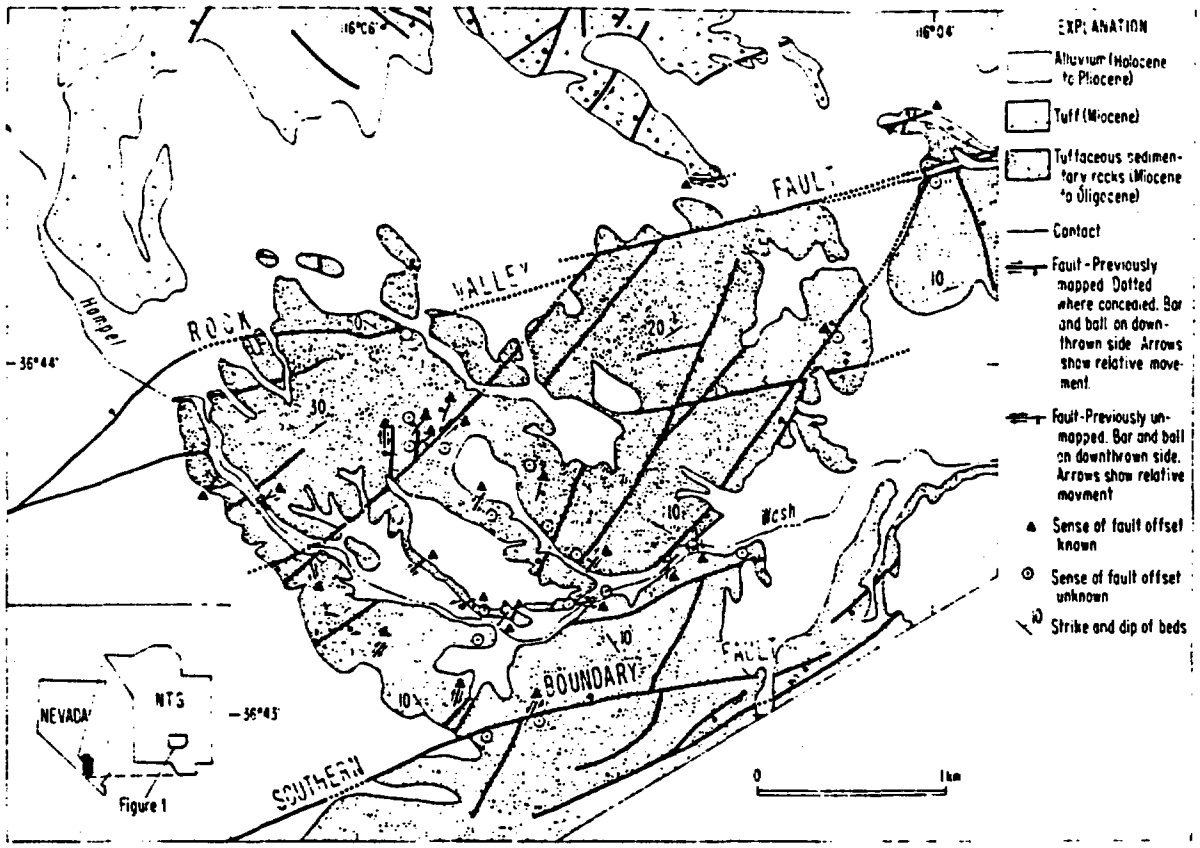


Fig. 1. Generalized geologic map of Hampel Wash area, Nevada Test Site, Nevada (after Hinrichs, 1968), showing locations from which fault slip data were obtained. Most data were collected from previously unmapped small faults that are depicted schematically. (a) All data collected along or near Rock Valley fault. (b) all data collected along southern bounding fault. (c) lower hemispheric equal area projection for all Hampel Wash data (n=160). (d) data collected from faults having known sense of displacement (n=50).