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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Annual American Geophysical Meeting (20-5702-152)

DATE/PLACE: December 5-9, 1994
San Francisco, CA

AUTHORS: H.L. McKague and B. Hill

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AUTHOR(S): H.L. McKague and B. Hill

PERSONS PRESENT: D. Ferrill (CNWRA), B. Henderson (SwRI), and A. Morris (Consultant)

BACKGROUND AND PURPOSE OF TRIP:

The annual meeting of the American Geophysical Union is an important scientific meeting. Each year more papers on the structure and hydrology at and around Yucca Mountain (YM) are being presented.

SUMMARY OF PERTINENT POINTS:

On the first day a number of scientific papers on the results of the Fall 1993 Southern Sierra Crustal Dynamics survey were given. The papers addressed some of the regional tectonic problems in the western Basin and Range. A significant result of the survey was that the Sierra Nevada is underlain by a relatively thin, 6-8 km root zone. This suggests uplift of the Sierra Nevada is the result of a $-.2$ g/cc density change rather than isostatic rebound. B. Wernicke proposed the roots thinned about 10 million years ago resulting in a density change in the mantle and uplift of the Sierra. The thinning was the result of extensional tectonics to the east of the Sierra Nevada. In another presentation, K. Snow suggested that 80 percent of the extension in the Basin and Range is due to crustal thinning and 20 percent by right-lateral slip. Snow concludes that his analysis precludes significant right-shear, map-view plain strain in the western Basin and Range. This theory would appear to preclude a significant right lateral shear zone in Crater Flat, which was proposed by C. Fridrich (USGS) and others at this meeting.

Morris, Ferrill, and Henderson's poster on slip tendency analysis was well attended. Several people expressed interest in obtaining a copy for both teaching and research applications. B. Heinz expressed interest in publishing the paper in Geophysical Reviews Research Letters. The poster presented by D. Ferrill, S. Young, and B. Henderson on "Geometric and Kinematics of Coseismic Faulting Along the Landers Rupture Zone Using Time and Space Patterns of Seismicity" was also heavily visited.

I. Wong (Woodward-Clyde) presented a paper on "Preliminary Probabilistic Seismic Hazard Analysis of Yucca Mountain, NV." The seismic analysis was performed for the ESF. The analysis considered 24 faults within 100 km of YM. A floating background source also was considered, and proved to be the most dominant earthquake for earthquakes with return intervals of $< 10{,}000$ years. Wong also explained the process DOE will go through to assess the seismic hazard at YM. Both deterministic and probabilistic SHA will be performed for the YM site. The deterministic analysis will be headed up by T. Hanks (USGS). Five to six faults will be investigated including the Death Valley, Solitario Canyon, Paintbrush,

and Rock Valley Faults. Wong will head up the probabilistic analysis. Two expert groups will be formed, one will consider ground motion, the other will consider faults, fault replacement and seismic hazard analysis. These groups will hold 5 public meetings each. The first meeting is planned for Salt Lake City in the spring and will be held to address the information/data needs of the experts. Most of the meetings will be held in FY96 with the final reports being issued in FY97.

Several sessions addressed recent advances in modeling physical and chemical processes in igneous systems. Presentations by Proussevitch (Univ. NH), C. Klug (Univ. OR), F. Spera (Univ. CA), and J. Gardner (IPGP, France) directly addressed how magmatic volatiles diffuse and degas during eruptions and presented several new techniques for determining these effects in natural and experimental systems. One interesting trend from this research is that the low viscosity of basaltic magmas may inhibit the fragmentation of magma into ash-sized particles, relative to rhyolitic magmas. This information is critical to constructing accurate basaltic eruption dynamics models. Posters by J. Dixon (Univ. Miami) and P. Wallace (Univ. Chicago) also discussed methods for accurately determining magmatic pre-eruptive volatile contents and processes that can affect volatile abundances in erupting magmas.

A poster by C. Menges (USGS) and others described layers of basaltic volcanic ash in several trenches near Yucca Mountain. At least 1 layer is present in Trench 14 (Bow Ridge fault) and Alice Ridge A1 (Paintbrush Canyon fault), and 2-3 layers have been observed at the Busted Butte trench (Paintbrush Canyon fault), Trenches SCR-T1 and SCR-T3 (Stagecoach Road fault), and Trenches T8 and SCF-T1 (Solitario Canyon fault). Geochemical analyses are ongoing at Los Alamos National Laboratory to correlate these Quaternary ashes with known volcanoes.

Three posters were presented on perched water at the NTS. J. Czarnecki (USGS) showed two videos from USW G-2. One video was taken in 1981 and the second in November 1989. Both videos show water entering the borehole at approximately 1718'. The water level in G-2 has slowly declined about 12 meters since 1981. Czarnecki suggests perched water may account for the high vertical gradient southeast of G-2.

P. Burger and K. Scofield characterized the occurrence of perched water in five YM boreholes. In general, the perched water was found about 100 m above the static water level. Commonly, the perched water occurs in fractured rocks with low matrix permeability overlying rocks with lower fracture counts and slightly higher matrix porosity.

A study of perched water in boreholes U19bh suggests that perched water in fractured rock aquifers often occurs in isolated pockets. This study by T. Brikowski, DRI, was based on a tracer test.

IMPRESSIONS/CONCLUSIONS

CNWRA should establish a presence at the annual AGU meeting through the presentation of posters and talks. This is especially true in the field of hydrology. The hydrologists should consider presenting a paper there each year.

PROBLEMS ENCOUNTERED

None

RECOMMENDATIONS

There were a number of papers presented in tectonics and hydrology that were directly related to YM. This is also the leading national meeting for volcanism research. CNWRA should continue to have two or three participants attend the annual AGU meeting.

SIGNATURES:

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