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U.S. Nuclear Regulatory Commission
ATTN: Deborah A. DeMarco
Office of Nuclear Material Safety and Safeguards
Two White Flint North
Mail Stop 7 C6
Washington, DC 20555

Subject: Submittal of Abstract: Polygenetic Secondary Calcite Mineralization in Yucca Mountain, NV

Dear Mrs. DeMarco:

Enclosed is an abstract for presentation at the 2000 National Geological Society of America Meeting. This abstract is based on work done by Drs. John Stamatakos and David Ferrill of the CNWRA and Dr. Mary Beth Gray of Bucknell University. The abstract identifies a class of faults at yucca Mountain that contains secondary polygenetic calcite. Following programmatic acceptance by the NRC, this abstract will be submitted to the GSA Meeting organizing committee for presentation at the National meeting.

If you have any questions please contact Dr. John Stamatakos at (210) 522-5247 or me at (210) 522-5252.

Sincerely,

Budhi Sagar
Technical Director

/rae

Enclosure

cc: J. Linehan, W. Reamer, B. Meehan, J. Greeves, S. Wastler, D. Brooks, P. Justus, B. Leslie, W. Patrick, CNWRA Directors, CNWRA Element Managers, T. Nagy, J. Stamatakos, D. Ferrill

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POLYGENETIC SECONDARY CALCITE MINERALIZATION IN YUCCA MOUNTAIN, NV

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Samples collected in the Exploratory Studies Facility and cross drift show that approximately 20% of the faults we've observed have a distinctive secondary calcite mineralization history, especially when compared to other occurrences of secondary calcite in fractures and lithophysal cavities. Among all of the faults studied, we recognize four broadly-defined fault zone morphologies, Classes A-discrete shears; B-minor faults; C-intra-block faults; and D-block bounding faults. The four classes are associated with increasing displacement from a few centimeters (A) to more than 100 meters (D). Classes A, C and D appear to be genetically linked. They strike N-S and contain little secondary calcite. Fault rocks from these three fault classes underwent progressive grain size reduction as a function of increased fault displacement. Class B faults are unique, however, and do not fit into the progression. As much as 65% of the Class B fault rock is composed of coarse-grained, secondary calcite. Most calcite is synkinematic and contains two-phase fluid inclusions and thick mechanical twins indicative of deformation at elevated temperatures. Some post-kinematic blocky calcite mineralization is also observed. Poikilotopic textures incorporate both syn- and post-kinematic calcite suggesting that Class B fault breccias underwent (post-) post-kinematic recrystallization. In contrast to the Class B faults, occurrences of secondary minerals in lithophysal cavities appear to record an extensive and protracted history of mineralization (e.g., Paces et al., 1996). The sharp difference between calcite mineralization in the Class B faults compared to calcite mineralization in the lithophysal cavities shows that the thermal and hydrologic history of Yucca Mountain (YM) was complex and polygenetic. Performance assessments of YM as a nuclear waste repository may have to account for these differences in fluid history. [Work supported by the U.S. NRC (Contract NRC-02-97-009). This abstract is an independent product of the CNWRA and does not necessarily reflect the regulatory positions of the NRC]