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U.S. Nuclear Regulatory Commission
ATTN: Mrs. Deborah A. DeMarco
Two White Flint North
11545 Rockville Pike
Mail Stop T8A23
Washington, DC 20555

Subject: Programmatic Review of Abstract

Dear Mrs. DeMarco:

The enclosed abstract is being submitted for programmatic review. This abstract will be submitted for presentation at the Geological Society of America 2002 Annual Meeting and Exposition to be held October 27–30, 2002, in Denver, Colorado. The title of the abstract is:

> "Matrix Permeabilities of Faulted Nonwelded Tuffs" by C.L. Dinwiddie, R.W. Fedors, D.A. Ferrill, and K.K. Bradbury

Please advise me of the results of your programmatic review. Your cooperation in this matter is appreciated.

Sincerely,

Budhi Sagar
Technical Director

/ph
Enclosure
cc: J. Linehan, B. Meehan, E. Whitt, J. Greeves, W. Reamer, D. Brooks, B. Leslie, J. Schlueter, L. Hamden, W. Ford, H. Arlt, J. Bradbury, L. Campbell, W. Dam, W. Patrick, CNWRA Directors, CNWRA Element Managers, T. Nagy (SwRI Contracts), P. Maldonado, C. Dinwiddie, R. Fedors, D. Ferrill, J. Winterle

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Matrix Permeabilities of Faulted Nonwelded Tuffs

C.L. Dinwiddie, R.W. Fedors, D.A. Ferrill (CNWRA, 6220 Culebra Road, San Antonio, TX 78238; 210-522-6085; e-mail: cdinwiddie@swri.org); K. K. Bradbury (Utah State University).

Nonwelded tuff units at Yucca Mountain, the proposed site for a high-level radioactive waste repository, play a prominent role in determining percolation rates through the portion of the unsaturated zone that lies above the potential repository horizon. Lateral flow at lithologic contacts within the nonwelded Paintbrush tuff (PTn) unit has been suggested as a possible mechanism that potentially can reduce flow toward the repository drifts. However, primary heterogeneity or secondary discontinuities (e.g., fractures and faults) could lead to preferential flow paths through the PTn and into the welded Topopah Spring Tuff (the repository horizon) that lies below, thus disrupting the potential for capillary or permeability barriers to divert water laterally away from the repository.

The nonwelded tuffs are poorly exposed at Yucca Mountain, hence, work at an analog site for the PTn was initiated at the basal Bishop Tuff units near Bishop, CA. Just as at Yucca Mountain, the basal Bishop Tuff includes matrix-supported, massive ignimbrites and clast-supported, bedded deposits; prior work has established the Bishop Tuff as a credible PTn analog. This study focuses on an innovative technique for measuring the changes in matrix permeability near faults and the associated enhancement of vertical flow and possible disruption of lateral flow.

Sample extraction from nonwelded tuffs continues to be a challenge. However, a new small-drillhole minipermeameter probe provides the means to eliminate sample extraction as a necessity for permeability measurement. Previous fieldwork in friable sandstone and saprolitic soils demonstrated that the new probe design is an effective field technique. Advantages of this approach include (1) minimization of the influence of weathering on measured permeability; (2) provision of a superior sealing mechanism around the gas injection zone; and (3) the potential for measurement collection at multiple depths below the outcrop surface. Finally, the small drillhole minipermeameter probe shows promise for data collection of permeability measurements within nonwelded tuffs at spatially refined positions and at multiple orientations within the matrix of the deformation zone surrounding faults. In light of this, the influence of primary lithology, texture, and faults on fluid flow through the nonwelded Bishop Tuff will be interpreted using data obtained from small-drillhole gas minipermeameter tests and water permeameter tests.

[This abstract is an independent product of the CNWRA and does not necessarily reflect the views or regulatory position of the NRC.]

Session T68: Yucca Mountain Update: Recent Advances from Scientific Investigations of the Unsaturated Zone (Oral Only)