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U.S. Nuclear Regulatory Commission
ATTN: Ms. Deborah A. DeMarco
Office of Nuclear Material Safety and Safeguards
Two White Flint North
Mail Stop 8 A23
Washington, DC 20555

Subject: Submittal of abstract: Imaging an Active Normal Fault in Alluvium by High-Resolution Magnetic and Electromagnetic Surveys

Dear Ms. DeMarco:

Attached is an abstract for presentation at the 2000 American Geophysical Union's Annual Meeting. This abstract is based on work conducted by Peter La Femina, Chuck Connor, John Stamatakos, and David Farrell of the CNWRA. The abstract describes techniques utilized to delineate and measure the displacement along the South Crater Flat fault. The important result of this paper is that it demonstrates how detailed geophysical surveys can be used to vastly improve paleoseismic studies. Following programmatic acceptance by the NRC, this abstract will be submitted to the AGU Meeting organizing committee for presentation at the annual meeting.

If you have any questions please contact Mr. Peter La Femina at (305) 361-4928 or me at (210) 522-5252.

Sincerely,

Budhi Sagar
Technical Director

BS/re
Attachment

cc:	B. Meehan	T. Essig	W. Patrick	P. La Femina
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Imaging an Active Normal Fault in Alluvium by High-Resolution Magnetic and Electromagnetic Surveys

La Femina, Peter C., C. B. Connor, J.A. Stamatakos, D.A.Farrell (CNWRA, Box 28510, San Antonio, TX 78238, plafemina@swri.edu)

High-resolution geophysical investigations can dramatically improve paleoseismic studies and the characterization of fault zones. Here, a detailed magnetic survey indicates that 60-70 m of vertical separation has occurred on the South Crater Flat fault (SCFF), Nye County, Nevada, since the eruption of basaltic lavas approximately 3.75 Ma. The SCFF is a west-dipping normal fault. These values give an average throw rate of 0.017 mm/yr and an average slip rate of 0.02 mm/yr, roughly one order of magnitude greater than Quaternary slip rates derived from trench studies of alluvial stratigraphy across the fault. The Pliocene basalt has a reversed remanent magnetization (inclination = -61.7°, declination = 162.0°, intensity of magnetization ≈10 A/m), creating a > 1000 nT anomaly across the SCFF. Forward models of three magnetic profiles reveal several synthetic and antithetic normal faults west of the SCFF and a decrease in displacement on the SCFF from north to the south. Electromagnetic surveys reveal a 140-200 m wide, 1.5-2.5 mS/m electrical conductivity anomaly parallel to the fault zone in the alluvial wedge of the hanging wall. This anomaly correlates with active drainageways and reflects lateral variations in allostratigraphy, produced by Quaternary slip on the SCFF, that complicate trench stratigraphy. Variations in clay content and porosity most likely cause the electrical anomaly. These results indicate that displacement has been distributed across several faults and that the long-term average slip rate is higher than Quaternary slip rates derived from trench studies alone. Thus, these geophysical methods provide an areal and temporal perspective on the fault zone not possible with traditional fault characterization techniques.