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U.S. Nuclear Regulatory Commission  
ATTN: Mrs. Deborah A. DeMarco  
Office of Nuclear Material Safety and Safeguards  
Mail Stop 8 A23  
Washington, DC 20555-0001

Subject: Submittal of Abstract—Geophysical Evidence for Two Distinct Miocene and Quaternary Slip Rates on the Bare Mountain Fault, Nevada

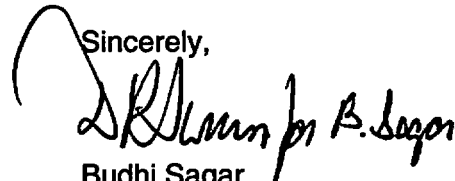
Dear Mrs. DeMarco:

The purpose of this letter is to transmit the subject abstract for programmatic review. The material discussed in the abstract is to be presented as a poster at the Geological Society of America Annual Meeting and Exposition to be held November 2–5, 2003, in Seattle Washington. The abstract will be submitted to a special theme session on Seismic Hazards and Neotectonics in Southern Nevada, which is being organized by Catherine M. Snelson and Wanda J. Taylor of the University of Nevada, Las Vegas.

The abstract documents work that has led to a better understanding of the tectonic setting of Southern Nevada and provides additional technical bases for staff evaluation of the seismic hazards at Yucca Mountain. The work does not address any new or unresolved policy issues. Included with the abstract is a copy of NRC Form 390A.

Should you have any questions regarding this please contact Dr. John Stamatakos at 210-522-5247 or Dr. H. Lawrence McKague at 210-522-5183.

Sincerely,

  
Budhi Sagar  
Technical Director

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## **Geophysical Evidence for Two Distinct Miocene and Quaternary Slip Rates on the Bare Mountain Fault, Nevada.**

**MURPHY, Katherine R., STAMATAKOS, John A., HILL, Brittain E., Center for Nuclear Waste Regulatory Analyses (CNWRA), SwRI, 6220 Culebra Rd., San Antonio, TX, 78238, GRAY, Mary Beth, Department of Geology, Bucknell University, Lewisburg, PA. 78249**

The Bare Mountain fault (BMF) in southwestern Nevada is an active range-front fault that juxtaposes Precambrian and Paleozoic strata in its footwall against Quaternary strata of Crater Flat basin in its hanging wall. Cumulative displacement is approximately 2.5 km [1.6 mi]. BMF is deemed capable of generating large magnitude ( $M_w \geq 7$ ) earthquakes. Because BMF dips beneath Yucca Mountain, it is potentially important to seismic hazard assessments of the proposed high-level waste repository. However, based on a variety of data, most of the displacement on BMF appears to have been accumulated over a short interval of time, between about 11 and 12 Ma. During this interval, slip rates may have been 250 cm/ky [98 in/ky] or higher. In contrast, stratigraphic relationships and sediment accumulation rates suggest Quaternary slip rates for BMF are between 1 and 6 cm/ky [0.4 and 2.4 in/ky], nearly two orders of magnitude lower than the peak slip rate in the Miocene. In this poster, we investigate the different slip rates on BMF for these two time periods.

Among the geological features used to constrain the timing of fault slip on BMF are a series of monolithologic carbonate megabreccias. Stratigraphic relationships indicate that the megabreccias were deposited between 11.0 and 11.5 Ma. We interpret the megabreccias as subareal landslides or rock avalanche deposits from the oversteepened footwall, caused by BMF earthquakes between 11 and 12 Ma. An unresolved aspect of the landslide model is the nature of Black Marble, a block of highly deformed Cambrian Bonanza King limestone and dolomite just south of Bare Mountain. Some workers identify Black Marble as part of the landslide deposits while others interpret it as a rooted block of the footwall. In this poster, we summarize the geophysical data that support our tectonic model for rapid faulting on BMF between 11 and 12 Ma, followed by a dramatic decrease in the slip rate from 11 Ma to the present. In particular we present newly acquired gravity data from southern Crater Flat, including Black Marble, which further constrain the geometry of BMF and its relationship to Black Marble and the nearby megabreccias.

[This abstract is an independent product of the CNWRA and does not necessarily reflect the views or regulatory positions of the U.S. Nuclear Regulatory Commission.]

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Geophysical Evidence for Two Distinct Miocene and Quaternary Slip Rates on the Bare Mountain Fault, Nevada

**2. AUTHOR(s)**

Katherine R. Murphy, John A. Stamatakos, and Brittain E. Hill

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