

DT# 48252 QA:NA 7/11/06 CB

DECREASING SLIP RATES FROM 12.8 MA TO PRESENT ON THE SOLITARIO CANYON FAULT AT YUCCA MOUNTAIN, NEVADA**BUESCH, David C., U. S. Geological Survey, 1180 N. Town Center Dr. MS423, Las Vegas, NV 89144, dbuesch@usgs.gov**

The Solitario Canyon fault, which bounds the west side of Yucca Mountain, Nevada, is the closest fault with Quaternary offset adjacent to the proposed spent nuclear fuel and high-level radioactive waste repository. Dip-slip offset between 12.8 and 10.7 Ma is determined from lithostratigraphic displacement in boreholes USW H-3 and USW WT-7, drilled in the footwall and hanging wall, respectively. The base of the 12.8-Ma Topopah Spring Tuff is interpreted to have 463.3 m of separation across the fault, an average dip slip rate of 0.036 mm/yr. Previous researchers identified a geothermal system active from 11.5 to 10.0 Ma with peak activity at 10.7 Ma that resulted in pervasive alteration of vitric rock to zeolitic minerals where the rocks were in the ground-water saturated zone. The contact between vitric (V) and pervasively zeolitic (Z) rocks cuts across the lithostratigraphic section and offset of this V-Z boundary can be used to measure slip rates between 12.8 and 10.7 Ma. In H-3, the V-Z boundary is 138.4 m below the base of the vitric, densely welded subzone of the Topopah Spring Tuff (Ttpv3). In WT-7, although the V-Z boundary is identified at the base of the Ttpv3, borehole video, cuttings, and geophysical log data indicate the Ttpv3 has well-developed zeolitic alteration along fractures, and this implies 19.5 m of the total thickness of Ttpv3 (and probably additional overlying crystallized rocks) also were in the saturated zone by 10.7 Ma. The V-Z relations across the Solitario Canyon fault in H-3 and WT-7 indicate a minimum of 157.9 m of separation before 10.7 Ma, which is 34.1 percent of the total slip of the Topopah Spring Tuff, and a minimum dip slip rate of 0.075 mm/yr from 12.8 to 10.7 Ma. These data are consistent with the broader structural history of the area near

Yucca Mountain. Previous workers used angular unconformities, tilting of structural blocks, and paleomagnetic data to constrain the main period of extensional faulting between 12.7 and 8.5 Ma. Paleoseismic studies in Quaternary deposits documented slip rates on the Solitario Canyon fault from 0.01 to 0.02 mm/yr since 0.077 and 0.20 Ma. The decrease of extensional activity slip rates data on the Solitario Canyon fault provide evidence of decreasing tectonic activity from the middle Miocene to present.