Seismic History of the Mead Slope Fault, Southern Nevada

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The Mead Slope fault (MSF), exposed along the southern shore of Lake Mead, has a significant fault scarp that has been recognized for decades, but the fault lacked detailed study. We documented and analyzed the seismic hazard parameters of the MSF.

We collected four different types of data that provided different parameters about the fault. (1) We used an autotracking total station and the expertise of Tom Sawyer (Piedmont GeoSciences) about this instrument to measure surface offsets of alluvial fan crests across the MSF and make a detailed topographic map of the offset fan surfaces and exposed scarp. These data show several meters of left-lateral offset and a few meter high scarp that appears to contain at least two bevels. These bevels indicate at least two surface-breaking ruptures. (2) We measured fault strike and dip, and kinematic indicators at a natural cut through the fault near lake level. In the cut, the MSF is exposed cutting Tertiary sedimentary deposits, typically called the Black Mountain conglomerate. The average measured strike and dip was N40^{o}E, 88^{o}S. Slickenlines, grooves and mullions on the fault surface had rakes ranging between 10^{o} and 20^{o}E, indicating strike-slip motion. Combined with the Total Station data indicating left-lateral slip, these data suggest left-lateral slip with a small reverse component of slip. (3) We described relevant units, which included bar and swale deposits made of boulders. (4) Geologic mapping at 1:12,000 scale shows three major surface-breaking fault strands. Two of these dip toward each other and form a pop-up block between them. The presence of this pop-up block is consistent with the small component of reverse slip on the natural cut through the fault. The third strand lies somewhat south of the pop-up block. It cuts Tertiary deposits, but locally has a scarp in an alluvial fan deposit.

In summary, our data indicate that this fault is capable of producing a M 6.5 or greater earthquake during left-lateral strike-slip motion. Bureau of Reclamation data obtained through Larry Anderson indicate that Hoover Dam was constructed to withstand an earthquake of this magnitude. However, an earthquake of that magnitude would also shake Las Vegas basin. The ground motions and necessary construction techniques to reduce damage produced by an earthquake on a strike-slip fault are likely to be significantly different from those produced by earthquakes along the normal faults that cut through the Las Vegas basin-fill deposits.

Total Costs $5,363.50; Overhead $1,592.96; Requested Subtotal $6,956.46
Match $6,967.88 Source of Match: Salaries, on-hand supplies, equipment rental and depreciation