Jump to Navigation

Quaternary Fault and Fold Database of the United States

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Northern Monitor Valley fault (Class A) No. 1202

Last Review Date: 2000-11-01

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Synopsis	This northerly striking, relatively wide fault zone is mainly in Monitor Valley where it is characterized by west-facing scarps and minor east-facing scarps on Quaternary, piedmont and piedmont-slope deposits. The south-central and central parts of the zone include faults along the range-front of the western flank of the Monitor Range. These range-front faults show down-to-the-west stratigraphic offset that place bedrock of the Monitor Range against Quaternary piedmont-slope deposits of the Monitor Valley; west-facing scarps are locally present along these faults. Down-to-the-west stratigraphic offsets along the range-front faults, as well as the predominant west-facing direction of the scarps, imply mostly down-to-the-west, Quaternary movement along the fault zone. The fault zone shows evidence for repeated Quaternary faulting events, the youngest of which is Holocene. However, the fault zone has not been studied in detail and little is

	actually known with certainty about its nature, character, and movement history. The principal sources of data consist of geologic mapping, photogeologic mapping supplemented by some field verification, and reconnaissance geomorphic study of fault scarps and basal fault facets.
Name comments	Refers to faults that were mapped by Stewart and McKee (1968 #4350; 1977 #4351), Kleinhampl and Ziony (1985 #2851), Schell (1981 #2844), and Dohrenwend and others (1992 #283). These faults are in the northern part of the Monitor Valley and along the western flank of the northern part of the Monitor Range. Schell (1981 #2844) mapped and referred to this fault zone as the Long Valley fault. dePolo (1998 #2845) portrayed and referred to this fault zone as the Northern Monitor Valley fault swarm. This name is used herein with the modification of a group rather than a swarm. The fault group extends from about Bottle Summit south through the northern part of the Monitor Valley along the western flank of the Monitor Range (and Martin Ridge) to about 3 km east of Johnny Potts Spring. **Fault ID:** Refers to faults that Schell (1981 #2844) mapped and labeled as 77, and refers to faults that dePolo (1998 #2845) portrayed and labeled as MI18.
County(s) and State(s)	NYE COUNTY, NEVADA EUREKA COUNTY, NEVADA LANDER COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location based on 1:250,000-scale maps of Schell (1981 #2844) and Dohrenwend and others (1992 #283). Mapping by Schell (1981 #2843; 1981 #2844) included field verification, but was based primarily on photogeologic analysis of 1:24,000-scale, color, aerial photography that was supplemented by analysis of some, 1:60,000-scale, black-and-white, aerial photography: faults identified on the aerial photographs were transferred by inspection to 1:62,500-scale topographic maps that were photographically reduced to 1:250,000-scale for final compilation of the faults on 1:250,000-scale topographic maps. Mapping by Dohrenwend and others (1992 #283) was based on

	photogeologic analysis of 1:58,000-nominal-scale, color-infrared photography transferred directly to 1:100,000-scale topographic maps enlarged to the scale of the photographs; these maps were then reduced and compiled at 1:250,000-scale.
Geologic setting	This north-northwest-striking group of faults is marked by a relatively wide zone of en echelon fault scarps and linear features that are prominent in the northern part of the Monitor Valley (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). These fault scarps are on Quaternary, piedmont and piedmont-slope deposits that were mapped by Stewart and McKee (1968 #4350; 1977 #4351) as Pleistocene to Holocene fan deposits and alluvium. The majority of these scarps face west; however, some of the scarps face east and may indicate the presence of horst and graben features. A range-front fault along the western flank of the Monitor Range marks the eastern boundary of the south-central to central part of the fault group (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). This range-front fault shows down-to-the-west stratigraphic offset that placed Quaternary fan deposits and alluvium, which are present along the eastern piedmont-slope of the Monitor Valley, against Tertiary and Paleozoic bedrock of the Monitor Range (Stewart and McKee, 1968 #4350; 1977 #4351; Dohrenwend and others, 1992 #283). The down-to-the-west stratigraphic offset shown along the range-front fault, as well as the west-facing direction of most fault scarps, suggest principally down-to-the-west Quaternary movement along the fault zone that may be related to continued down-dropping and adjustment of the Monitor Valley relative to the adjacent Monitor Range. The fault zone has not been studied in detail, however, and other insights and estimates that concern Quaternary offset amounts and slip rates have not been reported.
Length (km)	41 km.
Average strike	N22°E
Sense of movement	Normal *Comments:* Not specifically reported, however, the apparent down-to-the-west offsets along the range-front fault and the predominantly west-facing direction of scarps suggest principally down-to-the-west offsets along faults of this zone, which in this extensional regime probably reflects principally normal, dip-slip movement along west-dipping faults. The less abundant, east-facing scarps may mark antithetic, east-dipping faults and related

	graben and horst structures along the fault zone.
Dip Direction	W; E *Comments:* Not reported, but probably steep, based on dip measurements of other Quaternary faults in localities nearby and elsewhere in the Basin and Range Province.
Paleoseismology studies	
Geomorphic expression	This wide fault zone is expressed mostly by discontinuous, west-facing en echelon scarps along the northern part of the Monitor Valley (Schell, 1981 #2844; Kleinhampl and Ziony, 1985 #2851; Dohrenwend and others, 1992 #283). Some north-striking, linear features and east-facing fault scarps are also present in the Monitor Valley (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). A north-striking range front fault is present along the western flank of the Monitor Range, and this fault appears to mark the eastern edge of the central part of the fault zone (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). This range-front fault is locally marked by a few west-facing scarps that are present on the piedmont-slope deposits adjacent to the range-front (Dohrenwend and others, 1992 #283). Schell (1981 #2844) reported a maximum scarp height of 1 m along the fault zone. dePolo (1998 #2845) reported the presence of basal fault facets along the western range-front of the Monitor Range adjacent to the fault zone, and he reported a preferred maximum basal facet height of 85 m (61-110 m).
Age of faulted surficial deposits	Stewart and McKee (1968 #4350; 1977 #4351) and Kleinhampl and Ziony (1985 #2851) mapped faulted deposits along the fault zone as alluvium and fan deposits, to which they assigned a broad Holocene to Pleistocene age. Schell (1981 #2844) reported an age range of 0-15 ka for the youngest faulted deposits along the fault zone. Dohrenwend and others (1992 #283) assigned a broad age range of early to middle and (or) late Pleistocene to faulted deposits at some localities along the fault zone. At other localities along the fault zone, Dohrenwend and others (1992 #283) assigned late Quaternary (0-130 ka and 0-30 ka).
Historic earthquake	
Most recent	latest Quaternary (<15 ka)

prehistoric deformation	*Comments:* The timing of the most recent prehistoric faulting event is fairly well constrained. Both Schell (1981 #2844) and Dohrenwend and others (1992 #283) agree that there is evidence along the southern part of the zone for the most recent prehistoric faulting event that is no older than latest Quaternary (<15 ka), and probably no older than Holocene (<10 ka).
Recurrence interval	*Comments:* Geomorphic or stratigraphic data needed for estimating recurrence are not reported. Schell (1981 #2844), however, reported that faults in this zone have moved repeatedly and that the youngest movement is Holocene in age, but he did not speculate on the recurrence interval.
Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed data exists to determine slip rates for this fault. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.184 mm/yr based on an empirical relationship between his preferred maximum basal facet height and vertical slip rate. The size of the facets (tens to hundreds of meters, as measured from topographic maps) indicates they are the result of many seismic cycles, and thus the derived slip rate reflects a long-term average. However, the late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) suggest the slip rate during this period is of a similar or lesser magnitude. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	2000 David J. Lidke, U.S. Geological Survey
References	#2845 dePolo, C.M., 1998, A reconnaissance technique for estimating the slip rate of normal-slip faults in the Great Basin, and application to faults in Nevada, U.S.A.: Reno, University of Nevada, unpublished Ph.D. dissertation, 199 p. #283 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1992, Reconnaissance photogeologic map of young faults in the Millett 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2176, 1 sheet, scale 1:250,000.

	#2851 Kleinhampl, F.J., and Ziony, J.I., 1985, Geology of Northern Nye County, Nevada: Nevada Bureau of Mines and Geology Bulletin 99A, 172 p. #2843 Schell, B.A., 1981, Faults and lineaments in the MX Sitting Region, Nevada and Utah, Volume I: Technical report to U.S. Department of [Defense] the Air Force, Norton Air Force Base, California, under Contract FO4704-80-C-0006, November 6, 1981, 77 p. #2844 Schell, B.A., 1981, Faults and lineaments in the MX Siting Region, Nevada and Utah, Volume II: Technical report to U.S. Department of [Defense] the Air Force, Norton Air Force Base, California, under Contract FO4704-80-C-0006, November 6, 1981, 29 p., 11 pls., scale 1:250,000. #4350 Stewart, J.H., and McKee, E.H., 1968, Geologic map of the southeastern part of Lander County, Nevada: U.S. Geological Survey Open-File Report 68-260, 2 sheets, scale 1:62,500. #4351 Stewart, J.H., and McKee, E.H., 1977, Geology and mineral deposits of Lander County, Nevada: Nevada Bureau of Mines and Geology Bulletin 88, 106 p., 3 pls.