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Quaternary Fault and Fold Database of the United States

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Northern Simpson Park Mountains fault zone (Class A) No. 1158

Last Review Date: 2000-06-13

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Synopsis	The Northern Simpson Park Mountains fault zone is a sinuous east-northeast-striking presumed normal-dip slip structure that bounds the Simpson Park Mountains on the north and the Pine Valley on the south. The fault zone extends from near Dugout Spring east-northeast across the piedmont almost to Pine Creek. The zone is transverse to internal structures in the range, as is the similarly oriented Pine Valley to the north. The east-northeast fault trends are about 45? clockwise of the average N22?E trend of Quaternary range-bounding faults in the region, suggesting that the Quaternary fault trend is anomalous and their tectonic significance is unknown. Part of the zone is comprised of a major fault that bounds a tectonically active range front characterized by juxtaposition of Quaternary deposits against bedrock; however, one map shows the contact as depositional rather than structural (faulted). On the basis of photogeologic reconnaissance, the age

	of offset Quaternary deposits or erosion surfaces are estimated to range from early to middle Pleistocene (0.13-1.6 Ma) to Holocene (<10 ka) for one short (about 2 km) scarp. The last surface-displacement event is considered to <12 ka based on morphometric analysis of young fault scarps along the Northern Simpson Park Mountains fault zone.
Name comments	Modified from dePolo (1998 #2845), who applied the name "northern Simpson Park Mountains fault" to a sinuous east-northeast-striking fault that bounds the Simpson Park Mountains on the north and the Pine Valley on the south. The term fault zone is used herein because several fault traces form an east-northeast zone as shown by Dohrenwend and Moring (1991 #282) and McKee and Conrad (1993 #4315). **Fault ID:** Referred to as fault WI24 by dePolo (1998 #2845).
County(s) and State(s)	EUREKA COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* The locations of scarps and lineaments on Quaternary deposits and erosion surfaces mapped photogeologically (1:58,000-scale photos) by Dohrenwend and Moring (1991 #282) mostly do not agree with scarps or fault traces shown on the more recent and more detailed (1:24,000-scale) geologic map by McKee and Conrad (1993 #4315). The traces compiled here are from Wallace (1979 #203) who compiled them at 1:125,000 scale mostly from photogeologic and field mapping on 1:60,000-scale aerial photos. Those traces are in good agreement with Dohrenwend and Moring (1991 #282).
Geologic setting	The Northern Simpson Park Mountains fault zone separates the Horse Creek Valley portion of Pine Valley (to the north) from the Simpson Park Mountains (to the south). Rocks in the Northern Simpson Park Mountains dip east and east-northeast (Johnson, 1960 #4481; McKee, 1993 #4315), possibly resulting from tilting associated with displacement on the Simpson Park Mountains fault zone [1603]. The east-northeast-trending Northern Simpson Park Mountains fault zone is transverse to the internal structure of

	the range, as is the similarly oriented Pine Valley on the north. These east-northeast trends are about 45? clockwise of the average N22?E trend of Quaternary range-bounding faults in the southeast part of the Winnemucca sheet, suggesting that the Quaternary fault trend is anomalous. McKee and Conrad (1993 #4315) mapped east-northeast and east-striking faults in bedrock and in Quaternary/Tertiary basin-fill deposits in the northern Simpson Park Mountains. As with the northern Simpson Park Mountains fault zone, these faults are mostly down to the north, suggesting that normal faults of this anomalous trend are common locally. Their tectonic significance is not known. Dohrenwend and Moring (1991 #282) mapped part of the range margin at 1:250,000-scale as a major fault that bounds a tectonically active range front characterized by juxtaposition of Quaternary deposits against bedrock. However, the more detailed (1:24,000-scale) and more recent geologic map by McKee and Conrad (1993 #4315) shows a depositional rather than faulted contact between Quaternary deposits and bedrock along most of that range front. We consider the characterization of Dohrenwend and Moring (1991 #282) to be more accurate.
Length (km)	13 km.
Average strike	N59°E
Sense of movement	Normal *Comments:* No fault-slip data are reported; a normal sense in inferred from location and orientation in an extensional tectonic province.
Dip Direction	N
Paleoseismology studies	
Geomorphic expression	On the basis of photogeologic reconnaissance (1:58,000-scale aerial photos) Dohrenwend and Moring (1991 #282) show a discontinuous major active fault at the bedrock/alluvium contact and several short (<5 km) north-northwest-facing scarps on Quaternary surficial deposits or erosion surfaces in the adjacent piedmont. A few of the piedmont scarps coincide approximately with a much smaller population of scarps shown on a 1:24,000-scale geologic map by McKee and Conrad (1993 #4315). Some of the Quaternary scarps are parallel to and adjacent to Pine Creek, and a fluvial origin is possible, but the youngest mapped scarp

	crosses Denay Valley. A detailed description of the scarps is not reported. The preferred maximum basal fault facet is reported as 244 m (219-268 m) by dePolo (1998 #2845).
Age of faulted surficial deposits	Quaternary, Quaternary/Tertiary. On the basis of photogeologic reconnaissance, Dohrenwend and Moring (1991 #282) estimated the age of offset Quaternary deposits or erosion surfaces as early to middle Pleistocene (1.6-0.13 Ma) for some scarps, as late Pleistocene (10-130 ka) for others, and as Holocene (<10 ka) for one short (ca. 2 km) scarp. Wallace (1979 #203) estimated the age of scarps to be generally <12 ka.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Wallace (1979 #203) estimated the last surface-displacement event to be less than 12 ka, making Holocene movement possible, which would be consistent with the Holocene age assigned for one short scarp by Dohrenwend and Moring (1991 #282).
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 0.488 mm/yr based on an empirical relationship between his preferred maximum basal facet height and vertical slip rate. The tectonic and age significance of the reported 244-m-high facet is uncertain because Tertiary rocks that lie across the projection of the supposed facet-producing fault are mapped as unfaulted and lack a 244 m escarpment (McKee and Conrad, 1993 #4315). Regardless, 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. Likewise, 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 lesser magnitude. Thus, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and	2000

Compiler(s)	R. Ernest Anderson, U.S. Geological Survey, Emeritus
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. #282 Dohrenwend, J.C., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Winnemucca 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2175, 1 sheet, scale 1:250,000. #4481 Johnson, J.G., 1960, Geology of the northern Simpson Park Range, Eureka County, Nevada: Los Angles, University of California, M.S. thesis. #4315 McKee, E.H., and Conrad, J.E., 1993, Geologic map of the northern part of the Simpson Park Mountains (Rocky Hills and western part of the Pete Hanson Creek quadrangles), Eureka County, Nevada: U.S. Geological Survey Open-File Report 93-519. #203 Wallace, R.E., 1979, Map of young fault scarps related to earthquakes in north-central Nevada: U.S. Geological Survey Open-File Report 79-1554, 2 sheet, scale 1:125,000.