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Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.

Spruce Mountain Ridge fault zone (Class A) No. 1719

Last Review Date: 2000-06-28

citation for this record: **Rowley, P.C., and Anderson, R.E., compilers, 2000, Fault number 1719, Spruce Mountain Ridge fault zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 02:26 PM.**

Synopsis	A series of north-northeast-striking, block-bounding, range-front, and mid-valley normal faults bounding Spruce Mountain Ridge and Spruce Mountain. The main range-front fault bounds the western side of Spruce Mountain Ridge, then continues south-southwest as a mid-valley fault that probably is the southward extension of the main range-front fault. On the basis of photogeologic reconnaissance, the youngest surficial deposits or erosion surfaces offset by the faults are late Pleistocene. No detailed studies are reported, and recurrence times and slip rates are not known.
Name comments	Name taken from dePolo (1998 #2845) who applied it to a zone of north-northeast-striking, block-bounding, mid-valley and range-front faults mapped by Dohrenwend and others (1991

	#286). The main fault of the zone is a range-bounding structure that bounds the western side of Spruce Mountain Ridge and extends south-southwest as a mid-valley fault into Clover Valley; this was called the Spruce Mountain Ridge fault zone by dePolo (1998 #2845). We also include the block-bounding fault on the northwestern flank of Spruce Mountain and a down-to-the-east fault on the eastern side of Spruce Mountain Ridge (referred to as the eastern Spruce Mountain Ridge fault, EK10, by dePolo, 1998 #2845). **Fault ID:** Refers to faults EK9 and EK10 of dePolo (1998 #2845).
County(s) and State(s)	ELKO COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Locations based on reconnaissance photogeologic mapping at 1:250,000 by Dohrenwend and others (1991 #286). That map was produced by direct transfer from the photos to 1:100,000-scale topographic maps enlarged to the scale of the photos. Those maps were, in turn, reduced and recompiled at 1:100,000 scale.
Geologic setting	The main fault is a down-to-the-west range-front or block-bounding structure that separates bedrock of Spruce Mountain Ridge and Spruce Mountain (on the east) from the basin beneath Clover Valley (on the west). The fault along Spruce Mountain Ridge splays south-southwest into the basin beneath Clover Valley as a mid-valley fault. Dohrenwend and others (1991 #286) classified the faults as major range-front faults with fresh tectonic features that place bedrock against Quaternary sediment, as block-bounding faults with less fresh tectonic features that place bedrock against Quaternary sediment, and as faults that displace Quaternary sediment and/or surfaces. The fault on the eastern flank of Spruce Mountain Ridge is down-to-the-east and apparently separates part of the ridge from part of Independence Valley.
Length (km)	31 km.

Average strike	N17°E
Sense of movement	Normal
Dip Direction	W; E
Paleoseismology studies	
Geomorphic expression	Little is known about the geomorphic expression of faults of this zone. Barnhard (1985 #428) did not recognize scarps on alluvium, possibly suggesting the fault's weak geomorphic expression. The western flank of the northern part of Spruce Mountain Ridge is extensively eroded and has a weakly defined base along the fault trace. By contrast, the west-facing southern part of Spruce Mountain Ridge and the northwest-facing escarpment of Spruce Mountain have a conspicuous break in slope at the piedmont/range front contact. dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 98 m (73–122 m).
Age of faulted surficial deposits	According to Dohrenwend and others (1991 #286), the youngest surficial deposits or erosion surfaces offset by the scarps are either early to middle and (or) late Pleistocene (10 ka to 1.6 Ma) or late Pleistocene (10–130 ka).
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Based on age of displaced surficial deposits or erosion surfaces, estimated to be late Pleistocene by Dohrenwend and others (1991 #286) on the basis of photogeologic reconnaissance.
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 displacement rate of 0.199 mm/yr based on an empirical relationship between his preferred maximum basal facet height and vertical 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 rate

	reflects a long-term average. 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 low. Thus, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	2000 Peter C. Rowley, U.S. Geological Survey, Retired R. Ernest Anderson, U.S. Geological Survey, Emeritus
References	#428 Barnhard, T.P., 1985, Map of fault scarps formed in unconsolidated sediments, Elko 1° x 2° quadrangle, Nevada and Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1791, 1 sheet, scale 1:250,000. #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. #286 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Elko 1° by 2° quadrangle, Nevada and Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2179, 1 sheet, scale 1:250,000.