Jump to Navigation

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.

Petersen Mountain fault (Class A) No. 1640

Last Review Date: 1999-06-30

citation for this record: **Sawyer, T.L., compiler, 1999, Fault number 1640, Petersen Mountain fault, 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 02:35 PM.**

Synopsis	This generally distributed zone consists of range-front normal faults that bound the prominent east front of Petersen Mountain, from Border Town north to near Red Rock peak, and bounding east edge of an outlying bedrock block extending south from Porcupine Mountain along west side of Lees Flat, east of Petersen Mountain; short piedmont faults in northern Cold Spring Valley and in western Red Rock Valley; and one short intra basin fault in Cold Spring Valley north of White Lake, that is the southern continuation of the range-front fault bounding Petersen Mountain. Fault may be related to the Peavine Mountain fault zone [1644], based on distribution on young faults in region. Reconnaissance photogeologic mapping of the fault and detailed and regional geologic mapping in the region are the sources of data.
Name comments	Refers to faults mapped by Slemmons (1968, unpublished Reno 1:250,000-scale map), Bonham (1969 #2999), Bell (1984 #105),

	Szecsody (1983 #3604), Nitchman (1991 #3704), Nitchman and Ramelli (1991 #2551), and Green and others (1991 #3487) along east side of Petersen Mountain, and in western Red Rock Valley and Lees Flat. Named the Peterson (sic) Mountain fault as generally defined by Nitchman and Ramelli (1991 #2551). **Fault ID:** Refers to fault numbers R1A and R1B [Peterson (sic) Mountain fault] of dePolo (1998 #2845).
County(s) and State(s)	WASHOE COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:*
Geologic setting	This generally distributed zone consist of range-front normal faults bounding prominent east front of Petersen Mountain, from Border Town north to near Red Rock peak, and bounding east edge of an outlying bedrock block extending south from Porcupine Mountain along west side of Lees Flat, east of Petersen Mountain, short piedmont faults in northern Cold Spring Valley and in western Red Rock Valley, and one short intra basin fault in Cold Spring Valley north of White Lake, that is the southern continuation of the range-front fault bounding Petersen Mountain (Slemmons, 1968, unpublished Reno 1:250,000-scale map, Szecsody, 1983 #3604; Bell, 1984 #105; Nitchman and Ramelli, 1991 #2551; Nitchman, 1991 #3704). Fault may be related to the Peavine Mountain fault zone [1644], based on distribution on young faults in region (*e.g.*, Jennings, 1994 #2878).
Length (km)	25 km.
Average strike	N1°W
Sense of movement	Normal *Comments:* Not studied in detail; sense of movement from Bonham (1969 #2999), Szecsody (1983 #3604), Nitchman (1991 #3704), Nitchman and Ramelli (1991 #2551), and Greene and others (1991 #3487).

Dip Direction	E; SW
Paleoseismology studies	
Geomorphic expression	Range-front faults are expressed as discontinuous scarps on late Quaternary piedmont-slope deposits and as abrupt, generally prominent, mountain-front escarpments with Quaternary deposits juxtaposed against bedrock at their base (Szecsody, 1983 #3604; Nitchman and Ramelli, 1991 #2551; Nitchman, 1991 #3704; dePolo, 1998 #2845). The "eastern strand" of Nitchman (1991 #3704) and Nitchman and Ramelli (1991 #2551), is expressed as small and compound scarps, offset alluvial surfaces, oversteepened slopes, a linear drainage valley, and aligned springs; near south end of eastern strand, north of Summit Spring, a late Quaternary (believed to be Tahoe-age equivalent) alluvial terrace is displaced approximately 5–6 m (Nitchman, 1991 #3704). dePolo (1998 #2845) reports a maximum preferred basal fault facet height of 130 m (110–150 m) along this part of the range front. The western strand has basal fault facets up to 170 m (150–190 m) high (dePolo, 1998 #2845). Piedmont faults are marked by scarps on late Quaternary alluvium in northern Cold Spring Valley (Szecsody, 1983 #3604) and as lineaments on undifferentiated Quaternary piedmont-slope deposits in Red Rock Valley (Bell, 1984 #105). The intrabasin fault is marked by a 2.8-m-high scarp (Szecsody, 1983 #3604; Bell, 1984 #105; Nitchman, 1991 #3704) along the faulted contact between late Quaternary deltaic sand deposits and forebeach deposits (Soeller and Nielson, 1980 #3603).
Age of faulted surficial deposits	Holocene; late Pleistocene; Quaternary; Tertiary. Quaternary deposits, including Holocene and late Pleistocene lacustrine and related deposits and terrace deposits, respectively, are faulted along the range-front, piedmont and intra basin faults (Slemmons, 1968, unpublished Reno map, Bonham, 1969 #2999; Soeller and Nielson, 1980 #3603; Szecsody, 1983 #3604; Nitchman and Ramelli, 1991 #2551; Greene and others, 1991 #3487; Nitchman, 1991 #3704; dePolo, 1998 #2845). Quaternary deposits also are juxtaposed against Tertiary bedrock on west side of northern Red Rock Valley (Bonham, 1969 #2999) and of Lees Flat (Greene and others, 1991 #3487).
Historic earthquake	
Most recent	late Quaternary (<130 ka)

prehistoric deformation	*Comments:* Although timing of most recent event is not well constrained, a late Quaternary time is suggested based on mapping by Szecsody (1983 #3604), Nitchman (1991 #3704) and Soeller and Nielsen (1980 #3603), which is generally consistent with an undifferentiated Quaternary time suggested by mapping of Bell (1984 #105), Bonham (1969 #2999), Greene and others (1991 #3487), and Dohrenwend and others (1996 #2846); dePolo's (1998 #2845) interpretation of recency of faulting is permissive of a late Quaternary time.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* dePolo (1998 #2845) and dePolo and Anderson (2000 #4471) calculated a preferred vertical slip rate of 0.15 mm/yr (0.06–0.24 mm/yr) for eastern strand (his fault number R1B) of the Peterson (sic) Mountain fault, based on an assumed age of 24–74 k.y. for the offset alluvial terrace reported by Nitchman (1991 #3704). However, dePolo (1998 #2845) assigned a vertical slip rate of 0.310 mm/yr to the western strand 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 lesser magnitude. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	1999 Thomas L. Sawyer, Piedmont Geosciences, Inc.
References	#105 Bell, J.W., 1984, Quaternary fault map of Nevada—Reno sheet: Nevada Bureau of Mines and Geology Map 79, 1 sheet, scale 1:250,000. #2999 Bonham, H.F., 1969, Geology and mineral deposits of Washoe and Storey Counties, Nevada: Nevada Bureau of Mines and Geology Bulletin 70, 140 p., 1 pl., 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.

#4471 dePolo, C.M., and Anderson, J.G., 2000, Estimating the slip rates of normal faults in the Great Basin, USA: Basin Research, v. 12, p. 227-240.

#2846 Dohrenwend, J.C., Schell, B.A., Menges, C.M., Moring, B.C., and McKittrick, M.A., 1996, Reconnaissance photogeologic map of young (Quaternary and late Tertiary) faults in Nevada, *in* Singer, D.A., ed., Analysis of Nevada's metal-bearing mineral resources: Nevada Bureau of Mines and Geology Open-File Report 96-2, 1 pl., scale 1:1,000,000.

#3487 Greene, R.C., Stewart, J.H., John, D.A., Hardyman, R.F., Silberling, N.J., and Sorensen, M.L., 1991, Geologic map of the Reno 1° by 2° quadrangle, Nevada and California: U.S. Geological Survey Miscellaneous Field Studies Map MF-2154-A, scale 1:250,000.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#3704 Nitchman, S.P., 1991, Peterson Mountain fault: Nevada Bureau of Mines and Geology Preliminary Fault Evaluation Report, 3 p., scale 1:62,500.

#2551 Nitchman, S.P., and Ramelli, A.R., 1991, Freds Mountain fault: Nevada Bureau of Mines and Geology Evaluation Report, 7 p., 2 scarp profiles, scale 1:62,500.

#3603 Soeller, S.A., and Nielson, R.L., 1980, Geologic map, Reno NW quadrangle: Nevada Bureau of Mines and Geology Map 4Dg, scale 1:24,000.

#3604 Szecsody, G.C., 1983, Earthquake hazards of the Reno NE quadrangle—Part I, Geology; Part II, Earthquake hazards: Final Technical Report, U.S. Geological Survey, 69 p., scale 1:24,000.

Questions or comments?