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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.

Penoyer fault (Class A) No. 1132

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citation for this record: **Anderson, R.E., compiler, 1999, Fault number 1132, Penoyer 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 02:18 PM.**

Synopsis	The Penoyer fault is a curved, generally down-to-the-west, basin-bounding fault along the eastern side of Sand Spring Valley. Mapping suggests that the fault may have contrasting Quaternary history and structural setting along its length. The fault forms the boundary between the precipitous uplifted Worthington Mountains structural block on the east and the basin beneath Sand Spring Valley along the northern part. To the south and southwest, the trace is broadly concave west with a conspicuous right step southwest of Rachel. The southern part of the fault is not at the range front, but it still may mark the structural margin of the basin beneath Sand Spring Valley. It is a piedmont fault expressed as a combination of continuous scarps and discontinuous scarps and lineaments, with single- and multiple-event scarps. The maximum scarp height is reported as 9 m and the maximum scarp slope angle is reported as 22°. The probable age of last movement on the south part of the Penoyer fault is late Pleistocene.

Name comments	Name taken from Schell (1981 #2844) who applied it to a slightly S-shaped structure that probably forms the south, southeast, and east structural margin of the basin beneath Sand Spring Valley. Referred to as Sand Spring Valley fault zone by dePolo (1998 #2845). The fault extends from the north flank of the Worthington Mountains generally southward and southwestward to the north flank of Chalk Mountain. **Fault ID:** Refers to fault #93 of Schell (1981 #2844), fault PEN of Piety (1995 #915), and faults C1A and C1B of dePolo (1998 #2845).
County(s) and State(s)	LINCOLN COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Fault traces taken from an unpublished 1:250,000 map of J. C. Dohrenwend (published at 1:1,000,000 by Dohrenwend and others, 1996 #2846).
Geologic setting	In its north part, the Penoyer fault forms the west margin of the precipitous uplifted Worthington Mountains structural block. Schell (1981 #2844), dePolo (1998 #2845), and Dohrenwend and others (1996 #2846) map the fault there, but neither Tschantz and Pampeyan (1970 #1682) nor Ekren and others (1977 #1036) show a range-front fault along the Worthington Mountains. This north part of the fault strikes mostly north-south, but it curves east at its north end. To the south and southwest, the trace of the Penoyer fault is broadly concave northwest, discontinuous, and forms the west margin of a broad topographically subdued area where bedrock and Quaternary-Tertiary gravel form the footwall block (Ekren and others, 1977 #1036). That part of the fault is a piedmont structure, possibly marking the structural margin of the basin beneath Sand Spring Valley. Discontinuous easterly striking faults in southern Sand Spring Valley are included with the Penoyer fault by Schell (1981 #2844, plate 9). The Penoyer fault may connect through those faults to the Chalk Mountain fault [1049]. In any case, the Penoyer fault appears to be a curved, generally down-to-the-west, basin-bounding fault.

Length (km)	49 km.
Average strike	N25°E
Sense of movement	Normal
Dip Direction	W; NW
Paleoseismology studies	
Geomorphic expression	Along the northern part, the fault follows the west base of the precipitous bedrock escarpment of the Worthington Mountains, but there is no published description of its geomorphic expression. Schell (1981 #2844) maps the south part of the Penoyer fault as a combination of continuous scarps and discontinuous scarps and lineaments. Although he does not describe the scarps in detail, he reports the maximum scarp height as 9 m and the maximum scarp slope angle as 22° (Schell, 1981 #2844, Table A2). The piedmont fault is characterized by dePolo (1998 #2845) as marked by discontinuous single- and multiple-event scarps, with a 6.8-m-high scarp reported in one location. At the southwesternmost part of the fault, Reheis (1992 #1604) maps several short (<2 km) lineaments or scarps that range from prominent to poorly defined and some longer ones (<5 km) taken from previous mapping. In general, little information is available on the geomorphic expression.
Age of faulted surficial deposits	Schell (1981 #2844) reports that the youngest unit displaced by the fault and the oldest unit not displaced is intermediate-age alluvium, the age range of which is estimated at 15–700 ka (mostly 15–200 ka). In an unpublished map of Quaternary faults in the Caliente 1:250,000-scale map by J. C. Dohrenwend (published at 1:1,000,000 by Dohrenwend and others, 1996 #2846), the fault is mapped as developed on surfaces or materials of late Pleistocene (10–130 ka) or questionable late Pleistocene age. The northern part of the fault is considered Pleistocene.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Schell (1981 #2844, Table A2) reports that the probable age of last movement on the Penoyer fault is late Pleistocene. Presumably this probable age is based on the 22° maximum scarp slope angle, and not on the stratigraphic relations

	between faulted and post-faulting deposits, which would not constrain the age of last movement closer than middle to late Pleistocene. Dohrenwend and others (1996 #2846) also indicate a late Pleistocene (10–130 ka) or questionable late Pleistocene age. Even though Dohrenwend and others (1996 #2846) can not constrain the timing of faulting on the northern part of the fault except to indicate that it is Pleistocene (0.01–1.5 Ma), we include it with the obviously young part of the fault because of the precipitous front along the Worthington Mountains.
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 0.016 mm/yr for a site near the central part of the southern part of the fault northwest of Tempiute Mountain. The slip rate estimate was made on the basis of a qualitative assessment of soil development on an uplifted alluvial fan of estimated 375 ka (mid-Pleistocene) age where the scarp height is about 6.8 m.
Date and Compiler(s)	1999 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. #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. #1036 Ekren, E.B., Orkild, P.P., Sargent, K.A., and Dixon, G.L., 1977, Geologic map of Tertiary rocks, Lincoln County, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-

1041, 1 sheet, scale 1:250,000.

#915 Piety, L.A., 1995, Compilation of known and suspected Quaternary faults within 100 km of Yucca Mountain, Nevada and California: U.S. Geological Survey Open-File Report 94-112, 404 p., 2 pls., scale 1:250,000.

#1604 Reheis, M.C., 1992, Aerial photographic interpretation of lineaments and faults in late Cenozoic deposits in the Cactus Flat and Pahute Mesa 1:100,000 quadrangles and the western parts of the Timpahute Range, Pahranagat Range, Indian Springs, and Las Vegas 1:100,000 quadrangles, Nevada: U.S. Geological Survey Open-File Report 92-193, 14 p., 3 pls., scale 1:100,000.

#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.

#1682 Tschanz, C.M., and Pampeyan, E.H., 1970, Geology and mineral deposits of Lincoln County, Nevada: Nevada Bureau of Mines and Geology Bulletin 73, 188 p.