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Quaternary Fault and Fold Database of the United States

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Lone Mountain fault zone (Class A) No. 1338

Last Review Date: 1999-02-23

citation for this record: Sawyer, T.L., and Anderson, R.E., compilers, 1999, Fault number 1338, Lone Mountain 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 02:14 PM.

Synopsis	This northeast-striking zone of down-to-the-northwest normal faults extends across piedmont slope in southeastern Big Smoky Valley and bounds front of Lone Mountain. Well-defined scarps are preserved on Holocene deposits along the range front and on the valley floor. Middle to late-Pleistocene surfaces are vertically offset as much as 5 m and, along the same fault trace, Holocene surfaces are offset only a meter, providing evidence for recurrent middle to late Quaternary movement on the fault. The pattern of curvilinear scarps on valley floor west of Lone Mountain and southwest of McLeans resembles the pattern of secondary deformation features (*e.g.*, lateral-spread scarps). Reconnaissance and detailed photogeologic mapping of these faults and some studies of scarp and fault-facet morphology are the sources of data.
Name	Faults along the northwest front of Lone Mountain were compiled

comments	on unpublished map by Slemmons (1998; written commun.), Dohrenwend and others (1992 #289; 1996 #2846), Schell (1981 #2844), Maldonado (1984 #2929), Yount and others (1993 #621), and Stewart and others (1994 #2921). Schell (1981 #2844) referred to it as the Millers Pond fault and dePolo (1998 #2845) later referred to it as the Lone Mountain fault zone; the Lone Mountain name of dePolo (1998 #2845) is used here. The fault extends along the southeast side of Big Smoky Valley, from Montezuma Wells southwestward across U.S. 6 and along northwest front of Lone Mountain. Fault continues southwest into the Goldfield 1° x 2° sheet where it cuts across the piedmont at the west base of the Weepah Hills (Reheis and Noller, 1991 #1195). **Fault ID:** Refers to fault 8 on Plate A7 in Schell (1981 #2844) and fault number T7 of dePolo (1998 #2845).
County(s) and State(s)	ESMERALDA COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location based on 1:62,500-scale unpublished map by Slemmons (1968, unpublished Tonopah 1:250,000-scale map) and 1:250,000-scale maps by Schell (1981 #2844) and Dohrenwend and others (1992 #289; 1996 #2846). Original mapping by Slemmons was based on photogeologic analysis of 1:12,000-scale low-sun-angle aerial photography, transferred using proportional dividers to 1:62,500-scale topographic maps. Mapping by Schell (1981 #2843; 1981 #2844) is based on photogeologic analysis of primarily 1:24,000-scale color aerial photography supplemented with 1:60,000-scale black-and-white aerial photography, transferred by inspection to 1:62,500-scale topographic maps and photographically reduced and directly transferred to 1:250,000-scale topographic maps, and subsequent field verification. Later mapping by photogeologic analysis of 1:58,000-nominal-scale color-infrared photography transferred directly to 1:100,000-scale topographic maps enlarged to scale of the photographs (Dohrenwend and others, 1992 #289; 1996 #2846). The southwest end extending into the Goldfield sheet from mapping at 1:100,000 by Reheis and Noller (1991 #1195) based on study of photos ranging in scale from 1:24,000 to

	1:80,000.
Geologic setting	This northeast-striking right-stepping zone of down-to-the-northwest normal faults extends across piedmont slope in southeastern Big Smoky Valley (~80% of length) and bounds fronts of Lone Mountain and the Weepah Hills (~20% of length). The fault zone appears to border a southeast-tilted half-graben bounded on the northwest by the Monte Cristo Range, a late Cenozoic domal uplift (Stewart and others, 1994 #2921). The pattern of anastomosing scarps on valley floor west of Lone Mountain and southwest of McLeans resembles the pattern of secondary deformation features (e.g., lateral-spread scarps). The southwest part of the fault west of the Weepah Hills does not follow a range-front escarpment. The trace is marked by lineaments and low scarps that face both northwest and southeast (Reheis and Noller, 1991 #1195; Dohrenwend and others, 1992 #289).
Length (km)	37 km.
Average strike	N26°E
Sense of movement	Normal *Comments:* Yount and others (1993 #621) suggested a predominance of vertical displacement based on the sinuous nature and large height of scarps on Quaternary deposits, and reported that "convincing examples of right-lateral stream offsets" were found in at least two localities. However, a possible left-lateral component has been suggested by dePolo (1998 #2845) based on right-stepping patterns exhibited along the fault zone.
Dip Direction	NW
Paleoseismology studies	
Geomorphic expression	Nearly continuous scarps are preserved on Holocene to probably early Pleistocene deposits along the range front and on the valley floor. Yount and others (1993 #621) reported evidence for recurrent middle to late Quaternary movement on the fault; scarps as much as 5 m high on middle to late-Pleistocene surfaces and along the same fault trace scarps on Holocene surfaces are only a meter high. Schell (1981 #2844) also reported 5-m-high scarps on late Quaternary deposits and documented slope angles of 21.5° or

	less. Irregular fault facets on the front of Lone Mountain are as much as 183±24 m high (dePolo, 1998 #2845). Most of the traces extending southwest into the Goldfield sheet are weakly to moderately expressed lineaments or scarps on Quaternary deposits and faults in Tertiary deposits (Reheis and Noller, 1991 #1195).
Age of faulted surficial deposits	Holocene to early Pleistocene; Quaternary. Scarps have been mapped on Quaternary deposits ranging in age from Holocene to early to middle Pleistocene (Schell, 1981 #2844; Dohrenwend and others, 1992 #289; Yount and others, 1993 #621; Dohrenwend and others, 1996 #2846).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Although timing of most recent prehistorical event is not well constrained, there is general agreement among topical studies by Slemmons (1998; written commun.), Schell (1981 #2844), Dohrenwend and others (1992 #289; 1996 #2846), and Yount and others (1993 #621) on a Holocene time.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Yount (1997, written commun., reported in dePolo, 1998 #2845) measured a 3.2-m-high scarp (presumably multiple-event scarp) on a latest Pleistocene (15–30 ka) fluvial terrace along the fault west of Lone Mountain. dePolo (1998 #2845) and dePolo and Anderson (2000 #4471) calculated a preferred vertical displacement rate of 0.13 mm/yr (using a preferred vertical offset of 2.9 m from Yount's original data) and preferred age of the deposit of 22.5 k.y.
Date and Compiler(s)	1999 Thomas L. Sawyer, Piedmont Geosciences, Inc. 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.

#289 Dohrenwend, J.C., Schell, B.A., McKittrick, M.A., and Moring, B.C., 1992, Reconnaissance photogeologic map of young faults in the Goldfield 1° by 2° quadrangle, Nevada and California: U.S. Geological Survey Miscellaneous Field Studies Map MF-2183, 1 sheet, scale 1:250,000.

#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.

#7761 Hoeft, J.S., and Frankel, K.L., 2010, Temporal variations in extension rate on the Lone Mountain fault and strain distribution in the eastern California shear zone–Walker Lane: Geosphere, v. 6, p. 917–936, doi:10.1130/GES00603.1.

#2929 Maldonado, F., 1984, Bedrock geologic map of the Lone Mountain pluton area, Esmeralda County, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-1533, 1 sheet, scale 1:24,000.

#1195 Reheis, M.C., and Noller, J.S., 1991, Aerial photographic interpretation of lineaments and faults in late Cenozoic deposits in the eastern part of the Benton Range 1:100,000 quadrangle and the Goldfield, Last Chance Range, Beatty, and Death Valley Junction 1:100,000 quadrangles, Nevada and California: U.S. Geological Survey Open-File Report 90-41, 9 p., 4 sheets, scale 1:100,000.

#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.

#2921 Stewart, J.H., Kelleher, P.C., and Zorich, E.A., 1994, Geologic map of the Monte Cristo Range area, Esmeralda and Mineral Counties, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2260, scale 1:62,500.

#621 Yount, J.C., Bell, J.W., dePolo, C.M., and Ramelli, A.R., 1993, Neotectonics of the Walker Lane, Pyramid Lake to Tonopah, Nevada—Part I, *in* Lahren, M.M., Trexler, J.H., Jr., and Spinosa, C., eds., Crustal evolution of the Great Basin and the Sierra Nevada: Reno, Mackay School of Mines, University of Nevada, Geological Society of America, Cordilleran/Rocky Mountain section meeting, Reno, Nevada, May 19-21, 1993, Guidebook, p. 383-391.