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.

Monte Cristo Valley fault zone (Class A) No. 1325

Last Review Date: 1998-07-19

citation for this record: **Sawyer, T.L., compiler, 1998, Fault number 1325, Monte Cristo Valley 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 02:15 PM.**

Synopsis	Investigation of these northwest-striking right-lateral faults in Monte Cristo Valley began after the 1932 Cedar Mountain earthquake that resulted in surface rupture along much of the fault zone. This right-stepping to parallel zone of high-angle right-lateral faults in Monte Cristo Valley is the easternmost in an echelon series of four or five northwest-striking dextral faults in Monte Cristo Valley, Stewart Valley and Gabbs Valley Range area of the Walker Lane belt. The complex patterns of Quaternary faulting and 1932 surface ruptures, suggests that this fault may be related to other faults in the area [1323 and 1324]. The fault zone has a nearly continuous series of fault scarps that extends northwestward from Kibby Flat (Dry Lake) and across piedmont slope of the Pilot Mountains. East of about Black Jack Spring, one group of scarps branches northward and obliquely crosses the valley floor and piedmont slope of the Cedar Mountains. The

	other group continues northwestward across piedmont slope of the southeastern Gabbs Valley Range, from where it extends northward across Monte Cristo Valley to southwest margin of the Cedar Mountains. More than half of the 1932 surface ruptures were along the base of distinct older scarps, and form grabens, pressure ridges, and drainage deflections (Gianella and Callaghan, 1934 #1515; Molinari, 1984 #1584, Bell , 1998, written commun. #2468; Oldow and Meinwald, 1992 #2920; Yount and others, 1993 #621; Dohrenwend and others, 1996 #2846; Bell and others, 1999 #4768). Detailed photogeologic mapping of the fault zone and allostratigraphic units and detailed trench investigations are the sources of data.
Name comments	Refers to faults mapped in Monte Cristo Valley by Knopf (1922 #2919), Gianella and Callaghan (1934 #1515), Hardyman and others (1975 #2918), Molinari (1984 #1584), Bell and others (1999 #4768), and unpublished map of Quaternary faults and lineaments in Monte Cristo Valley of Bell (1998, written commun. #2468), Oldow and Meinwald (1992 #2920), Dohrenwend and others (1996 #2846), dePolo (1994 #2458). Bell and others (1999 #4768) and dePolo (1998 #2845) refer to these faults as the Monte Cristo Valley fault zone. This fault zone extends northwestward from Kibby Flat (Dry Lake), through the west side of Monte Cristo Valley, and obliquely across the valley floor to southwest margin of the Cedar Mountains west of Little Pilot Peak. **Fault ID:** Refers to fault T3 of dePolo (1996 #2846).
County(s) and State(s)	ESMERALDA COUNTY, NEVADA MINERAL COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location based on unpublished 1:62,500-scale maps of Bell based on photogeologic analysis of 1:12,000-scale low-sun-angle aerial photography; 1:48,000-scale map of dePolo (1994 #2458), which is a detailed compilation of 1932 surface ruptures based on original mapping by Gianella and Callaghan (1934 #1515) and by Molinari (1984 #1584) supplemented by photogeologic analysis of 1:12,000-scale low-sun-angle aerial

	photography and field reconnaissance; and 1:250,000-scale map by Dohrenwend and others (1996 #2846) from photogeologic analysis of 1:58,000-nominal-scale color-infrared photography.
Geologic setting	This right-lateral fault zone strikes northwest across Monte Cristo Valley and is the easternmost in an echelon series of four or five high-angle northwest-striking dextral faults in the Walker Lane belt. The 1932 Cedar Mountain earthquake resulted in surface rupture distributed along much of the fault zone.
Length (km)	28 km.
Average strike	N2°E
Sense of movement	Right lateral *Comments:* Right-lateral and right-oblique movements were reported for the 1932 ruptures along the Monte Cristo Valley fault zone. Many topical studies agree that the general faulting pattern is consistent with a dextral wrench-fault system (Gianella and Callaghan, 1934 #1515; Molinari, 1984 #1584; Yount and others, 1993 #621; Bell, 1998, written commun. #2468; Bell and others, 1999 #4768). Right-lateral displacement is consistent with subhorizontal (10°-N.) plunge of slickensides and mullion on cemented fault surface at site 1325-2 (Bell and others, 1999 #4768), with offsets of late Cenozoic sedimentary and volcanic rocks (Molinari, 1984 #1584), and with seismicity (Doser, 1988 #126).
Dip	80° W. to near vertical *Comments:* Bell and others (1999 #4768) reported a near-vertical to 80°-W. dipping fault in Quaternary alluvial deposits and Tertiary sedimentary rock exposed in trenches on the floor of Monte Cristo Valley.
Paleoseismology studies	Seven trenches have been excavated on the Monte Cristo Valley fault zone; results from three of these trenches at two different locations have been published. Radiocarbon dates on organic soils obtained from all three trenches primarily constrain movement history of the fault zone; additional constraints provided by geomorphic-soil relationships, tephrochronology, and radiocarbon dates on regional Quaternary allostratigraphic units. Six events were recognized at the two locations. The 1932 ruptures occurred

	on Holocene and late Pleistocene faults marked by scarps. These studies concentrated on the 1932 ruptures along south-central part of the fault zone. Site 1325-1 (refers to rift 24 of Gianella and Callaghan, 1934 #1515) is about 4.8 km east-southeast of Bettles Ranch Spring (Bell and others, 1999 #4768). Nine mean-residence-time radiocarbon dates were obtained on exposed organic soils. Six faulting events, including 1932, are inferred since 25 to 35 ka, based on correlation of uplifted alluvial-fan remnant to a regional sequence of allostratigraphic units. Site 1325-2 (refers to rift 24 of Gianella and Callaghan, 1934 #1515). Two trenches were excavated at this site, about 4.3 km east-southeast of Bettles Ranch Spring and 1 km south of site 1325-1 (Bell and others, 1999 #4768). Four mean-residence-time radiocarbon dates were obtained on exposed organic soils. Six faulting events, including 1932, are inferred since 25 to 35 ka, based on correlation of uplifted alluvial-fan remnant to a regional sequence of allostratigraphic units.
Geomorphic expression	The fault zone has a nearly continuous series of fault scarps that extends northwestward from Kibby Flat (Dry Lake) and across piedmont slope of the Pilot Mountains. East of about Black Jack Spring, one group of scarps branches northward and obliquely crosses the valley floor and piedmont slope of the Cedar Mountains. The other group continues northwestward across piedmont slope of the southeastern Gabbs Valley Range, from there it extends northward across Monte Cristo Valley to southwest margin of the Cedar Mountains. Locally reverse faults bound low hills underlain by monoclinally folded alluvium and Tertiary lake beds. The 1932 ruptures were marked by right-lateral offsets (up to 1.7±0.5 m) of stream channels and bar-and-swale topography, small scarps (as much as 50 cm high), fissures, graben, swells, rare moletracks, and left echelon-stepping ground cracks; however post-faulting erosion has considerably modified these original features (Yount and others, 1993 #621). More than half of the 1932 surface ruptures occurred along the base of distinct to subdued older scarps, and the most pronounced 1932 faulting occurred along a set of late Pleistocene and Holocene fault traces expressed by compound scarps, graben, pressure ridges, and drainage deflections (Gianella and Callaghan, 1934 #1515; Molinari, 1984 #1584, dePolo, 1987 #1495; Yount and others, 1993 #621; Bell, 1998, written commun. #2468; Bell and

	others, 1999 #4768).
Age of faulted surficial deposits	Holocene; late Pleistocene; Quaternary; Tertiary. Scarps have been mapped on Holocene deposits, compound scarps on late Pleistocene and Quaternary deposits, and scarps are preserved on Tertiary lake beds (Esmeralda formation) and volcanic rocks (Gianella and Callaghan, 1934 #1515; Molinari, 1984 #1584; Yount and others, 1993 #621; Bell, 1998, written commun. #2468; Bell and others, 1999 #4768).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Studies by Bell and others (1999 #4768) document evidence for multiple latest Quaternary events, and suggest that the most recent event occurred about 4 ka.
Recurrence interval	4–6 k.y. (<21 ka) *Comments:* Studies by Bell and others (1999 #4768) suggest an average recurrence interval of 4 to 6 k.y. during the latest Quaternary, based on mean-residence-time radiocarbon dating and trench studies. They infer periodic rather than clustered movement history consisting of paleoevents at 4, 6, 12, 18, and 21 ka; event times have ±2 k.y. uncertainties.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Bell and others (1999 #4768) estimated an average, latest Quaternary net-rate of displacement is 0.2–0.5 mm/yr based on 6–12 m of cumulative offset of alluvial fan deposits correlated by geomorphic-soil relations to a regional allostratigraphic unit (25–35 k.y.) dated by tephrochronology and radiocarbon dates.
Date and Compiler(s)	1998 Thomas L. Sawyer, Piedmont Geosciences, Inc.
References	#2468 Bell, J.W., 1998 written commun., Map of Quaternary faults and lineaments, Monte Cristo Valley: map, 1 sheet, scale 1:62,500. #4768 Bell, J.W., dePolo, C.M., Ramelli, A.R., Sarna-Wojcicki, A.M., and Meyer, C.E., 1999, Surface faulting and paleoseismic history of the 1932 Cedar Mountain earthquake area, west-central

Nevada, and implications for modern tectonics of the Walker Lane: Geological Society of America Bulletin, v. 111, p. 791–807.

#2458 dePolo, C.M., 1994, Surface faulting associated with the December 20, 1932 Cedar Mountain earthquake, central Nevada: Nevada Bureau of Mines and Geology Open-File Report OF-94-4, scale 1:24,000.

#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.

#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.

#126 Doser, D.I., 1988, Source parameters of earthquakes in the Nevada seismic zone, 1915-1943: Journal of Geophysical Research, v. 93, no. B12, p. 15,001-15,015.

#1515 Gianella, V.P., and Callaghan, E., 1934, The Cedar Mountain, Nevada, earthquake of December 20, 1932: Bulletin of the Seismological Society of America, v. 24, p. 345- 377.

#2918 Hardyman, R.F., Ekren, E.B., and Byers, F.M., Jr., 1975, Cenozoic strike slip, normal and detachment faults in the northern part of the Walker Lane, west-central Nevada: Geological Society of America Abstracts with Programs, v. 7, no. 7, p. 1100.

#1584 Molinari, M.P., 1984, Late Cenozoic geology and tectonics of Stewart and Monte Cristo Valleys, west-central Nevada: Reno, University of Nevada, unpublished M.S. thesis, 124 p., 7 pls., scale 1:62,500.

#2920 Oldow, J.S., and Meinwald, J.N., 1992, Geologic map of the Bettles Well quadrangle, Nevada: Nevada Bureau of Mines and Geology Field Studies Map 1, 1 sheet, scale 1:24,000.

#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.