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.

Cane Spring fault (Class B) No. 1067

Last Review Date: 1998-04-09

citation for this record: **Anderson, R.E., compiler, 1998, Fault number 1067, Cane Spring 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 Cane Spring fault is one of a group of northeast-striking faults known or inferred to have sinistral slip in and near the southern part of the Nevada Test Site. The fault is mainly a Tertiary structure with a poorly documented Quaternary history evidenced by discontinuous short (< 0.6 km) fault traces on early Pleistocene(?) deposits. Much of its trace is in bedrock, and a 2.6-km-long trace previously mapped as Quaternary may be a fault-line scarp on bedrock, thus the structure is considered herein to be a class B fault.
Name comments	Name applied by Poole and others (1965 #1600) to a northeast-striking fault extending from the Halfpint Range southwest past Cane Spring to the area southeast of Skull Mountain.
County(s) and State(s)	NYE COUNTY, NEVADA
Physiographic	

Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* The Quaternary trace of the Cane Spring fault was compiled from 1:250,000-scale mapping of Piety (1992 #538) who compiled it from various sources (Ekren and Sargent, 1965 #1509; Poole and others, 1965 #1600; Cornwall, 1972 #1482; Swadley and Huckins, 1990 #1666; Reheis and Noller, 1991 #1195). These sources were based on field mapping and inspection of aerial photos at scales ranging from 1:24,000 to 1:80,000. Most of the trace of the Cane Spring fault is in bedrock where its location is well controlled (Cornwall, 1972 #1482; Frizzell and Shulters, 1990 #1037). Subsurface projections of the fault to the northeast beneath basin-fill deposits are uncertain and vary from 4.7 km (Cornwall, 1972 #1482) to 12 km (Reheis and Noller, 1991 #1195) in length.
Geologic setting	The Cane Spring fault is one of four main faults that have been grouped into the 30-to-60-km-wide Spotted Range-Mine Mountain structural zone (SRMM), which is characterized by northeast-striking, left-lateral faults that have experienced relatively small amounts of displacement (p. 9 Carr, 1974 #1470; p. 56 Carr, 1984 #1472). The other three faults in SRMM are the Mine Mountain fault [1066], the Rock Valley fault [1065], and the Wahmonie fault [1068]. These faults have been interpreted to be "first-order structures that form a conjugate system with the northwest-striking, right-lateral faults of the Las Vegas Valley shear zone" (Barnes and others, 1982 #1441). On the basis of field study reported in a summary of northeast-trending strike-slip fault zones of the SRMM (TRW Environmental Safety Systems Inc., 1998 #3907), outcrops show the Cane Spring fault to be a shear zone about 1.5 m wide oriented N50?E and dipping vertical to 80?S. Long-term displacement is interpreted to be mainly dip slip.
Length (km)	15 km.
Average strike	N37°E
Sense of movement	Left lateral *Comments:* Displacement on the Cane Spring fault may be oblique. The southwestern end is shown as down to the southeast (Ekren and Sargent, 1965 #1509; Poole and others, 1965 #1600);

	its central part near Cane Spring is shown by as down to the northwest (Poole and others, 1965 #1600); and its northeastern end northeast of Cane Spring is shown as left-lateral (Poole and others, 1965 #1600). The mapping by Cornwall (1972 #1482) shows the Cane Spring fault as having left-lateral (sinistral) strike slip along its entire length. Faults along the southern side of Skull Mountain are portrayed by Swadley and Huckins (1990 #1666) as both down to the northwest and down to the southeast. On the basis of field study reported in a summary of northeast-trending strike-slip fault zones of the SRMM (TRW Environmental Safety Systems Inc., 1998 #3907), left-slip kinematic indicators are recognized, but the main long-term displacement is interpreted to be dip slip.
Dip	Vertical to 80°S *Comments:* Based on field study reported in a summary of northeast-trending strike-slip fault zones of the SRMM (TRW Environmental Safety Systems Inc., 1998 #3907).
Paleoseismology studies	
Geomorphic expression	Where not in bedrock, the Cane Spring fault is typically buried beneath Quaternary alluvium. However, the traces of the fault mapped by Reheis and Noller (1991 #1195) are weakly expressed in Tertiary or Quaternary deposits or were identified by previous mapping. On the basis of subsequent field examination of northeast-trending faults making up the SRMM (TRW Environmental Safety Systems Inc., 1998 #3907), that part of the fault has been characterized as a fault-line scarp, raising doubt as to whether it contains evidence for Quaternary displacement. In general, published geomorphic evidence that the Cane Spring fault is Quaternary is sparse to absent.
Age of faulted surficial deposits	Currently, the best evidence for Quaternary displacement is a group of short (<0.6 km) faults mapped on the SE flank of Skull Mountain approximately along the projection of the Cane Spring fault (Swadley and Huckins, 1990 #1666). These faults cut early Pleistocene and Pliocene deposits but not late and middle Pleistocene deposits. Some sections of the fault are portrayed as faulted contacts between Tertiary rocks and younger Tertiary or Quaternary deposits. This includes (1) one 0.5- to 1.0-km-long section at the fault's southwestern end, which is shown by

	Cornwall (1972 #1482) as a faulted contact between Wahmonie and Salyer formations (his Tws unit) and Quaternary alluvium (his Qal deposits), (2) fault traces along Skull Mountain, which are portrayed by Swadley and Huckins (1990 #1666) as faulted contacts between Pliocene to Oligocene rocks (their Tr unit) and early Pleistocene and Pliocene(?) alluvium (their QTa deposits), and (3) other fault traces that are shown by Ekren and Sargent (1965 #1509) as displacing Tertiary volcanics of Wahmonie Flat (their Twm unit), Pliocene Piapi Canyon Formation (their Tpr and Tpat units), or Pliocene basalt of Skull Mountain (their Tbs unit) against Pliocene older alluvium (their Tao deposits) and Quaternary alluvium (their Qa deposits). Other sections of the Cane Spring fault are portrayed as faults in Tertiary or Quaternary deposits, or as lineaments or scarps on Tertiary or Quaternary surfaces.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Although the time of the most recent event is not well constrained, Quaternary movement is suspected based on reconnaissance photogeologic mapping by Reheis and Noller (1991 #1195). Much of its trace is in bedrock, and a 2.6-km-long trace previously mapped as Quaternary may be a fault-line scarp on bedrock, thus the structure is considered herein to be a class B fault.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* A low long-term cumulative slip rate is indicated based on about 1 km sinistral offset of 9.5 Ma volcanic rock (Poole and others, 1965 #1600; TRW Environmental Safety Systems Inc., 1998 #3907). The Quaternary slip rate is probably lower, based on the poor preservation and/or sparsity of scarps along the fault. The range of preferred Quaternary slip rate resulting from a formal seismic-hazard elicitation involving six separate teams (three experts each) is 0.01 to 0.025 mm/yr (Arabasz and others, 1998 #3908). Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault
Date and	1998

Compiler(s)	R. Ernest Anderson, U.S. Geological Survey, Emeritus
References	#3908 Arabasz, W.J., Anderson, R.E., and Ramelli, A.R., 1998, Appendix E, Seismic source and fault displacement expert elicitation summaries, *in* Wong, I.G., and Stepp, J.C., eds., Probabilistic seismic hazard analyses for fault displacement and vibratory ground motion at Yucca Mountain, Nevada, Final report, v. 2: Technical report to Department of Energy, Denver, Colorado, under Contract DE-AC04-94AL85000, Interagency Agreement DE-A108-92NV10874, February 23, 1998, p. AAR1-94. #1441 Barnes, H., Ekren, E.B., Rodgers, C.L., and Hedlund, D.C., 1982, Geologic and tectonic maps of the Mercury quadrangle, Nye and Clark Counties, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-1197, 1 sheet, scale 1:24,000. #1470 Carr, W.J., 1974, Summary of tectonic and structural evidence for stress orientation at the Nevada Test Site: U.S. Geological Survey Open-File Report 74-176, 53 p. #1472 Carr, W.J., 1984, Regional structural setting of Yucca Mountain, southwestern Nevada, and late Cenozoic rates of tectonic activity in parts of the southwestern Great Basin, Nevada and California: U.S. Geological Survey Open-File Report 84-854, 114 p. #1482 Cornwall, H.R., 1972, Geology and mineral deposits of southern Nye County, Nevada: Nevada Bureau of Mines and Geology Bulletin 77, 49 p., 1 pl., scale 1:250,000. #1509 Ekren, E.B., and Sargent, K.A., 1965, Geologic map of the Skull Mountain quadrangle, Nye County, Nevada: U.S. Geological Survey Geologic quadrangle Map GQ-387, 1 sheet, scale 1:24,000. #1037 Frizzell, V.A., Jr., and Shulters, J., 1990, Geologic map of the Nevada Test Site, southern Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-2046, 1 sheet, scale 1:100,000. #538 Piety, L.A., Sullivan, J.T., and Anders, M.H., 1992, Segmentation and paleoseismicity of the Grand Valley fault, southeastern Idaho and western Wyoming, *in* Link, P.K., Kuntz,

M.A., and Platt, L.B., eds., Regional geology of eastern Idaho and western Wyoming: Geological Society of America Memoir 179, p. 155-182.

#1600 Poole, F.G., Elston, D.P., and Carr, W.J., 1965, Geologic map of the Cane Spring quadrangle, Nye County, Nevada: U.S. Geological Survey Geologic quadrangle Map GQ-455, 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.

#1666 Swadley, W., and Huckins, H.E., 1990, Geologic map of the surficial deposits of the Skull Mountain quadrangle, Nye County, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-1972, 1 sheet, scale 1:24,000.

#3907 TRW Environmental Safety Systems Inc., 1998, Civilian radioactive waste management system management and operating contractor, Book 1-Section 3.2, Regional geological setting, Yucca Mountain site description, Draft A: Technical report to U.S. Department of Energy, North Las Vegas, Nevada, under Contract DE-AC08-91RW00134, April 1998.