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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.

Black Hills fault (Class A) No. 1116

Last Review Date: 2017-04-26

citation for this record: **Anderson, R.E., and Haller, K.M., compilers, 2017, Fault number 1116, Black Hills 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 Black Hills fault is a short northeast-striking fault along the southeastern base of the Black Hills (northeastern side of the Mc Cullough Range), southwest of Railroad Pass. It appears to be a normal fault that forms the structural margin between the Black Hills and the basin beneath Eldorado Valley. The southeast-facing bedrock escarpment of the Black Hills becomes increasingly precipitous to the northeast and, where it is highest and most precipitous directly southwest of Railroad Pass, it is flanked by a short (<5 km) conspicuous escarpment on the flanking Quaternary alluvial-fan deposits. Elsewhere along the fault's trace, there is apparently no record of Quaternary displacement. On the basis of estimated ages of faulted deposits and scarp-profile interpretation, the most recent surface faulting event probably occurred in the mid to late Holocene (<5 ka) and produced single-event scarps as much as 4 m in height.

Name comments	Name taken from Anderson and O'Connell (1993 #1440) who applied it to a short northeast-striking fault along the southeastern base of the Black Hills (northeastern side of the McCullough Range), southwest of Railroad Pass. A more extensive fault had previously been referred to as the Eldorado Valley fault by Smith (1984 #4699) and Weber and Smith (1987 #7768). **Fault ID:** Refers to fault number K1A (Black Hills fault) of dePolo (1998 #2845).
County(s) and State(s)	CLARK COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* Location taken from plate (without topography) at 1:250,000 scale by Anderson and O'Connell (1993 #1440) who mapped the fault using aerial photos at scale of about 1:58,000. More detailed map (about 1:25,000 scale) included as page-size figure within report by Anderson and O'Connell (1993 #1440).
Geologic setting	The Black Hills fault forms the southeastern margin of the Black Hills, an area of bedrock highlands separate from, and on the northeast side of, the McCullough Range, south of Las Vegas. The fault strikes northeast and separates the Black Hills structural block on the northwest from the basin beneath Eldorado Valley. It appears to be a normal fault (Anderson and O'Connell, 1993 #1440).
Length (km)	9 km.
Average strike	N31°E
Sense of movement	Normal *Comments:* Some northeast-striking Tertiary faults in the Lake Mead area are mainly left-slip structures (Anderson, 1973 #4701; Anderson and Barnhard, 1993 #4700), but the Black Hills fault appears to be a normal fault (Anderson and O'Connell, 1993 #1440).
Dip Direction	SE

Paleoseismology studies	Site 1116-1 trench by Fossett (2005 #6917).
Geomorphic expression	The southeast-facing bedrock escarpment of the Black Hills becomes increasingly precipitous to the northeast and, where it is highest and most precipitous directly southwest of Railroad Pass, it is flanked by a short (<5 km) conspicuous escarpment in the flanking Quaternary fan deposits. The fault is composed of four or more surface traces (Fossett, 2005 #6917) that are continuously expressed across all alluvial surfaces except the most recent. Fault scarps that are 0.5–3 m have slope angles of 23–29° (Fossett, 2005 #6917). The preferred maximum basal fault facet is reported as 146 m (122–195 m) by dePolo (1998 #2845).
Age of faulted surficial deposits	On the basis of mapping at about 1:25,000 scale, four map units estimated to be latest Pleistocene and Holocene were identified (Anderson and O'Connell, 1993 #1440). The youngest unit offset by the fault is estimated to be mid to early Holocene (<5 ka).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The most recent coseismic rupture of the Black Hills fault occurred in the Holocene, 2,250–10,580 yr (Fossett, 2005 #6917). Earlier age estimates of offset Quaternary strata and scarp-profile interpretations suggest that the last faulting event occurred in mid to late Holocene (Anderson and O'Connell, 1993 #1440).
Recurrence interval	Fossett (2005 #6917) interprets five coseismic surface ruptures exposed in the trench that occurred in the past 25 k.y. *Comments:* Study of the Quaternary scarps, including scarp profiles, failed to identify evidence for more than one surface-faulting event along the trace marked by a scarp on alluvium (Anderson and O'Connell, 1993 #1440).
Slip-rate category	Less than 0.2 mm/yr *Comments:* Fossett (2005 #6917) estimated a maximum vertical displacement rate of 0.33–0.55 mm/yr based on radiocarbon dates and colluvial wedge thickness. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.267 mm/yr 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, and lack of evidence supporting multiple faulting events, 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. Lamichhane (2014 #7767) modeled the Black Hill fault source with a slip rate of 0.4 mm/yr based on Fossett (2005 #6917).
Date and Compiler(s)	2017 R. Ernest Anderson, U.S. Geological Survey, Emeritus Kathleen M. Haller, U.S. Geological Survey
References	#1440 Anderson, L.W., and O'Connell, D.R., 1993, Seismotectonic study of the northern portion of the lower Colorado River, Arizona, California, and Nevada: U.S. Bureau of Reclamation Seismotectonic Report 93-4, 122 p., 3 sheets. #4701 Anderson, R.E., 1973, Large-magnitude late Tertiary strike-slip faulting north of Lake Mead, Nevada: Geological Survey Professional Paper 794, 18 p., 1, scale 1:62,500. #4700 Anderson, R.E., and Barnhard, T.P., 1993, Heterogeneous Neogene strain and its bearing on horizontal extension and horizontal and vertical contraction at the margin of the extensional orogen, Mormon Mountains area, Nevada and Utah: U.S. Geological Survey Bulletin 2011, 43 p., 5. #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. #6917 Fossett, E., 2005, Paleoseismology of the Black Hills fault, southern Nevada, and implications for regional tectonics: University of Nevada, Las Vegas, unpublished Masters thesis, 94 p. #6918 Fossett, E. and Taylor, W.J., 2003, Evidence and implications of Holocene faulting along the Black Hills fault, southern Nevada: Geological Society of America, Abstracts with Program, v. 35, p. 476.

	#7767 Lamichhane, S., 2014, An alternative analysis of the probabilistic seismic hazard for Las Vegas valley, Nevada: Bulletin of the Seismological Society of America, v. 104, p. 741–768, doi:10.1785/0120120268 #4699 Smith, E.I., 1984, Geologic map of the Boulder Beach quadrangle, Nevada: Nevada Bureau of Mines and Geology Map 81, scale 1:24,000. #7768 Weber, M.E., and Smith, E.I., 1987, Structural and geochemical constraints on the reassembly of disrupted mid-Miocene volcanoes in Lake Mead-Eldorado Valley area of southern Nevada: Geology, v. 15., p. 553–556, doi:10.1130/0091-7613(1987)15<553:SAGCOT>2.0.CO;2.