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.

Grimes Hills fault (Class A) No. 1201

Last Review Date: 2000-10-17

citation for this record: **Lidke, D.J., compiler, 2000, Fault number 1201, Grimes 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 02:17 PM.**

Synopsis	East-facing scarps and some linear features on Quaternary piedmont-slope deposits on the eastern side of Monitor Valley characterize the northern and southern parts of this fault zone. The northern part is expressed by a wider zone of fault-related features that strike more northeast compared to features that define the southern part of the zone. The central part of the zone is characterized by a single, north-striking fault that shows down-to-the-east stratigraphic offset and places bedrock along the eastern flank of the Grimes Hills against Quaternary piedmont-slope deposits. There appears to be evidence for at least one Quaternary faulting event that probably is no older that late Pleistocene and possibly is Holocene. Down-to-the-east stratigraphic offset along the central part of the fault zone, as well as the east-facing direction of the scarps, imply mostly down-to-the-east Quaternary movement along the fault zone. The fault zone has not been studied in detail and little is actually known with certainty about its nature, character, and movement history. The principal sources of data consist of photogeologic mapping supplemented by some

	field verification, reconnaissance photogeologic mapping, and reconnaissance geomorphic study of fault scarps.
Name comments	Refers to north-striking faults that were mapped by Schell (1981 #2844) and Dohrenwend and others (1992 #283) along the eastern flank of the Grimes Hills in the northern part of Monitor Valley and along the western side of the north end of the Monitor Range. Schell (1981 #2844) mapped and referred to these faults as the Bottle Summit fault. dePolo (1998 #2845) later portrayed and referred to these faults as the Grimes Hills fault. The later name dePolo (1998 #2845), Grimes Hills fault, is retained herein because it better describes the location of the faults. This zone of faults extends from about 1 km south of U.S. Highway 50, south along the eastern side of the Grimes Hills and into Monitor Valley to about 3 km south of Bottle Summit. **Fault ID:** Refers to faults that Schell (1981 #2844) mapped and labeled as 77, and to faults that dePolo (1998 #2845) portrayed and labeled as MI17.
County(s) and State(s)	EUREKA COUNTY, NEVADA LANDER COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location based on 1:250,000-scale maps of Schell (1981 #2844) and Dohrenwend and others (1992 #283). Mapping by Schell (1981 #2843; 1981 #2844) included field verification but was based primarily on photogeologic analysis of 1:24,000-scale, color aerial photography that was supplemented by analysis of some 1:60,000-scale, black-and-white aerial photography. Faults identified on the aerial photographs were transferred by inspection to 1:62,500-scale topographic maps that were photographically reduced to 1:250,000-scale for final compilation on 1:250,000-scale topographic maps. Mapping by Dohrenwend and others (1992 #283) was based on photogeologic analysis of 1:58,000-nominal-scale, color-infrared photography transferred directly to 1:100,000-scale topographic maps enlarged to the scale of the photographs. These maps were then reduced and compiled at 1:250,000-scale.

Geologic setting	This relatively continuous, north-striking fault zone is marked by a down-to-the-east fault along the eastern side of the Grimes Hills and by east-facing scarps and linear features that express the northern and southern ends of the fault zone (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). Stewart and McKee (1968 #4350; 1977 #4351) did not show the distal portions of the fault zone on their geologic maps of this region but their mapping indicates that the central part of the fault zone places Tertiary volcanic rock of the Grimes Hills against Quaternary fan deposits of Monitor Valley. The east-facing scarps and linear features that express the northern and southern ends of the fault zone are on similar Quaternary fan deposits, according to geologic mapping by Stewart and McKee (1968 #4350; 1977 #4351). The down-to-the-east stratigraphic offset shown along the Grimes Hills, as well as the east-facing direction of other scarps, indicates principally down-to-the-east movement along the fault zone that may be related to continued Quaternary down-dropping and adjustment of Monitor Valley relative to the adjacent Monitor Range. The fault zone has not been studied in detail; the down-to-the-east faults relative to extensive down-to-the-west faults [1202] directly to the south in the Monitor Valley have not been reported.
Length (km)	17 km.
Average strike	N27°E
Sense of movement	Normal *Comments:* Not specifically reported; the apparent down-to-the-east offset along the Grimes Hills and the consistent east-facing direction of the scarps suggest mostly down-to-the-east offsets along faults of this zone, which in this extensional regime probably reflects principally normal, dip-slip movement along east-dipping faults.
Dip Direction	E; SE *Comments:* Not reported; probably steep based on dip measurements of other Quaternary faults in localities nearby and elsewhere in the Basin and Range Province.
Paleoseismology studies	
Geomorphic	The central part of the fault zone is expressed by a main north-

expression	striking bedrock fault that occupies a swale between the Grimes Hills and the western flank of Monitor Range (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). The northern and southern parts of the fault zone are expressed by north-striking, east-facing scarps and by some linear features on Quaternary piedmont-slope deposits along the eastern side of Monitor Valley (Schell, 1981 #2844; Dohrenwend and others, 1992 #283). These fault-related features form a much wider zone along the northern part of the fault zone than they do along the southern part.
Age of faulted surficial deposits	Stewart and McKee (1968 #4350; 1977 #4351) mapped deposits along the fault zone as Pleistocene to Holocene alluvial-fan deposits, and Schell (1981 #2844) and Dohrenwend and others (1992 #283) indicate on their maps that these deposits are faulted. Schell (1981 #2844) reported an age 15-700 ka for the youngest faulted fan deposits, but suggested that these deposits probably are no older than 200 ka. Dohrenwend and others (1992 #283) assigned a broad age range of early to middle and (or) late Pleistocene to faulted deposits along scarps of the southern and central part of the fault zone. Along the northern part of the fault zone Dohrenwend and others (1992 #283) assigned a late Pleistocene age to faulted fan deposits along a scarp and assigned a Holocene age to deposits that show linear features.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* The timing of the most recent prehistoric faulting event is not tightly constrained. Schell (1981 #2844) reported the probable age as late Pleistocene age for the last movement along the fault zone. Similarly, reconnaissance photogeologic mapping by Dohrenwend and others (1992 #283) suggests that the most recent prehistoric faulting event probably is no older than late Pleistocene (<130 ka) and may be as young as Holocene (<10 ka).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed data exists to determine slip rates for this fault. dePolo (1998 #2845) assigned a reconnaissance vertical slip rate of 0.01 mm/yr for the fault based on the presence of scarps on

	alluvium and the absence of basal facets. The late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) support a low slip rate. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and Compiler(s)	2000 David J. Lidke, U.S. Geological Survey
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. #283 Dohrenwend, J.C., Schell, B.A., and Moring, B.C., 1992, Reconnaissance photogeologic map of young faults in the Millett 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2176, 1 sheet, scale 1:250,000. #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. #4350 Stewart, J.H., and McKee, E.H., 1968, Geologic map of the southeastern part of Lander County, Nevada: U.S. Geological Survey Open-File Report 68-260, 2 sheets, scale 1:62,500. #4351 Stewart, J.H., and McKee, E.H., 1977, Geology and mineral deposits of Lander County, Nevada: Nevada Bureau of Mines and Geology Bulletin 88, 106 p., 3 pls.