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.

Hickison Summit fault zone (Class A) No. 1200

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Synopsis	This north-striking, narrow-to-wide zone of deformation is characterized by faults, fault scarps, and linear features along the eastern flanks of the southern Simpson Park Mountains and the northern Toquima Range. Much of the fault zone is marked by a relatively continuous, but partly en echelon, series of range front faults that have down-to-the-east stratigraphic offset. The faults place bedrock of the mountain ranges against Quaternary piedmont-slope deposits of the adjacent Monitor Valley. East-facing scarps are locally present along the range front faults, but the scarps are most prominent east of the range front along the northern and southern ends of the fault zone where they are on piedmont-slope Quaternary deposits of the Monitor Valley. Down-to-the-east stratigraphic offset along the range front faults, as well as the predominant east-facing direction of the scarps, imply mostly down-to-the-east Quaternary movement along the fault zone. Composite fault scarps along the fault zone indicate

	more than one Quaternary faulting event and the youngest faulting event probably is no older than late Pleistocene and is perhaps as young as Holocene. 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 geologic mapping, photogeologic mapping supplemented by some field verification, and reconnaissance geomorphic study of fault scarps and basal fault facets.
Name comments	Refers to north- to northeast-striking faults that were mapped by McKee (1968 #4364), Stewart and McKee (1968 #4350; 1977 #4351), Schell (1981 #2844), and Dohrenwend and others (1992 #283) along the eastern flanks of the northern part of the Toquima Range and southern end of the Simpson Park Mountains. Shell (1981 #2844) mapped and referred to most of this fault zone as the Dry Creek fault, but referred to the northern and southern parts of this zone as the Point and Monitor Ranch faults, respectively. dePolo (1998 #2845) portrayed and referred to this fault zone as the Hickison Summit fault zone, and that name is also used herein. This zone of faults extends from about 5 km north and west of The Point south along the eastern flanks of the southern part of the Simpson Park Mountains and northern part of the Toquima Range to about Stoneberger Creek. **Fault ID:** Refers to faults that Schell (1981 #2844) mapped and labeled as 57, 78, and 79, and refers to the fault zone that dePolo (1998 #2845) portrayed and labeled as MI16.
County(s) and State(s)	LANDER COUNTY, NEVADA NYE 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 of the faults 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 north- to northeast-striking fault zone is mainly characterized by a series of partly en echelon range front faults that show down-to-the-east stratigraphic offset of Tertiary and Paleozoic bedrock of the Toiyabe Range and Simpson Park Mountains against Quaternary alluvial-fan deposits of Monitor Valley (Stewart and McKee, 1977 #4351; Schell, 1981 #2844; Dohrenwend and others, 1992 #283). East-facing scarps are present locally along the range front faults (Dohrenwend and others, 1992 #283). The apparent down-to-the-east offset along the range front faults and the predominant east-facing aspect of scarps suggest principally down-to-the-east movement along the fault zone. Along the northern part of the fault a prominent series of west-facing scarps are preserved on piedmont-slope deposits east of the range front. Schell (1981 #2844) mapped these west-facing scarps as part of the Point fault that mimics the slightly sinuous trace of the range front fault west of it and is considered herein to be the east-bounding fault of a graben along the northern part of this fault zone. The southern part of the fault zone shows a few relatively short, west-facing fault scarps near the range front and has a prominent series of east-facing scarps east of the range front that were previously mapped as the Monitor Ranch fault by Schell (1981 #2844). The Monitor Ranch fault of Schell (1981 #2844) is included in the Hickson Summit fault zone because it appears to be a southern continuation and piedmont-slope expression of this larger fault zone along the eastern flank of the Toquima Range. McKee (1976 #4349) reported that late Cenozoic vertical offset along the bounding faults of the northern part of the Toquima Range is greater than about 650 m as determined from offset of flat-lying Tertiary tuffs that are now at the top of the range. Quaternary offset along the fault zone probably reflects some continued uplift of the Toquima Range and Simpson Park Mountains relative to the adjacent Monitor Valley. The fault zone has not been studied in detail and other insights and estimates of Quaternary offset amounts have not been reported.

Length (km)	54 km.
Average strike	N10°E
Sense of movement	Normal *Comments:* Not specifically reported; the apparent down-to-the-east offsets along the range front faults and the predominantly east-facing direction of scarps consistently 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 *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 expression	Fault zone is largely expressed by a relatively continuous, partly en echelon, down-to-the-east series of range front bedrock faults that form the common boundary between the Toiyabe Range, Simpson Park Mountains and the Monitor Valley (Stewart and McKee, 1977 #4351; Schell, 1981 #2844; Dohrenwend and others, 1992 #283). Locally, east-facing fault scarps are along and directly adjacent to the range front faults, but scarps and linear features are most prominent on piedmont-slope deposits east of the range front. A prominent series of west-facing fault scarps is present on piedmont-slope deposits east of the range-front and it appears to mark the northeastern edge of the fault zone and to define the eastern-bounding fault of a graben along the northern part of the fault zone. Schell (1981 #2844) reported a maximum scarp height of 4 m but also said that some multiple-event fault scarps may be much higher than 4 m. dePolo (1998 #2845) reported a preferred maximum basal facet height of 85 m (61-110 m).
Age of faulted surficial deposits	McKee (1968 #4364) and Stewart and McKee (1968 #4350; 1977 #4351) mapped faulted deposits along the northern part of the fault zone as alluvium and fan deposits of broadly Holocene to Pleistocene. Schell (1981 #2844) reported an age range of 15-700 ka for the youngest faulted alluvial-fan deposits along the fault

	zone and he further 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 at several localities along the fault zone. At a few other localities along the fault zone, however, Dohrenwend and others (1992 #283) assigned Holocene, late Pleistocene, and questionable late Pleistocene and latest Pleistocene to Holocene to faulted deposits.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* The timing of the most recent prehistoric faulting event is not well constrained. Schell (1981 #2844) reported probable late Pleistocene 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 late Pleistocene or even Holocene (<30 ka).
Recurrence interval	*Comments:* Geomorphic or stratigraphic data needed for estimating recurrence are not reported. Schell (1981 #2844) suggested that compound scarps are present along the fault zone which would imply multiple Quaternary faulting events.
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 0.184 mm/yr for the fault based on the presence or absence of scarps on alluvium and 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.

#4364 McKee, E.H., 1968, Geologic map of the Ackerman Canyon quadrangle, Lander and Eureka Counties, Nevada: U.S. Geological Survey Geologic quadrangle Map GQ-761, 1 sheet, scale 1:62,500.

#4349 McKee, E.H., 1976, Geology of the northern part of the Toquima Range, Lander, Eureka, and Nye Counties, Nevada: U.S. Geological Survey Professional Paper 931, 49 p., 2 pls., scale 1:62,500.

#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.