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Quaternary Fault and Fold Database of the United States

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Hiko fault zone (Class A) No. 1130

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Synopsis	The Hiko fault zone consists of a convex-west zone of discontinuous, north- to northeast-striking, down-to-the-west faults at the west base of the northern Hiko Range and to the west in Pahranagat Valley. At least one strand in Pahranagat Valley is down to the east. Published maps of the Quaternary faults are in poor agreement. No comprehensive descriptions are known of the scarps along the Hiko fault zone, but a maximum scarp height of 9 m and a maximum scarp slope angle of 15° are reported. Intermediate-age alluvium with an estimated age range of 15–700 ka (mostly 15–200 ka) is offset by the fault and young alluvium with an age range of 0–15 ka is not. The probable age of last movement is late Pleistocene.
Name comments	Name adapted from Schell (1981 #2844) who applied the name Hiko fault to "a 2-mile-wide zone of subparallel scarps and a fault at the bedrock-alluvial contact" at the west base of and west of the Hiko Range. Called the Crystal Springs fault zone by dePolo

	(1999 #2845); preference to the earlier name is given here. **Fault ID:** Referred to as fault number 90 of Schell (1981 #2844) and fault number C10 of dePolo (1999 #2845).
County(s) and State(s)	LINCOLN COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Fault traces taken from Schell (1981 #2844) who compiled them at 1:250,000 from 1:25,000-scale aerial photos following field study. Also shown on 1:250,000-scale unpublished map of Quaternary faults, based on photogeologic studies in the Caliente 1:250,000-scale map by J.C. Dohrenwend (published at 1:1,000,000, Dohrenwend and others, 1996 #2846). The faults mapped by Schell do not agree well with those mapped by Ekren and others (1977 #1036) who used 1:60,000-scale aerial photos.
Geologic setting	As mapped by Schell (1981 #2844) the Hiko fault zone consists of a convex-west zone of north- to northeast-striking faults at the west base of the northern Hiko Range and to the west in Pahranagat Valley. In contrast, Ekren and others (1977 #1036) only mapped Quaternary faults in the alluvium in Pahranagat Valley, and showed no fault at the west base of the Hiko Range. The faults mapped by them suggest a small (about 13-km-long) south-widening graben within the alluvial deposits of the north part of Pahranagat Valley. However, fault traces in Pahranagat Valley do not agree well between the two maps. Schell shows a down-to-the-east fault, but it does not bound a graben as shown by Ekren and others (1977 #1036). Neither map shows a range-front fault along the west margin of the central Hiko Range, but Ekren and others (1977 #1036) show a range-front fault along the southern range (beyond the area mapped by Schell) where Quaternary-Tertiary basin-fill deposits are in fault contact with bedrock. Because some bedrock/alluvium faults in that area are shown as down on the bedrock side and others are known not to be Quaternary faults, it is assumed that the fault presentation by Ekren and others (1977 #1036) marks a fault-line scarp and not necessarily a Quaternary fault. The Hiko fault zone as used here is restricted to the north part of the range and includes a

	discontinuous, convex-west, down-to-the-west, range-front fault as mapped by Schell (1981 #2844) and some subsidiary faults to the west. Switzer (1996 #5827) and Taylor and others (1998 #3844) suggest that there is a structural and geometric discontinuity in the Hiko fault between Crystal Springs and Hiko. The fault they consider includes a pre-Quaternary (?) strand to the southeast, along the eastern side of Pahranagat Valley.
Length (km)	15 km.
Average strike	N14°E
Sense of movement	Normal *Comments:* Switzer (1996 #5827) notes slickenlines on fault surfaces in two areas have rakes of 85° S. and 88° N., supporting a predominately normal dip-slip displacement along the Hiko fault.
Dip Direction	W *Comments:* Probably steep.
Paleoseismology studies	
Geomorphic expression	No description is given of the scarps along the Hiko fault zone, but Schell (1981 #2844, Table A2) reports a maximum scarp height of 9 m and a maximum scarp slope angle of 15°. dePolo (1999 #2845) indicates there are no basal facets.
Age of faulted surficial deposits	Schell (1981 #2844, Table A2) reports that intermediate-age alluvium with an estimated age range of 15–700 ka (mostly 15–200 ka) is cut by the fault and young alluvium with an age range of 0–15 ka is not.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Schell (1981 #2844, Table A2) estimates the probable age of last movement to be late Pleistocene, but no evidence is cited. In an unpublished map of Quaternary faults in the 1:250,000-scale Caliente map, J.C. Dohrenwend (published at 1:1,000,000, Dohrenwend and others, 1996 #2846) it is estimated

	(based on photogeologic study) that several of the scarps are formed on deposits or surfaces of late Pleistocene (10–130 ka) age. On the basis of this estimated age, a late Quaternary timing is chosen.
Recurrence interval	*Comments:* No estimate can be made, but the 9-m-high scarp reported by Schell (1981 #2844) is not likely to represent a single-event feature.
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)	1999 R. Ernest Anderson, U.S. Geological Survey, Emeritus
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. #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. #1036 Ekren, E.B., Orkild, P.P., Sargent, K.A., and Dixon, G.L., 1977, Geologic map of Tertiary rocks, Lincoln County, Nevada: U.S. Geological Survey Miscellaneous Investigations Map I-1041, 1 sheet, scale 1:250,000. #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. #5827 Switzer, C.D., 1996, The geology and structures in the northern Hiko Range, Lincoln County, Nevada: Las Vegas, University of Nevada, unpublished M.S. thesis, 119 p., scale 1:24,000. #3844 Taylor, W.J., Switzer, D.D., and Hammond, J.K., 1998, Definition of fault segments on young normal faults—Geometry, offset, and scarps of the Hurricane fault, Utah and Hiko fault, Nevada, *in* Lund, W.R., ed., Proceedings volume, Basin and Range province, seismic-hazards summit: Utah Geological Survey Miscellaneous Publication 98-2.