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Quaternary Fault and Fold Database of the United States

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Hanaupah fault (Class A) No. 68

Last Review Date: 2002-02-19

Compiled in cooperation with the California Geological Survey

citation for this record: **Machette, M.N., compiler, 2002, Fault number 68, Hanaupah 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 02:04 PM.**

Synopsis	The Hanaupah fault is in an intrabasin position, just above the floor of central Death Valley. It is antithetic to the much larger and more active Black Mountains fault [142], and is similar to but more continuous than the many faults grouped within the '"unnamed faults on the west side of Death Valley [106]." The presence of scarps as much as 50–75 feet (15–23 m) high on late to middle (?) Pleistocene deposits along the Hanaupah fault indicates a recurrent history of fault movement along a singular preferred fault. The youngest movement on the fault is surely latest Quaternary (<130 ka), although there have been no detailed studies of the fault.
Name	This feature appears to have never been formally named, although

comments	Hunt and Mabey (1966 #1551) who were the first to map and discuss the fault, referred to it as the fault at the foot of the Hanaupah (Canyon) escarpment. The fault is herein named the Hanaupah fault, for its location at the distal end of the alluvial fan complex that emanates from Hanaupah Canyon. The Hanaupah fault is located 0.3–2.5 km west of the West Side Road, on the western piedmont of central Death Valley. Its recognizable trace extends a distance of about 7 km from about 1-km northwest of Tule Spring (on the north) south to about a point 1 km south of due west of Eagle Borax Works (ca. 2 km south of the Hanaupah Canyon road). **Fault ID:** Comments: Refers to number 248 of Jennings (1994 #2878).
County(s) and State(s)	INYO COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* The fault has been show with various continuities; Hunt and Mabey (1966 #1551) drew the first trace at 1:96,000 scale. The fault is shown in most detail on a 1:24,000 scale map by Wills (fig. 3c, 1989 #1693). Brogan and others (1991 #298) mapped it fairly comprehensively at 1:62,500 scale and Reheis and Noller (1991 #1195) showed it at 1:100,000 scale; the latter traces were used for digitization.
Geologic setting	The Hanaupah fault is in an intrabasin position, just above the floor of Death Valley. It is antithetic to the much larger and more active Black Mountains fault [142], and is similar to but more continuous than the many faults grouped within the '"unnamed faults on the west side of Death Valley [106]." In this region, Death Valley has a general half-graben structure as indicated by the large, relatively undeformed fans that emanate from the Panamint Mountains on the west, versus the small, highly deformed fans that emanate from the Black Range on the east. Surely there is a lot of intravalley deformation in the subsurface, but the Holocene to late Pleistocene landscape leaves little hint of such structural architecture. The presence of scarps as much as 50–75 feet (15–23 m) high along the Hanaupah fault (escarpment)

	(p. A103, Hunt and Mabey, 1966 #1551) indicates a recurrent history of fault movement along a singular preferred fault.
Length (km)	7 km.
Average strike	N7°E
Sense of movement	Normal *Comments:* Inferred from aspect of scarps in an extensional regime. No sense of slip indicator has been reported.
Dip	85° E *Comments:* Wills (fig. 3c, 1989 #1693) notes that there are oriented cobbles along an 85° SE.-dipping plane. This fault may or may not be the principal fault of the escarpment.
Paleoseismology studies	
Geomorphic expression	The Hanaupah fault forms small (<2 m) to large (15–23 m) scarps on relatively coarse grained alluvial-fan deposits that form the Hanaupah fan, one of the largest fans on the west side of central Death Valley (Hunt and Mabey, 1966 #1551). These scarps were first shown and noted as the product of multiple deformation by Hunt and Mabey (fig. 76, 1966 #1551). The mapped trace is about 7 km long; its south end appears to be real, whereas the northern end may extend many kilometers further (Hunt and Mabey, 1966 #1551) beneath Holocene playa deposits that form the surface of central Death Valley. Wills (fig. 3c, 1989 #1693) notes that the scarp at the Hanaupah Canyon Road is about 8 m high and has a maximum scarp slope angle of 27°; this scarp is obviously a product of multiple fault movements and may in fact be partially buried by alluvium from the southwest.
Age of faulted surficial deposits	Hunt and Mabey (1966 #1551) reported that their gravel 2 (late Pleistocene) and gravel 3 (latest Pleistocene) are deformed by the fault. Although these units were undated at the time, Klinger (table A-1, 2001 #4770) correlates their gravels 2 and 3 with his units Q2b (80–120 ka) and Q3a-c (2–12 ka) respectively. Gravel unit 4 (Recent, probably late Holocene) of Hunt and Mabey (1966 #1551) is not deformed by the Hanaupah fault. Wills (fig. 3c, 1989 #1693) notes that most of the scarp is formed on older alluvium that has well developed desert pavement and well-

	varnished clasts. In addition, he found evidence for about 1 m of offset in a debris flow that emanates from on of the small drainages that have incised the larger scarp.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Although there have been no detailed studies of the fault, observations by Hunt and Mabey (1966 #1551), Wills (fig. 3c, 1989 #1693), Reheis and Noller (1991 #1195), and the compiler suggest that alluvial deposits of late Pleistocene age (i.e., late Quaternary, <130 ka) age are clearly faulted, and the older deposits are displaced by multiple faulting events (*i.e.*, 15–23 m of offset). The timing of the most recent faulting is less clear, but Hunt and Mabey (1966 #1551) reported deformation of undated latest Pleistocene alluvium. It is unclear whether their gravel 3 is <12 ka as suggested by Klinger (Table A-12001 #4770), and no other detailed mapping of the youngest offset deposits is has been published. Wills (fig. 3c, 1989 #1693) notes that a portion of the fault scarp is on late Pleistocene to Holocene alluvium, although no dates have been obtained from these faulted deposits. Therefore, we suspect youngemovement <15 ka may have occurred.
Recurrence interval	*Comments:* The Hanaupah fault has clear evidence for repeated displacement through the late Quaternary (<130 ka) as evidence by 15-23 m high scarps on older (late Quaternary) alluvium and smaller (<2 m high) scarps on younger alluvium (Hunt and Mabey, 1966 #1551). However, without better dating of faulted deposits and estimates of offset per event, estimates of recurrence intervals can not be made.
Slip-rate category	Less than 0.2 mm/yr *Comments:* No published information exists on slip rates for the Hanaupah fault. However, the 15–23 m high scarps on Hunt and Mabey's (1966 #1551) gravel 2 (unit Q2b, 80–120 ka, Table A-1 in Klinger and Sarna-Wojcicki, 2001 #4770) suggest moderate-term rates are probably be <0.2 mm/yr.
Date and Compiler(s)	2002 Michael N. Machette, U.S. Geological Survey, Retired

References	#298 Brogan, G.E., Kellogg, K.S., Slemmons, D.B., and Terhune, C.L., 1991, Late Quaternary faulting along the Death Valley-Furnace Creek fault system, California and Nevada: U.S. Geological Survey Bulletin 1991, 23 p., 4 pls., scale 1:62,500. #1551 Hunt, C.B., and Mabey, D.R., 1966, Stratigraphy and structure, Death Valley, California: U.S. Geological Survey Professional Paper 494-A, 162 p., 3 pls., scale 1:96,000. #4770 Klinger, R.E., and Sarna-Wojcicki, A.M., 2001, Field trip guide for Day A, northern Death Valley, *in* Machette, M.N., Johnson, M.L., and Slate, J.L., eds., eds., Quaternary and late Pliocene geology of the Death Valley region—Recent observations on tectonics, stratigraphy, and lake cycles (Guidebook for the 2001 Pacific Cell, Friends of the Pleistocene Fieldtrip): U.S. Geological Survey Open-File Report 01-51, p. A5-A49. #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. #1693 Wills, C.J., 1989, Death Valley fault zone, Inyo and San Bernardino Counties, California: California Division of Mines and Geology Fault Evaluation Report FER-204, 17 p., 1 pl., scale 1:62,500.