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Quaternary Fault and Fold Database of the United States

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Grapevine Mountains fault (Class A) No. 1094

Last Review Date: 1999-01-11

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Synopsis	The Grapevine Mountains fault consists of two main overlapping north- and northeast-striking faults that bound bedrock blocks at the northwest margin of the Grapevine Mountains at their junction with Grapevine Canyon. The northern fault is relatively straight and the southern one strongly convex to the northwest. Quaternary displacement is inferred from photogeologic study and is based on weak to prominent scarps or lineaments on Quaternary deposits or at contacts between bedrock and Quaternary deposits along parts of the faults. Photogeologic mapping is the main source of data for this fault; there is little or no information available on scarp height, slip sense, slip rate, or recurrence interval. The only estimate of slip rate for the fault is low and based mainly on the presence or absence of scarps in alluvium and basal facets.
Name	Name applied by Piety (1995 #915) to a group of faults at the

comments	northwest margin of the Grapevine Mountains in Nevada and California. dePolo (1998 #2845) referred to the fault as the Northern Grapevine Mountain fault zone. The name applied by Piety (1995 #915), Grapevine Mountains fault, is retained herein for these north- and northeast-striking faults and fault-related features that were mapped by Reheis (1991 #1602), Reheis and Noller (1991 #1195), and Dohrenwend and others (1992 #289) along the northwestern flank of the Grapevine Mountains **Fault ID:** Referred to as GM by Piety (1995 #915) and portrayed as G8 by dePolo (1998 #2845).
County(s) and State(s)	INYO COUNTY, CALIFORNIA ESMERALDA COUNTY, NEVADA NYE COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Location is from Reheis and Noller (1991 #1195) and Reheis (1991 #1602) who compiled the faults on 1:100,000-scale topographic maps from photogeologic study of aerial photos at scales ranging from 1:24,000 to 1:80,000. Some traces shown on those maps are in bedrock and marked by bedrock scarps. These do not match well with bedrock scarps or lineaments shown at 1:250,000 by Dohrenwend and others (1992 #289). Because of the discrepancy and the lack of evidence for Quaternary history, those fault traces are not included with the Grapevine Mountains fault. The fault is not shown on the 1:250,000-scale geologic map of Esmeralda County (Albers and Stewart, 1972 #3863).
Geologic setting	The faults are located in the Goldfield section of the Walker Lane belt of Stewart (1988 #1654), an area characterized by a general lack of major through-going northwest-striking strike-slip faults and by a scarcity of major Basin and Range faults. They are similar to several northeast-striking faults that bound ranges and ridges in nearby areas of west central Nevada and adjacent parts of California. These faults could be conjugate left-slip shears to the northwest-striking, right-slip Fish Lake Valley fault zone [49] or, they may be normal faults perpendicular to the regional northwest-southeast extension direction (Reheis and Noller, 1989 #1610; Reheis and Noller, 1991 #1195).

Length (km)	23 km.
Average strike	N°E
Sense of movement	Normal *Comments:* On the basis of photogeologic study, most of the fault traces are decorated with ticks indicating scarps that slope to the northwest (Reheis and Noller, 1989 #1610; Reheis and Noller, 1991 #1195; Dohrenwend and others, 1992 #289) but no specific slip information is available.
Dip Direction	Unknown *Comments:* Unknown, possibly northwest based on northwest-facing scarps (Reheis and Noller, 1989 #1610; Reheis and Noller, 1991 #1195; Dohrenwend and others, 1992 #289).
Paleoseismology studies	
Geomorphic expression	Photogeologic compilations at scales of 1:100,000 (Reheis and Noller, 1991 #1195; Reheis, 1991 #1602) and 1:250,000 (Dohrenwend and others, 1992 #289) show scarps with slopes facing northwest developed on Quaternary surficial deposits, but no field descriptions or scarp-height data are available. There is good agreement between 1:100,000 and 1:250,000 compilations on the location of scarps along the SW part of the northern fault but poor agreement elsewhere. Along the agreed-upon southwestern trace, Reheis and Noller (1991 #1195) show short trace segments as moderate- to well-developed scarps or lineaments on Quaternary deposits, suggesting well-established Quaternary activity. The southern fault is strongly convex to the northwest, and much of its trace is characterized by Reheis and Noller (1991 #1195) and Reheis (1991 #1602) as well defined by scarps or lineaments in Quaternary deposits, also suggesting well-established Quaternary activity. dePolo (1998 #2845) reported the presence of scarps and absence of fault facets along this fault.
Age of faulted surficial deposits	Dohrenwend and others (1992 #289) show portions of the northern trace as scarps on depositional or erosional surfaces with ages of Pleistocene (10 ka to 1.5 Ma) and possibly late Pleistocene (10 to 130 ka).
Historic	

earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Assignment is based on photogeologic interpretation of Dohrenwend and others (1992 #289).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No stratigraphic offset or scarp height data are available. 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	#3863 Albers, J.P., and Stewart, J.H., 1972, Geology and mineral deposits of Esmeralda County, Nevada: Nevada Bureau of Mines and Geology Bulletin 78, 88 p. #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. #289 Dohrenwend, J.C., Schell, B.A., McKittrick, M.A., and Moring, B.C., 1992, Reconnaissance photogeologic map of young faults in the Goldfield 1° by 2° quadrangle, Nevada and California: U.S. Geological Survey Miscellaneous Field Studies Map MF-2183, 1 sheet, scale 1:250,000. #915 Piety, L.A., 1995, Compilation of known and suspected Quaternary faults within 100 km of Yucca Mountain, Nevada and California: U.S. Geological Survey Open-File Report 94-112, 404 p., 2 pls., scale 1:250,000. #1602 Reheis, M.C., 1991, Aerial photographic interpretation of lineaments and faults in late Cenozoic deposits in the eastern parts

	of the Saline Valley 1:100,000 quadrangle, Nevada and California, and the Darwin Hills 1:100,000 quadrangle, California: U.S. Geological Survey Open-File Report 90-500, 6 p., 2 pls., scale 1:100,000. #1610 Reheis, M.C., and Noller, J.S., 1989, New perspectives on Quaternary faulting in the southern Walker Lane, Nevada and California, *in* Ellis, M.A., ed., Late Cenozoic evolution of the southern Great Basin: Nevada Bureau of Mines and Geology Open-File Report 89-1, p. 57-61. #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. #1654 Stewart, J.H., 1988, Tectonics of the Walker Lane belt, western Great Basin—Mesozoic and Cenozoic deformation in a zone of shear, *in* Ernst, W.G., ed., Metamorphism and crustal evolution of the western United States, Ruby Volume VII: Englewood Cliffs, New Jersey, Prentice Hall, p. 683-713.