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Quaternary Fault and Fold Database of the United States

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Clayton Ridge fault (Class A) No. 1104

Last Review Date: 1999-02-11

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Synopsis	The Clayton Ridge fault is a north-northeast-striking, down-to-the west range-bounding fault separating Clayton Ridge from Clayton Valley. It is one of several such faults in the central part of Esmeralda County. Crenulations and slickensides within bedrock shear zones, observed at one locality on the northeastern end of Clayton Ridge, may suggest left-oblique displacement for the Clayton Ridge fault. The relative amounts of normal and sinistral displacement are not known. For most northeast-striking faults in this area, there is generally little evidence to support left-lateral displacement. Photogeologic mapping is the main source of data for these faults. The most recent event is estimated to be late Quaternary, but the recurrence interval is unknown.
Name comments	Name given here to a range-bounding fault separating Clayton Ridge from Clayton Valley. Piety (1995 #915) combined this fault with a fault to the north at the west base of Paymaster Ridge and

	referred to the 51-km-long structure as the Clayton Ridge-Paymaster Ridge fault (CRPR). dePolo (1998 #2845) similarly combined the two faults and referred to them as the Clayton and Paymaster Ridges fault zone. The faults are compiled here as separate structures because, as mapped by Reheis and Noller (1991 #1195), the northern part of the Clayton Ridge fault bends eastward and the southern part of the Paymaster Ridge fault [1105] bends westward creating a lack of alignment. A left-sense step-over of 5 km is required to connect the two range-bounding structures. A left step is not indicated on the 1:100,000-scale photogeologic map of Reheis and Noller (1991 #1195). Range-front fault traces mapped by Dohrenwend and others (1992 #289) show more continuity between the two faults than do those mapped by Reheis and Noller (1991 #1195). The north-northeast-striking Clayton Ridge fault extends from about Lida Wash, northward along the northwest flank of Clayton Ridge, to about the north end of the ridge. **Fault ID:** The southern part of a long fault referred to as CRPR by Piety (1995 #915) and portrayed as G5 by dePolo (1998 #2845).
County(s) and State(s)	ESMERALDA 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) who compiled the fault on a 1:100,000-scale topographic map from photogeologic study of aerial photos at scales ranging from 1:24,000 to 1:80,000.
Geologic setting	The Clayton Ridge fault is 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 a scarcity of major Basin and Range faults. It has the appearance of a Basin and Range fault as it separates Clayton Ridge on the east from the basin beneath Clayton Valley on the west, and thus may represent an exception to the rule. It is part of a larger group of northeast-striking, generally down-to-the northwest faults that extend 25 km westward from the

	Montezuma Range across Clayton Valley (Reheis and Noller, 1991 #1195; Dohrenwend and others, 1992 #289). These faults probably all have a normal component of displacement, and there is generally little evidence to support left-lateral displacement (Reheis and Noller, 1989 #1610; 1991 #1195). On the basis of exposures at one locality on the northeastern end of Clayton Ridge, Reheis and Noller (1989 #1610) concluded that observed crenulations and slickensides within bedrock shear zones suggest left-oblique displacement along the Clayton Ridge fault.
Length (km)	22 km.
Average strike	N21°E
Sense of movement	Normal *Comments:* On the basis of exposures at one locality on the northeastern end of Clayton Ridge, Reheis and Noller (1989 #1610) concluded that observed crenulations and slickensides within bedrock shear zones suggest left-oblique displacement for the Clayton Ridge fault. The relative amounts of normal and sinistral displacement are not known. For the northeast-striking faults in this area, there is generally little evidence to support left-lateral displacement (Reheis and Noller, 1991 #1195). dePolo (1998 #2845) reported a normal sense of displacement for this fault and the Paymaster Ridge fault, which he portrayed as a single fault zone.
Dip Direction	W *Comments:* On the basis of photogeologic interpretation and limited field data pertaining to the northeast-striking faults in the area, Reheis and Noller (1989 #1610) suggested the fault dips steeply (70? to 90?).
Paleoseismology studies	
Geomorphic expression	The Clayton Ridge fault is portrayed as one of the major Quaternary range-front faults in the area (Dohrenwend and others, 1992 #289). It is expressed as moderate to prominent lineaments and scarps on surfaces of chiefly Quaternary deposits (Reheis and Noller, 1991 #1195). dePolo (1998 #2845) reported the presence of scarps and basal facets along this fault zone and (or) the Paymaster Ridge fault [1105] to the north.

Age of faulted surficial deposits	Quaternary. Fan deposits of assumed upper Pleistocene and Holocene age abut the bedrock front of Clayton Ridge, but the displacement relations are not reported in detail (Reheis and Noller, 1989 #1610).
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Late Quaternary displacement on the Clayton Ridge fault is suggested by upper Pleistocene and Holocene alluvial-fan deposits that abut the bedrock fronts of Clayton Ridge and appear to bury older alluvial-fan deposits (Reheis and Noller, 1989 #1610).
Recurrence interval	 *Comments:* Layers of sheared alluvium and (or) colluvium were observed to overlie sheared bedrock along the Clayton Ridge fault (Reheis and Noller, 1989 #1610). Variations in the particle size, extent of shearing, and cementation of these layers suggest that the layers become younger and less disturbed by faulting away from the bedrock. These relationships suggested to Reheis and Noller (1989 #1610) that several episodes of displacement have occurred rather than a single episode. No age data are available, so recurrence intervals cannot be assessed.
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 0.214 mm/yr to this fault and (or) the Paymaster Ridge fault [1105] to the north, based on an empirical relationship between his preferred maximum basal facet height and vertical slip rate. The size of the facets (tens to hundreds of meters, as measured from topographic maps) indicates they are the result of many seismic cycles, and thus the derived slip rate reflects a long-term average. However, the late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) suggest the slip rate during this period is of a lesser magnitude. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.
Date and	1999

Compiler(s)	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. #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. #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.