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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.

Sulphur Spring fault (Class A) No. 1138

Last Review Date: 2000-01-19

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Synopsis	The Sulphur Spring fault is a cross-valley (cross-basin) structure of uncertain tectonic significance. It extends from Buffalo Mountain across the alluvium of Pumpernickel Valley to the northeastern margin of Edna Mountain, where it forms the faulted eastern margin of young (Quaternary/Tertiary) basalt. The fault is in the westernmost part of a tectonic subprovince characterized by NE- and NNE-striking normal faults, but it is not a major range-front structure. Pumpernickel Valley drains to the northeast to the Humboldt River, but the Sulphur Spring fault crosses the valley obliquely as a continuous, low, north-trending scarp and a less continuous northeast-trending scarp. The scarps are estimated to be formed on deposits or erosion surfaces ranging from middle to early Pleistocene (0.13-1.6 Ma) to Holocene (0-10 ka) in age. No detailed studies have been reported and no recurrence times estimated. The fact that most of the fault is expressed as a low scarp on valley alluvium suggests that the most recent event is

	young, but the long-term slip rate is low. Where against bedrock, the fault lacks fault facets which also suggests a low long-term slip rate.
Name comments	Name modified from Wallace (1979 #203) who referred to the fault as the Sulphur Spring scarps. The fault extends from about 1.5 km north of Interstate 80 south and southwest across Pumpernickel Valley to the north flank of Buffalo Mountain. Wallace (1979 #203) mapped the fault as extending farther to the south, but less far to the north than Dohrenwend and Moring (1991 #282).
County(s) and State(s)	HUMBOLDT COUNTY, NEVADA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Fault traces taken from the 1:125,000-scale map of young fault scarps by Wallace (1979 #203). That map was compiled mostly from a combination of photogeologic and field mapping on 1:60,000-scale aerial photographs.
Geologic setting	The Sulphur Spring fault is a cross-valley (cross-basin) structure of uncertain tectonic significance. It extends from Buffalo Mountain across the alluvium of Pumpernickel Valley to the northeast margin of Edna Mountain where it forms the faulted eastern margin of young (Quaternary/Tertiary) basalt (Stewart and Carlson, 1978 #3413). Although some reaches of the fault are mapped as a major range-front structure (Dohrenwend and Moring, 1991 #282), that characterization seems inappropriate based on the fault's overall geomorphic expression. The fault is in the westernmost part of the Shoshone extensional area of dePolo (1998 #2845), a tectonic subprovince characterized by NE- and NNE-striking normal faults.
Length (km)	27 km.
Average strike	N18°E
Sense of movement	Normal *Comments:* No specific data available; sense inferred from

	location in extensional tectonic province. The fault is located within the Shoshone extensional area of dePolo (1998 #2845), a tectonic subprovince characterized by NE- and NNE-striking normal faults.
Dip Direction	E; SE
Paleoseismology studies	
Geomorphic expression	Pumpernickel Valley drains to the northeast to the Humboldt River, but the Sulphur Spring fault crosses the valley obliquely as a continuous, low, north-trending scarp and a less continuous northeast-trending scarp. To the northeast, it forms the structural margin between Pumpernickel Valley alluvium and bedrock of Edna Mountain. Part of that trace is designated a major range-front fault by Dohrenwend and Moring (1991 #282), but the footwall block lacks almost all of the definitive geomorphic characteristics of such faults including a major range with steep bedrock slopes, faceted spurs, wineglass valleys and sub parallel systems of high-gradient transverse canyons.
Age of faulted surficial deposits	On the basis of photogeologic reconnaissance, Dohrenwend and Moring (1991 #282) estimated that the scarps are formed on deposits or erosion surfaces ranging from middle to early Pleistocene (0.13-1.6 Ma) and Holocene (0-10 ka) age.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Age assignment is based on Wallace (1979 #203), who estimated that the scarps formed <2 k.y. ago. However, there are no morphometric or other dating studies to support such a young time of rupture.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* The fact that most of the fault is expressed as a low scarp on valley alluvium suggests that the long-term slip rate is low. Where against bedrock, the fault lacks fault facets, also supporting a low long-term slip rate.

Date and Compiler(s)	2000 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. #282 Dohrenwend, J.C., and Moring, B.C., 1991, Reconnaissance photogeologic map of young faults in the Winnemucca 1° by 2° quadrangle, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-2175, 1 sheet, scale 1:250,000. #3413 Stewart, J.H., and Carlson, J.E., 1978, Geologic map of Nevada: U.S. Geological Survey, Special Geologic Map, 1, scale 1:500,000. #203 Wallace, R.E., 1979, Map of young fault scarps related to earthquakes in north-central Nevada: U.S. Geological Survey Open-File Report 79-1554, 2 sheet, scale 1:125,000.