Jump to Navigation

Quaternary Fault and Fold Database of the United States

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Mohawk Valley fault zone, Sierra Valley section (Class A) No. 25b

Last Review Date: 1995-10-01

Compiled in cooperation with the California Geological Survey

citation for this record: **Sawyer, T.L., and Bryant, W.A., compilers, 1995, Fault number 25b, Mohawk Valley fault zone, Sierra Valley section, 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 02:55 PM.**

Synopsis	**General:** The fault has been mapped in detail (Sawyer and others, 1995 #5227), but is poorly understood. The southern part of the northern section is the only fault along the eastern front of the entire northern Sierra Nevada to have been trenched (Sawyer and Page, 1993 #5226; Sawyer and others, 1995 #5227). Toppozada and others (1981 #3718) initially suggested than an earthquake in 1875 ruptured a short section of the fault near Clio; the epicenter of this event is somewhat controversial, but is now thought to be located in the Honey Lake Valley.

	Sections: This fault has 2 sections. The Mohawk Valley fault zone is herein subdivided into two sections with a boundary between the Sierra and Mohawk valleys, where the strike and character of the fault zone change. The section names are Mohawk Valley [25a] and Sierra Valley [25b].
Name comments	**General:** The Mohawk Valley fault zone was first described by Turner (1897 #5229) and is named for its location in Mohawk Valley, northeastern California. **Section:** Refers to southern part of the Mohawk Valley fault zone of Saucedo (1992 #5225) and to the "southern part" of the Mohawk Valley fault zone of Sawyer and others (1995 #5227). **Fault ID:** Refers to numbers 97 (Mohawk Valley area, possible 1875 earthquake rupture) and 98 (Mohawk Valley fault) of Jennings (1994 #2878).
County(s) and State(s)	SIERRA COUNTY, CALIFORNIA
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:62,500 scale. *Comments:* Location of fault from Qt_flt_ver_3-0_Final_WGS84_polyline.shp (Bryant, W.A., written communication to K.Haller, August 15, 2017) attributed to 1:62,500-scale map by Grose (2000 #8387).
Geologic setting	High-angle, normal to dextral-divergent fault zone that extends along the eastern side of the northern Sierra Nevada and across parts of Sierra and Mohawk valleys. The total vertical offset across the fault is 500–1,180 m based on the amount of vertical separation of the Mehrten Formation and Lovejoy Basalt (Page and Sawyer, 1992 #5224; Sawyer and Page, 1993 #5226).
Length (km)	This section is 18 km of a total fault length of 79 km.
Average strike	N27°W (for section) versus N38°W (for whole fault)
Sense of movement	Right lateral, Normal *Comments:* Normal component is down-to-the-northeast. Possible dextral component based on changes in character and pattern of

	faulting with variations in fault strike, low scarps, groundwater barriers and tonal lineaments on the floor of Sierra Valley, in addition to focal mechanisms for small to moderate events in the vicinity of the fault (Martinelli, 1989 #5223).
Dip Direction	NE
Paleoseismology studies	
Geomorphic expression	Forms a faceted bedrock escarpment as much as 800 m high, moderate-to well-defined scarps and graben on glacial (Tioga ?) and colluvial deposits along front of Sierra Nevada (generally obscured by forest), and low scarps on the floor of southeastern Sierra Valley.
Age of faulted surficial deposits	Holocene alluvium, glacial (Tioga ?) till, Quaternary basin-fill sediment, and late Miocene to early Pliocene rocks of the Mehrten Formation.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Hawkins and others (1986 #3627) inferred that the most recent paleoevent occurred during the late Quaternary on the basis of the steep, relatively undissected faceted front of Sierra Nevada. An inferred Holocene event at trench site on southernmost Mohawk Valley section (25-1) is possibly related to an event on this fault section (Sierra Valley).
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Assuming that vertical separation (500–700 m) of the Mehrten Formation occurred during the current seismotectonic setting (3-5 m.y.), the minimum long-term average slip rate is 0.10-0.23 mm/yr. The rate of inferred lateral slip is unknown.
Date and Compiler(s)	1995 Thomas L. Sawyer, Piedmont Geosciences, Inc. William A. Bryant, California Geological Survey
References	#8103 Gold, R.D., Briggs, R.W., Personius, S.F., Crone, A.J.,

Mahan, S.A., and Angster, S.J., 2014, Latest Quaternary paleoseismology and evidence of distributed dextral shear along the Mohawk Valley fault zone, northern Walker Lane, California: Journal of Geophysical Research, Solid Earth, v. 119, p. 5014-5032, doi:10.1002/2014JB010987

#8387 Grose, T.L.T., 2000, Geologic map of the Sierraville 15' quadrangle, Sierra and Plumas counties, California: California Division of Mines and Geology Open-File Report OFR 00-24, map scale 1:62,500.

#3627 Hawkins, F.F., LaForge, R., and Hansen, R.A., 1986, Seismotectonic study of the Stampede, Prosser Creek, Boca, and Lake Tahoe dams, Truckee/Lake Tahoe area, northeastern Sierra Nevada, California: Seismotectonic Report No. 85-4, 210 p.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#5223 Martinelli, D.M., 1989, Geophysical investigations of the northern Sierra Nevada-Basin and Range boundary, west-central Nevada and east-central California: University of Nevada, Reno, unpublished M.S. thesis, 172 p.

#5224 Page, W.D., and Sawyer, T.L., 1992, Tectonic deformation of the Lovejoy Basalt, a late Cenozoic strain gage across the northern Sierra Nevada, California: Eos, Transactions of the American Geophysical Union, v. 73, no. 43, p. 590.

#4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p.

#5225 Saucedo, G.J., 1992, Map showing recency of faulting, Chico quadrangle, California: California Department of Conservation, Division of Mines and Geology Regional Geologic Map Series, Map 7A, 5, scale 1:250,000.

#5226 Sawyer, T.L., and Page, W.D., 1993, Recurrent late

Quaternary surface faulting along the Mohawk Valley fault zone, NE California: Geological Society of America, Abstracts with Programs, v. 25, no. 5, p. 142.

#5227 Sawyer, T.L., Page, W.D., and Hemphill-Haley, M.A., 1995, Southern Mohawk Valley fault zone at the Calpine trench site, *in* Page, W.D., ed., Quaternary Geology along the boundary between Modoc Plateau, southern Cascade Mountains, and northern Sierra Nevada: Friends of the Pleistocene 1995 Pacific Cell field trip guidebook.

#3718 Toppozada, T.R., Real, C.R., and Parke, D.L., 1981, Preparation of isoseismal maps and summaries of reported effects for pre-1900 earthquakes: California Division of Mines and Geology Open-File Report 81-11SAC, 182 p.

#5229 Turner, H.W., 1897, Downieville folio, California: U.S. Geological Survey Folio 37, scale 1:125,000.