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Quaternary Fault and Fold Database of the United States

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

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 25a, Mohawk Valley fault zone, Mohawk 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:** Includes faults first described by Turner (1897 #5229) and refers to the northern Mohawk Valley fault zone of Saucedo (1992 #5225) and to the "northern 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)	PLUMAS COUNTY, CALIFORNIA SIERRA COUNTY, CALIFORNIA
Physiographic province(s)	CASCADE-SIERRA MOUNTAINS
Reliability of location	Good Compiled at 1:62,500 and unspecified 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 maps by Grose (2000) and Grose and others (2000), and Gold and others (2014) mapped at unspecified scale.
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 24 km of a total fault length of 79 km.
Average strike	N42°W (for section) versus N38°W (for whole fault)
Sense of movement	Right lateral, Normal

	Comments: Inferred dextral component based on orientation of slickensides observed in trenches across the southern part of this section, on the character and pattern of faulting (James Yount, pers. commun. 1994; Sawyer and others, 1995 #5227), and on focal mechanisms (Martinelli, 1989 #5223). The tectonic setting and block-faulting models also suggest dextral shear (Hawkins and others, 1986 #3627). Normal component is down-to-northeast.
Dip	55° E. to 90° *Comments:* Dips of 55° E. to vertical were observed on fault planes in granitic bedrock and in unconsolidated alluvial deposits exposed in a backhoe trench across a scarp-forming splay of the main range-front fault (site 25-1) (Sawyer and Page, 1993 #5226).
Paleoseismology studies	Study at one location (site 25-1) involved the excavation of two fault-normal trenches on the southernmost part of the Mohawk Valley [25a] section of the fault zone (Sawyer and Page, 1993 #5226; Sawyer and others, 1995 #5227) and both yielded dateable materials. One trench crossed a graben-bounding antithetic fault at the range front and the other crossed a scarp-forming subsidiary fault. Multiple (more than four) prehistoric events were recognized along the subsidiary fault and a Holocene event was inferred along the antithetic fault.
Geomorphic expression	This section of the fault zone forms a linear faceted bedrock escarpment as much as 1,200 m high. In addition, there are possible discontinuous fault scarps along the base of escarpment, and a low (1-m high) well defined scarp and coinciding tonal lineaments on the floor of Mohawk Valley (Alt and others, 1977 #5220; Smith, 1983 #5228).
Age of faulted surficial deposits	Holocene valley-fill sediment may be faulted on the floor of Mohawk Valley (Smith, 1983 #5228). Other offset deposits include pre-glacial (pre-Tioga stage) till along range front in northern Mohawk Valley (Durrell, 1967 #5221; James Yount, pers. commun., 1994), mid Quaternary valley-fill deposits including the mid Pleistocene Rockland ash (James Yount, pers. commun., 1994), as well as late Miocene Mehrten Formation and middle Miocene (16 Ma) Lovejoy Basalt.
Historic earthquake	

Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The most recent paleoevent occurred before 4,735±155 radiocarbon yrs B.P. and after the Tioga (?) glaciation; event may be related to movement on the Sierra Valley section [25b], because to the north there is a lack of geomorphic evidence of faulting in probable late Pleistocene moraines (Ford and Swanson, 1961 #5222).
Recurrence interval	*Comments:* Sawyer and Page (1993 #5226) interpreted at least four surface faulting events from the deformation of middle to late Pleistocene deposits exposed in a trench along a splay of the principal range front fault, possibly suggesting a rather long recurrence interval.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Assuming that vertical separation (as much as 1,180 m) of the Lovejoy Basalt occurred during the current seismotectonic setting (past 3–5 m.y.), the long-term average slip rate is 0.24–0.39 mm/yr (Sawyer and others, 1995 #5227). 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	#5220 Alt, J.N., Schwartz, D.P., and McCrumb, D.R., 1977, Regional geology and tectonics, Volume 3 of the earthquake evaluation studies of the Auburn Dam area: Unpublished consultant report of Woodward-Clyde Consultants submitted to U.S. Bureau of Reclamation, Denver, Colorado, 118 p. #8444 Briggs, R.W., Wesnousky, S.G., Brune, J.N., Purvance, M.D., and Mahan, S.A., 2013, Low footwall accelerations and variable surface rupture behavior on the Fort Sage Mountains fault, northeast California: Bulletin of the Seismological Society of America, v. 103, p. 157–168, doi: 10.1785/0120110313. #5221 Durrell, C., 1967, Geology of the Feather River country and adjacent regions: California Division of Mines and Geology Open-File Report, 57 p.

#5222 Ford, R.S., and Swanson, A.A., 1961, Geology and geohydrology of Sierra, Mohawk, and Humbug valleys, Plumas and Sierra Counties: California Department of Water Resources, Division of Resources Planning in-house report, 54 p., 12 pls., scale 1:62,500.

#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

#8110 Grose, T.L.T., Durrell, C., and D'Allura, J.A., 2000, Geologic map of the Blairsden 15' quadrangle, Plumas County, California: California Division of Mines and Geology Open-File Report OFR 00-21, 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.

#5228 Smith, T.C., 1983, Evaluation of faults in the Mohawk Valley area, Plumas and Sierra Counties, California: California Division of Mines and Geology Fault Evaluation Report FER-151, microfiche in California Division of Mines and Geology Open-File Report 90-10, 12 p.

#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.