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Quaternary Fault and Fold Database of the United States

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Concord fault, Avon section (Class A) No. 38a

Last Review Date: 1998-08-18

Compiled in cooperation with the California Geological Survey

citation for this record: **Bryant, W.A., and Cluett, S.E., compilers, 1998, Fault number 38a, Concord fault, Avon 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 03:10 PM.**

Synopsis	**General:** Holocene active dextral strike-slip fault. Fault is characterized by aseismic creep at a rate of 3.0–3.5 mm/yr (Galehouse, 1999 #5500). Several site-specific studies in compliance with the Alquist-Priolo Act have documented the location and approximate time of the most recent faulting (Wills and Hart, 1992 #5340; 1992 #5341). Detailed studies at Galindo Creek yielded a preliminary slip-rate of 3.7±2.0 mm/yr (Borchardt, 1998 #5334). **Sections:** This fault has 3 sections. Sharp (1973 #508) defined three segments based on differences in geomorphic expression and amount of fault creep. Due to reconnaissance nature of his

	report, Sharp's segments are herein considered as sections.
Name comments	**General:** Concord fault was first mapped and named by Poland (1935 #5337) based on groundwater data. Tolman (1931 #5322) previously referred to the Concord fault as the Sulpher Springs Mountain fault. The Concord fault extends from Suisun Bay south to the northwestern slope of Mt. Diablo. **Section:** Defined as the Avon segment by Sharp (1973 #508). Section extends from the southern shore of Suisun Bay southeast to Buchanan Airport **Fault ID:** Comments: Refers to number 160 (Concord fault) of Jennings (1994 #2878) and number C3 (Concord fault) of Working Group on Northern California Earthquake Potential (1996 #1216).
County(s) and State(s)	CONTRA COSTA COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of fault traces based on digital revisions to Jennings (1994 #2878) using original mapping by Sharp (1973 #508) and Wills and Hart (1992 #5341) at 1:24,000 scale.
Geologic setting	This dextral strike-slip fault traverses the town of Concord and borders the western side of Lime Ridge. The northern end of the fault probably connects with the Green Valley fault [37] along an approximately 1-km-wide extensional jog north across Suisun Bay. The southern extent of the fault is conjectural. One possibility is that slip is transferred to the Greenville fault [53] across a complex compressional jog characterized by the Mt. Diablo uplift (Unruh and Sawyer, 1995 #5339). Alternatively, slip may be transferred to the northern part of the Calaveras fault [54] across a complex extensional jog (Oppenheimer and Lindh, 1992 #5336; Wills and Hart, 1992 #5340). Maximum dextral offset along the fault is unknown, but may be several kilometers based on geomorphic expression.
Length (km)	This section is 9 km of a total fault length of 20 km.

Average strike	N29°W (for section) versus N28°W (for whole fault)
Sense of movement	Normal *Comments:* Displacement principally defined by dextral fault creep (Sharp, 1973 #508).
Dip Direction	V *Comments:* Dip not reported, but assumed to be near vertical based on linear strike and geomorphic expression indicating strike-slip fault.
Paleoseismology studies	
Geomorphic expression	Fault trace is generally concealed by marshes near the mouth of Pacheco Creek. Fault locally is marked by a linear west-facing escarpment near Tank Farm Hill and smaller scarps mapped as by Sharp (1973 #508). An eastern trace is marked by a linear bench and associated broad scarp and tonal lineament (Wills and Hart, 1992 #5340; 1992 #5341).
Age of faulted surficial deposits	Borings near Highway 4 encountered a probable vertically displaced bedrock-alluvial contact. The alluvium consists of gray clay and silty clay (unoxidized bay mud ?) overlying a thin layer of sand and gravel; the age is probably latest Pleistocene to Holocene (Wills and Hart, 1992 #5340; 1992 #5341).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Offset alluvium overlying a thin layer of sand and gravel is probably latest Pleistocene to Holocene (Wills and Hart, 1992 #5340; 1992 #5341).
Recurrence interval	
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* Slip rate for Avon section has not been determined. Dextral deflection of two bridges indicates contemporary fault creep, but this rate has not been determined either. Assumed slip

	rate is from Concord section [38b].
Date and Compiler(s)	1998 William A. Bryant, California Geological Survey Sereyna E. Cluett, California Geological Survey
References	#5334 Borchardt, G., 1998, Holocene slip rate of the Concord fault at Galindo Creek in Concord, California: U.S. Geological Survey National Earthquake Hazards Reduction Program, Annual Summaries, v. 39, USGS Contract No. 1434-HQ-97-GR-03102, (electronic version on line at http://erp-web.er.usgs.gov/). #5500 Galehouse, J.S., 1999, Theodolite measurement of creep rates on San Francisco Bay region faults: U.S. Geological Survey, Summaries of National Earthquake Hazards Reduction Program, v. 40, USGS Contract 99-HQ-GR-0084 (electronic version available on line at http://erp-web.er.usgs.gov). #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. #5336 Oppenheimer, D.H., and Lindh, A.G., 1992, The potential for earthquake rupture of the northern Calaveras fault, *in* Borchardt, G., and others, eds., Proceedings of the second conference on earthquake hazards in the eastern San Francisco Bay area: California Division of Mines and Geology Special Publication 113, p. 233-240. #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. #5337 Poland, J.F., 1935, Ground-water conditions in Ygnacio Valley, California: Stanford University, M.A. thesis, 83 p. #508 Sharp, R.V., 1973, Map showing recent tectonic movement on the Concord fault, Contra Costa and Solano Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-505 (U.S. Department of the Interior and U.S. Department of Housing and Urban Development Basic Data

Contribution 55), 1 sheet, scale 1:24,000.

#5322 Tolman, C.F., 1931, Geology of upper San Francisco Bay region with special reference to a salt water barrier below confluence of Sacramento and San Joaquin Rivers (Appendix D): California Department of Water Resources Bulletin No. 28, 309-360 p.

#5339 Unruh, J.R., and Sawyer, T.L., 1995, Late Cenozoic growth of the Mt. Diablo fold and thrust belt, central Contra Costa County, California, and implications for transpressional deformation of the northern Diablo Range [abs.]: American Association of Petroleum Geologists, 1995 Pacific Section Convention Abstracts, 47 p.

#5340 Wills, C.J., and Hart, E.W., 1992, Progress in understanding the Concord fault through site specific studies, *in* Borchardt, G., and others, eds., Proceedings of the second conference on earthquake hazards in the eastern San Francisco Bay area: California Division of Mines and Geology Special Publication 113, p. 311-317.

#5341 Wills, C.J., and Hart, E.W., 1992, The Concord fault, Contra Costa County, California: California Division of Mines and Geology Fault Evaluation Report FER-231, 37 p., scale 1:24,000.

#1216 Working Group on Northern California Earthquake Potential (WGNCEP), 1996, Database of potential sources for earthquakes larger than magnitude 6 in northern California: U.S. Geological Survey Open-File Report 96-705, 40 p.