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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.

Bill Williams fault (Class A) No. 956

Last Review Date: 1997-01-03

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., compiler, 1997, Fault number 956, Bill Williams fault, 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 03:13 PM.**

Synopsis	The Bill Williams fault is a major, northeast-trending structure that is approximately on trend with the Mesa Butte fault to the northeast. The Bill Williams fault displaces lower Pleistocene to Pliocene basalt flows by increasing amounts, indicating that it was active through this time interval. No middle to upper Pleistocene basalt flows exist along the fault, and no definitive evidence for late Quaternary activity has been found. The fault scarps formed on Pliocene basalt range are as much as about 50 m high and have gentle to moderately steep slopes. This fault likely has been active during the middle or late Quaternary, but the age of youngest activity is poorly constrained.

Name comments	This fault is part of the regional Mesa Butte fault system as described by Shoemaker and others (1974 #2166; 1978 #2155). This southern part of the Mesa Butte fault zone was mapped and renamed by Menges and Pearthree (1983 #2073) to distinguish it from the spatially distinct, northern part of the Mesa Butte fault. Geologic map of the area is by Newhall and others (1987 #2154).
County(s) and State(s)	COCONINO COUNTY, ARIZONA
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Trace mapped at 1:50,000 scale; transferred to 1:250,000-scale topographic base map.
Geologic setting	The Bill Williams fault is located on the Colorado Plateaus in the western part of the Pliocene-Quaternary San Francisco volcanic field, which rests on the erosion surface cut on Paleozoic rocks between the Mogollon Rim and the Grand Canyon. The fault cuts Paleozoic bedrock and Pliocene and lower Quaternary basalt flows. It is one of several large, NE-trending faults in the vicinity of the Grand Canyon that have long and complex histories of movement (Shoemaker and others, 1978). Much of the downthrown side of the fault is covered by late Quaternary alluvium that has accumulated in small basins along the escarpment; reconnaissance studies have not revealed any faulted late Quaternary alluvium.
Length (km)	21 km.
Average strike	N44°E
Sense of movement	Normal *Comments:* Inferred from surface displacement and regional relations.
Dip Direction	SE
Paleoseismology studies	
Geomorphic	Low (5 m) to fairly high (50 m), southeast-facing scarps are

expression	formed on Pliocene and lower Quaternary basalt flows. The larger fault scarps are moderately steep (as much as 23?), but a 5-m-high scarp on lower Pleistocene basalt near the northern end of the fault is quite subdued, suggesting that the fault may not have ruptured in the late Quaternary.
Age of faulted surficial deposits	Paleozoic, Pliocene, early Pleistocene
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* A lower Pleistocene (ca. 1 Ma) basalt flow is displaced about 4-10 m near northern end of fault. Fault scarps formed on basalt flows range from gentle to moderately steep, and Holocene alluvium is not faulted. The youngest rupture likely occurred in the middle or possibly late Pleistocene, but this estimate is poorly constrained.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* An upper Pliocene to lowermost Pleistocene (~1.5 to 3.5 Ma) basalt flow is displaced at least 32 m in the central part of the fault zone. These data suggest long-term slip rates that are well within the bounds of the assigned slip-rate category. However, more recent displacement might have been at even slower rates as indicated about 4-10 m of displacement since about 1 Ma.
Date and Compiler(s)	1997 Philip A. Pearthree, Arizona Geological Survey
References	#2073 Menges, C.M., and Pearthree, P.A., 1983, Map of neotectonic (latest Pliocene-Quaternary) deformation in Arizona: Arizona Geological Survey Open-File Report 83-22, 48 p., scale 1:500,000. #2154 Newhall, C.G., Ulrich, G.E., and Wolfe, E.W., 1987, Geologic map of the southwest part of the San Francisco Volcanic Field, north-central Arizona: U.S. Geological Survey

	Miscellaneous Field Studies Map MF-1958, 2 sheets, scale 1:50,000. #2166 Shoemaker, E.M., Squires, R.L., and Abrams, M.J., 1974, The Bright Angel and Mesa Butte fault systems of northern Arizona, *in* Karlstrom, T.N.V., Swann, G.A., and Eastwood, R.L., eds., Geology of northern Arizona, Part I, Regional studies: Geological Society of America, Rocky Mountain Section Meeting, Guidebook, p. 355-391. #2155 Shoemaker, E.M., Squires, R.L., and Abrams, M.J., 1978, Bright Angel and Mesa Butte fault systems in northern Arizona, *in* Smith, R.B., and Eaton, G.P., eds., Cenozoic tectonics and regional geophysics of the Western Cordillera: Geological Society of America Memoir 152, p. 341-367.