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Quaternary Fault and Fold Database of the United States

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Washburn Ranch fault zone (Class A) No. 2092

Last Review Date: 2016-02-10

Compiled in cooperation with the New Mexico Bureau of Geology & Mineral Resources

citation for this record: **Machette, M.N., and Jochems, A.P., compilers, 2016, Fault number 2092, Washburn Ranch fault zone, 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 02:21 PM.**

Synopsis	This zone of en echelon faults bound the western margin of the Animas Valley and eastern margin of the Peloncillo Mountains, an elongate range that straddles the Arizona/New Mexico state boundary. The fault has fresh scarps that appear to be Holocene in age on the basis of their morphology. Some of the larger scarps are compound (have definite slope elements) and are the result of a recent faulting event superposed on an older scarp.
Name comments	These faults were first mapped by Gillerman (1958 #1067), but were later named by Machette and others (1986 #1033) for Washburn Ranch, which is near the north end of the fault zone. The fault zone extends southeast about 15 km from near the

	latitude of Cowboy Pass to just south of New Mexico State Highway 9, west of Animas, New Mexico. **Fault ID:** Fault number 9 of Machette and others (1986 #1033).
County(s) and State(s)	HIDALGO COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Original trace from 1:250,000-scale map of Machette and others (1986 #1033), which was compiled at 1:24,000-scale from aerial photographs. Drewes and Thorman (1980 #1040) identified several additional scarps along the fault zone as part of 1:24,000-scale geologic mapping, whereas Drewes and others (1985 #1034) showed the generalized trace of the northern part of the fault on their 1:250,000-scale map. Updated fault trace compiled at 1:24,000 scale using photogrammetric methods.
Geologic setting	This zone of south- to southwest-trending faults bound the western margin of the Animas Valley and east margin of the Peloncillo Mountains, an elongate range that crosses the Arizona/New Mexico state boundary. The fault scarps are on Quaternary surficial deposits, except near the southern end of the fault where the fault appears to offset part of the basalt of Animas Valley. These basalts were dated at 0.14–0.54 Ma by whole-rock K-Ar techniques (Machette and others, 1986 #1033, table 1); whole-rock K-Ar ages now would be considered suspect.
Length (km)	12 km.
Average strike	N20°W
Sense of movement	Normal
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	Gillerman (1958 #1067) first noted the fault scarps and briefly described them as being incompletely buried by deposits along intermittent streams. Drewes and Thorman (1980 #1040) mapped

	several additional scarps along the fault but did not describe their geomorphic expression. Machette and others (1986 #1033) reported that the scarps range from 0.5–5 m in height (this includes minor strands) in the area between Martin Draw (on the south) and a point about 1 km northeast of Grand Dad Well (Cotton City 7.5-minute quadrangle). On the basis of topographic profiling, they separated the data into two sets: those north of Martin Draw and those south of Martin Draw. The northern scarps are generally 2.6–4.8 m high and are morphologically younger than the Drum Mountains scarps of Utah (Machette and others, 1986 #1033, fig. 9), whereas the southern scarps are 2.2–4.0 m high and are morphologically similar to the Drum Mountains scarps (Machette and others, 1986 #1033, fig. 8). However, without trenching or direct dating of the scarps, these differences do not justify separating the fault into sections or segments.
Age of faulted surficial deposits	Machette and others (1986 #1033) indicated that the scarps are formed on alluvial-fan deposits of middle to late Pleistocene and Holocene age. These age estimates were based on preservation of landforms, expression on aerial photographs, and brief glimpses of soils developed on the deposits. However, no detailed studies of the Quaternary alluvial sequence have been made in this area.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Morphometric data from the Washburn Ranch scarps indicate that some of them are probably compound (more than one faulting event). The most recent faulting occurred no earlier than about 15 ka (Machette and others, 1986 #1033). These data support Gillerman's (1958 #1067) inference of Holocene faulting
Recurrence interval	15–45 k.y. (<130 ka) *Comments:* The scarps are present on middle to late Pleistocene and Holocene age deposits, and the larger scarps on older deposits may reflect two discrete faulting events. The compound scarps have poorly defined bevels, suggesting that scarps from the penultimate faulting event were not greatly modified before the most recent event. Thus, Machette and others (1986 #1033) suspected that the penultimate event occurred in the late Pleistocene (i.e., 30–130 ka), but the recurrence interval may be only 30–50 ka as reflected by the lack of pronounced bevels. If

	their inference is correct, the most recent recurrence interval might be somewhere between 15 k.y. (if events occurred at 15 and 30 ka) and 45 k.y. (if events occurred at 5 and 50 ka). However, any prior faulting event must have occurred at least 80–100 k.y. earlier as evidenced by similar-size scarps on late and middle Pleistocene deposits.
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip-rate category assigned based on small scarps (0.5–5.0 m) on late Pleistocene deposits.
Date and Compiler(s)	2016 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1040 Drewes, H., and Thorman, C.H., 1980, Geologic map of the Cotton City quadrangle and the adjacent part of the Vanar quadrangle, Hidalgo County, New Mexico: U.S. Geological Survey Miscellaneous Investigations Map I-1221, 1 sheet, scale 1:24,000. #1034 Drewes, H., Houser, B.B., Hedlund, D.C., Richter, D.H., Thorman, C.H., and Finnell, T.L., 1985, Geologic map of the Silver City 1° x 2° quadrangle New Mexico and Arizona: U.S. Geological Survey Miscellaneous Investigations Map I-1310-C, 1 sheet, scale 1:250,000. #1067 Gillerman, E., 1958, Geology of the central Peloncillo Mountains, Hidalgo County, New Mexico, and Cochise County, Arizona: [New Mexico] Bureau of Mines and Mineral Resources Bulletin 57, 152 p., 2 pls. #1033 Machette, M.N., Personius, S.F., Menges, C.M., and Pearthree, P.A., 1986, Map showing Quaternary and Pliocene faults in the Silver City 1° x 2° quadrangle and the Douglas 1° x 2° quadrangle, southeastern Arizona and southwestern New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-1465-C, 12 p. pamphlet, 1 sheet, scale 1:250,000.