[Jump to Navigation]

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.

Gray Ranch fault zone (Class A) No. 2095

Last Review Date: 2016-02-12

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

citation for this record: **Vincent, K.R., Jochems, A.P., and Machette, M.N., compilers, 2016, Fault number 2095, Gray 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	The Gray Ranch fault zone is marked by three en echelon, discontinuous, east-facing, south-trending scarps along the eastern flank of a south-central part of the Peloncillo Mountains. The scarps record evidence of multiple faulting events during or before the middle Pleistocene and at least one event in the late Pleistocene. Evidence for different times of movement on these scarps implies that the fault could be divided into sections, although no trenching studies have been done along the fault.
Name comments	Part of this fault zone was first mapped by Wrucke and Bromfield (1961 #1066), but it was more completely mapped and named by Machette and others (1986 #1033) for Gray [sic Grays] Ranch,

	which is near the fault zone (Animas Peak 15-minute quadrangle, New Mexico). Vincent and Krider (1997 #1193) published detailed mapping (1:24,000 scale) of the faults and geomorphic surfaces in the area. The fault zone extends from Tank Mountain, south to near the confluence of Indian Creek and Animas Creek. The southernmost part of the fault that parallels Animas Creek, as shown by Wrucke and Bromfield (1961 #1066), is not included because Vincent and Krider (1997 #1193) could find no evidence of Quaternary movement and because this part of the scarp may be entirely fluvial in origin. The mid-point of the fault is about 25 km south of Animas, New Mexico. **Fault ID:** Fault number 20 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:* Originally compiled at 1:100,000 scale. Updated using 1:24,000-scale maps of Vincent and Krider (1997 #1193) combined with accurate placement using photogrammetric methods.
Geologic setting	The Gray Ranch fault zone forms the western margin of the Animas Valley and the eastern margin of the south-central part of the Peloncillo Mountains. Over much of its length, the Animas Valley consists of a full-graben, with the bounding structures being the east-dipping Gray Ranch fault zone [2095] and the west-dipping Gillespie Mountain fault [2096]. However, the southern part of the valley is a relatively inactive half-graben with only the single, short, west-dipping Lang Canyon fault [2025] on the southeast margin. The transition from full-graben to half-graben is located near the confluence of Animas and Indian Creeks, and is coincident with both a 6-km-wide right step in the Animas range-front and a bedrock promontory that extends east into the valley from the Peloncillo Mountains. The southern end of Quaternary scarps on the Gray Ranch fault zone (and on the Gillespie Mountain fault) terminates at or near this transition zone. Uplift and dissection of the narrow pediment between the fault and the mountains implies that recurrent Quaternary

	movement occurred after an extensive period of tectonic quiescence during which the pediment was formed, perhaps in early Pleistocene time.
Length (km)	20 km.
Average strike	N7°W
Sense of movement	Normal
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	The fault zone consists of: an upper-piedmont trace, a middle-piedmont trace, and a lower-piedmont trace that extends north along the eastern side of Tank Mountain (Vincent and Krider, 1997 #1193). Each trace consists of continuous to discontinuous, east-facing, south-trending scarps. The 13-km-long upper-piedmont trace marks the boundary between rocks of the Peloncillo Mountains and surficial sediment of the basin. This is the main trace of the fault in that it has the most formidable escarpment and records the longest period of tectonism. It is expressed as a high escarpment, and at many locations the crest of that escarpment forms the edge of a narrow pediment. Locally, the scarp is formed on middle Pleistocene (*i.e.*, 500–750 ka) terrace sediment that covers the pediment and extends into the basin. South of Miner Canyon, a scarp with 17 m of surface offset formed on this material probably reflects multiple events. Younger terraces do not extend across the fault, so no data is available for the timing of the most recent event on that trace. The discontinuous middle-piedmont trace (with a preserved length of 6 km) is formed on middle Pleistocene alluvium (with scarps less than or equal to 3 m high), whereas late Pleistocene (100 ka) terraces cover the fault. The lower-piedmont trace (with a preserved length of 5 km) consists of a nearly continuous but subdued (mature) scarp (1–2 m high) formed on late Pleistocene (100 ka) fan remnants (and foot-slope deposits on the east side of Tank Mountain). This is the youngest faulted deposit in the zone but Holocene terraces cover the trace of this strand (Vincent and Krider, 1997 #1193). The

	differing histories of the three traces requires multiple faulting events with the most surface-faulting events occurring on the upper- (main) piedmont trace.
Age of faulted surficial deposits	Machette and others (1986 #1033) suggested that the scarps are formed on piedmont-slope deposits of probable early to middle Pleistocene age. Vincent and Krider (1997 #1193) concur with this assessment for the upper- and middle-piedmont traces, but their lower-piedmont trace (previously unmapped) clearly disrupts late Pleistocene deposits that are thought to be about 100 ka on the basis of soil development.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Vincent and Krider (1997 #1193) concluded that the most recent movement probably occurred in the late Pleistocene (*i.e.*, 30–130 ka).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* A low slip-rate category is assigned based on the amount of long term offset across the three traces. About 22 m of net cumulative vertical displacement is recorded by the three traces over a period of record of 500 k.y. to 1 m.y.
Date and Compiler(s)	2016 Kirk R. Vincent, U.S. Geological Survey Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources Michael N. Machette, U.S. Geological Survey, Retired
References	#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. #1193 Vincent, K.R., and Krider, P.R., 1997, Geomorphic surface maps of the southern Animas Valley, Hidalgo County, New

	Mexico: New Mexico Bureau of Mines and Mineral Resources Open-File Report OF-429, 12 sheets, scale 1:24,000. #1066 Wrucke, C.T., and Bromfield, C.S., 1961, Reconnaissance geologic map of part of the southern Peloncillo Mountains Hidalgo County, New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-160, 1 sheet, scale 1:62,500.