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Quaternary Fault and Fold Database of the United States

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Jornada Draw fault, northern section (Class A) No. 2056a

Last Review Date: 2015-12-21

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

citation for this record: **Machette, M.N., and Jochems, A.P., compilers, 2015, Fault number 2056a, Jornada Draw fault, northern 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 02:22 PM.**

Synopsis	**General:** The fault is marked by a series of low, subtle scarps on Quaternary deposits, by the eastward termination and offset of Tertiary bedrock units, and by tectonically induced physiography, such as playa lakes along the downthrown (eastern) side of the fault. No specialized studies have been conducted along the fault, although it is seen in several natural exposures. Soil development has been used to estimate the timing of most recent movement on the fault. **Sections:** This fault has 3 sections. Although originally defined as

	segments by Seager and Mack (1995 #963), their scheme was not supported by paleoseismic or geomorphic data nor were the limits of the segments defined. Therefore, we consider the parts of the fault to be sections for descriptive purposes.
Name comments	**General:** Named by Seager and Mack (1995 #963) for the fault's apparent control of the course of Jornada Draw, an ephemeral stream that drains the axial portion of the southern Jornada del Muerto. The fault extends south-southeast from near Engle to south of the Point of Rocks Hills, a distance of about 64 km. A similarly located unnamed fault was shown by Woodward and others (1978 #986) on a regional map of the Rio Grande rift, but subsequent studies of the sub-alluvial geology showed that the existence of that fault was based on mistaken interpretations (Seager and Mack, 1995 #963). Seager and Mack (1995 #963) suggested three segments for the fault, but this scheme is not supported by paleoseismic or geomorphic data nor were the limits of the segments defined; therefore they are referred to here as sections. **Section:** Referred to as the northern segment of the Jornada Draw fault by Seager and Mack (1995 #963). This part of the fault extends from about 3 km west of Engle to the north side of Prisor Hill. The southern boundary is at 33°00", just west of the Aleman Ranch headquarters and Spaceport America.
County(s) and State(s)	SIERRA COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* General trace of the fault shown on 1:125,000-scale map of Seager and Mack (1995 #963), but detailed trace is based on 1:24,000-scale mapping of Seager (1995 #1261) and Mack and Seager (1993 #1262). Fault location is from these maps combined with photogrammetric placement of its trace in some locations.
Geologic setting	The Jornada Draw fault forms the boundary between two major late Tertiary structural blocks; it appears to have accommodated growing structural relief between the eastward-tilted Caballo Mountains horst on the west and the broad, shallow Jornada del Muerto syncline (pre-Quaternary) on the east. On the basis of

	drill-hole information (Seager and others, 1987 #627), it appears that early Tertiary rocks are offset as much as 305–564 m along the fault. Although most of the displacement apparently occurred in Pliocene time, its most recent movement probably was in the middle Pleistocene. A late Pliocene (?) basaltic cinder cone is offset along the northern section of the fault and Quaternary offset locally is more than 30 m.
Length (km)	This section is 21 km of a total fault length of 62 km.
Average strike	N19°W (for section) versus N33°W (for whole fault)
Sense of movement	Normal *Comments:* Seager and Mack (1995 #963) show this as a normal fault.
Dip	60° E *Comments:* Fault dip measured in natural exposure along Aleman Draw near southern end of section (Seager and Mack, 1995 #963). However, Seager and Mack (1995 #963) suggested that the fault may have an east-dipping listric geometry on the basis of gentle (1°) west-dipping strata that could represent reverse drag on the fault.
Paleoseismology studies	
Geomorphic expression	The northern section of the fault is characterized by small subtle scarps on piedmont-slope deposits of the Palomas Formation that forms the constructional Cuchillo surface. The scarps are locally as high as 30 m, but appear quite variable. For example, just north of New Mexico State Highway 52 (Engle to Truth or Consequences), the upper beds of the Palomas Formation are only offset 4.5–6 m, although 3 km farther south the associated Cuchillo surface is offset about 30 m. At Black Hill, the fault has produced 15–30 m of displacement of the basaltic cinder cone, which probably dates from late Pliocene time (Seager and Mack, 1995 #963).
Age of faulted surficial deposits	The fault displaces early Tertiary bedrock, late Pliocene basalts, Pliocene and Pleistocene basin-fill deposits of the Palomas Formation, and the 700–900 ka (Mack and others, 1993 #1020) constructional Cuchillo surface. There is no evidence that late

	Pleistocene and Holocene deposits are disturbed by the fault.
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Seager and Mack (1995 #963) argued that the piedmont scarps are clearly younger than the Cuchillo surface (700–900 ka, Mack and others, 1993 #1020) but are older than well-developed calcic soils (probably at least 400 ka) that have formed on the scarps. The relations between faulted and unfaulted soils along the southern section suggests that the most recent displacement probably occurred about 400 ka (Seager and Mack, 1995 #963).
Recurrence interval	 *Comments:* No information exists about the timing of discrete events along the fault. However, owing to the size of the scarps (15–30 m), they are clearly the product of multiple faulting events during the middle Pleistocene. Conversely, no faulting events are known to have occurred during the past 400 k.y.
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip-rate category assigned based on 15–30 m of displacement occurred between 700–900 ka and 400 ka; there has been no demonstrable slip in the past 400 k.y.
Date and Compiler(s)	2015 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1262 Mack, G., and Seager, W.R., 1993, Geologic map of the Engle quadrangle, Sierra County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Open-File Geologic Map OF-GM 207, scale 1:24,000. #1020 Mack, G.H., Salyards, S.L., and James, W.C., 1993, Magnetostratigraphy of the Plio-Pleistocene Camp Rice and Palomas formations in the Rio Grande rift of southern New Mexico: American Journal of Science, v. 293, p. 49–77. #1261 Seager, W.R., 1995, Geologic map of the Cutter 7.5-minute quadrangle, Sierra County, New Mexico: New Mexico Bureau of

	Mines and Mineral Resources Open-File Geologic Map 206, scale 1:24,000. #963 Seager, W.R., and Mack, G.H., 1995, Jornada Draw fault—A major Pliocene-Pleistocene normal fault in the southern Jornada Del Muerto: New Mexico Geology, v. 17, no. 3, p. 37–43. #627 Seager, W.R., Hawley, J.W., Kottlowski, F.E., and Kelley, S.A., 1987, Geology of east half of Las Cruces and northeast El Paso 1° x 2° sheets, New Mexico: New Mexico Bureau of Mines and Mineral Resources Geologic Map 57, 3 sheets, scale 1:125,000. #986 Woodward, L.A., Callender, J.F., Seager, W.R., Chapin, C.E., Gries, J.C., Shaffer, W.L., and Zilinski, R.E., 1978, Tectonic map of Rio Grande rift region in New Mexico, Chihuahua, and Texas, *in* Hawley, J.W., ed., Guidebook to Rio Grande rift in New Mexico and Colorado: New Mexico Bureau of Mines and Mineral Resources Circular 163, 1 pl., scale 1:1,000,000.