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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.

East Potrillo fault (Class A) No. 2066

Last Review Date: 2016-01-26

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 2066, East Potrillo 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 02:22 PM.**

Synopsis	This south-southeast trending fault bounds the eastern margin of the uplifted and tilted East Potrillo Mountains and forms east-facing intrabasin scarps on the La Mesa (geomorphic) surface southwest of Las Cruces and in northern Chihuahua, Mexico. Scarp-morphology data have been collected along twenty two profiles from two studies of the fault in New Mexico, and high-resolution seismic reflection profiles were taken across the fault in two additional locations.
Name comments	This fault was shown on a small-scale figure by De Hon (1965 #1018). Although the fault is named for the East Potrillo Mountains (Seager and Mack, 1994 #1015), the first recorded use

	of the term "Potrillo fault" was for the southward extension of the East Robledo [2063] and Fitzgerald [2065] faults into Mexico (Reeves 1969 #1017). The fault's surface trace extends from the north edge of the East Potrillo Mountains (about 5 km east of Mount Riley), south along the east side of the mountain front and the Potrillo maar. It crosses the International Boundary with Mexico about 3 km east of -107° (9 km west of Noria siding, New Mexico) and extends south-southeast into Mexico for an unknown distance. Reeves (1969 #1017) reported that the fault extends at least 24 km, and perhaps as much as 64 km, southeast into Mexico, although the trace has not been shown on a topographic base map.
County(s) and State(s)	DOÑA ANA COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Fault trace from 1:24,000-scale mapping of Seager and Mack (1994 #1015) combined with accurate placement using photogrammetric methods. Approximately 6.5 km of the scarp and associated surficial deposits were mapped at 1:5,000 scale by Cervera (2006 #7378). Additionally, parts of the fault have been shown on various small- to intermediate-scale maps, primarily in articles about the bedrock geology of the East Potrillos or regional studies of Quaternary geology in both the U.S. and Mexico.
Geologic setting	This range-bounding fault forms the eastern side of the southwest-tilted East Potrillo Mountain block (an asymmetrical horst). It forms persistent east-facing scarps on Quaternary sediment of the Camp Rice Formation (and equivalent units in Mexico) and locally on younger Quaternary surficial materials. Seismic imaging performed by Carley (2012 #7377) suggests that the scarp-forming fault is the middle of three structures, with a down-to-the-east range-bounding fault approximately 300 m west of the scarp and a small, buried antithetic fault intersecting the scarp-forming structure at depth.
Length (km)	31 km.
Average strike	N24°W
Sense of	

Sense of movement	Normal
Dip	75° E *Comments:* The fault is shown as a high-angle structure on the cross sections of Seager and Mack (1994 #1015). They reported a dip of 75° E. for the fault where it cuts tuffaceous deposits of the Potrillo maar.
Paleoseismology studies	
Geomorphic expression	The fault forms persistent east-facing scarps on sediment of the Camp Rice Formation and on younger alluvial-fan and piedmont-slope deposits. Scarp morphology studies by Machette (unpublished data, 1980) and Cervera (2006 #7378) indicated scarp heights of 5–20 m and maximum scarp-slope angles of 9.5°–18° along the southern 5–7 km of the East Potrillo Mountains. Between these two studies, measurements were made from twenty two profiles of multiple-event fault scarps on deposits of late middle Pleistocene age; where bevels were obvious on the crest and toe of the scarps, the smallest height elements of these scarps are about 5–7 m, which in themselves suggest two or more faulting events. Even plotting the smaller scarp elements against maximum scarp-slope angle (Machette and McGimsey, 1983 #1024) yields morphologies bracketed by scarps formed in similar climates about 15 ka and 100 ka.
Age of faulted surficial deposits	Quaternary units that are faulted include the upper part of the Camp Rice Formation (early to middle (?) Pleistocene), the upper and lower La Mesa surfaces (constructional surfaces of the Camp Rice Formation), airfall-tuff deposits of the Potrillo maar (180 ka; Seager and Mack, 1994 #1015), and a sequence of older, middle late (?) Pleistocene, alluvial-fan and piedmont deposits that may be equivalent to the Jornada and Tortugas or Picacho alluviums (250±50 ka and 100±30 ka, respectively). Geomorphic equivalents of the lower La Mesa surface are believed to have stabilized about 700–900 ka (Mack and others, 1993 #1020), whereas the upper La Mesa is early Quaternary where overlain by the West Potrillo basalt (about 1.2 Ma).
Historic earthquake	
Most recent	late Quaternary (<130 ka)

prehistoric deformation	*Comments:* Timing based on offset of 180-ka airfall tuff deposits of the Potrillo maar and middle to late (?) Pleistocene surfaces. The most recent faulting event probably occurred after 100 ka, but well before 15 ka as indicated by scarp morphology comparisons. Using field measurements and the linear-plus-cubic diffusion model, Cervera (2006 #7378) estimated the age of the scarp as 57–377 ka. Though lacking geochronologic data, this estimate generally agrees with middle to late (but not latest) Pleistocene rupture on the fault.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip-rate category assigned based on 7–10 m scarps on the lower of two faulted surfaces (possibly Tortugas) and 12–17 m on the upper of two faulted surfaces (Jornada), both of which are believed to be middle Pleistocene in age.
Date and Compiler(s)	2016 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#7377 Carley, S.A., 2012, Seismic reflection study of the East Potrillo fault, southwestern Doña Ana County, New Mexico: El Paso, University of Texas at El Paso, unpublished M.S. thesis, 48 p. #7378 Cervera, S.N., 2006, The Quaternary deformational history of the East Potrillo Mountains, Doña Ana County, New Mexico: El Paso, University of Texas at El Paso, unpublished M.S. thesis, 67 p., 1 pl., scale 1:5,000. #1018 De Hon, R.A., 1965, Maare of La Mesa, *in* Fitzsimmons, J.P., and Lochman-Balk, C., eds., Guidebook of southwestern New Mexico II: New Mexico Geological Society, 16th Field Conference, October 15-17, 1965, Guidebook, p. 204-209. #1024 Machette, M.N., and McGimsey, R.G., 1983, Map of Quaternary and Pliocene faults in the Socorro and western part of the Fort Sumner 1° x 2° quadrangles, central New Mexico: U.S.

	Geological Survey Miscellaneous Field Studies Map MF-1465-A, 12 p. pamphlet, 1 sheet, scale 1:250,000. #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. #1017 Reeves, C.C., Jr., 1969, Pluvial Lake Palomas northwestern Chihuahua, Mexico, *in* Cordoba, D.A., Wengerd, S.A., and Shomaker, J., eds., Guidebook of the border region: New Mexico Geological Society, 20th Field Conference, October 23-25, 1969, Guidebook, p. 143-154. #1015 Seager, W.R., and Mack, G.H., 1994, Geology of East Potrillo Mountains and vicinity, Doña Ana County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Bulletin 113, 28 p., 3 pls.