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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.

El Oro fault (Class A) No. 2050

Last Review Date: 2015-12-14

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 2050, El Oro 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	Backsliding (extension) on this former Laramide reverse fault has resulted in the formation of a high, nearly continuous fault-line escarpment on Precambrian and Paleozoic rocks. Evidence for Quaternary movement is recorded by small isolated scarps (less than 5 percent of the fault's length) on alluvial-fan deposits derived from erosion of the adjacent fault-line escarpment. Down-to-the-west (normal) movement on the fault has caused at least 88 m of offset of the bedrock channel of the Mora River. The timing of this offset is unknown, but nearby Pliocene basalts are also offset a similar amount. No detailed studies have been conducted to refine the timing or amount of offset recorded by the isolated Quaternary scarps along the length of the fault.

Name comments	This fault was named by Baltz and O'Neill (1984 #1713) for its proximity to El Oro Mountains, which are immediately south of Mora, New Mexico. El Oro fault extends as mostly a concealed structure from Puertocito (3 km north of Rito Cebolla) north and across the Mora River valley according to mapping of Baltz and O'Neill (1984 #1713). However, it probably continues farther north past El Turquillo and into Guadalupita Canyon. The north end of the fault is poorly defined, but taken herein as at Guadalupita according to mapping of O'Neill (1988 #1717). Farther north, the mapped trace of the fault enters bedrock and there is no preserved evidence for Quaternary movement; however, O'Neill (1988 #1717) mapped a continuation of the El Oro fault north and west into the Moreno Valley, where Pliocene basalts are offset.
County(s) and State(s)	MORA COUNTY, NEW MEXICO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Main part of fault trace from 1:24,000-scale geologic mapping by Baltz and O'Neill (1984 #1713). Northern extension of the fault (north of the Mora 7.5-minute quadrangle) is from 1:125,000-scale map of O'Neill (1988 #1717). Composite trace transferred to 1:250,000-scale topographic base map for compilation. In 2015, the fault was digitized at 1:24,000 scale using photogrammetry to accurately map its trace from these maps
Geologic setting	Backsliding (extension) on this former Laramide reverse fault has resulted in a large continuous fault-line escarpment on Precambrian and Paleozoic rocks. The fault is the source of a prominent strike valley. Down-to-the-west movement on the fault has caused at least 88 m of offset on the base of the bedrock channel of the Mora River according to drilling and geophysical studies. The timing of this offset is unknown, but Pliocene basalts to the north are also offset a similar amount.
Length (km)	27 km.

Average strike	N10°E
Sense of movement	Normal *Comments:* Fault was created as a Laramide reverse fault, but was reactivated in Quaternary time as a normal fault (Baltz and O'Neill, 1990 #1671).
Dip Direction	W *Comments:* No dips shown on map, but cross sections A and B of Baltz and O'Neill (1984 #1713) show the faults as having a high to moderate angle in the subsurface. With depth, they show the fault curving (less dip) and merging with thrusts faults of Laramide age.
Paleoseismology studies	
Geomorphic expression	Down-to-the-west Cenozoic movement on the fault has formed a large continuous fault-line escarpment on Precambrian and Paleozoic rocks, and small isolated scarps (less than 5 percent of length) on alluvial-fan deposits derived from the adjacent fault-line escarpment. No morphometric analyses of the isolated scarps have been made.
Age of faulted surficial deposits	Fault has offset locally derived alluvial-fan deposits of Pleistocene age. Baltz and O'Neill's (1984 #1713) units Qfm, middle (?) Quaternary, and Qfo, middle (?) to early Quaternary, are offset by the fault, whereas younger deposits bury the fault. No detailed studies of soil development or radiometric dating have been conducted in order to refine the age of faulted and unfaulted deposits. Northeast of Mora, New Mexico, Pliocene (4.3–4.4 Ma) basalts at El Cerro Colorado (O'Neill and Mehnert, 1988 #1716) are locally offset by the fault; they lie at discordant elevations with the basalts on the eastern (uplifted) side more than 180 m higher than those on the west (Baltz and O'Neill, 1990 #1671).
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* Based on offset alluvial-fan deposits of probable middle to early Quaternary age, discontinuous (buried) nature of

	scarps, and large (90 m) offset of subsurface channel of Mora River.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Late Quaternary slip rate must be low based on the discontinuous nature and size of scarps, whereas earlier slip may have occurred at a higher rate.
Date and Compiler(s)	2015 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1713 Baltz, E., and O'Neill, J.M., 1984, Geologic map and cross sections of the Mora River area, Sangre de Cristo Mountains, Mora County, New Mexico: U.S. Geological Survey Miscellaneous Investigations Map I-1456, 2 sheets, scale 1:24,000. #1671 Baltz, E.H., and O'Neill, J.M., 1990, Third-day road log, from Angel Fire to Las Vegas, via Black Lake, Guadalupita, Mora, Rociada and Sapello, *in* Bauer, P.W., Lucas, S.G., Mawer, C.K., and McIntosh, W.C., eds., Tectonic development of the southern Sangre de Cristo Mountains, New Mexico: New Mexico Geological Society, 41st Field Conference, September 12-15, 1990, Guidebook, p. 67-92. #1717 O'Neill, J.M., 1988, Late Cenozoic physiographic evolution of the Ocate Volcanic Field, *in* Petrology and physiographic evolution of the Ocate Volcanic Field, north-central New Mexico: U.S. Geological Survey Professional Paper 1478, p. B1-B15. #1716 O'Neill, J.M., and Mehnert, H.H., 1988, The Ocate Volcanic Field—Description of volcanic vents and the geochronology, petrography, and whole-rock chemistry of associated flows, *in* Petrology and physiographic evolution of the Ocate Volcanic Field, north-central New Mexico: U.S. Geological Survey Professional Paper 1478, p. A1-A30, 1 pl., scale 1:125,000.