

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](#).

unnamed fault of Bonita Canyon (Class B) No. 2144

Last Review Date: 2016-04-22

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

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Synopsis

Fault scarp-like features have been mapped on the late Quaternary Twin Craters and El Calderon basalt flows of El Malpais lava field. The associated fault may represent reactivation of a bedrock fault that is concealed in Bonita Canyon, but which must juxtapose Precambrian rock on the west against Paleozoic rock on the east. However, similar mapped features within El Malpais lava field are considered by Levish and others (1992 #1715) to be related to volcanic processes. No detailed study of the fault has been conducted to confirm its origin or document the amount of vertical displacement that may be associated with it. Thus, the

	feature is herein considered to be of suspect origin.
Name comments	This fault was first mapped by Maxwell (1986 #1720). Levish and others (1992 #1715) characterized it a non-tectonic feature related to volcanic processes as part of a regional reconnaissance for a dam-hazards study. Levish and others (1992 #1715) referred to it as one of the faults in the Zuni-Bandera volcanic field. This fault forms a north-trending scarp (?) across the Twin Craters and El Calderon lava flows south of Bonita Canyon. The scarp is located at the south end of Cerritos de Jaspe (a prominent, west-facing ridge), which is just east of Bonita Canyon.
County(s) and State(s)	CIBOLA COUNTY, NEW MEXICO
Physiographic province(s)	COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:24,000 scale. <i>Comments:</i> Trace from 1:62,500-scale geologic map of Maxwell (1986 #1720) combined with accurate placement using photogrammetric methods.
Geologic setting	The fault is in Quaternary (undifferentiated) basalt flows according to the mapping of Maxwell (1986 #1720). It trends north on the basalts, and northwest up Bonita Canyon where it juxtaposes Precambrian rock on the west against Paleozoic rock on the east (Timmons and Cikoski, 2012 #7426).
Length (km)	9 km.
Average strike	N11°W
Sense of movement	Normal <i>Comments:</i> Mapping by Maxwell (1986 #1720) and Timmons and Cikoski (2012 #7426) indicates that Paleozoic bedrock is down-dropped on the eastern side of the fault relative to Precambrian bedrock along a northern (concealed) extension of the fault. Conversely, where the fault crosses the El Calderon flow it appears to form a west-facing scarp. On the basis of this observation and similarity to other Cenozoic faults in the region, we infer that the fault has normal dip slip movement.

Dip Direction	Unknown
Paleoseismology studies	
Geomorphic expression	The fault forms a 2-km-long north-trending scarp (?) on basaltic lava flows (Maxwell, 1986 #1720). Levish and others (1992 #1715) suggested that the fault is related to volcanic processes and is not of tectonic origin. No measurements of any vertical displacement have been made across the fault to confirm the amount or direction of possible movement.
Age of faulted surficial deposits	Maxwell (1986 #1720) mapped the fault as offsetting the Twin Craters lava flow, dated at approximately 17_19 ka using radiocarbon and surface cosmogenic techniques (Laughlin and WoldeGabriel, 1997 #7425; Dunbar and Phillips, 2004 #7424). In addition, just south of New Mexico State Highway 53 the fault is mapped as crossing a small tongue of El Calderon flow, dated at 115–120 ka using paleomagnetic constraints (Cascadden and others, 1997 #7423).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> The fault scarp-like features are present on two Quaternary basalt flows dated at approximately 17–19 and 115–120 ka (Cascadden and others, 1997 #7423; Laughlin and WoldeGabriel, 1997 #7425; Dunbar and Phillips, 2004 #7424).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> No measurement of offset across the fault has been reported. The fault does not appear to form a high or even moderate (>5 m) scarp on aerial photographs. Thus, it seems reasonable that slip rates associated with this suspect fault would be in the low slip-rate category (<0.2 mm/yr).
Date and Compiler(s)	2016 Michael N. Machette, U.S. Geological Survey, Retired Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#7423 Cascadden, T.E., Geissman, J.W., Kudo, A.M., and

Laughlin, A.W., 1997, El Calderon cinder cone and related basalt flows, *in* Mabery, K., compiler, Natural History of El Malpais National Monument: New Mexico Bureau of Mines and Mineral Resources Bulletin 156, p. 41--51.

#7424 Dunbar, N.W., and Phillips, F.M., 2004, Cosmogenic ^{36}Cl ages of lava flows in the Zuni-Bandera volcanic field, north-central New Mexico, U.S.A., *in* Cather, S.M., McIntosh, W.C., and Kelley, S.A., eds., Tectonics, geochronology, and volcanism in the Southern Rocky Mountains and Rio Grande Rift: New Mexico Bureau of Geology and Mineral Resources Bulletin 160, p. 309-317.

#7425 Laughlin, A.W., and WoldeGabriel, G., 1997, Dating the Zuni-Bandera volcanic field, *in* Mabery, K., compiler, Natural History of El Malpais National Monument: New Mexico Bureau of Mines and Mineral Resources Bulletin 156, p. 25-29.

#1715 Levish, D.R., Vetter, U.R., Ake, J.P., and Piety, L.A., 1992, Seismotectonic study for Black Rock Dam, Bureau of Indian Affairs, Pueblo of Zuni, New Mexico: Bureau of Reclamation Seismotectonic Report 92-3, 62 p.

#1720 Maxwell, C.H., 1986, Geologic map of El Malpais Lava Field and surrounding areas, Cibola County, New Mexico: U.S. Geological Survey Miscellaneous Investigations Map I-1595, 1 sheet, scale 1:62,500.

#7426 Timmons, J.M., and Cikoski, C.T., 2012, Geologic map of the San Rafael quadrangle, Cibola County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 232, scale 1:24,000.

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