

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](#).

Lobato Mesa fault zone (Class A) No. 2004

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

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Synopsis

The Lobato Mesa fault zone offsets upper Tertiary volcanic deposits derived from the Valles Caldera and rift-fill sediments in the Abiquiu embayment. Fault strands are identified primarily by field mapping; the fault zone herein mostly includes strands with west-down displacements west of La Sotella Peak. The La Cañada del Amagre fault zone [2005] is located along the eastern side of La Sotella Peak and consists of faults having primarily east-down displacements. Together, the Lobato Mesa and La Cañada del Amagre fault zones form the western and eastern margins, respectively, of a north-trending horst in Tertiary volcanic and sedimentary rocks.

Name comments	Parts of the Lobato Mesa fault zone were mapped, but not named, by Kelley (1954 #1222), Smith and others (1970 #1125), Kelley (1978 #1107), Machette and Personius (1984 #1113), and Manley and others (1987 #1119). The faults were referred to as the Lobato Mesa fault zone by Wong and others (1995 #1155), after the mesa crossed by the fault zone south of Abiquiu, New Mexico. The Lobato Mesa fault zone of Gardner and House (1987 #1097) is referenced to mapping by Dethier and Martin (1984 #1092) east of Lobato Mesa and is considered herein as part of the La Cañada del Amagre fault zone [2005]. The Lobato Mesa fault zone is about 4 to 6 km wide, is located west of La Sotella Peak, and extends from the vicinity of Mesa de la Gallina (20 km west of Española) on the south, to the latitude of Cañon la Madera on the north.
County(s) and State(s)	RIO ARRIBA COUNTY, NEW MEXICO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS
Reliability of location	Good Compiled at 1:24,000 scale. <i>Comments:</i> The trace of the Lobato Mesa fault zone is based on 1:24,000-scale field mapping of Kempter and others (2005 #7578) combined with accurate placement using stereogrammetric analysis at scales of 1:12,000 to 1:24,000 by A.P. Jochems.
Geologic setting	The Lobato Mesa fault zone is within the Abiquiu embayment of the Rio Grande rift, along the northern margin of the Jemez Mountains volcanic edifice. The fault zone may have a weak association with contemporary microseismicity (Wong and others, 1995 #1155; House and Hartse, 1995 #1160).
Length (km)	14 km.
Average strike	N7°E
Sense of movement	Normal
Dip Direction	W <i>Comments:</i> Surface and subsurface data are lacking for this fault.

Paleoseismology studies	
Geomorphic expression	Prominent west-facing topographic scarps are present along the fault traces, in particular across mesas underlain by Lobato Basalt derived from the Valles Caldera. Scarps on the basalt are as much as 150 m high, although there is little topographic expression where the faults traverse underlying, less resistant rift-fill sediment of the Santa Fe Group.
Age of faulted surficial deposits	The fault zone displaces the 9–10 Ma Lobato Formation (Kempton and others, 2005 #7578) but is mapped as buried by the Miocene to Pliocene Puye Formation (Smith and others, 1970 #1125). However, Machette and Personius (1984 #1113) suggest the faults displace early Pleistocene to Pliocene deposits, and analysis of aerial photography by Wong and others (1995 #1155) suggests possible displacement of the Puye Formation and younger surficial deposits on Lobato Mesa. Kempton and others (2005 #7578) also map several strands in the fault zone as cutting Puye Formation deposits south of Vallecitos. Possible association of the fault zone with contemporary microseismicity (House and Hartse, 1995 #1160) also suggests younger (Quaternary) displacement.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> The timing of the most-recent earthquake on the Lobato Mesa fault zone is unknown.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> Long-term rate of 0.05 mm/yr is given by Gardner and House (1987 #1097), which is based on about 0.5 km offset of a 10.6-Ma dike documented in Dethier and Martin (1984 #1092). However, a lower short-term slip rate is suggested by 15 m offset of the Badnelier Tuff (Dethier and Martin, 1984 #1092).
Date and Compiler(s)	2016 Keith I. Kelson, William Lettis & Associates, Inc. Andrew P. Jochems, New Mexico Bureau of Geology & Mineral

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#1097 Gardner, J.N., and House, L., 1987, Seismic hazards investigations at Los Alamos National Laboratory, 1984-1985: Los Alamos National Laboratory Report LA-11072-MS, 76 p.

#1160 House, L., and Hartse, H., 1995, Seismicity and faults in northern New Mexico, *in* Bauer, P.W., Kues, B.S., Dunbar, N.W., Karlstrom, K.E., and Harrison, B., eds., Geology of the Santa Fe region, New Mexico: New Mexico Geological Society, 46th Field Conference, September 27-30, 1995, Guidebook, p. 135–137.

#1222 Kelley, V.C., 1954, Tectonic map of a part of the upper Rio Grande area, New Mexico: U.S. Geological Survey Oil and Gas Investigations Map OM-157, 1 sheet, scale 1:190,080.

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#7578 Kempter, K., Kelley, S., Koning, D., Ferguson, C., Osburn, B., and Fluk, L., 2005, Geologic map of the Vallecitos quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 108, scale 1:24,000.

#1113 Machette, M.N., and Personius, S.F., 1984, Map of Quaternary and Pliocene faults in the eastern part of the Aztec 1° by 2° quadrangle and the western part of the Raton 1° by 2° quadrangle, northern New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-1465-B, 1 sheet, scale 1:250,000.

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#1125 Smith, R.L., Bailey, R.A., and Ross, C.S., 1970, Geologic map of the Jemez Mountains, New Mexico: U.S. Geological Survey Miscellaneous Investigations Map I-571, 1 sheet, scale 1:125,000.

#1155 Wong, I., Kelson, K., Olig, S., Kolbe, T., Hemphill-Haley, M., Bott, J., Green, R., Kanakari, H., Sawyer, J., Silva, W., Stark, C., Haraden, C., Fenton, C., Unruh, J., Gardner, J., Reneau, S., and House, L., 1995, Seismic hazards evaluation of the Los Alamos National Laboratory: Technical report to Los Alamos National Laboratory, Los Alamos, New Mexico, February 24, 1995, 3 volumes, 12 pls., 16 appen.

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