

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](#).

West Joyita fault zone (Class A) No. 2110

Last Review Date: 2016-03-14

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

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Synopsis

The West Joyita fault zone forms the eastern margin of the Rio Grande rift in the narrow part of the rift known as the Socorro Constriction. Faulting on the West Joyita fault zone appears to be much less active than on the Ladron and Lemitar Mountains on the western margin of the Socorro constriction. In most places the fault zone is poorly expressed, except northeast of San Acacia, on the west flank of the northernmost Joyita Hills, where the fault places upper Santa Fe Group sediment (Sierra Ladrones Formation) against Paleozoic rocks. South of the latitude of San Acacia, to about 2 km south of U.S. highway 380, the fault zone is comprised of a series of poorly expressed right- and left-stepping en echelon normal faults. The West Joyita fault zone is

	buried along most of its length by middle Pleistocene and younger rocks but offsets early Pleistocene Sierra Ladrones Formation more than 150 m near its northern end.
Name comments	The West Joyita fault zone (West La Joya fault of Machette and McGimsey, 1983 #1024) extends along the west flank of the Joyita Hills, and forms the eastern margin of the Socorro Constriction. The fault was first mapped and named by Wilpolt and others (1946 #1424) and Wilpolt and Wanek (1951 #1425) during oil and gas investigations in the Albuquerque-Belen basin. Subsequent detailed mapping has been conducted along much of the fault zone (Beck, 1993 #1284; Cather, 2002 #7478; Cather and others, 2004 #7480; Cather and Colpitts, 2005 #7479). Note that basinward faults near the northern end of the West Joyita fault zone were previously included with unnamed faults on the Llano de Manzano [2117]. They are included here because of their discontinuity with faults in that group (Machette and McGimsey, 1983 #1024) and because they are located beyond the southern extent of the Llano de Manzano. These faults parallel the main strand of the West Joyita fault zone in the Mesa del Yeso 7.5-minute topographic quadrangle.
County(s) and State(s)	SOCORRO COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. <i>Comments:</i> Fault traces are from 1:63,360 scale map of Wilpolt and others (1946 #1424), and the 1:24,000 scale map of Cather (2002 #7478), Cather and others (2004 #7480), and Cather and Colpitts (2005 #7479). Traces accurately placed using photogrammetric methods.
Geologic setting	The West Joyita fault zone forms the eastern margin of Rio Grande rift in the Socorro Constriction. This constriction lies in the axial part of the Rio Grande Valley, well away from the mountain ranges that form the topographic valley. In some places, the fault juxtaposes conglomeratic piedmont facies of the Sierra Ladrones Formation (Plio-Pleistocene) against Upper Paleozoic strata or, less commonly, against Proterozoic basement rocks (Wilpolt and others, 1946 #1424; Cather, 2002 #7478; Cather and

	Colpitts, 2005, #7479).
Length (km)	48 km.
Average strike	N10°W
Sense of movement	Normal
Dip	41°–80° W <i>Comments:</i> Dip data are from Cather (1996 #1290), along the southern end of the West Joyita fault zone.
Paleoseismology studies	
Geomorphic expression	The West Joyita fault is poorly expressed; it is buried along much of its length by middle Pleistocene and younger deposits.
Age of faulted surficial deposits	The West Joyita fault zone offsets sediment of the Pliocene to early Pleistocene Sierra Ladrones Formation along much of its length. These sediments contain reworked deposits of Bandelier pumice in the San Antonio quadrangle near the southern end of the fault zone, and thus in places must be less than 1.6 Ma (S.M. Cather, unpublished mapping, 1996). Cather (1996 #1290) describes apparent segmented behavior along a section of the fault in the Loma de las Cañas 7.5 minute quadrangle. Here, the Coyote fault (one strand of the West Joyita fault zone) is buried by the upper Sierra Ladrones Formation in the middle of the quadrangle near Arroyo de la Presilla, but offsets the upper aggradational surface of the Sierra Ladrones Formation (Las Cañas surface of McGrath and Hawley, 1987 #1239) in the southern part of the quadrangle near Arroyo de las Cañas.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> Timing is based on the youngest deposits offset by the West Joyita fault zone, the early Pleistocene Sierra Ladrones Formation.
Recurrence interval	

Slip-rate category	<p>Less than 0.2 mm/yr</p> <p><i>Comments:</i> Assigned slip-rate category based on offset/age estimates of Machette and McGimsey (1983 #1024).</p>
Date and Compiler(s)	<p>2016</p> <p>Stephen F. Personius, U.S. Geological Survey Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources</p>
References	<p>#1284 Beck, W.C., 1993, Structural evolution of the Joyita Hills, Socorro County, New Mexico: Socorro, New Mexico Institute of Mining and Technology, unpublished Ph.D. dissertation, 187 p.</p> <p>#7479 Cather, S., and Colpitts, R., Jr., 2005, Geologic map of the Loma de las Cañas quadrangle, Socorro County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 110, scale 1:24,000.</p> <p>#1290 Cather, S.M., 1996, Geologic maps of the upper Cenozoic deposits of the Loma de las Cañas and Mesa del Yeso 7.5-minute quadrangles, New Mexico: New Mexico Bureau of Mines and Mineral Resources Open-File Report 417, 32 p. pamphlet, 2 sheets, scale 1:24,000.</p> <p>#7478 Cather, S.M., 2002, Geologic map of the San Antonio 7.5-minute quadrangle, Socorro County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 58, scale 1:24,000.</p> <p>#7480 Cather, S.M., Colpitts, R.M., Jr., and Hook, S.C., 2004, Geologic map of the Mesa del Yeso quadrangle, Socorro County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 92, scale 1:24,000.</p> <p>#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.</p> <p>#1239 McGrath, D.B., and Hawley, J.W., 1987, Geomorphic evolution and soil-geomorphic relationships in the Socorro area, central New Mexico, <i>in</i> McLemore, V.T., and Bowie, M.R., eds., Guidebook to the Socorro area, New Mexico: New Mexico</p>

Bureau of Mines and Mineral Resources, 24th Annual Meeting of the Clay Minerals Society and 36th Annual Clay Minerals Conference, Guidebook, p. 55-67.

#1425 Wilpolt, R.H., and Wanek, A.A., 1951, Geology of the region from Socorro and San Antonio east of Chupadera Mesa, Socorro County, New Mexico: U.S. Geological Survey Oil and Gas Investigations Map OM-121, 2 sheets, scale 1:63,360.

#1424 Wilpolt, R.H., Bates, R.L., MacAlpin, A.J., and Vorbe, G., 1946, Geologic map and stratigraphic sections of Paleozoic rocks of Joyita Hills, Los Piños Mountains, and northern Chupadera Mesa, Valencia, Torrance, and Socorro Counties, New Mexico: U.S. Geological Survey Oil and Gas Investigations Preliminary Map 61, 1 sheet, scale 1:63,360.

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