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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.

Santa Fe fault (Class A) No. 2123

Last Review Date: 2015-12-21

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

citation for this record: **Personius, S.F., and Jochems, A.P., compilers, 2015, Fault number 2123, Santa Fe 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 02:21 PM.**

Synopsis	The Santa Fe fault forms the western margin of the Rio Grande rift in the central Albuquerque-Belen basin. The fault has been quite active in the Pliocene and early Pleistocene, based on offset of upper Santa Fe Group (Sierra Ladrones Formation) sediment. Other indirect evidence of Quaternary offset includes differences in the elevation of the "Ortiz surface" across the fault trace and the geometry of spring deposits found along the fault. However, no scarps on surficial deposits have been observed along the trace of the Santa Fe fault.
Name comments	The Santa Fe fault forms part of the western margin of the Rio Grande rift and the Albuquerque basin (Machette, 1982 #1401;

	Machette and McGimsey, 1983 #1024). The structure was originally named the Carrizo fault by Wright (1946 #1427), was later renamed the Santa Fe fault by Kelley and Wood (1946 #1379), and was included on subsequent compilations (Kelley, 1954 #1222; Kelley, 1977 #1106). The Santa Fe fault places Pliocene to early Pleistocene (Lozinsky and Tedford, 1991 #1399) sediment of the Sierra Ladrones Formation down-to-the-east against older rocks (Machette and McGimsey, 1983 #1024; Ricketts and Karlstrom, 2014 #7300). **Fault ID:** Fault no. 2 of Machette (1982 #1401), fault no. 1 of Machette and McGimsey (1983 #1024).
County(s) and State(s)	VALENCIA COUNTY, NEW MEXICO
Physiographic province(s)	BASIN AND RANGE COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* No scarps on surficial deposits have been observed; the fault had been shown as dashed along most of its trace on published maps until mapping was completed along much of its trace by Ricketts and Karlstrom (2014 #7300). Fault location is taken from this 1:24,000 map.
Geologic setting	The Santa Fe fault forms the western margin of the Rio Grande rift and the Albuquerque basin; this structure separates the rift from the edge of the Colorado Plateau to the west.
Length (km)	30 km.
Average strike	N4°E
Sense of movement	Normal
Dip	45°–80° E *Comments:* Dip data are from Wright (1946 #1427), Callender and Zilinski, (1976 #1289), Russell and Snelson (1994 #1186), and Ricketts and Karlstrom (2014 #7300).
Paleoseismology	

studies	
Geomorphic expression	No scarps have been recognized on surficial deposits along the Santa Fe fault, but the fault forms a bedrock escarpment along the northern half of its trace.
Age of faulted surficial deposits	The Santa Fe fault offsets Pliocene to early Pleistocene (Lozinsky and Tedford, 1991 #1399) sediment of the Sierra Ladrones Formation down-to-the-east against older rocks (Machette and McGimsey, 1983 #1024; Ricketts and Karlstrom, 2014 #7300. Other indirect evidence of Quaternary offset includes differences in the elevation of the Pliocene (?) Ortiz surface across the fault trace (Kelley and others, 1976 #1380; Kelley, 1977 #1106, p. 28) and the geometry of spring deposits found along the fault (Callender and Zilinski, 1976 #1289).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Timing estimate is based on offset of Pliocene-Pleistocene Sierra Ladrones Formation sediment (Machette and McGimsey, 1983 #1024; Ricketts and Karlstrom, 2014 #7300).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* No detailed studies of fault offset or age of offset deposits are available; low slip-rate category is assigned based on about 30 m offset of 3.7-Ma basalt (Bachman and Mehnert, 1978 #1265) at the mouth of Arroyo Comanche (Kelley, 1977 #1106; Bachman and Mehnert, 1978 #1265).
Date and Compiler(s)	2015 Stephen F. Personius, U.S. Geological Survey Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
References	#1265 Bachman, G.O., and Mehnert, H.H., 1978, New K-Ar dates and the late Pliocene to Holocene geomorphic history of the central Rio Grande region, New Mexico: Geological Society of America Bulletin, v. 89, p. 283-292. #1289 Callender, J.F., and Zilinski, R.E., Jr., 1976, Kinematics of

Tertiary and Quaternary deformation along the eastern edge of the Lucero uplift, central New Mexico, *in* Woodward, L.A., and Northrop, S.A., eds., Tectonics and mineral resources of southwestern North America: New Mexico Geological Society Special Publication 6, p. 53-61.

#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.

#1106 Kelley, V.C., 1977, Geology of Albuquerque basin, New Mexico: New Mexico Bureau of Mines and Mineral Resources Memoir 33, 60 p., 2 pls.

#1379 Kelley, V.C., and Wood, G.H., Jr., 1946, Geology of the Lucero uplift, Valencia, Socorro, and Bernalillo Counties, New Mexico: U.S. Geological Survey Oil and Gas Investigations Map 47, 1 sheet, scale 1:63,360.

#1380 Kelley, V.C., Woodward, L.A., Kudo, A.M., and Callender, J.F., 1976, Guidebook to Albuquerque basin of the Rio Grande rift, New Mexico: New Mexico Bureau of Mines and Mineral Resources Circular 153, 31 p.

#1399 Lozinsky, R.P., and Tedford, R.H., 1991, Geology and paleontology of the Santa Fe Group, southwestern Albuquerque basin, Valencia County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Bulletin 132, 35 p., 3 pls., scale 1:24,000.

#1401 Machette, M.N., 1982, Quaternary and Pliocene faults in the La Jencia and southern part of the Albuquerque-Belen basins, New Mexico—Evidence of fault history from fault-scarp morphology and Quaternary geology, *in* Grambling, J.A., and Wells, S.G., eds., Albuquerque Country II: New Mexico Geological Society, 33rd Field Conference, November 4-6, 1982, Guidebook, p. 161-169.

#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.

	#7300 Ricketts, J.W., and Karlstrom, K.E., 2014, Geologic map of the South Garcia SE 7.5-minute quadrangle, Valencia County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 246, scale 1:24,000. #1186 Russell, L.R., and Snelson, S., 1994, Structure and tectonics of the Albuquerque basin segment of the Rio Grande rift—Insights from reflection seismic data, *in* Keller, G.R., and Cather, S.M., eds., Basins of the Rio Grande rift—Structure, stratigraphy, and tectonic setting: Geological Society of America Special Paper 291, p. 83–112. #1427 Wright, H.E., Jr., 1946, Tertiary and Quaternary geology of the lower Rio Puerco area, New Mexico: Geological Society of America Bulletin, v. 57, p. 383-456.