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Quaternary Fault and Fold Database of the United States

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Picuris-Pecos fault (Class B) No. 2023

Last Review Date: 2016-06-27

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

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Synopsis	The steeply dipping Picuris-Pecos fault strikes north-northeast within the Sangre de Cristo Mountains, and has undergone several episodes of displacement, including movement during Precambrian, Pennsylvanian, late Cretaceous, and possibly Neogene time. The fault is associated with a prominent series of linear valleys and other geomorphic features, and is well expressed in the Sangre de Cristo Mountains on remote-sensing imagery. However, evidence for displacement of Quaternary deposits has not been documented on the Picuris-Pecos fault.
Name comments	The Picuris-Pecos fault lies within the Sangre de Cristo Mountains, about 15 km east of Santa Fe, between the village of

	Cañoncito on the south and Talpa on the north. The northern part was originally named the Alamo Canyon tear fault (Montgomery, 1953 #1139); the fault was later mapped in the southern Sangre de Cristo Mountains by Miller and others (1963 #1121), Bauer (1987 #1134), and Moench and others (1988 #1122). Bauer and Ralser (1995 #1159) show the entire fault at a scale of 1:555,555, with detailed maps of selected sections at scales of 1:19,000 and 1:62,500.
County(s) and State(s)	MORA COUNTY, NEW MEXICO RIO ARRIBA COUNTY, NEW MEXICO SAN MIGUEL COUNTY, NEW MEXICO SANTA FE COUNTY, NEW MEXICO TAOS COUNTY, NEW MEXICO
Physiographic province(s)	SOUTHERN ROCKY MOUNTAINS BASIN AND RANGE
Reliability of location	Good Compiled at 1:48,000 and 1:24,000 scale. *Comments:* Location of the Picuris-Pecos fault is based on 1:24,000-scale maps by Bauer and others (1996 #7534), Bauer and Kelson (1997 #7304), Ilg and others (1997 #7535), Melis and others (2002 #7536), Aby and Timmons (2005 #7532), and Bauer and others (2005 #7533), and the 1:48,000-scale map of Moench and others (1988 #1122). Additional air photo mapping at 1:24,000-scale was compiled by A.P. Jochems along the central portions of the fault. Lower scale maps of the fault include those of Miller and others (1963 #1121) and Bauer and Ralser (1995 #1159).
Geologic setting	he Picuris-Pecos fault is located within the Sangre de Cristo Mountains, and has had several episodes of displacement, including movement during the Precambrian, the Pennsylvanian, the late Cretaceous, and possibly the Neogene (Miller and others, 1963 #1121; Chapin and Cather, 1981 #1135; Bauer and Ralser, 1995 #1159). Several investigators suggest that the fault forms the eastern boundary of the Española block, which may have undergone late Cenozoic counterclockwise rotation (Muehlberger, 1979 #1123; Brown and Golombek, 1985 #1087; Aldrich, 1986 #1084). However, detailed paleomagnetic data (Salyards and others, 1994 #1188) and documented sinistral slip on the Embudo fault [2007] (Bradford, 1992 #1174) argue against this hypothesis. Kelley (1995 #1157) suggested that about 400 m of west-down

	separation occurred during the late Cenozoic, implying that the Picuris-Pecos fault has been involved in Miocene and younger deformation related to the Rio Grande rift. Bauer and Ralser (1995 #1159) suggested that the Picuris-Pecos fault, in conjunction with the adjacent Borrego and Jicarilla faults, forms a large positive flower structure related to regional sinistral deformation.
Length (km)	98 km.
Average strike	N16°E
Sense of movement	Normal *Comments:* The Picuris-Pecos fault shows about 37 km of sinistral separation of Precambrian structural features (Miller and others, 1963 #1121; Chapin and Cather, 1981 #1135; Bauer, 1987 #1134). Kelley (1995 #1157) suggested that about 400 m of west-down separation occurred during the late Cenozoic, although she noted that the amount of separation varies along strike.
Dip Direction	V *Comments:* The Picuris-Pecos fault dips steeply, has a linear trace across rugged topography, and has had substantial lateral movement (Miller and others, 1963 #1121; Moench and others, 1988 #1122). Bauer and Ralser (1995 #1159) suggested that the adjacent Borrego and Jicarilla faults dip to the east and west, respectively, toward the Picuris-Pecos fault and merge with it at depth.
Paleoseismology studies	
Geomorphic expression	The fault is associated with a prominent series of linear valleys and other geomorphic features, and is well expressed in the Sangre de Cristo Mountains on remote-sensing imagery (Wong and others, 1995 #1155). However, there is little evidence for young geomorphic expression owing to a general absence of Quaternary deposits in the mostly bedrock terrain along the western margin of the Sangre de Cristo Mountains.
Age of faulted surficial deposits	The Picuris-Pecos fault clearly displaces Pennsylvanian strata, but does not appear to displace the 26 Ma Picuris Formation in the Picuris Mountains at its north end, south of Taos (Bauer and

	Ralser, 1995 #1159). However, the prominent geomorphic expression on bedrock and the possibility of late Cenozoic displacement suggested by apatite fission-track analyses (Kelley, 1995 #1157) suggest possible Quaternary activity.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* No detailed studies of Quaternary deposits have been conducted on the Picuris-Pecos fault. The Picuris-Pecos fault is included in some compilations of possible seismic sources in the region (Wong and others, 1995 #1155) but not in others (LaForge and Anderson, 1988 #1111).
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Wong and others (1995 #1155) conservatively estimate a range of 0.01 to 0.45 mm/yr, with a preferred value of 0.05 mm/yr, based on analysis of regional slip rates in the Rio Grande rift and the prominent geomorphic expression of the Picuris-Pecos fault in the Sangre de Cristo Mountains.
Date and Compiler(s)	2016 Keith I. Kelson, William Lettis & Associates, Inc. Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
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