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Jemez-San Ysidro fault, San Ysidro section (Class A) No. 2029b

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

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Synopsis	**General:** The Jemez-San Ysidro fault is a steeply east-dipping normal fault that, in part, forms the active western margin of the Rio Grande rift south of the Valles caldera. The fault is divided into sections on the basis of a 45° change in fault strike at the latitude of Cañones and evidence for young (Holocene) rupture along its southern section. The northern, northeast-striking section of the fault (Jemez section) is aligned with northeast-striking faults within the collapsed center of the Valles caldera and the Embudo fault, and is coincident with the Jemez Lineament. The

	central fault (San Ysidro section) merges with the southern fault (Calabacillas section) about 7 km south of the town of San Ysidro. **Sections:** This fault has 3 sections. The Jemez-San Ysidro fault consists of a northeast-striking fault (the Jemez fault of Goff and Kron, 1980 #1099), and north-striking faults along the northwestern margin of the Albuquerque basin (the Jemez and San Ysidro faults of Woodward, 1987 #1130). The boundary between the northern (Jemez) and central (San Ysidro) sections is placed at the 45° change in fault strike near Cañones. The boundary between the central and southern (Calabacillas) sections is near Arroyo Piedra Parada, 7 km south of San Ysidro. These sections are distinguished primarily on the basis of younger demonstrated displacement on the Calabacillas section, a prominent down-to-the-east normal fault that offsets the west side of the Llano de Albuquerque along the western margin of the Rio Grande rift.
Name comments	**General:** The Jemez-San Ysidro fault extends from the latitude of the Albuquerque Volcanoes north to the southern rim of the Valles caldera near Highway 4. As used herein, the Jemez-San Ysidro fault includes the northeast-striking faults referred to as the Jemez fault zone by Goff and Kron (1980 #1099) and Goff and others (1981 #1182), the north-striking Sierrita fault of Woodward and DuChene (1975 #1131), Aldrich (1986 #1084), and Woodward (1987 #1130); the north-striking San Ysidro fault of Woodward and Ruetschilling (1976 #1133), Hawley and Galusha (1978 #1103), and Woodward (1987 #1130); and the north-striking Calabacillas fault of Bryan and McCann (1937 #1288, fig. 4), Wright (1946 #1427) and Cather and others (1997 #1763). All of these faults are grouped together herein because of lateral continuity (Wong and others, 1995 #1155; Koning and others, 1998 #7375). **Section:** This part of the Jemez-San Ysidro fault was named the San Ysidro section by Wong and others (1995 #1155). The section extends from Crow Springs, about 5 km west of Cañones on the north to near Arroyo Piedra Parada, 7 km south of San Ysidro, where it joins with the Calabacillas section (e.g., Kelley, 1977 #1106; correlation implied by fault name convention of Koning and others, 1998 #7375; Connell, 2008 #7454).
County(s) and State(s)	SANDOVAL COUNTY, NEW MEXICO

Physiographic province(s)	BASIN AND RANGE SOUTHERN ROCKY MOUNTAINS COLORADO PLATEAUS
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Detailed geologic maps at a scale of 1:24,000 are available along the entire fault trace (Woodward and Ruetschilling, 1976 #1133; 1977 #1132), which are compiled and synthesized by Woodward (1987 #1130). Formento-Trigilio (1997 #1377) and Formento-Trigilio and others (1998 #7249) mapped Quaternary deposits and faults near Jemez Pueblo and San Ysidro at 1:24,000 scale. Additional detailed mapping of parts of the fault zone can be found in Koning and others (1998 #7375), Minor and Hudson (2006 #7246), and Caine and Minor (2009 #7244).
Geologic setting	The Jemez-San Ysidro fault forms the northwestern margin of the Albuquerque basin, although the amount of Quaternary vertical separation is less than that along other rift-margin faults. Aldrich (1986 #1084) stated that the fault was the western margin of the Rio Grande rift during the Oligocene, and that activity later stepped eastward to the Pajarito fault zone [2008]. Wong and others (1995 #1155) and House and Hartse (1995 #1160) identified seismicity aligned along the northern part of the fault.
Length (km)	This section is 34 km of a total fault length of 92 km.
Average strike	N2°W (for section) versus N14°E (for whole fault)
Sense of movement	Normal *Comments:* Woodward and DuChene (1975 #1131) characterize movement along the fault as dominantly dip-slip with a minor right-slip component. Down-to-the-east normal displacement is consistent with the occurrence of Tertiary rift-fill sediments (Zia Sand Formation) on the east faulted against Precambrian rocks on the west (Woodward, 1987 #1130).
Dip	58°–70° E. *Comments:* Hudson and others (2008 #7245) report the fault dips eastward at 58° to 70° based on magnetic susceptibility studies. Caine and Minor (2009 #7244) report variable oblique slip along

	strike based on slickenline data; the variation is controlled by the geometry of the fault, which is interpreted to have an average dip of 66° to the east (Caine and Minor, 2009 #7244). Advances in interpreting fault dip from aeromagnetic expression will improve the fault's three-dimensional geometry in the future.
Paleoseismology studies	
Geomorphic expression	Moderate geomorphic expression in bedrock is apparent on aerial photography, as a result of juxtaposition of different rock types and differential erosion. Short fault scarps and fault exposures in middle and late Pleistocene alluvial deposits have been mapped on several strands of the San Ysidro section near Jemez Pueblo and San Ysidro near the southern end of the fault (Formento-Trigilio and Pazzaglia, 1996 #1295; Formento-Trigilio, 1997 #1377; Formento-Trigilio and others, 1998 #7249). They measured offsets of 2–11 m on middle Pleistocene alluvial deposits along several strands of the fault. The numerous subparallel faults identified from high-resolution aeromagnetic data (Grauch and Hudson, 2007 #7243) are not included because of lack of reported recognized surface expression.
Age of faulted surficial deposits	The youngest faulted bedrock mapped along the San Ysidro section is the Miocene Zia Sand Formation (Woodward and Ruetschilling, 1976 #1133; 1987 #1130). Formento-Trigilio and Pazzaglia (1996 #1295), Formento-Trigilio (1997 #1377), and Formento-Trigilio and others (1998 #7294) map and describe fault scarps on fluvial and alluvial-fan deposits in the Jemez River drainage. The clearest evidence of faulting is found in deposits that contain the Lava Creek B ash; these sediments were deposited about 620 ka (Izett and Wilcox, 1982 #1708; Sarna-Wojcicki and others, 1987 #1707). Formento-Trigilio and Pazzaglia (1996 #1295) and Formento-Trigilio (1997 #1377) also described probable offset of a 100–200 ka terrace strath; some offset deposits along the San Ysidro section may be late Pleistocene in age.
Historic earthquake	
Most recent prehistoric deformation	middle and late Quaternary (<750 ka) *Comments:* The timing of the most-recent event is unknown. Formento-Trigilio and Pazzaglia (1996 #1295) and Formento-

	Trigilio (1997 #1377) found offsets in 620-ka alluvial deposits, and probable faulting of a middle- to late-Pleistocene (100–200 ka) fluvial terrace. These relations indicate that the San Ysidro section has been active in middle and probably late Pleistocene time.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Formento-Trigilio and Pazzaglia (1996 #1295) and Formento-Trigilio (1997 #1377) measured offsets of as much as 6–11 m on several strands of the San Ysidro section in alluvial deposits containing the 620 ka Lava Creek B ash; these data support a low long-term slip rate.
Date and Compiler(s)	2015 Keith I. Kelson, William Lettis & Associates, Inc. Stephen F. Personius, U.S. Geological Survey Kathleen M. Haller, U.S. Geological Survey Daniel J. Koning, New Mexico Bureau of Geology & Mineral Resources Andrew P. Jochems, New Mexico Bureau of Geology & Mineral Resources
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Questions or comments?