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San Jacinto fault, Superstition Hills section (Class A) No. 125f

Last Review Date: 1999-03-01

Compiled in cooperation with the California Geological Survey

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Synopsis	**General:** This is the most seismically active fault in southern California, with significant earthquakes (larger than M5.5), including surface rupturing earthquakes in 1968 (M6.6 Borrego Mountain earthquake) and 1987 (M6.6 Superstition Hills and M6.2 Elmore Ranch earthquakes), and numerous smaller shocks within each of its main sections. Slip rates in the northern half of the fault system are around 12 mm/yr but are only around 4 mm/yr for faults in the southern half where strands overlap or are sub-parallel.

	Sections: This fault has 7 sections. Sections taken from segments defined by Working Group on California Earthquake Probabilities (1995 #4945) and by Petersen and others (1996 #4860), and include from north to south into: San Bernardino section [125a], San Jacinto Valley section [125b], Anza section [125c], Coyote Creek section [125d], Borrego Mountain section [125e], Superstition Hills section [125f], and Superstition Mountain section [125g]. Sanders and Magistrale (1997 #6396) defined 18 segments based on inferred and observed historic ruptures and bends or steps in the continuity of the faults (these "segments" are listed under the seven sections described herein). Wesnousky (1986 #5305) divided the fault zone into nine segments, including the entire Claremont fault in the northern segment, including the Casa Loma fault with the Clark fault, and distinguishing the Hot Springs, Thomas Mountain and Buck Ridge faults as separate segments, in addition to the Coyote Creek, Borrego Mountain, Superstition Hills and Superstition Mountain sections as used by Working Group on California Earthquake Probabilities (1995 #4945).
Name comments	**General:** San Jacinto fault named by Lawson and others (1908 #4969). Later mapping of major parts of zone by Fraser (1931 #6379), Dibblee (1954 #6376) and Sharp (1967 #6397). Major named faults within the zone include the Claremont, Casa Loma, Clark, Buck Ridge, Coyote Creek, Superstition Mountain, and Superstition Hills faults. See section discussions for more detail. **Section:** Section represented herein includes Superstition Hills fault (no. 504) and Wienert fault (no. 506) of Jennings (1994 #2878); first mapped by Tarbet (1951 #6400) and named by Dibblee (1954 #6376); Wienert fault named by Sharp and others (1989 #6510). The section extends for at least 27 km and consists of three right-stepping en echelon strands--the northern and southern strands of the Superstition Hills fault and the Wienert fault (Sharp and others, 1989 #6510). **Fault ID:** Refers to numbers 400 (Lytle Creek fault), 401 (San Jacinto fault), 402 (Glen Helen fault), 429 (Rialto-Colton fault), 447 (Claremont fault), 457 (Casa Loma fault), 458 (Hot Springs fault), 459 (Clark fault), 471 (Buck Ridge fault), 478 (Coyote Mountain fault), 479 & 480 (Coyote Creek fault), 504 (Superstition Hills fault), 505 (Superstition Mountain fault) and 506 (Wienert fault) of Jennings (1994 #2878); numbers 2 (Glen Helen fault), 3 (San Jacinto fault), 4 (Lytle Creek fault), 5 (Claremont fault), 6 (Casa Loma fault), 7 (Hot Springs fault), and

	8 Clark fault) of Ziony and Yerkes (1985 #5931).
County(s) and State(s)	IMPERIAL COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Traces based on State of California Alquist-Priolo Earthquake Fault Zone maps.
Geologic setting	The San Jacinto fault zone is a major element of the San Andreas fault system in southern California, with historic earthquakes (if not ground rupture) associated with most of its sections. This dextral fault zone branches off from the San Andreas near Cajon pass and extends southeastward through the Peninsular Ranges for 240 km into southwestern Imperial Valley. Sharp (1967 #6397) believes that this is currently the most active strand of the San Andreas system in southern California, but is relatively young, with only about 24 km of total dextral offset. The fault zone may be divided into four principal sections: the Claremont, Clark, Coyote Creek and Superstition sections which are separated by major discontinuities (Sanders and Magistrale, 1997 #6396). The fault zone is further subdivided for seismic-hazard modeling purposes into from 5 to as many as 20 "segments" by various authors. The principal faults within the zone overlap in a right-stepping fashion, with a major overlap (50 km in length) occurring between the Clark and Coyote Creek faults.
Length (km)	This section is 38 km of a total fault length of 244 km.
Average strike	(for section) versus N58°W (for whole fault)
Sense of movement	Right lateral
Dip	90° *Comments:* Dip based on shallow focal mechanism and aftershocks of the 1987 earthquake, as reported by Magistrale and others (1989 #6385); surface mapping shows variable near-surface attitudes (Sharp and others, 1989 #6510).
Paleoseismology	Imler Road (125-1): Three-dimensional trenching across historic

studies	surface rupture documented fault history for past 330 yr (Hudnut and Sieh, 1989 #6382).
Geomorphic expression	deflected drainages, scarps
Age of faulted surficial deposits	Holocene fluvial and lacustrine deposits (including 340 yr BP Lake Cahuilla shoreline deposits); Pleistocene Brawley formation (principally lacustrine).
Historic earthquake	Superstition Hills earthquake 1987
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Historic event (M6.3) on 11/24/87; penultimate 1906/1915 or 1641 (Hudnut and Sieh, 1989 #6382); surface ruptures in 1951, 1965, 1968, 1969, 1979, 1981 may have all been triggered slip.
Recurrence interval	*Comments:* 250 (+400, -133) yr return time calculated by Working Group on Northern California Earthquake Potential (1995 #4945); 150–300 yr estimated by Hudnut and Sieh (1989 #6382), depending on timing of penultimate event; Wesnousky (1986 #5305) calculates 422 yr.
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* 2–6±1 mm/yr in the past 330 yr (Hudnut and Sieh, 1989 #6382); 4.0±2.0 mm/yr chosen by Working Group on Northern California Earthquake Potential (1995 #4945); 1.0 mm/yr (Wesnousky, 1986 #5305). Petersen and others (1996 #4860) assign a slip rate of 4.0 mm/yr (with minimum and maximum assigned slip rates of 2.0 mm/yr and 6.0 mm/yr, respectively) for probabilistic seismic hazard assessment for the State of California.
Date and Compiler(s)	1999 Jerome A. Treiman, California Geological Survey Matthew Lundberg, California Geological Survey
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