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Quaternary Fault and Fold Database of the United States

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Newport-Inglewood-Rose Canyon fault zone, San Diego section (Class A) No. 127f

Last Review Date: 1999-06-01

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Synopsis	**General:** Data on this fault zone is variable. Fault locations onshore and in some limited offshore areas are generally well located. The large central portion of the fault zone is offshore and less well defined. Urbanization in the San Diego area has also somewhat limited the accurate location of some of the fault strands. The northern onshore portion is demonstrably Holocene based on numerous geotechnical studies as well as the historic Long Beach earthquake. The southern onshore portion, through San Diego, is also demonstrably active based on geotechnical and research studies. The intermediate offshore portion is presumed Holocene based on sparse evidence of displacement of presumed young Holocene sediments offshore as well as its continuity to the better-defined onshore sections. There are three detailed study sites along

	the fault zone. Grant and others (1997 #1366) reported evidence for 3–5 earthquakes in the past 11.7 ka, but stated that the recurrence interval varied from 1,200 yr to 3,000 yr. Slip rate is not fully constrained, but appears to be approximately 1.0±0.5 mm/yr in the north, increasing to 1.5±0.5 mm/yr in the south. **Sections:** This fault has 7 sections. Section designations after Fischer and Mills (1991 #6468) who designated three segments offshore, two segments onshore south of La Jolla and one southern segment within the Los Angeles basin (thereby implying a northern, 7th segment as well). Sections were distinguished based on asperities (bends), steps and seismicity. The division of the Los Angeles basin part of the fault zone into two segments is based on slight differences in geometry (discussed by several workers, including Wright (1991 #5950), seismicity differences (Hauksson, 1987 #6475), and the subsurface extent of the 1933 Long Beach earthquake rupture (Wesnousky, 1986 #5305; Hauksson and Gross, 1991 #6476). Fischer (1992 #6467) designates one additional segment offshore. Working Group on California Earthquake Probabilities (1995 #4945) and Petersen and others (1996 #4860) identify three sections: Newport-Inglewood, Newport-Inglewood offshore and Rose Canyon (the latter including offshore faults north to Oceanside).
Name comments	**General:** Entire fault zone referred to as Newport-Inglewood-Rose Canyon fault zone by Greene and others (1979 #6470). Newport-Inglewood fault: onshore structural zone first recognized as a zone of folding by Mendenhall (1905 #6488). Hamlin (1918 #6473) associated seismicity and faulting with the zone; first mapped and named by Taber (1920 #6491) as the Inglewood-Newport-San Onofre fault; called Newport-Inglewood fault by Hoots (1931 #5921). Eaton (1933 #6463) was first to suggest continuity to Rose Canyon fault in the San Diego area; offshore portion was called the South Coast Offshore fault by utility consultants (Southern California Edison Co. and San Diego Gas and Electric Co., 1972 #6490), and the South Coast Offshore Zone of Deformation by Woodward-Clyde Consultants (1979 #6496). Rose Canyon fault: Fairbanks (1893 #6466) suggested presence of fault and Ellis and Lee (1919 #6465) were the first to show part of the fault on a map. Hanna (1926 #6474) referred to the Soledad Mountain fault; Hertlein and Grant (1939 #6477) were the first to refer to the Rose Canyon fault; Kennedy (1975 #6478) and Kennedy and others (1975 #6480) mapped the fault in greater detail. See sections 127f and g for additional fault strands.

	Section: Section name from Fischer and Mills (1991 #6468); includes Rose Canyon, Mount Soledad, Country Club, Mission Bay, and Old Town faults. The Rose Canyon fault was named by Hertlein and Grant (1939 #6477); Kennedy (1975 #6478) named the Country Club and Mission Bay faults as well as the Mount Soledad fault (Soledad Mountain fault was previously applied to the Rose Canyon fault by (Hanna, 1926 #6474); Old Town fault mapped and described by Artim & Pinckney (1973 #6459) who also mapped the Morena fault which is part of the Country Club fault; section extends southeasterly from La Jolla Bay to vicinity of downtown San Diego. **Fault ID:** Refers to numbers 434 (Potrero, Inglewood and Avalon-Compton faults), 439 (South Branch, Newport-Inglewood fault zone), 440 (North Branch, Newport-Inglewood fault zone), 441 (Cherry-Hill, Reservoir Hill and Seal Beach faults), 465 (Newport Inglewood-Rose Canyon fault zone, offshore), 487 (Mission Bay fault), 490 (Coronado fault, offshore), 490A (Spanish Bight fault, offshore), 491 (Rose Canyon fault zone), 492 (Old Town fault), and 493A (Silver Strand fault, offshore) of Jennings (1994 #2878). Also refers to numbers 30 (Newport-Inglewood, north section) and 31 (Newport-Inglewood, south section) of Hecker and others (1998 #6118), and to numbers 25 (Inglewood fault), 26 (Potrero fault), 27 (Avalon-Compton fault), 28 (Cherry-Hill fault), 29 (Reservoir Hill fault), 30 (Newport-Inglewood North Branch), 31 (Newport-Inglewood, South Branch), and 32 (Faults offshore of San Clemente) of Ziony and Yerkes (1985 #5931).
County(s) and State(s)	SAN DIEGO COUNTY, CALIFORNIA
Physiographic province(s)	LOWER CALIFORNIAN
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of fault from Qt_flt_ver_3-0_Final_WGS84_polyline.shp (Bryant, W.A., written communication to K.Haller, August 15, 2017) attributed to 1:24,000-scale map by (Kennedy and Peterson, 1975) and Treiman (1990) mapped at unspecified scale.
Geologic setting	This fault zone is a major structural element within the Peninsular Ranges. Both onshore, to the north, and in the offshore region the

	fault zone separates contrasting Mesozoic basement terrane-Catalina Schist on the west and metasediments, intrusives and volcanics to the east (Yerkes and others, 1965 #5930). The onshore Los Angeles basin reach of the fault zone is marked by a northwesterly trending line of generally en echelon anticlinal folds and faults that extends 40 miles from Newport Mesa to the Cheviot Hills along the western side of the Los Angeles Basin (Barrows, 1974 #6460); the zone is tentatively extended northward to the Santa Monica [101] and Hollywood [102] faults by Wright (1991 #5950). The onshore structural zone is an important petroleum-producing region. The offshore reach of the fault zone continues southeastward until offshore of Oceanside where it bends and steps and continues on a more south-southeast trend, paralleling the coastline. The Rose Canyon fault [127e, 127f] comes onshore at La Jolla and is characterized by zones of compression and extension associated with restraining and releasing bends in the faults. The fault zone is locally more than 1 km wide and is composed of both dip-slip and strike-slip en echelon faults that together extend from La Jolla Cove 50 km to San Diego Bay and beyond on the south (Treiman, 1993 #6494).
Length (km)	This section is 20 km of a total fault length of 209 km.
Average strike	N31°W (for section) versus N29°W,N27°W,N31°W (for whole fault)
Sense of movement	Right lateral *Comments:* Also includes reverse component within compressional bend around Soledad Mountain and normal component adjacent to Mission Bay.
Dip Direction	V *Comments:* Vertical dip assumed by Petersen and others (1996 #4860); detailed mapping shows that surface traces typically are steeper than 80°, but locally may be as shallow 45°.
Paleoseismology studies	Site 127-1 Rose Canyon: Three dimensional trench study documented minimum displacement of a Holocene channel across one of two or more strands of the Rose Canyon fault zone. The observed fault is believed to be the principal strand at this location.

	Up to three events may be recorded. Faulted and unfaulted sediments were based on 14C dating of detrital charcoal (Lindvall and Rockwell, 1995 #6487).
Geomorphic expression	Large-scale features include uplift of Soledad Mountain and depression of Mission Bay; intermediate- to small-scale features include pressure ridges, sag ponds, offset drainages, linear drainages, scarps and benches (Treiman, 1993 #6494; Lindvall and Rockwell, 1995 #6487).
Age of faulted surficial deposits	Holocene stream channel and slope wash deposits (see description of site 127-2); late Quaternary marine terrace deposits associate with oxygen-isotope stages 5a and 5e, as well as older marine terraces (Kern, 1977 #6484; Kern and Rockwell, 1992 #6485). These older terraces fall within the Pleistocene Lindavista Formation; Pleistocene deposits included within the Bay Point Formation.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Three events since 8,100 14C yr BP; last event may have been within past 225–500 yr (Lindvall and Rockwell, 1995 #6487).
Recurrence interval	about 4,000 yr *Comments:* Lindvall and Rockwell (1995 #6487) estimate recurrence is about 4 ka, based on observation that a minimum of 3 events have occurred in the past 8.1 k.y.
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* 1.5±0.5 mm/yr based on minimum of 1.1 mm/yr along one strand (Lindvall and Rockwell, 1995 #6487); 1–2 mm/yr poorly constrained rate since Pliocene (data from Kennedy, 1975 #6478); Wesnousky (1986 #5305) and Working Group on California Earthquake Probabilities (1995 #4945) assign 1.5 mm/yr.
Date and Compiler(s)	1999 Jerome A. Treiman, California Geological Survey Matthew Lundberg, California Geological Survey
References	#6459 Artim, E.R., and Pinckney, C.J., 1973, La Nacion fault

system, San Diego, California: Geological Society of America Bulletin, v. 84, p. 1075-1080.

#6460 Barrows, A.G., 1974, A review of the geology and earthquake history of the Newport-Inglewood structural zone, southern California: California Division of Mines and Geology Special Report 114, 115 p.

#6463 Eaton, J.E., 1933, Long Beach, California earthquake of March 10, 1933: American Association of Petroleum Geologists Bulletin, v. 17, p. 732-738.

#6465 Ellis, A.J., and Lee, C.H., 1919, Geology and groundwaters of the western part of San Diego County, California: U.S. Geological Survey Water Supply Paper 446, 321 p.

#6466 Fairbanks, H.W., 1893, Geology of San Diego County-Also portions of Orange and San Bernardino Counties: California Mining Bureau 11th Annual Report, p. 76-120.

#6467 Fischer, P.J., 1992, Neotectonics of the Newport-Inglewood and Palos Verdes fault zones along the offshore margins of the greater Los Angeles basin, *in* Association of Engineering Geologists, Proceedings of the 35th Annual Meeting, p. 603-615.

#6468 Fischer, P.J., and Mills, G.I., 1991, The offshore Newport-Inglewood-Rose Canyon fault zone, California: structure, segmentation and tectonics, *in* Abbott, P.L., and Elliott, W.J., eds., Environmental perils San Diego region: San Diego Association of Geologists, October 20, 1991, p. 17-36.

#1366 Grant, L.B., Waggoner, J.T., Rockwell, T.K., and von Stein, C., 1997, Paleoseismicity of the north branch of the Newport-Inglewood fault zone in Huntington Beach, California, from cone penetrometer test data: Bulletin of the Seismological Society of America, v. 87, p. 277-293.

#6470 Greene, H.G., Bailey, K.A., Clarke, S.H., Ziony, J.I., and Kennedy, M.P., 1979, Implications of fault patterns of the inner California continental borderland between San Pedro and San Diego, *in* Abbott, P.L., and Elliot, W.J., eds., Earthquakes and other perils, San Diego region: San Diego Association of Geologists, Geological Society of America field trip, November, 1979, p. 21–28.

#6473 Hamlin, H., 1918, Earthquakes in southern California: Bulletin of the Seismological Society of America, v. 8, p. 20-24.

#6474 Hanna, M.A., 1926, Geology of the La Jolla quadrangle, California: University of California Publications, Bulletin of the Department of Geological Science, v. 16, no. 7, p. 187-246.

#6475 Hauksson, E., 1987, Seismotectonics of the Newport-Inglewood fault zone in the Los Angeles basin, southern California: Bulletin of the Seismological Society of America, v. 77, p. 539-561.

#6476 Hauksson, E., and Gross, S., 1991, Source parameters of the 1933 Long Beach earthquake: Bulletin of the Seismological Society of America, v. 81, p. 81-98.

#6118 Hecker, S., Kendrick, K.J., Ponti, D.J., and Hamilton, J.C., 1998, Fault map and database for southern California, Long Beach 30'x60' quadrangle: U.S. Geological Survey Open-File Report 98-129, http://quake.wr.usgs.gov/research/seismology/scfaults/lb/index.html.

#6477 Hertlein, L.G., and Grant, U.S., IV, 1939, Geology and oil possibilities of southwestern San Diego County: California Journal of Mines and Geology, v. 35, no. 1, p. 57-78.

#5921 Hoots, H.W., 1931, Geology of the eastern part of the Santa Monica Mountains, Los Angeles County, California: U.S. Geological Survey Professional Paper 165-C, p. 83-134, scale 1:24,000.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#6478 Kennedy, M.P., 1975, Geology of the western San Diego metropolitan area, California-Del Mar, La Jolla, and Point Loma quadrangles, *in* Geology of the San Diego metropolitan area, California: California Division of Mines and Geology Bulletin 200, p. 9-39.

#8167 Kennedy, M.P., and Peterson, G.L., 1975, Geology of the San Diego metropolitan area, California: California Division of Mines

and Geology Bulletin 200, map scale 1:24,000.

#6480 Kennedy, M.P., Tan, S.S., Chapman, R.H., and Chase, G.W., 1975, Character and recency of faulting, San Diego metropolitan area, California: California Division of Mines and Geology Special Report 123, 33 p, 2 plates, map scale 1:50,000.

#6484 Kern, J.P., 1977, Origin and history of upper Pleistocene marine terraces, San Diego, California: Geological Society of America Bulletin, v. 88, p. 1553-1566.

#6485 Kern, J.P., and Rockwell, T.K., 1992, Chronology and deformation of Quaternary marine shorelines, San Diego County, California, *in* Heath, E.G., and Lewis, W.L., eds., The regressive Pleistocene shoreline, southern California: South Coast Geological Society, Annual field trip guidebook No. 20, p. 1-7.

#6487 Lindvall, S.C., and Rockwell, T.K., 1995, Holocene activity of the Rose Canyon fault zone in San Diego, California: Journal of Geophysical Research, v. 100, no. B12, p. 24,121-24,132.

#6488 Mendenhall, W.C., 1905, Development of underground waters in the western coastal plain region of southern California: U.S. Geological Survey Water-Supply and Irrigation Paper 139, 105 p.

#4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p.

#6490 Southern California Edison Co. and San Diego Gas and Electric Co., 1972, Southern California Edison Co. and San Diego Gas and Electric Co., [1970-72], San Onofre Nuclear Generating Station, units 2 and 3, preliminary safety analysis report: Technical report to U.S Atomic Energy Commission, 5 vols., amendments 1-15.

#6491 Taber, S., 1920, The Inglewood earthquake in southern California, June 21,1920: Bulletin of the Seismological Society of America, v. 10, p. 129-145.

#8321 Treiman, J.A., 1990, Rose Canyon fault zone, San Diego County, California: California Division of Mines and Geology Fault Evaluation Report 216, in Fault Evaluation Reports Prepared Under the Alquist-Priolo Earthquake Fault Zoning Act, Region 2 – Southern California: California Geological Survey CGS CD 2002-02 (2002).

#6494 Treiman, J.A., 1993, The Rose Canyon fault zone, southern California: California Department of Conservation, Division of Mines and Geology Open-File Report 93-02, 45 p., 3 pls., scale 1:100,00 and 1:24,000.

#5305 Wesnousky, S.G., 1986, Earthquakes, Quaternary faults, and seismic hazards in California: Journal of Geophysical Research, v. 91, no. B12, p. 12,587-12,631.

#6496 Woodward-Clyde Consultants, 1979, Report of the evaluation of maximum earthquake and site ground motion parameters associated with the Offshore Zone of Deformation, San Onofre Nuclear Generating Station: Technical report to Southern California Edison, June 1979, 30 p.

#4945 Working Group on California Earthquake Probabilities, 1995, Seismic hazards in southern California—Probable earthquakes, 1994 to 2024: Bulletin of the Seismological Society of America, v. 85, no. 2, p. 379-439.

#5950 Wright, T.L., 1991, Structural geology and tectonic evolution of the Los Angeles Basin, California, *in* Biddle, K.T., ed., Active margin basin: American Association of Petroleum Geologists Memoir 52, p. 35–134.

#5930 Yerkes, R.F., McCulloh, T.H., Schoellhamer, J.E., and Vedder, J.G., 1965, Geology of the Los Angeles Basin, California—An introduction: U.S. Geological Survey Professional Paper 420-A, 57 p.

#5931 Ziony, J.I., and Yerkes, R.F., 1985, Evaluating earthquake and surface faulting potential, *in* Ziony, J.I., ed., Evaluating earthquake hazards in the Los Angeles region—An earth-science perspective: U.S. Geological Survey Professional Paper 1360, p. 43–91.

Questions or comments?