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San Gabriel fault zone, Newhall section (Class A) No. 89c

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Synopsis	**General:** Quaternary to late Quaternary active dextral normal fault zone that locally exhibits evidence of Holocene displacement. The fault zone extends for about 135 km from the Frazier Mountain area southeast to the Saugus/Castaic area where the fault's strike changes to an east-west trend through the southern San Gabriel Mountains. The fault apparently either dies out or is truncated by the San Antonio fault [328] in the eastern San Gabriel Mountains (Ehlig, 1973 #7867; Weber, 1982 #7881, 1986 #7882; Powell, 1993 #5753; Matti and Morton, 1993 #5737). **Sections:** This fault has 5 sections. There is insufficient data to delineate seismogenic segments. Weber (1982 #7881) described 5 segments that delineate the San Gabriel fault zone, and his nomenclature is adopted in this compilation, although section

	boundaries are slightly modified. From north to south they included the Palomas [89a], Honor Rancho [89b], Newhall [89c], San Gabriel River [89d], and Big Tujunga [89e] sections. Crowell (1982 #7857) suggested that dextral offset on the San Gabriel fault began in late Miocene (about 10 Ma) and mostly ceased by the end of Miocene time and concluded that dextral slip within the San Andreas transform system switched from the San Gabriel to the San Andreas fault [1] about 5 Ma. Weber (1982 #7881), however, questioned this interpretation, and noted that Pliocene Hungry Valley Formation is disrupted by the San Gabriel fault and that a few kilometers of dextral offset occurred after deposition of the Hungry Valley Formation. Weber (1982 #7881) presented geomorphic and stratigraphic evidence of late Quaternary dextral normal offset. Cotton (1986 #7848, 1987 #7854) documented evidence of Holocene strike-slip displacement along the Honor Rancho section [89b] of the San Gabriel fault at the Rye Canyon [89-1a] and Trench A [89-1b] paleoseismic sites. Alluvial package mismatches across faults exposed at the Rye Canyon site [89-1a] indicate significant strike-slip offset. Cotton (1986 #7848, 1987 #7854) reported a preliminary Holocene dextral slip rate of about 0.6 mm/yr, based on dextrally offset paleochannel and fold axis exposed at the Trench A site [89-1b]. Uncertainty values were not reported in Cotton (1987 #7854).
Name comments	**General:** Fault first mapped and named by Kew (1924 #6014) for northwest striking fault extending from Tujunga Canyon northwest to the vicinity of Holser Canyon. Kew (1924 #6014) named the fault based on exposures in the western San Gabriel Mountains. Additional named faults forming the San Gabriel fault zone include: Canton, Castaic Valley, Daisy, De Mille, Dillon, Gold Creek, Piru, Placerita, and Ybarra faults. The San Gabriel fault zone bifurcates near Big Tujunga Creek and strands here have been referred to as the Vasquez or Vasquez Creek fault (Miller, 1928 #5961; Jahns and Proctor, 1975 #6093, Crook and others, 1987 #5956), the Sierra Madre fault (Eckis, 1934 #6087; Ehlig, 1968 #7865), or the South Branch of the San Gabriel fault (Crowell, 1962 #7855, 1981 #7856; Ehlig, 1973 #7867, 1975 #7868, 1981 #7869, 1982 #7870; Weber, 1982 #7881). **Section:** Newhall section generally is based on the Newhall segment delineated by Weber (1982 #7881). Section extends from about 1.5 km southeast of the fault's junction with Highway 14 southeast to the vicinity of Big Tujunga Station. Here the fault bifurcates into two major zones, the San Gabriel River section

	[89d] to the east, and the Big Tujunga section [89e] that strikes to the southeast. Newhall section includes Dillon and De Mille faults mapped and named by Hill (1930), Gold Creek fault, and San Gabriel fault. **Fault ID:** Refers to numbers 316 (San Gabriel fault - Western Part) and 384 (San Gabriel fault – Eastern Part) of Jennings (1994 #2878), and number 63 (San Gabriel fault – Central part) of Ziony and Yerkes (1985 #5931).
County(s) and State(s)	LOS ANGELES COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
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 Weber (1982 #7881).
Geologic setting	San Gabrie fault zone is one of the principal structural elements of the Transverse Ranges. The San Gabriel fault zone consists of steeply dipping faults that extend for about 135 km from the eastern San Gabriel Mountains along a generally east-west strike, through the Saugus/Castaic area where the fault zone is characterized by a northwest strike. Near Big Tujunga Canyon the South Branch San Gabriel fault branches off southeast of the east-striking San Gabriel fault. The South Branch San Gabriel (Vasquez Creek) fault may have up to 5 km of cumulative dextral displacement as reported by Powell (1993 #5753), but other workers interpret 22–38 km of dextral offset (Matti and Morton, 1993 #5737; Ehlig, 1968 #7866). Beyer and others (2009#7849) suggested that as much as 12.2 km of post Miocene dextral separation. Farther southeast the South Branch San Gabriel fault dips to the northeast at a shallow angle and is characterized by an unknown amount of reverse or thrust displacement (Smith, 1986 #7880). Northwest of the Saugus area the fault zone forms the southwestern edge of the Ridge basin and terminates near Frazier Mountain (Yeats and others, 1994 #7883). Principal sense of displacement is dextral strike-slip, although there is a down-to-north component of normal stratigraphic separation (Yeats and

	others, 1994 #6114; Powell, 1993 #7883). Maximum cumulative dextral displacement is controversial—estimates range from 0–5 km (Weber, 1982 #7881, 1986 #7882), to a maximum of 70 km (Ehlert, 1982 #7864). Most estimates fall in the 30–45 km range. The reader is referred to Powell (1993 #5753) and Yeats and others (1994 #6114) for summaries of previous estimates of displacement along the San Gabriel fault zone.
Length (km)	km.
Average strike	
Sense of movement	Right lateral, Normal *Comments:* Weber (1982 #7881)
Dip	70° NE. to near vertical *Comments:* Dip is approximate, based on poorly constrained cross sections in Weber (1982 #7881). Weber reported that dip at surface varies from near vertical to about 70° NE in the Placerita Canyon area.
Paleoseismology studies	
Geomorphic expression	Traces of the Newhall section are delineated by fault-line valleys, scarps, and minor sag areas and springs (Dort, 1948). Drainages are both dextrally and sinistrally deflected (Weber, 1982 #7881), suggesting that systematic dextral displacement is not well developed along the Newhall section. Weber (1982 #7881) identified uphill-facing scarps and scarps on terrace surfaces locally along strands of the Newhall section.
Age of faulted surficial deposits	Fault offsets Plio-Pleistocene Saugus Formation, late Quaternary alluvium and terrace deposits, and Pleistocene landslide deposits (Weber, 1982 #7881; Bull and others, 1979 #7852).
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Timing of most recent paleoevent is poorly constrained. Weber (1982 #7881) reported that fault offsets older alluvium and terrace deposits thought to be late Pleistocene, based

	on soil profile development.
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr
Date and Compiler(s)	2017 William A. Bryant, California Geological Survey
References	#7849 Beyer, L.A., McCulloh, T.H., Denison, R.E., Morin, R.W., Enrico, R.J., Barron, J.A., and Fleck, R.J., 2009, Post-Miocene right separation on the San Gabriel and Vasquez Creek faults, with supporting chronostratigraphy, western San Gabriel Mountains, California: U.S. Geological Survey Professional Paper 1759, 27 p. 6 appendices. #7852 Bull, W.B., Menges, C.M., and McFadden, L.D., 1979, Stream terraces of the San Gabriel Mountains, southern California: Final Technical Report to U.S. Geological Survey under Contract 14-08-0001-6-394, 100 p. #7848 Cotton, W.R., 1986, Holocene paleoseismology of the San Gabriel fault, Saugus/Castaic area, Los Angeles, California, *in* Ehlig, P.L. (compiler), Neotectonics and faulting in southern California: Guidebook and volume prepared for the 82nd Annual Meeting of the Cordilleran Section of the Geological Society of America, p. 33–41. #7854 Cotton, W.R., 1987, Late Pleistocene and Holocene paleoseismicity of the San Gabriel fault, *in* National earthquake hazards reduction program, Summaries of technical reports, volume XXIV: U.S. Geological Survey Open-File Report 87-374, U.S. Geological Survey Contract 14-08-0001-G1196, p. 180–181. #5956 Crook, R., Jr., Allen, C.R., Kamb, B., Payne, C.M., and Proctor, R.J., 1987, Quaternary geology and seismic hazard of the Sierra Madre and associated faults, western San Gabriel Mountains, *in* Recent reverse faulting in the Transverse Ranges, California: U.S. Geological Survey Professional Paper 1339, p. 27–63, scale 1:24,000. #7855 Crowell, J.C., 1962, Displacement along the San Andreas fault, California: Geological Society of America Special Paper 71,

61 p.

#7856 Crowell, J.C., 1981, An outline of the tectonic history of southeastern California, *in* Ernst, W.G., ed., The geotectonic development of California—Rubey Volume 1: Englewood Cliffs, New Jersey, Prentice-Hall, p. 583–600.

#7857 Crowell, J.C., 1982, The tectonics of Ridge Basin, southern California, *in* Crowell, J.C., and Link, M.H., eds., Geologic history of Ridge Basin, southern California: Pacific Section, Society of Economic Paleontologists and Mineralogists Field Trip Guide and Volume, p. 25–42.

#6087 Eckis, R., 1928, Alluvial fans of the Cucamonga district, southern California: Journal of Geology, v. 36, p. 224–247.

#7864 Ehlert, K.W., 1982, Basin analysis of the Miocene Mint Canyon Formation, southern California, *in* Ingersoll, R.V., and Woodburne, M.O., eds., Cenozoic nonmarine deposits of California and Arizona: Pacific Section, Society of Economic Paleontologists and Mineralogists, p. 51–64.

#7865 Ehlig, P.L., 1968, Causes of distribution of Pelona, Rand, and Orocopia schists along the San Andreas and Garlock faults, *in* Dickinson, W.R., and Grantz, A., eds., Proceedings of conference on geologic problems of San Andreas fault system: Stanford, California, Stanford University Publications in the Geological Sciences, v. 11, p. 294–306.

#7866 Ehlig, P.L., 1968, Displacement along the San Gabriel fault, San Gabriel Mountains, southern California [abs.]: Geological Society of America Special Paper 115, p. 55.

#7867 Ehlig, P.L., 1973, History, seismicity and engineering geology of the San Gabriel fault, *in* Moran, D.E., Slosson, J.E., Stone, R.O., and Yelverton, C.A., eds., Geology, seismicity and environmental impact: Association of Engineering Geologist Special Publication, October 1973, p. 247–251.

#7868 Ehlig, P.L., 1975, Basement rocks of the San Gabriel Mountains, south of the San Andreas fault, southern California, *in* Crowell, J.C., ed., San Andreas fault in southern California: California Division of Mines and Geology Special Report 118, p. 177–186.

#7869 Ehlig, P.L., 1981, Origin and tectonic history of the basement terrane of the San Gabriel Mountains, central Transverse Ranges, *in* Ernst, W.G., ed., The geotectonic development of California—Rubey Volume 1: Englewood Cliffs, New Jersey, Prentice-Hall, p. 253–283.

#7870 Ehlig, P.L., 1982, The Vincent thrust—Its nature, paleogeographic reconstruction across the San Andreas fault and bearing on the evolution of the Transverse Ranges, *in* Fife, D.L., and Minch, J.A., eds., Geology and mineral wealth of the California Transverse Ranges, Mason Hill Volume: Santa Ana, California, South Coast Geological Society Annual Symposium and Guidebook 10, p. 370–379.

#6091 Hill, M.L., 1930, Structure of the San Gabriel Mountains, north of Los Angeles, California: University of California Publications, Bulletin of the Department of Geological Sciences, v. 19, no. 6, p. 137-170.

#6093 Jahns, R.H., and Proctor, R.J., 1975, The San Gabriel and Santa Susana—Sierra Madre fault zones in the western and central San Gabriel Mountains, southern California: Geological Society of America Abstracts With Programs, v. 7, no. 3, p. 329.

#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.

#6014 Kew, W.S.W., 1924, Geology and oil resources of a part of Los Angeles and Ventura Counties, California: U.S. Geological Survey Bulletin 753, 202 p.

#5737 Matti, J.C., and Morton, D.M., 1993, Paleogeographic evolution of the San Andreas fault in southern California—A reconstruction based on a new cross-fault correlation, *in* Powell, R.E., Weldon, R.J., II, and Matti, J.C., ed., The San Andreas fault system—Displacement, palinspastic reconstruction, and geologic evolution: Geological Society of America Memoir 178, p. 107-160.

#5961 Miller, W.J., 1928, Geomorphology of the southwestern San Gabriel Mountains of California: University of California,

Bulletin of the Department of Geological Sciences, v. 17, no. 6, p. 193-240.

#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.

#5753 Powell, R.E., 1993, Balanced palinspastic reconstruction of pre-late Cenozoic paleogeology, southern California—Geologic and kinematic constraints on evolution of the San Andreas fault system, *in* Powell, R.E., Weldon, R.J., II, and Matti, J.C., ed., The San Andreas Fault System—Displacement, palinspastic reconstruction, and geologic evolution: Geological Society of America Memoir 178, p. 1-106.

#7880 Smith, D.P., 1986, Geology of the north half of the Pasadena quadrangle, Los Angeles County, California: California Division of Mines and Geology Open-File Report 86-4 LA, scale 1:12,000.

#7881 Weber, F.H., Jr., 1982, Geology and geomorphology along the San Gabriel fault zone, Los Angeles and Ventura counties, California (Including reinterpretation of slip history and reevaluation of activity): California Division of Mines and Geology Open-File Report 82-2 LA, 157 p., 2 plates, scale 1:24,000.

#7882 Weber, F.H., Jr., 1986, Geologic relationships along the San Gabriel fault between Castaic and the San Andreas fault, Kern, Los Angeles, and Ventura counties, California, *in* Field Trip Number 10, Neotectonics in the area between the central and western Transverse Ranges, southern California: Guidebook and Volume for Geological Society of America Cordilleran Section 82nd Annual Meeting, March 25–28, 1986, p. 109–122.

#7883 Yeats, R.S., and Stitt, L.T., 2003, Ridge Basin and San Gabriel fault in the Castaic lowland, southern California, *in* Crowell, J.C., ed., Evolution of Ridge Basin, southern California, an interplay of sedimentation and tectonics: Geological Society of America Special Paper 367, p. 131–156.

	#6114 Yeats, R.S., Huftile, G.J., and Stitt, L.T., 1994, Late Cenozoic tectonics of the east Ventura Basin, Transverse Ranges, California: American Association of Petroleum Geologists Bulletin, v. 78, p. 1040–1074. #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.