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Quaternary Fault and Fold Database of the United States

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Hosgri fault zone (Class A) No. 81b

Last Review Date:

citation for this record: **Hanson, K.L., and Bryant, W.A., compilers, 2016, Fault number 81b, Hosgri fault zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 01:59 PM.**

Synopsis	**General:** Fault lies entirely offshore, extensive data set including geophysical, seismological, and geologic data was compiled and reviewed for seismic hazard source characterization studies conducted by Pacific Gas and Electric Company (PG&E, 1988 #7833) as part of the Long Term Seismic Program for the Diablo Canyon Power Plant; the results of the multi-disciplinary study were extensively reviewed by the Nuclear Regulatory Commission and their consultants (Nuclear Regulatory Commission, 1991). **Sections:** This fault has 2 sections. Based primarily on geophysical data the Hosgri fault zone is subdivided into five sections (referred to as reaches) characterized by distinct variations in strike, down-dip geometry, trace geometry, amount and sense of vertical separation, and adjacent structural trends that occur along the fault zone (PG&E, 1988 #7833; Rietman and

	others, in review #7896; Hanson and others, 2004 #7890). Northern section. San Simeon/Hosgri step-over south to intersection with Los Osos [79] fault– 20–22 km San Luis-Pismo section. Intersection of Los Osos [79] fault south to intersection of Pecho fault – 20–22 km San Luis Obispo section. Intersection of Pecho [82] fault south to intersection with Casmalia [84] fault – 23 km. Includes re Point Sal section. Intersection of Casmalia [84] fault zone to southern limit of Lion's Head [83] fault zone – 14–18 km Southern reach. Lion's Head [83] fault zone south to Point Pedernales – 24–26 km
Name comments	**General:** **Fault ID:** Refers to number 287 (Hosgri fault zone) of Jennings (1994 #2878).
County(s) and State(s)	SAN LUIS OBISPO COUNTY, CALIFORNIA SANTA MARIA COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:40,000 and 1:250,000 scale. *Comments:* (1) Original compilation of offshore geophysical and bathymetric data at 1:48,000 scale (PG&E, 1988 #7833); photographically reduced to scale of 1:250,000 and published by Lettis and others (2004 #7844). Traces of Shoreline fault mapped by PG&E (2014 #7833) at scale of 1:40,000.
Geologic setting	Contemporary tectonic setting: Convergent right-slip (transpressional) fault (PG&E, 1988 #7833; Hanson and others, in review). Various alternative models for the style, amount, and timing of displacement have been proposed as follows: Right-slip (major displacement) – Neogene displacement > 100 km – Hall (1975 #7825), Graham and Dickinson (1978 #7887); Quaternary slip rates of 5–19 mm/yr (Weber, 1983 #7834). Right-slip (minor displacement) – Neogene displacement 5 km in 5 Ma (Hamilton and Willingham, 1979 #7889; Hamilton, 1982 #7888, 1984 #5402; Sedlock and Hamilton, 1991 #7897); late Quaternary slip rate of 1–3 mm/yr (Hanson and others, 2004 #7890). Reverse fault – Interpreted as a steep east-dipping basin margin reverse fault (Hoskins and Griffiths, 1971 #7892).

	Thrust-fault – One of several listric coastal thrusts that root in an aseismic detachment zone (Crouch and others, 1984 #7885; Crouch and Suppe, 1993 #7886). Alternative model of detachment faulting proposed by Namson and Davis (1988 #7893; 1990 #7845) in which the Hosgri fault is a former basin-normal fault that has been rotated and reactivated as a reverse fault. In both models, the Hosgri fault is interpreted to be reactivated by Pliocene and younger northeast-southwest shortening. Oblique slip (right-normal) – complex, extensional (southwest-dipping) Tertiary basin-margin tectonic boundary along which some strike slip has also occurred (McCulloch, 1987 #4880). Oblique slip (right reverse) – contemporary style of faulting is interpreted to be a right oblique slip at rate of about 5 mm/yr (Brown, 1990 #7884).
Length (km)	km.
Average strike	
Sense of movement	Right lateral *Comments:* Evaluation of components of slip indicate ratios of horizontal to vertical slip of 2:1 to 30:1; based on the rake angles implied by these horizontal to vertical ratios, together with an estimate of fault dip, the Hosgri fault zone is classified as a strike-slip fault along most, if not all, of its length. The uncertainties allow for the possibility that the fault may have oblique slip south of Point Sal (Hanson and others, 2004 #7890).
Dip	>60° E. to vertical *Comments:* Assessment of down-dip geometry from both high-resolution and common-depth-point seismic reflection data, retrodeformable structural modeling and seismologic data show a high angle (>60° E.) down-dip geometry for the primary strands (PG&E, 1988 #7833; Rietman and others, in review #7896); the down-dip distribution of microearthquakes having strike-slip mechanisms that have occurred along the fault zone near Point Buchon suggests a steeply-dipping to near vertical fault to a depth of at least 12 km (Hanson and others, 2004 #7890).
Paleoseismology	

studies	
Geomorphic expression	Topographic expression varies along strike among sections; inflections, steps, and scarps in the seafloor, disruptions of the post-late Wisconsin unconformity (18 ka), and mismatched post-late Wisconsin sediment thicknesses across the fault along all sections demonstrate late Pleistocene to Holocene activity along the zone (Wagner, 1974 #7899; Leslie, 1981 #7830; Niemi and others, 1987 #7894, PG&E, 1988 #7833).
Age of faulted surficial deposits	Post-late Wisconsin (18 ka) sediments (locally observed along entire fault zone).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of most recent paleoevent is not known; offshore location precludes conventional paleoseismic investigations, such as trenching, interpretation of high-resolution seismic data and reconnaissance by diver geologists demonstrate post-late Wisconsin (18 ka) activity.
Recurrence interval	
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* There are no recognized marker horizons or features (piercing points) that can be correlated across the Hosgri fault zone for direct measurement of the lateral component of slip. Slip rates estimated for the Hosgri fault zone include cumulative lateral and vertical components of slip across the entire fault zone, encompassing high- and low-angle fault strands and structural relief due to folding proximal to the fault zone. The rate of horizontal slip is judged to be 1–3 mm/yr based on paleoseismic and Quaternary mapping studies conducted along the San Simeon [80] fault zone, evaluation of the transfer of slip across the San Simeon/Hosgri pull-apart basin, and consideration of regional tectonics and geodetic rates of crustal shortening in south-central California (Hanson and others, 2004 #7890). Post middle-Pliocene vertical slip rates across the fault zone range from 0.1 to 0.4 mm/yr, with a maximum value of 0.44 mm/yr (Hanson and others, 2004 #7890).

Date and Compiler(s)	2016 Kathryn L. Hanson, AMEC Environment & Infrastructure (AMEC E&I) William A. Bryant, California Geological Survey
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