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Calico-Hidalgo fault zone, Hidalgo section (Class A) No. 121c

Last Review Date: 2000-08-31

Compiled in cooperation with the California Geological Survey

citation for this record: **Bryant, W.A., compiler, 2000, Fault number 121c, Calico-Hidalgo fault zone, Hidalgo section, 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 02:17 PM.**

Synopsis	**General:** Major Holocene and locally historically active dextral strike-slip fault located in the central Mojave Desert. Sections, as defined in this compilation, from north to south are: Calico section [121a], West Calico section [121b], and Hidalgo section [121c]. It is possible that dextral slip may transfer northwest from the Calico fault to the Blackwater fault zone [113] across an approximately 11 km right-releasing step-over, although a connection has not been established. Calico-Hidalgo fault zone is delineated by well-defined geomorphic evidence of Holocene dextral strike-slip displacement (Bull, 1978 #6613; Morton and

	others, 1980 #6636; Bortugno, 1987 #6687; Hart, 1994 #6689) and locally offsets Holocene alluvium. No paleoseismic studies have been published to date and latest Pleistocene to Holocene slip rates are not well documented. Clark and others (1984 #2876) and Petersen and Wesnousky (1994 #6024) reported long term late Cenozoic dextral slip rates that range from 0.4 mm/yr to 5 mm/yr, based on 10 km dextral offset of the Kane Spring fault (Dokka and Travis, 1990 #3188). Petersen and Wesnousky (1994 #6024) reported a preferred late Cenozoic slip rate of 2.6 mm/yr. Hart and others (1988 #6690) inferred a late Quaternary slip rate of 0.5 to 1.0 mm/yr for the West Calico fault, based on its similar geomorphic expression to the Pisgah fault [122a]. The Newberry fracture zone, a north-northeast striking branch of the Calico fault, had coseismic rupture (generally normal and extensional displacement) associated with the June 1992 Mw 7.3 Landers earthquake (Hart and others, 1993 #3356; Unruh and others, 1994 #6693). **Sections:** This fault has 3 sections. There is insufficient data to delineate seismogenic segments. Bortugno (1987 #6687) divided the fault zone into three segments for discussion purposes: the Calico, West Calico, and Hidalgo faults. These divisions are used in this compilation. The Calico section extends from the Quaternary active traces mapped by Dibblee (1970 #6640) in the Calico Mountains southeast to a 2.5 km left-restraining step-over delineating the section boundary between the Calico and West Calico faults. The West Calico fault extends southeast to an approximately 3 km left-restraining step over delineating the section boundary between the West Calico and Hidalgo faults. It is possible that dextral slip may transfer northwest from the Calico fault to the Blackwater fault zone [113] across an approximately 11 km right-releasing step-over, although a connection has not been established.
Name comments	**General:** The Calico, West Calico, and Hidalgo faults are here grouped as the Calico-Hidalgo fault zone. These faults were first mapped in part by Gardner (1940 #6648) and named by Dibblee (1964 #6639; 1966 #1346; 1967 #6657; 1967 #6688; 1968 #6708; 1970 #6640) and Dibblee and Bassett (1966 #1341). The southern part of the Hidalgo fault is also referred to as the Surprise Spring fault and was named by Moyle (1984 #6691). The Newberry fracture zone, a zone of previously unmapped north northeast-striking faults ruptured during the June 1992 Mw 7.1 Landers earthquake just east of the Calico fault and are considered a splay of the Calico fault (Hart, 1994 #6689). The Newberry fracture

	zone was first observed by A. Barrows and S. Bezore (cited in Hart, 1994 #6689) and mapped in detail and named by Unruh and others (1994 #6693). **Section:** The Hidalgo section consists of the Hidalgo fault of Dibblee (1967 #6657; 1967 #6688; 1968 #6708) and extends from its junction with the West Calico section [121b] at the northern end of the Hidalgo Mountains southeast along the western flank of the Hidalgo Mountains to about 1.5 km south of Surprise Spring. Quaternary active traces of the Hidalgo fault (Surprise Spring fault of Moyle, 1984 #6691) extend farther southeast to about 2 km north of the Copper Mountains. **Fault ID:** Includes numbers 376 (Calico fault), 417 (West Calico fault), and 419 (Hidalgo fault) of Jennings (1994 #2878).
County(s) and State(s)	SAN BERNARDINO COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE PACIFIC BORDER
Reliability of location	Good Compiled at 1:62,500 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Dibblee (1967 #6657; 1967 #6688; 1968 #6708), Bader and Moyle (1960 #6644), and Moyle (1984 #6691) at 1:62,500; mapping by Morton and others (1980 #6636) and Bortugno (1987 #6687) at 1:24,000.
Geologic setting	Holocene and locally historically active, predominantly dextral strike-slip fault zone located in the central Mojave Desert. The north to northwest-striking Calico-Hidalgo fault zone is part of a series of subparallel dextral strike-slip faults in the central Mojave Desert that are part of the eastern California shear zone (Dokka and Travis, 1990 #3188). Quaternary and Holocene active traces of the Calico-Hidalgo fault zone extend for approximately 115 km from the Calico Mountains southeast to the vicinity just north of the Copper Mountains. Cumulative late Cenozoic dextral strike-slip displacement is about 10 km, based on the dextral offset of the Kane Spring fault, a Cenozoic extensional structure (Dokka and Travis, 1990 #3188).
Length (km)	This section is 38 km of a total fault length of 117 km.

Average strike	N21°W
Sense of movement	Right lateral *Comments:* Geomorphic expression of fault is consistent with dextral strike-slip offset (Morton and others, 1980 #6636; Bortugno, 1987 #6687). Dokka and Travis (1990 #3188) document 10 km of late Cenozoic dextral strike-slip offset along Calico-West-Calico-Hidalgo fault zone.
Dip Direction	V *Comments:* Dibblee (1967 #6657; 1967 #6688; 1968 #6708)
Paleoseismology studies	
Geomorphic expression	Hidalgo fault is delineated by geomorphic features indicative of Holocene dextral strike-slip offset, such as dextrally deflected drainages, linear troughs, aligned saddles, linear drainages, scarps and linear tonal contrasts in late Pleistocene and Holocene alluvium (Morton and others, 1980 #6636; Bortugno, 1987 #6687).
Age of faulted surficial deposits	Strands of the Hidalgo section offset Mesozoic crystalline basement rocks, Quaternary and late Pleistocene alluvium, and Holocene alluvium (Dibblee, 1967 #6657; 1967 #6688; 1968 #6708; Bortugno, 1987 #6687).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of most recent paleoevent is not known. Geomorphic expression of fault is consistent with Holocene dextral strike-slip offset (Bortugno, 1987 #6687). Surprise Spring fault of Moyle (1984 #6691) (southern Hidalgo fault) is prominent groundwater barrier, but does not offset latest Pleistocene and Holocene alluvium (Dibblee, 1967 #6688) and lacks geomorphic evidence of Holocene displacement (Bryant, 1986 #6645; Bortugno, 1987 #6687).
Recurrence interval	

Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Latest Pleistocene to Holocene slip rate is unknown but likely 0.2-1 mm/yr. Dokka and Travis (1990 #3188) reported that the Calico-Hidalgo fault zone has about 10 km of late Cenozoic dextral slip. The onset of slip is not well constrained, but assuming that slip commenced about 6 to 10 Ma, a long-term dextral slip rate of 1 to 1.7 mm/yr can be estimated (Hart, 1994 #6689). Slip rate assigned by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 0.6 mm/yr (with minimum and maximum assigned slip rates of 0.2 mm/yr and 1.0 mm/yr, respectively).
Date and Compiler(s)	2000 William A. Bryant, California Geological Survey
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