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Homestead Valley fault zone (Class A) No. 116

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Compiled in cooperation with the California Geological Survey

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Synopsis	Historically active dextral strike-slip fault zone that had 3–3.75 m of dextral strike-slip displacement associated with the June 1992 M_w7.3 Landers earthquake (Bryant, 1992 #6658; Hart and others, 1993 #3356; Sieh and others, 1993 #3406; Hauksson and others, 1993 #6649; Bryant, 1994 #6646). Minor surface rupture was associated with the ML5.2 Homestead Valley earthquakes sequence in March 1979 (Hill and others, 1980 #3360). Detailed reconnaissance level geologic and geomorphic mapping exists for the Homestead Valley fault zone (Bader and Moyle, 1960 #6644; Dibblee, 1964 #6639, 1967 #6614, 1967 #6657; Manson, 1986 #6664, 1986 #6651; Bryant, 1992 #6658, 1994 #6646). Hecker and others (1993 #6660) identified 3 late Quaternary surface-

	rupturing earthquakes along the Homestead Valley fault that occurred prior to the 1992 Landers earthquake: a penultimate event that occurred between 5.7 ka and 8.5 ka, a pre-penultimate event that occurred not long after 12.5–14 ka, and an older, undated event. Based on the assumption that the penultimate event was characterized by net slip similar to the 1992 Landers earthquake, Hecker and others (1993 #6660) calculated a preliminary Holocene horizontal dispacement rate of 0.4–0.6 mm/yr.
Name comments	The Homestead Valley fault was first mapped in part by Bader and Moyle (1960 #6644) and first mapped in its entirety by Dibblee (1964 #6639, 1967 #6614, 1967 #6657). Although Hawkins and McNey (1979 #6670) suggested the name Pipes Wash fault, Hill and others (Hill and others, 1980 #3360) preferred the name Homestead Valley fault in order to avoid confusion with the Pipes Canyon fault [320] located about 22 km southwest of Homestead Valley. Homestead Valley fault zone includes the Maumee fault, first mapped by Bader and Moyle and named by Bryant (1994 #6646) after the Maumee benchmark located near the southern end of the fault. **Fault ID:** Refers to number 421 (Homestead Valley fault) of Jennings (1994 #2878).
County(s) and State(s)	SAN BERNARDINO COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Dibblee (1964 #6639, 1967 #6614, 1967 #6657) at 1:62,500; mapping by Manson (1986 #6651, 1986 #6664) and Bryant (1992 #6658, 1994 #6646) at 1:24,000.
Geologic setting	The north to northwest-striking, historically active, predominantly dextral strike-slip Homestead Valley fault zone is part of a series of subparallel dextral slip faults in the central Mojave Desert. Homestead Valley fault zone is part of the eastern California shear zone (Dokka and Travis, 1990 #3265). The Homestead Valley

	fault zone extends from about 6 km southeast of the Bessemer Mine Road where it complexly intersects the Emerson [114b] fault to about 5 km southeast of Spy Mountain. Cumulative dextral offset along the Homestead Valley fault is not known.
Length (km)	31 km.
Average strike	N12°W
Sense of movement	Right lateral *Comments:* Fault zone is delineated by moderately to locally well defined geomorphic evidence of dextral strike-slip displacement, although minor vertical components of displacement locally exist (Morton and others, 1980 #6636; Manson, 1986 #6651, 1986 #6664; Bryant, 1992 #6658, 1994 #6646). Surface rupture associated with the 1992 Landers earthquake was predominantly dextral strike slip (Hart and others, 1993 #3356; Sieh and others, 1993 #3406; Hauksson and others, 1993 #6649). Homestead Valley fault surface rupture locally was characterized by north-vergent thrust faulting near the intersection with the Kickapoo fault [115b], but this is a local, probably near surface feature (Spotila and Sieh, 1995 #6673).
Dip Direction	V; W *Comments:* Fault dip is based on focal mechanisms for March 1979 Homestead Valley earthquake sequence (Hutton and others, 1980 #6671).
Paleoseismology studies	Site 116-1 and 116-2 by Hecker and others (1993 #6660) involved the excavation of 6 fault normal trenches in alluvial fan and playa deposits offset by the Homestead Valley fault. Hecker and others (1993 #6660) exposed evidence of 3 earthquakes prior to the June 1992 M_w7.3 Landers earthquake that were delineated by scarp-derived colluvium, compound fissure infills, and faults with upward decreasing net displacement terminating at different stratigraphic horizons. Detrital charcoal recovered from playa silts allowed Hecker and others (1993 #6660) to interpret ages for the last two surface-rupturing earthquakes. Site 116-3 (Thrust site) by Lindvall and Rockwell (1994 #6672) and Rockwell and others (2000 #6654) excavated one fault normal trench across a secondary thrust fault developed in a left

	jog of the Homestead Valley fault. They identified at least three surface-rupturing earthquakes prior to the 1992 Landers earthquake. The penultimate event occurred about 13–17 ka, based on thermoluminescence dating of a colluvial wedge formed over a late Pleistocene paleosurface. A pre-penultimate event.
Geomorphic expression	Homestead Valley fault zone is moderately to moderately well defined fault zone delineated by geomorphic features indicative of late Pleistocene to Holocene dextral strike-slip displacement such as dissected linear ridges, shutter ridges, dextrally deflected drainages, linear drainages, ponded alluvium, degraded scarps on older alluvium, linear sidehill troughs and benches, beheaded drainages, and linear vegetation contrasts in Holocene alluvium (Manson, 1986 #6651, 1986 #6664; Bryant, 1992 #6658, 1994 #6646).
Age of faulted surficial deposits	Fault offsets Mesozoic crystalline basement rocks and Quaternary alluvium, and lacustrine deposits (Dibblee, 1964 #6639, 1967 #6614, 1967 #6657). Prior to 1992 Landers earthquake Homestead Valley fault offset early to mid Holocene (5.7 ka to 8.5 ka) alluvial fan and playa deposits, based on AMS 14C dates reported by Hecker and others (1993 #6660).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Hecker and others (1993 #6660) reported that the penultimate event on the Homestead Valley fault occurred 5.7–8.5 ka, based on AMS 14C dating of detrital charcoal from playa silts.
Recurrence interval	4–8.5 k.y. (<14 ka) *Comments:* Hecker and others (1993 #6660) observed evidence for three earthquakes prior to the June 1992 M_w7.3 Landers earthquake. The penultimate event occurred 5.7–8.5 ka and the next oldest event occurred shortly before 12.5–14 ka, based on AMS 14C dating of detrital charcoal recovered from playa silts.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Hecker and others (1993 #6660) reported a late Pleistocene horizontal displacement rate of 0.4–0.6 mm/yr for the

	Homestead Valley fault. This rate is based on the observation that the apparent vertical separation for the penultimate event (35–40 cm) is similar to the surface rupture at their site associated with the June 1992 M_W7.3 Landers earthquake. If the net displacement of 3–3.75 m associated with the 1992 Landers rupture is the same as the net displacement for the penultimate event, then the timing of the penultimate event (5.7–8.5 ka) suggests that the rate is 0.4–0.6 mm/yr. Slip rate assigned by Petersen and others (1996 #4860) for the Homestead Valley fault and Mesquite Lake fault 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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