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White Mountains fault zone, Inyo-Waucoba section (Class A) No. 47d

Last Review Date: 2000-12-08

Compiled in cooperation with the California Geological Survey

citation for this record: **Bryant, W.A., compiler, 2000, Fault number 47d, White Mountains fault zone, Inyo-Waucoba 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 03:08 PM.**

Synopsis	**General:** This major Basin and Range Holocene active dextral-normal and normal fault zone is located along the western front of the White Mountains and northern Inyo Mountains. The fault zone is divided into 4 sections in this compilation, principally based on by modified from sections delineated by dePolo (1989 #2456). From north to south the sections are Montgomery, Hammil, central, and Inyo-Waucoba. There have been no paleoseismic studies using trenching, but dePolo (1989 #2456) profiled several fault scarps along strands of the fault zone and reported evidence of late Holocene displacement. A late Holocene

	event that dePolo (1989 #2456) termed the Black Mountain paleoseismic rupture occurred at 3 ka (?2 k.y.), based on diffusion modeling. dePolo (1989 #2456) estimated a preferred latest Pleistocene to Holocene vertical slip rate of 0.8-1mm/yr for the northern part of the White Mountains fault zone, based on amounts of offset of alluvial-fan surfaces their soil profile development for age constraints. Slip rates for the southern part of the fault zone are not as well documented due to a significant, but poorly constrained dextral strike-slip component. dePolo (1989 #2456) estimated an average recurrence interval of 3-5 k.y. based on offset Holocene alluvium at Marble Creek and Orchard Springs (Montgomery section). **Sections:** This fault has 4 sections. There is insufficient data to delineate seismogenic segments. dePolo (1989 #2456) proposed that the White Mountains fault zone consists of 5 sections, based on geomorphic expression. From north to south the sections are Montgomery, Hammil, central, Waucoba, and Inyo. These sections are adopted in this compilation with the exception of the Waucoba section. dePolo stated that the boundary between the Waucoba and Inyo sections is arbitrary and so a combined Inyo-Waucoba section is used in this compilation.
Name comments	**General:** The White Mountains fault zone was first mapped in detail by Anderson (1933 #5595) and Taylor (1933 #5607). Anderson, who mapped the northern part of the fault zone, called this part the Montgomery fault zone. Crowder and others (1972 #5600) and Crowder and Sheridan (1972 #5594) first used the name White Mountains fault zone generally for bedrock faults in the Montgomery and Hammil sections of fault zone. Bryant (1984 #5589; 1984 #5597; 1984 #5598) called the fault zone south of Milner Canyon the White Mountains frontal fault zone, whereas dePolo (1989 #2456) proposed the name White Mountains fault system. The name White Mountains fault zone will be used in this compilation. It includes the Benton Valley fault, named by Smith (1984 #5606) and the Aberdeen fault, first named by dePolo (1989 #2456). **Section:** The combined Inyo-Waucoba section was originally proposed by dePolo (1998 #2845) as two sections: the Waucoba section and the Inyo section (to the south). The boundary between these two sections is somewhat arbitrary (dePolo, 1998 #2845) and in this compilation the two sections are considered together. The Inyo-Waucoba extends from near Black Mountain, about 3 km north of the Westgard Pass road south to just south of

	Tinemaha Reservoir. The central part of the Inyo-Waucoba section was termed the Mule Spring section by Bryant (1988 #5599). The southern end of section includes the Aberdeen fault, which was first named by dePolo (1998 #2845). **Fault ID:** Refers to numbers 204 (northern part of White Mountains fault and Benton Valley fault) of Jennings (1994 #2878), and faults MA10 (Benton Valley fault) and MA11A (White Mountains fault system) of dePolo (1989 #2456).
County(s) and State(s)	INYO COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:62,500 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) mapping. Original mapping by Nelson (1966 #1591), Bachman (1974 #5596), Bryant (1988 #5599), and dePolo (1989 #2456) is at 1:62,500 scale.
Geologic setting	The White Mountains fault zone is a major, north- to northwest-striking zone of normal and dextral strike-slip faults that extend about 115 km along the western front of the White Mountains and northern Inyo Mountains. The fault zone extends from Northern Queen Valley in Nevada along a somewhat arcuate southwest trend. The fault zones intersection of the Benton Valley fault marks a change in strike to generally north-south along the western front of the White Mountains. South of the Waucoba embayment, the fault changes to a southwest trend delineated by the Aberdeen fault, which may complexly link with the Owens Valley [51] fault zone. The White Mountains fault zone is in the western portion of the Basin and Range province, an area characterized by oblique extensional tectonics resulting in both dextral strike-slip and normal dip-slip displacement. Anderson (1933 #5595) estimated 2,433 m of total vertical displacement along the White Mountains fault. Gilbert (1938 #5602; 1941 #5604) reported 1,824-2,134 m of vertical displacement. Total dextral strike-slip displacement has not been documented. Surface fault ruptures of as much as 5 mm dextral-normal displacement occurred along the central section of the White Mountains fault zone [47c] in association with the July 21, 1986 Mw 6.1 Chalfant

	Valley earthquake (Kahle and others, 1986 #5605; dePolo and Ramelli, 1987 #3339; Lienkaemper and others, 1987 #3371).
Length (km)	This section is 29 km of a total fault length of 109 km.
Average strike	N9°W (for section) versus N7°W (for whole fault)
Sense of movement	Normal *Comments:* Faults of the Inyo-Waucoba section have predominantly down-to-west normal displacement, although dePolo (1989 #2456) suggests that a component of dextral strike-slip may exist based on the generally N 15-30? W strike of faults within a northwest-directed extensional region.
Dip Direction	W *Comments:* Data on dip angle are not well constrained. Geophysical surveys suggest a major, relatively simple fault zone bounding the western border of the White Mountains (Pakiser and others, 1964 #1596; Oliver and Robbins, 1978 #5647). Gravity data indicates the fault zone dips steeply west and locally may be vertical (Oliver and Robbins, 1978 #5647).
Paleoseismology studies	
Geomorphic expression	Fault traces along the northern and southern parts of the Inyo-Waucoba section are characterized by moderately to well defined geomorphic features indicative of latest Pleistocene and Holocene normal to normal-dextral displacement such as closed depressions, ponded alluvium, and youthful scarps on unconsolidated late Pleistocene and Holocene alluvium (Bryant, 1988 #5599; dePolo, #2456). The central part of the Inyo-Waucoba section is poorly defined and lacks geomorphic evidence of latest Pleistocene to Holocene offset (Bryant, 1988 #5599). dePolo (1989 #2456) observed that alluvial fans along the central part of this section are small and are right at the mountain front, suggesting recent, local downwarping.
Age of faulted surficial deposits	Strands of the Inyo-Waucoba section offset Mesozoic crystalline basement rocks, Pliocene alluvial and lacustrine deposits (Bachman, 1974 #5596), late Pleistocene tephra deposits of the Big Pine volcanic field (250?50 ka, Turrin and Gillespie, 1986 #5608), and Holocene alluvial deposits (Bryant, 1988 #5599;

	dePolo, #2456).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of the most recent paleoevent is not well constrained. dePolo (1989 #2456) measured scarp profiles along the southern part of the Inyo-Waucoba section and his diffusion modeling suggests a late Holocene time of displacement for these single-event scarps. Diffusion modeling of fault scarps at the northern end of the Inyo-Waucoba section yielded ages of 3.1 to 3.3 ka (? 1.5 k.y.), indicating that dePolo's (1989 #2456) Black Mountain paleoseismic rupture extended south into the Inyo-Waucoba section. Small, youthful scarps near the northern end of the Inyo-Waucoba section (north of Westgard Wash) are suggestive of rupture associated with the 1872 Owens Valley earthquake (Bachman, 1974 #5596; Bryant, 1988 #5599; dePolo, 1989 #2456).
Recurrence interval	*Comments:* Wesnousky (1986 #5305) estimated a recurrence interval of about 3 k.y. for the entire White Mountains fault zone, based on a preferred vertical slip rate of 0.8 mm/yr and an assumed Mw 7.1 earthquake.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* dePolo (1989 #2456) estimated slip rates for the northern and southern parts of the combined Inyo-Waucoba section. Near Waucoba Wash, alluvium estimated by dePolo to be less than 10 ka (based on relative age-dating techniques) is vertically displaced as much as 4.8 m. Assuming a dip angle of 60?, dePolo (1989 #2456) calculated a Holocene dip-slip rate of at least 0.6 mm/yr. Near the southern end of the Inyo-Waucoba section, dePolo calculated a Holocene dip-slip rate of greater than 0.2mm/yr. This value is based on 1.8 m dip-slip offset and the assumption, based on soil profile development, that the offset alluvium is less than 10 ka (i.e, Holocene).
Date and Compiler(s)	2000 William A. Bryant, California Geological Survey
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