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Quaternary Fault and Fold Database of the United States

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Algodones fault zone (Class A) No. 944

Last Review Date: 2011-02-03

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., Bryant, W.A., and Haller, K.M., compilers, 2011, Fault number 944, Algodones 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 03:14 PM.**

Synopsis	The Algodones fault zone consists of northwest-trending predominantly normal faults located within the Yuma Desert, southeast of Yuma, on the margin of the San Andreas fault system (California). The Yuma Desert, which is a broad plain between the Gila Mountains and the lowermost Colorado River, is covered with locally-derived alluvium, deposits of the Colorado River, and eolian deposits. The Algodones fault zone follows a basement high located between two deep late Cenozoic basins. Its faults displace probable upper Pleistocene Colorado River deposits on Upper Mesa by at least 15 m. Trenches revealed a broad zone of faults that dip northeast and have predominantly normal displacement. Multiple buried soil horizons and colluvial wedges are displaced by faulting, indicating that multiple events occurred in the late Pleistocene. The amount of

	vertical displacement per event is estimated at 0.5–1.5 m. Holocene eolian deposits blanket the faults and are not displaced. The age of youngest displacement was estimated to be latest Pleistocene (11–15 ka).
Name comments	The fault zone was mapped and named by Olmsted and others (1973 #2106). Geophysical studies of an area including the Algodones fault were done by Mattick and others (1973 #2134). The fault zone was mapped in more detail and its late Quaternary behavior was investigated by Woodward-McNeil & Associates (1974 #2135).
County(s) and State(s)	YUMA COUNTY, ARIZONA IMPERIAL COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 and 1:750,000 scale. *Comments:* Location of fault in Arizona based on mapping at 1:125,000-scale by Olmsted and others (1973 #2106) and at about 1:70,000-scale by Woodward-McNeil & Associates (1974 #2135); location of fault in California and Mexico based on 1:750,000-scalde map by Jennings (1994 #2878).
Geologic setting	The Algodones fault zone is composed of northwest-trending predominantly normal faults located northeast of the main San Andreas transform fault system. The Algodones fault zone is within the Yuma Desert, a broad plain between the Gila Mountains and the lowermost Colorado River. The Algodones fault zone follows a basement high between the approximately 2000 m deep, narrow late Cenozoic Fortuna basin to the northeast and the deep (>2000 m), broader San Luis basin to the southwest (Mattick and others, 1973 #2134). The Algodones faults displace probable upper Pleistocene Colorado River deposits on Upper Mesa by at least 15 m (Woodward-McNeil & Associates, 1974 #2135).
Length (km)	83 km.
Average strike	N39°W
Sense of movement	Normal *Comments:* Some workers have inferred right-lateral strike-slip displacement based primarily on fault orientation relative to the nearby faults of the San Andreas system. The Algodones fault zone was even considered as a possible continuation of the San Andreas fault (Mattick

	and others, 1973 #2134). However, the subsurface configuration of the top of the Pliocene Bouse Formation, which crosses the fault, precludes substantial lateral displacement. The Algodones faults bound deep, young sedimentary basins to the northeast and southwest, implying that the dip-slip component of displacement is the important. Faults recognized in trenches were interpreted as normal faults. Based on this collective evidence, it is likely that the Algodones fault zone is composed predominantly of normal faults that are not spatially linked to the San Andreas fault system (Woodward-McNeil & Associates, 1974 #2135).
Dip	50° NE to near vertical *Comments:* Near surface estimates of dip are based on faults mapped in trenches (Woodward-McNeil & Associates, 1974 #2135).
Paleoseismology studies	Site 944-1. Five trenches were excavated across the fault zone, which consists of multiple fractures with a width of about 70 m. The individual faults have variable, moderate to steep northeast dips, and predominantly normal displacement. Multiple buried soil horizons and colluvial wedges are displaced by faulting, indicating that multiple events occurred during the late Pleistocene. Vertical displacement per event is estimated to be 0.5–1.5 m. Holocene eolian deposits blanket the faults and are not displaced. The age of youngest displacement was estimated at latest Pleistocene (11–15 ka; Woodward-McNeil, 1974 #2135).
Geomorphic expression	Faulting is expressed as 7- to 15-m-high, northeast-facing scarps on Upper Mesa, a Pleistocene terrace of the Colorado River. The scarp is well-defined on topographic maps and on aerial photographs. No morphologic data has been reported for this scarp.
Age of faulted surficial deposits	Late Pleistocene. The Algodones faults displace probable late Pleistocene Colorado River deposits on Upper Mesa by at least 15 m (Woodward-McNeil & Associates, 1974 #2135). This age estimate is based on soil development.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Trenching studies indicate a latest Pleistocene age for youngest movement (~11-15 ka).
Recurrence	

interval	*Comments:* Recurrence intervals are unknown but could be 5–10 k.y. This estimate is based on 15 m of displacement of upper Pleistocene deposits (approximately 50–100 ka), with displacements of 0.5–1.5 m per event. Evidently, it has been at last 10 k.y. since the most recent paleoevent.
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* A low slip rate is inferred based on 15 m of vertical displacement of Upper Mesa deposits, which are roughly estimated to be 50–100 ka.
Date and Compiler(s)	2011 Philip A. Pearthree, Arizona Geological Survey William A. Bryant, California Geological Survey Kathleen M. Haller, U.S. Geological Survey
References	#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. #2134 Mattick, R.E., Olmsted, F.H., and Zohdy, A.A.R., 1973, Geophysical studies in the Yuma area, Arizona and California: U.S. Geological Survey Professional Paper 726-D, 36 p., 3 sheets. #2106 Olmsted, F.H., Loeltz, O.J., and Irelan, B., 1973, Geohydrology of the Yuma area, Arizona and California: U.S. Geological Survey Professional Paper 486-H, 227 p., 17 sheets. #7205 Pearthree, P.A., 2011, Geologic map of the Yuma SE 7 ½' quadrangle, Yuma County, Arizona: Arizona Geological Survey Digital Geologic Map DGM-87, version 1.0, scale 1:24,000. #7203 U.S. Bureau of Reclamation, 2009, Ground water elevations—Seepage and groundwater investigations Yuma area: U.S. Bureau of Reclamation map, 1 sheet, http://www.usbr.gov/lc/yuma/programs/YAWMS/Groundwater/YA122008-72dpi.pdf. #2135 Woodward-McNeil & Associates, 1974, Geotechnical investigation, Yuma Dual-Purpose Nuclear Plant, Yuma, Arizona, Appendices E and F: Unpublished Report to the Salt River Project, Phoenix, Arizona.