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Hunter Mountain- Saline Valley fault zone, Saline Valley section (Class A) No. 66a

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Synopsis	**General:** Major Holocene active oblique-slip fault zone predominantly characterized by both Holocene dextral strike-slip and normal dip-slip offset (Zellmer, 1980 #1705; Burchfiel and others, 1987 #1454). The fault zone is divided into 2 sections in this compilation: the Saline Valley section [66a] which consists of the Western Frontal, East Side, and Central Valley fault zones of Zellmer (1980 #1705); and the Hunter Mountain section [66b]. Fault zone is delineated by well-defined geomorphic evidence of latest Pleistocene and Holocene dextral strike-slip and normal dip-slip displacement (Zellmer, 1980 #1705). There are no detailed studies for the Hunter Mountain-Saline Valley fault zone. Zellmer (1980 #1705) measured fault scarp profiles along normal dip-slip faults in and bordering the Saline Valley and concluded that these faults exhibited evidence of multiple Holocene surface fault rupturing earthquakes. Burchfiel and others (1987 #1454)

	calculated a minimum average dextral slip rate of 2 mm/yr to 3.2 mm/yr for the Hunter Mountain section [66b]. Zhang and others (1990 #199) calculated a dextral slip rate of 2 mm/yr to 2.7 mm/yr for the Hunter Mountain fault [66b] using a displacement of 9.3 km ? 1.4 km for a 4 Ma basalt (Burchfiel and others, 1987 #1454). Using this same amount of displacement, but assuming that displacement began about 6.1 Ma as suggested by Schweig (1989 #1636), Zhang and others (1990 #199) calculated a minimum dextral slip rate of 1.3 mm/yr to 1.75 mm/yr. **Sections:** This fault has 2 sections.
Name comments	**General:** **Section:** Section name proposed in this compilation. Saline Valley section is complex pull-apart structure with normal faults bounding Saline Valley and discontinuous normal dip-slip faults offsetting the valley floor. Zellmer (1980 #1705) interpreted Saline Valley as a rhombochasm between two northwest-striking, dextral slip faults (the Hunter Mountain fault [66b] on the south and an unnamed fault to the north) and between two north-northwest-striking, principally normal dip-slip faults (Western Frontal fault on the west and East Side fault zone on the east). The Western Frontal fault intersects the Hunter Mountain fault at an angle of greater than 90? at the southwest corner of Saline Valley near Daisy Canyon (Zellmer, 1980 #1705). **Fault ID:** Refers to number 244 (Hunter Mountain fault) of Jennings (1994 #2878) and faults SAL/WF, SAL/CEN, SAL/ES and HM of Piety (1995 #915).
County(s) and State(s)	INYO COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Zellmer at 1:50,000.
Geologic setting	The Hunter Mountain-Saline Valley fault zone is a major Holocene active, complex zone of dextral strike-slip, thrust, dextral-normal, and normal dip-slip faults in the Death Valley

	Extension Region of southeastern California (Burchfiel and others, 1987 #1454; Zhang and others, 1990 #199). The Panamint Valley-Hunter Mountain-Saline Valley fault system is one of three major fault systems that distribute approximately 8 mm/yr of dextral slip from the Mojave Desert northward to the Walker Lane Belt. The Hunter Mountain fault connects with the Panamint Valley fault zone [67] to the southeast along a complex compressional left step delineated by northeast-dipping Quaternary active thrust faults (Smith, 1976 #1646). Reheis (1991 #1602) suggested that the southern end of the Hunter Mountain fault zone extended into northern Panamint Valley and ended just north of Wildrose graben [67b]. Smith (1976 #1646) and Zellmer (1980 #1705) considered the junction between the Hunter Mountain and Panamint Valley faults [67] to be at the northern end of Panamint Valley south of Hunter Mountain. In this compilation the southern end of the Hunter Mountain fault zone is considered to be delineated by the shallow northeast-dipping thrust fault along the south side of Hunter Mountain mapped by Smith (1976 #1646). South of this point the dextral strike-slip faults in northern Panamint Valley exhibit fault strike and slip partitioning more similar to the Panamint Valley fault zone [67] south of Wildrose Canyon. Dextral slip on the Hunter Mountain fault zone accommodated the opening of Saline Valley and northern Panamint Valley, forming rhombochasms (Oswald and Wesnousky, 1996 #6450). Dixon and others (1995 #3187) suggest that dextral slip is transferred from the Hunter Mountain-Saline Valley fault zone to the Fish Lake Valley fault zone [49] along unnamed north to northeast-striking normal faults north of Saline Valley. Burchfiel and others (1987 #1454) estimated 8 km to 10 km of post-4 Ma dextral displacement and a down to the south dip-slip component of 0-2 km along the Hunter Mountain fault zone, based on an offset contact of the Cretaceous Hunter Mountain batholith. Zellmer (1980 #1705) reported a cumulative vertical displacement (down-to-north) of at least 6 km along the western Hunter Mountain section [66b] near Daisy Canyon.
Length (km)	This section is 31 km of a total fault length of 60 km.
Average strike	N37°W (for section) versus N46°W (for whole fault)
Sense of movement	Normal *Comments:* Zellmer (1980 #1705) reported that strands of the Western Frontal fault zone and Central Valley fault zone are normal dip-slip; strands of the East Side fault zone are primarily

	normal dip-slip, but some traces exhibit evidence of a dextral-slip component (Burchfiel and others, 1987 #1454)
Dip	V *Comments:* A near vertically dipping strand of the Western Frontal fault zone is exposed near Beveridge Canyon (Zellmer, 1980 #1705). Zellmer (1980 #1705) mapped generally east-facing scarps that delineate the Western Frontal fault zone along the western side of Saline Valley. The East Side fault zone is delineated by graben and west-facing scarps (Ross, 1967 #1628; Zellmer, 1980 #1705).
Paleoseismology studies	
Geomorphic expression	Traces of Western Frontal fault zone, Central Valley fault zone, and East Side fault zone are delineated by well-defined fault scarps on unconsolidated alluvial fans, lacustrine deposits, and eolian deposits. Zellmer (1980 #1705) reported that fault scarps exhibit evidence of multiple rupture events.
Age of faulted surficial deposits	Zellmer (1980 #1705) reported that strands of the Western Frontal offset all but the youngest alluvial fans and strands of the Central Valley fault offset playa deposits that could be as young as late Holocene.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Timing of the most recent paleoevent is well constrained. There is well-defined geomorphic evidence of Holocene displacement. Zellmer (1980 #1705) reported that faults comprising the Saline Valley section offset all but the youngest alluvial fans along the southern and western sides of Saline Valley (Western Frontal fault zone), offset the playa surface of Saline Valley (Central Valley fault zone), and offset alluvial fans on the northeastern margin Saline Valley (East Side fault zone). Zellmer (1980 #1705) concluded that deformation of Saline Valley is very young as evidenced by well-defined scarps on the fine-grained, frequently wet playa surface.
Recurrence	several

interval	*Comments:* Zellmer (1980 #1705) concluded that several surface-rupturing events have occurred in the Holocene, based on fault scarp profile data.
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* Well-defined scarps on latest Pleistocene and Holocene alluvium are suggestive of a slip rate on the order of about 1 mm/yr or greater. Slip rate assigned to the entire Hunter Mountain-Saline Valley fault by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 2.5 mm/yr (with minimum and maximum assigned slip rates of 1.5 mm/yr and 3.54 mm/yr, respectively.
Date and Compiler(s)	2000 William A. Bryant, California Geological Survey
References	#1454 Burchfiel, B.C., Hodges, K.V., and Royden, L.H., 1987, Geology of Panamint Valley-Saline Valley pull-apart system, California—Palinspastic evidence for low-angle geometry of a Neogene range-bounding fault: Journal of Geophysical Research, v. 92, no. B10, p. 10,422-10,426. #3187 Dixon, T.H., Robaudo, S., Lee, J., and Reheis, M.C., 1995, Constraints on present day Basin and Range deformation from space geodesy: Tectonics, v. 14, p. 755-772. #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. #1571 McAllister, J.F., 1956, Geologic map of the Ubehebe Peak quadrangle, California: U.S. Geological Survey Geologic quadrangle Map GQ-95, 1 sheet, scale 1:62,500. #6450 Oswald, J.A., and Wesnousky, S.G., 1996, Character of active faulting along the Hunter Mountain fault zone [abs.]: Eos, Transactions of the American Geophysical Union, v. 77, no. 46, p. F461. #4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of

Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p.

#915 Piety, L.A., 1995, Compilation of known and suspected Quaternary faults within 100 km of Yucca Mountain, Nevada and California: U.S. Geological Survey Open-File Report 94-112, 404 p., 2 pls., scale 1:250,000.

#1602 Reheis, M.C., 1991, Aerial photographic interpretation of lineaments and faults in late Cenozoic deposits in the eastern parts of the Saline Valley 1:100,000 quadrangle, Nevada and California, and the Darwin Hills 1:100,000 quadrangle, California: U.S. Geological Survey Open-File Report 90-500, 6 p., 2 pls., scale 1:100,000.

#1628 Ross, D.C., compiler, 1967, Generalized geologic map of the Inyo Mountains region, California: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-506, 1 sheet, scale 1:125,000.

#1636 Schweig, E.S., III, 1989, Basin-Range tectonics in Darwin Plateau, southwestern Great Basin, California: Geological Society of America Bulletin, v. 101, p. 652-662.

#1646 Smith, R.S.U., 1976, Late-Quaternary pluvial and tectonic history of Panamint Valley, Inyo and San Bernardino Counties, California: Pasadena, California Institute of Technology, unpublished Ph.D. dissertation, 300 p.

#1705 Zellmer, J.T., 1980, Recent deformation in the Saline Valley region, Inyo County, California: Reno, University of Nevada, unpublished Ph.D. dissertation, 168 p., 7 pls., scale 1:50,000.

#199 Zhang, P., Ellis, M., Slemmons, D.B., and Mao, F., 1990, Right-lateral displacements and the Holocene slip rate associated with prehistoric earthquakes along the southern Panamint Valley fault zone—Implications for southern Basin and Range tectonics and coastal California deformation: Journal of Geophysical Research, v. 95, no. B4, p. 4857—4872.