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Elsinore fault zone, Glen Ivy section (Class A) No. 126c

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Synopsis	**General:** A major dextral strike-slip fault zone that is part of the San Andreas fault system. Research studies have been done to assess faulting on most of the sections, and have documented Holocene activity for the length of the fault zone with a slip rate around 4–5 mm/yr. Multiple events have only been dated on the Whittier fault and Glen Ivy North fault strand, so interaction between faults and adjacent sections is not well-known. Multiple strands within several sections mean that the studies are not always fully representative of the whole section. Numerous consulting reports (not summarized herein) that have addressed location and recency of faulting are on file with the State of California, California Geological Survey, as part of the records of their Alquist-Priolo Earthquake Fault Zoning Program. **Sections:** This fault has 7 sections. Sections are selected

	following the segmentation from Working Group on California Earthquake Probabilities (1995 #4945) from north to south: Whittier section [126a], Chino section [126b], Glen Ivy section [126c], Temecula section [126d], Julian section [126e], Coyote Mountain section [126f], with addition of Laguna Salada section [126g] as used by Petersen and others (1996 #4860) and Chino fault (paired with the Whittier fault by Rockwell and others, 1992 #6431).Anderson and others (1989 #6372) also identified same segments, with addition of Chupamiertos and Sierra Mayor segments in Baja California (not included in this summary); Wesnousky (1986 #5305) defined four segments, combining the Whittier, Chino and Glen Ivy into his segment A, Temecula into segment B, Julian into segment C, and the Coyote Mountain and Laguna Salada sections into segment D.
Name comments	**General:** **Section:** Includes Glen Ivy North fault (#461), Glen Ivy South fault (#462), Fresno, Tin Mine and Main Street faults (#446) of Jennings (1994 #2878) and part of Eagle fault of Weber (1977 #6448). Glen Ivy first named by Engel (1933 #6409) and divided into Glen Ivy North and South by Jahns (1954 #6418). Eagle, Fresno, Tin Mine and Main Street faults named by Weber (1977 #6448). Jahns (1954 #6418) previously extended the Whittier fault south of Santa Ana River (Fresno fault of Weber, 1977 #6448) and called portions of the Eagle fault the Gypsum fault. Glen Ivy section has its northern end in the south-dipping Fresno fault, south of the Santa Ana River and extends south to where the Glen Ivy North fault forms the northeastern border of Lake Elsinore. At this southern end the Glen Ivy North fault parallels the northern end of the Temecula section, creating the northern end of the Elsinore trough. Rockwell (1989 #6429) describes this section as a segment. **Fault ID:** Refers to numbers 431 (Chino fault), 444 (Whittier fault), 446 (Fresno, Tin Mine and Main Street faults), 460 (Wildomar fault), 461 (Glen Ivy North fault), 462 (Glen Ivy South fault), 467 (Willard fault), 469 (Wolf Valley fault), 470 (unnamed faults flanking Agua Tibia Mountain), 482 (Earthquake Valley), 483 & 496 (Elsinore fault), and 511 (Laguna Salada fault) of Jennings (1994 #2878); and numbers 10 (Chino fault), 12 (Whittier fault), 13 (Main Street fault), 14 (Fresno-Eagle fault), 15 (Tin Mine fault), 16 (Glen Ivy North fault), 17 (Glen Ivy South fault), 18 (Wildomar fault), 19 (Willard fault), 20 (Wolf Valley fault) of Ziony and Yerkes (1985 #5931).

County(s) and State(s)	RIVERSIDE COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of fault traces based on mapping by Weber (1997 #6448) and Alquist-Priolo Earthquake Fault Zone maps by California Division of Mines and Geology (scale 1:24,000-Alberhill, Corona South, Elsinore, and Lake Mathews quadrangles).
Geologic setting	The Elsinore fault zone is a major dextral shear system, parallel to the southern San Andreas fault [1], that accommodates about 5 mm/yr of the Pacific-North American Plate boundary slip. The northern elements of the fault zone, the Chino and Whittier faults, bound the Puente Hills, an uplifted block of Tertiary sediments. The Glen Ivy section forms the northeast boundary of the Santa Ana Mountains, and, together with the Temecula section, forms the Elsinore trough. To the southeast the fault zone (Temecula, Julian, and Coyote Mountain sections) cuts diagonally across various Peninsular Range batholithic and pre-batholithic metamorphic terrain until it reaches the southwestern margin of the Salton Trough as the Laguna Salada fault. Total strike-slip is reported to be as much as 40 km but is more likely only 10–15 km, and total vertical separation is about 200 m (Hull and Nicholson, 1992 #6416).
Length (km)	This section is 46 km of a total fault length of 306 km.
Average strike	N54°W (for section) versus N51°W (for whole fault)
Sense of movement	Right lateral *Comments:* Variable vertical component: northern faults, such as Fresno and Eagle faults have thrust component, and Tin Mine and Main Street faults are reverse (Weber, 1977 #6448); Glen Ivy South fault has been described as both normal (Millman and Rockwell, 1986 #6423) and reverse (Weber, 1977 #6448), with the east side down. Glen Ivy North has normal component but also shows some reversals of separation (Weber, 1977 #6448); Millman and Rockwell (1986 #6423) suggest 2:1 horizontal to

	vertical displacement in the Temescal Valley.
Dip	15° SW. to 90° *Comments:* 45° SW. (Fresno); 90° (Tin Mine); 15–35° SW. (Eagle); 70° SW. (Glen Ivy North, near Rice Canyon.); 50–90° SW. (Glen Ivy South, near hot springs); 75° to seismogenic depths; northern faults are generally more gently inclined to the southwest, whereas the Main Street, Glen Ivy North and South faults are more steeply inclined; seismicity corroborates southwest dip to about 12 km depth (Hull and Nicholson, 1992 #6416)..
Paleoseismology studies	Site 126-4, Glen Ivy Marsh: three-dimensional trenching established 5 to 6 events since 1060 AD, and associated an early historic earthquake with probable surface rupture (Rockwell and others, 1986 #6432; Rockwell, 1989 #6429).
Geomorphic expression	Graben (including Temescal Valley),scarps, saddles, swales, depressions, deflected drainages, faceted spurs.
Age of faulted surficial deposits	Fresno fault displaces late Quaternary landslide deposits (Weber, 1977 #6448). Tin Mine fault locally displaces older alluvium (Weber, 1977 #6448). Eagle fault locally displaces landslide and older alluvial deposits (Weber, 1977 #6448). Main Street fault displaces older alluvium (Weber, 1977 #6448). Glen Ivy North fault displaces historic marsh deposits and man-made flume (Rockwell, 1989 #6429); Holocene alluvium; late Pleistocene fan deposits (Millman and Rockwell, 1986 #6423). Glen Ivy South fault displaces late Pleistocene fan deposits (Weber, 1977 #6448).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Historic surface rupture in 1910 is documented by Rockwell (1989 #6429) based on paleoseismic studies. Previous events were possibly post-1660 A.D., 1360–1660 A.D., ~1300 A.D., 1260 A.D., and about 1060 A.D. (Rockwell, 1989 #6429; Working Group on California Earthquake Probabilities, 1995 #4945).
Recurrence	200 yr (<960 yr)

interval	*Comments:* Most recent event was May 15, 1910; interval is considered maximum for ground-rupturing events; events identified back to about 1060 A.D. and earlier events are evident but not yet studied (Rockwell and others, 1986 #6433; Rockwell, 1989 #6429).
Slip-rate category	Greater than 5.0 mm/yr *Comments:* A 5.5–5.9 mm/yr horizontal separation rate and 3 mm/yr vertical separation rate in the northern portion of this section (Temecula Valley), with most of the dextral slip on the Glen Ivy North strand rather than the Glen Ivy South strand, while vertical component occurs on both strands is indicated by Millman and Rockwell (1986 #6423). Slip rate assigned to this part of the fault by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 5.0 mm/yr (with minimum and maximum assigned slip rates of 3.0 mm/yr and 7.0 mm/yr, respectively.
Date and Compiler(s)	1998 Jerome A. Treiman, California Geological Survey
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factors, Elsinore and Chino fault zones, northwestern Riverside County, California: California Division of Mines and Geology Open-File Report OFR 77-4 LA, 94 p., 4 pls., scale 1:24,000 and 1:48,000.

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