California Division of Mines and Geology

Fault Evaluation Report FER-14

September 17, 1976

1. Name of faults: Munson Creek and "Ortega" faults.

2. Location of faults: Lion Canyon, Wheeler Springs, and Old Man Mountain 7.5' quadrangles, Ventura County, California.

3. Reason for evaluation: Part of 10-year program; zoned in Ventura County's Seismic and Safety Element (Nichols, 1974).

4. List of references:

a) Dibblee, T.W., Jr., and Fisher, R.V., 1946a, Unpublished geologic mapping of the Old Man Mountain quadrangle, scale 1:31,680.

b) Dibblee, T.W., Jr., and Fisher, R.V., 1946b, Unpublished geologic mapping of the Wheeler Springs quadrangle, scale 1:31,680.

c) Dibblee, T.W., Jr., 1949, Unpublished geologic mapping of the Hines Peak quadrangle, scale 1:62,500. Remarks: No topography on base map, no roads, no sections, townships, and ranges; streams only shown.

d) Dickinson, W.R., 1969a, Geologic problems in the mountains between Ventura and Cuyama in Society of Economic Paleontologists and Mineralogists Pacific Coast Section 1969 field trip guide, upper Sespe Creek: SEPM Pacific Coast Section, p. 1-23.

e) Dickinson, W.R., 1969b, Quaternary terrace gravels and colluvium on the south side of Pine Mountain in Society of Economic Paleontologists and Mineralogists Pacific Coast Section 1969 field trip guide, upper Sespe Creek: SEPM Pacific Coast Section, p. 63.

f) Fisher, R.V., and Dibblee, T.W., Jr., 1961, Geology and possible significance of Munson Creek fault, San Rafael Mountains, California: Bull. Am. Assoc. of Petroleum Geologists, v. 45, no. 9, p. 1572-1581, 7 figures.

g) Gross, D.J., 1958, Geology of the Ortega area, Ventura County, California: University of California, Los Angeles, unpublished M.A. thesis, map scale 1:14,100.

h) Hagen, D.W., 1957, Geology of the Wheeler Springs area: University of California, Los Angeles, unpublished M.A. thesis, map scale 1:21,180.

i) Jennings, C.W., 1975, Fault map of California with locations of volcanoes, thermal springs and thermal wells: California Division of Mines and Geology, California Geologic Data Map Series, Map no. 1, scale 1:750,000.

j) Jennings, C.W., and Strand, R.G., 1969, Geologic map of California, Los Angeles Sheet: California Division of Mines and Geology, scale 1:250,000.

k) Jestes, E.C., 1963, A stratigraphic study of some Eocene sandstones, northeastern Ventura asin, California: University of California, Los Angeles, Ph.D thesis, map scale 1:42,500.

l) Merrill, W.R., 1954, Geology of the Sespe Creek-Pine Mountain area, Ventura County in Geology of southern California: California Division of Mines and Geology, Bulletin 170, map sheet 3.

m) Nichols, D.R., 1974, Surface faulting in Seismic and Safety Elements of the Resources Plan and Program, Ventura County Planning Department, section II, p. 1-35, pl. 1.

n) Shmitka, R.O., 1968, Geology of the eastern portion of Lion Canyon quadrangle, Ventura County, California: University of California, Davis, unpublished M.S. thesis, 86 p., 7 plates, map scale 1:12,000.

o) Stanford Geological Survey, 1963, Geologic map of the upper Sespe Creek area, Ventura County, California: Stanford Geological Survey, unpublished, map scale 1:24,000.

p) Weber, F.H., Jr., Kiessling, E.W., Sprotte, E.C., Johnson, J.A., Sherburne, R.W., and Cleveland, G.B., 1975 (Preliminary draft of 2/27/76), Seismic hazards of Ventura County, California: California Division of Mines and Geology, open file report 76-5LA, 396 p., 9 plates.

q) Ziony, J.I., Wentworth, C.M., Buchanan-Banks, J.M., and Wagner, H.C., 1974, Preliminary map showing recency of faulting in coastal southern California: U.S. Geological Survey, Miscellaneous Field Studies Map MF-585, 15 p., map scale 1:250,000, 3 pl.

5. <u>Summary of available data:</u>

The Munson Creek fault and the Ortega Thrust fault are zoned as secondary fault hazards in the Ventura County Seismic and Safety Element (Nichols, 1974) (figure 1). Essentially all faults shown on Jennings and Strand (1969) were zoned in the Element; thus it appears that Nichols did not attempt to identify only the most recently active faults.

Jennings (1975), after Dibblee (1949) and Dibblee and Fisher (1946a, 1946b) and previously summarized by Jennings and Strand (1969), depicts these faults as pre-Quaternary because the Munson Creek fault is mapped as buried under Pleistocene fanglomerate. The mapping of the Stanford

Geological Survey (1963) also shows the same relationships (not cutting Quaternary terrace gravels). Dickinson (1969b) describes these terrace deposits as partly fluvial, partly landslide, and notes that the present drainage is 100 feet to 250 feet below the terrace remnants. Dickinson suggests that these terraces date from a wetter time, perhaps during Pleistocene glaciation; thus the deposits are almost certainly pre-Holocene. As mapped by most authors, the youngest unit cut by the Munson Creek fault is the Rincon Formation (early Miocene). However, the Stanford Geological Survey shows Monterey Formation (Miocene) as the youngest unit cut.

Fisher and Dibblee (1961) postulate that the nearly vertical Munson Creek fault has had both left-lateral strike-slip and reverse to vertical dip-slip (south block up) movement. They suggest about 2,000 feet of vertical movement and one to two miles of lateral movement.

Dibblee and Fisher (1946b) show the unnamed branch (shown on figure 1) of the Munson Creek fault as confined to within the Juncal Formation (Eocene). The Ortega thrust (see figure 2), only partly shown on their map, is mapped as cutting only the Matilja Formation (Eocene). No younger units are shown overlying these two faults.

Jestes (1963) map does not show any Quaternary units, and thus, did not provide further data as to the minimum age of faulting.

A slightly different fault map is presented by Ziony, et al. (1974) (figure 2). They compiled not only those faults discussed above, but also the faults mapped by Gross (1958) and Hagen (1957). Hagen shows the Munson Creek fault as buried under older alluvium (Pleistocene) and Sespe Formation as the youngest unit cut. Gross suggests a left-lateral offset of four to five miles. Gross further notes (p. 63) "Each major stream course that crosses the fault is offset between 1,000 and 1,500 feet ..." and uses this as evidence supporting his left-lateral fault interpretation, and perhaps implying that the Munson Creek fault is recently active (see also item 6). However, Shmitka (1968, p. 52) notes "There is no topographic expression of the (Munson Creek) fault in the area."

There is some confusion over the name "Ortega fault" (see figure 2). Merrill (1954) and Gross (1958) show the fault in the same location, cutting only Matilja and Cozy Dell Formations (upper Eocene) and overlain by no younger units. Hagen's (1957) "Ortega fault" is an extension of the unnamed fault (referred to above) mapped by Dibblee and Fisher (1946b) (this does not refer to their unnamed branch of the Munson Creek fault). In Hagen's version, the fault is buried under "Recent" alluvium. The youngest unit cut is Cozy Dell Formation (upper Eocene). The fault dies out to the east on trend with an anticlinal axis.

Ziony, et al. (1974) (see figure 2) classified both of the "Ortega faults" and the short southern branch of the Munson Creek fault as of unknown age (the faults lack evidence of late Cenozoic movement but could have moved as recently as those of any other age class, except "Um"). The Munson Creek fault is classified as having moved during the late Cenozoic on the basis of a Pliocene unit being cut (symbol [4] on fig. 2). This information was evidently derived from their own mapping since neither Dibblee (1949) nor any other author show any Pliocene unit in the area. However, Dickinson (19691, p. 21) notes the presence of local exposures of Pliocene continental deposits in the trough of the syncline south of the Pine Mountain fault. Just why Ziony, et al. did not identify the locations where the Munson Creek fault is overlain by Pleistocene deposits is unknown, however it is likely that they were unable, ~~by~~ from their own field ~~checking~~ mapping, to determine whether the terraces actually were or were not cut.

Weber, et al. (1975, p. 179) did not study the "evidence for displacement" along the Ortega faults in detail, thus they did not determine the probable age of latest movement.

6. Interpretation of air photos:

U.S. Department of Agriculture aerial photos AXI-7K-81 through 84 and 125 through 127, scale 1:24,000, were viewed stereo-optically. These photos covered parts of the Lion Canyon and Wheeler Springs 7.5 ~~quad~~ quadrangles. No features associated with late Quaternary or Holocene faulting were observed. Specifically, the offset streams noted by Gross (1958) were not observed. The drainage is controlled by the bedrock and structure; streams tend to generally align along bedding planes in some places, but the apparent "offset" is not consistently in one direction. It is an erosional feature, not a tectonic feature.

7. Field observations:

The only place where I attempted to observe the Munson Creek fault in the field is where the fault crosses state route 33. However, here the fault is obscured by recent alluvium. No attempt was made to observe the other faults, which lie in rugged, poorly accessible areas.

8. Conclusions:

The Munson Creek fault has apparently been inactive at least since the end of the Pleistocene. The Ortega faults (either version) can only be classified as post-Eocene, however, there is no evidence indicating that either of these faults has been active during the late Pleistocene or Holocene.

9. Recommendations: No further investigations seem justified given the data on hand. Zoning of the Munson Creek and "Ortega" faults is not recommended.

10. Investigating geologist's name; date:

Theodore C. Smith
Theodore C. Smith
Assistant Geologist
September 17, 1976

Recommendation approved.
EWH
9/22/76

Figure 1 (from Nichols, 1974)

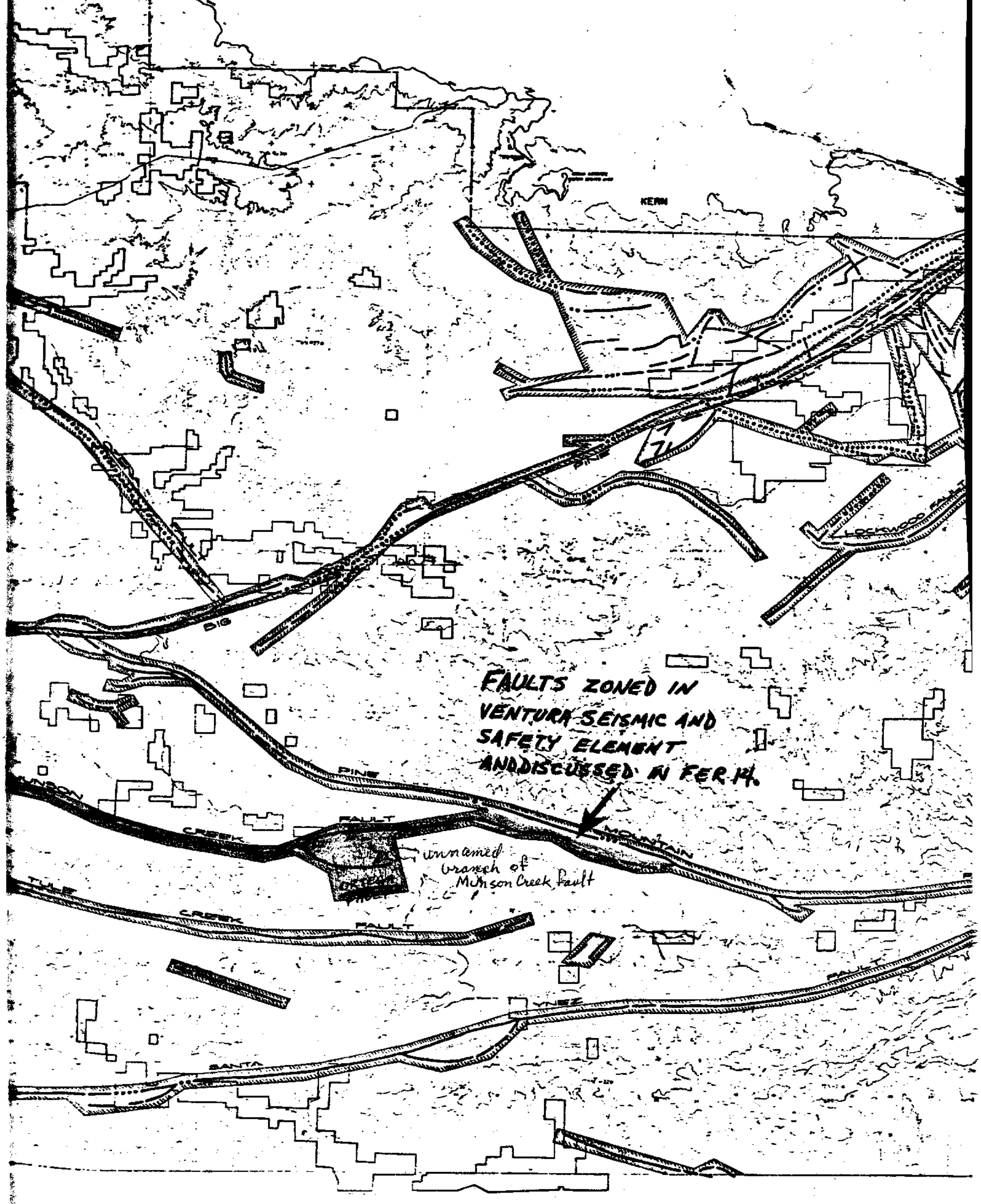

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Fig. 2.
(from Ziony, et al. 1974)