

CALIFORNIA DIVISION OF MINES AND GEOLOGY
FAULT EVALUATION REPORT FER-227

Part of the
RAYMOND FAULT
on the El Monte Quadrangle
Los Angeles County, California

by
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INTRODUCTION

The Raymond fault is a major east-west trending fault along the southern margin of the Transverse ranges (Figure 1). This fault was zoned under the Alquist-Priolo Special Studies Zones Act in 1977 and Special Studies Zones maps were issued for the Los Angeles, El Monte, and Mt. Wilson quadrangles (CDMG, 1977a,b,c). This zoning was based on compilation of previous work. The Special Studies Zones map for the El Monte quadrangle is being revised to include a newly defined active trace of the Whittier fault zone (Treiman, 1991). The purpose of this evaluation is to consider whether revision of the 1977 Special Studies Zones for the Raymond fault on this quadrangle is also warranted at this time.

SUMMARY OF AVAILABLE DATA

The Raymond fault (also sometimes called the Raymond Hill fault) was first mapped in detail by Buwalda (1940) although it had been recognized earlier (refer to Crook and others, 1987, for a discussion of earlier work and priority for naming this fault). Work by Proctor (1974) was based in part on Buwalda but also included new observations and interpretation. Proctor's map was one of the principal sources for the Special Studies Zones maps issued (CDMG, 1977a,b and c), at least for the northern trace on the El Monte quadrangle (Figure 2a). Buwalda's work was also cited. The southern trace shown on the El Monte quadrangle is apparently based on unpublished "work in progress" by Robert Hill and Edward Sprotte of the California Division of Mines and Geology. Remaining records of the work by Hill and Sprotte which relate to fault location in the San Marino area are mainly annotations to the 1927 and 1928 aerial photos and do not fully document this southern trace.

A more accurate map of the fault location and fault-related features was prepared by Crook and others (1978 and 1987). Although Buwalda (1940) thought the fault was principally a reverse fault, subsequent work by Proctor (1974), Crook and others (1978 and 1987), and Jones and others (1990) indicate that the dominant sense of displacement is left-lateral strike-slip. Holocene displacement has been documented at the San Marino High School as summarized by Crook and others (1987). The fault location of Crook and others (1987) is shown on Figure 2b.

SEISMICITY

Seismicity for the region from 1973 to 1989 is shown on Figure 3. Although the relationship of seismicity to the surface trace is not apparent, Jones and others (1990) attribute the December 3, 1988 M4.9 Pasadena earthquake to the Raymond fault. They note that "the hypocenters of the earthquake and its aftershocks define an east-northeast-striking, steeply northwest-dipping surface that projects up to the active surficial trace of the Raymond fault". The focal mechanism of the earthquake indicated left-lateral strike-slip displacement.

AERIAL PHOTO INTERPRETATION

Aerial photos taken by Fairchild Aerial Surveys in 1927 and 1928 were reviewed for the portion of the Raymond fault on the El Monte quadrangle. The photos used were the same ones used and annotated by Hill. The northern trace as mapped by earlier workers was apparent and was not re-plotted. The southern trace, as shown on the Special Studies Zones map, could not be verified, however, a small arcuate, north-facing scarp was apparent along the south margin of what was previously Wilson Lake (USGS, 1941). A more ambiguous scarp was interpreted along the southern part of the elliptical road which still exists in Lacy Park (see Figure 2b). A lake existed at this locality at least as far back as 1900 (Kewen Lake--USGS, 1900) and probably earlier, and continued to exist until the mid-1920's (USGS, 1941). The lake is drained in the 1927 photos and shows signs of modification, including a long mound of fill in the middle of the drained lake basin. A possible low north-south berm at the west end of the empty basin may have been constructed earlier in the century to enhance the lake. Roads or paths along the base of the two southern scarps suggest that these features could have been modified by man or they may have been the result of lakeshore processes. The southern scarps do not extend east or west beyond the lake basin.

FIELD OBSERVATIONS

No field checking was done due to the development in the area and the clarity of most features in the aerial photographs from 1927 and 1928.

DISCUSSION AND CONCLUSIONS

The northern fault trace shown on the Special Studies Zones map for the El Monte quadrangle is clearly well-defined based on geomorphic features identified by Buwalda (1940), Proctor (1974), and Crook and others (1987) and based on aerial photo interpretation by Hill (CDMG files) and for this evaluation. Holocene activity is evident from the geomorphic expression and from trenching studies summarized by Crook and others (1987).

The scarps at the southern margin of Lacy Park are on trend with the fault to the west, on the Los Angeles quadrangle, before it makes an abrupt step to the north. It is logical that such a left step on a left-lateral fault would result in a depression like

that at Lacy Park, and it is also reasonable to expect that the depression might be bounded on both sides by faults. Buwalda (1940) indicated that the surface south of the fault at this location was tilted northward toward the fault which may be a sufficient explanation for the ponding.

RECOMMENDATIONS

I recommend that the existing Alquist-Priolo Special Studies Zones be modified to incorporate the faults as shown on Figure 2b. The northern fault trace is the more accurately located trace of Crook and others (1987). The southern fault trace is inferred based on aerial photo interpretation of the 1927 and 1928 photos listed at the end of this report. The original zone boundaries should be redefined based on these faults and utilizing the narrower, roughly 500-foot setback which is now standard in establishing zone boundaries.

*Revised and
approved.
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AERIAL PHOTOGRAPHS USED

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|--------------------------|------|---------|----------|
| Fairchild Aerial Surveys | | | |
| Flight 113 | 1927 | b/w 7x9 | 1:18,000 |
| 425 to 426 | | | |
| 461 to 462 | | | |
| Fairchild Aerial Surveys | | | |
| Flight C-300 | 1928 | b/w 7x9 | 1:18,000 |
| K294 to K295 | | | |
| K317 to K319 | | | |

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