CALIFORNIA DIVISION OF MINES AND GEOLOGY

FAULT EVALUATION REPORT FER-127

September 28, 1981

1. Name of fault

Cordelia fault

2. Location of fault

Cordelia and Mt. George 7.5-minute quadrangles, Napa and Solano Counties (figure #1).

3. Reason for evaluation

Part of 10-year fault evaluation program (Hart, 1980).

4. List of References

Aerial photos (source unknown), 1964, NAP 16-267 and 16-269, black and white, vertical, scale approximately 1:91,000.

Bryant, W.A., 1981, Green Valley fault zone, Cordelia and Mt. George quadrangles, California: California Division of Mines and Geology, unpublished Fault Evaluation Report FER-126.

Frizzell, V.A., Jr., Sims, J.D.,Nilsen, T.H., and Bartow, J.A., 1974, Preliminary photointerpretation map of landslide and other surficial deposits of the Mare Island and Carquinez Strait 15-minute quadrangles, Contra Costa, Marin, Solano, and Sonoma Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-595 (also Basic Data Contribution 67), scale 1:62,500.

Geomechanics, Inc., 1978, Geologic investigation for Mangels ranch, Cordelia, California: unpublished consulting report (C-310).

Hart, E.W., 1980, Fault rupture hazard zones in California: California Division of Mines and Geology Special Publication 42.

Helley, E.J. and Herd, D.G., 1977, Map showing faults with Quaternary displacement, northeastern San Francisco Bay Region, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-881, scale 1:125,000.

Herd, D.G., (in press), Map of principal late-Quaternary faults, San Francisco Bay Region, California: U.S. Geological Survey Open-file Report, scale 1:250,000 (faults compiled for FER-127 based on 1:24,000 work maps).

Pampeyan, E.H., 1979, Preliminary map showing recency of faulting in north-central California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1070, scale 1:250,000.

Sims, J.D., Fox, K.F., Jr., Bartow, J.A., and Helley, E.J., 1973, Preliminary geologic map of Solano County and parts of Napa, Contra Costa, Marin, and Yolo Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-484, scale 1:62,500.

Sims, J.D. and Frizzell, V.A., Jr., 1976, Preliminary photo interpretation map of landslide and other surficial deposits of the Mt. Vaca, Vacaville, and parts of Courtland, Davis, Lake Berryessa, and Woodland 15-minute quadrangles, Napa and Solano Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-719, scale 1:62,500.

U.S. Department of Agriculture, 1953, Aerial photos CSI-8K-94 to 102, black and white, vertical, scale approximately 1:20,000.

U.S. Geological Survey, 1974, Aerial photos 10-7 to 10-14, low sun angle, color, vertical, scale 1:36,000.

5. <u>Review of available data, air photo interpretation, and field checking.</u>

The Cordelia fault zone was first recognized south of Cordelia as a linear tonal contrast in Holocene alluvium (Helley and Herd, 1977; figures 1, 2). The fault zone mapped by Helley and Herd is a discontinuous series of north and northeast-trending faults extending to the western shore of Lake Curry, a distance of about 19 km (figure 2). The Cordelia fault is a zone of faults with predominantly strike-slip offset, based on observations of roadcut exposures by Helley and Herd (1977) and this writer. Helley and Herd (1977) indicate that the sense of offset along the Cordelia fault is right-lateral strike-slip, based on the right-lateral deflection of drainages at locality 1 (figure 2) and the predominance of horizontal slickensides along exposed fault planes (localities 2 and 3, figure 2).

Herd (in press; p.c., September 1981) subsequently has remapped most of the fault zones shown on MF-881 (Helley and Herd, 1977), including the Cordelia fault zone, based on interpretation of air photos. Except for the segment south of Highway 80 (locality 5), Herd did not observe evidence of late-Quaternary active faulting along the Cordelia fault zone. Herd (p.c., September 1981) believes that the southern-most segment of the Cordelia fault is actually a branch of the Green Valley fault, located about 1 km to the west (see Bryant, 1981).

The majority of the Cordelia fault zone mapped by Helley and Herd is not sufficiently active (i.e. Holocene) or well-defined, based on air photo interpretation by this writer (figure 2). A large portion of the northern segment of the fault zone is located within massive landslide deposits (figure 2). No geomophic evidence of systematic, through-going faulting was observed by this writer (figure 2). Specific features identified by Helley and Herd

(1977) along most of the northern segment of the Cordelia fault are either clearly formed by landsliding or are vague and discontinuous.

Helley and Herd (1977) indicate that an offset A soil horizon is exposed in the roadcut at locality 2 (figure 2). The exposed fault zone is at least 300 feet wide and is characterized by vertical to steeply east-dipping shears within tuff-beds of Pliocene Sonoma Volcanics. Trends along individual faults range from N-S to N45°E. The main zone of faulting is vertical and trends N-S. Slickensided surfaces indicate predominantly strike-slip displacement. Soil development over the bedrock is very sparse and only slightly more abundant over the sheared bedrock. No evidence of offset soil was observed by D. Kilbourne (p.c., 1981), T. Smith (p.c., 1981), D. Herd (p.c., 1981), or this writer.

The main fault in the roadcut at locality 2 is characterized by a 2 to 3m-wide zone of sheared bedrock and gouge. This shear zone is unstable and easily eroded, evidenced by small slope failures in the roadcut. There is a small soil slump on top of the south face of the roadcut that coincides with the fault zone. This slump, plus the tendency for soil to develop more easily over the sheared bedrock, may account for Helley's interpretation of offset soil.

Geomorphic features indicating recently-active faulting north and south of locality 2 were not observed by this writer (figure 2). A trough mapped by Helley and Herd (1977) just north of the road is not on trend with faults exposed in the roadcut and is slightly sinuous, suggesting a drainage course rather than recent faulting (figure 2).

A tonal lineament in alluvium north of Highway 80 (locality 4, figure 2) is suggestive of active faulting. The tonal linament (associated with a modified west-facing scarp in bedrock) is somewhat sinuous along a southerly trend, suggesting an old drainage course rather than faulting. A site investigation involved the excavation of trenches across this tonal lineament (Geomechanics, 1978)(figure 2). No evidence of active faulting was observed. A crack, which extended to within 1 1/2 meters of the ground surface, was exposed in the northern-most trench. The crack occurred within weathered Sonoma Volcanics (tuff) and was abruptly truncated by a gray sand bed. The fracture extends into a gravel bed underlying the sand. However, no soil or bedrock units are displaced by the fracture and no evidence of a fault origin, such as slickensides or gouge, was observed. Two additional trenches were excavated to the south. Continuous, unfaulted alluvial beds were exposed and no evidence of the southern extent of the fracture was observed (Geomechanics, 1978).

Evidence permissive of Holocene-active faulting was mapped by Helley and Herd (1977) and Herd (in press) south of Highway 80 along a slightly arcuate northerly trend (locality 5, figure 2). A sharp tonal lineament in Holocene alluvium is associated with very subtle east and west-facing scarps, closed depressions, and a right-laterally deflected drainage, based on air photo interpretation by this writer (figure 2). The location of this fault mapped by Helley and Herd (1977) and Herd (in press) differs somewhat in location from the fault mapped by this writer where topographic control is subtle (figure 2). It is suspected that the fault location of Helley and Herd (1977) and Herd (in press) is not precisely located. The fault trace of Bryant (this report) was mapped directly on air photos and transfered to a topographic base map using a Bausch and Lomb Zoom Transfer Scope. Accuracy is believed to be within 50 feet.

6. Conclusions

A major portion of the Cordelia fault zone is not sufficiently active or well-defined. Discontinuous faults along the northern segment of the Cordelia fault are not well-defined and/or lie within massive, active landslide deposits from the SE 1/4 of section 12, T5N, R3W north to the NE 1/4 of section 36, T6N, R3W (figure 2).

Evidence of significant pre-Holocene strike-slip faulting can be observed in roadcut exposures at localities 2 and 3 (figure 2). Helley and Herd (1977) indicate that the A soil horizon at locality 2 is offset, but this writer, in addition to D. Kilbourne (p.c., 1981), T. Smith (p.c., 1981), and D. Herd (p.c., 1981), could not confirm an offset soil horizon. Specific geomorphic features indicating recently-active faulting at localities 2 and 3 were not observed by this writer, based on air photo interpretation and field checking (figure 2).

Geomorphic evidence permissive of Holocene-active faulting mapped by Helley and Herd (1977) at locality 4 was not confirmed by Geomechanics (1978) (figure 2). The tonal lineament in alluvium mapped by Helley and Herd (1977) is actually somewhat sinuous and could be an old stream channel, based on air photo interpretation by this writer (figure 2).

Holocene-active faulting south of Highway 80 (locality 5, figure 2) is indicated by a sharp, slightly arcuate tonal lineament in alluvium associated with closed depressions, subtle scarps in alluvium, and a right-laterally deflected drainage. The differences in location of this feature (figure 2) are assumed to be the result of the relatively flat, and subtly-featured alluvial plain. The fault trace of Bryant (this report) is believed to be accurate to within 50 feet.

7. Recommendations

Recommendations for zoning faults for special studies are based on the criteria of sufficiently active and well-defined (Hart, 1980).

Do not zone for special studies the Cordelia fault zone in the Mt. George quadrangle. These faults are not sufficiently active or well-defined.

Zone for special studies the segment of the Cordelia fault zone south of Highway 80 in the Cordelia quadrangle mapped by Bryant (this report; figure 3). Do not zone the Cordelia fault zone north of Highway 80. These faults are not sufficiently active or well-defined.

8. Report prepared by William A. Bryant, September 28, 1981.

William A. Bryant

Report reviewed and photos checked; observations and conclusions appear reasonable. EWH 12/30/81

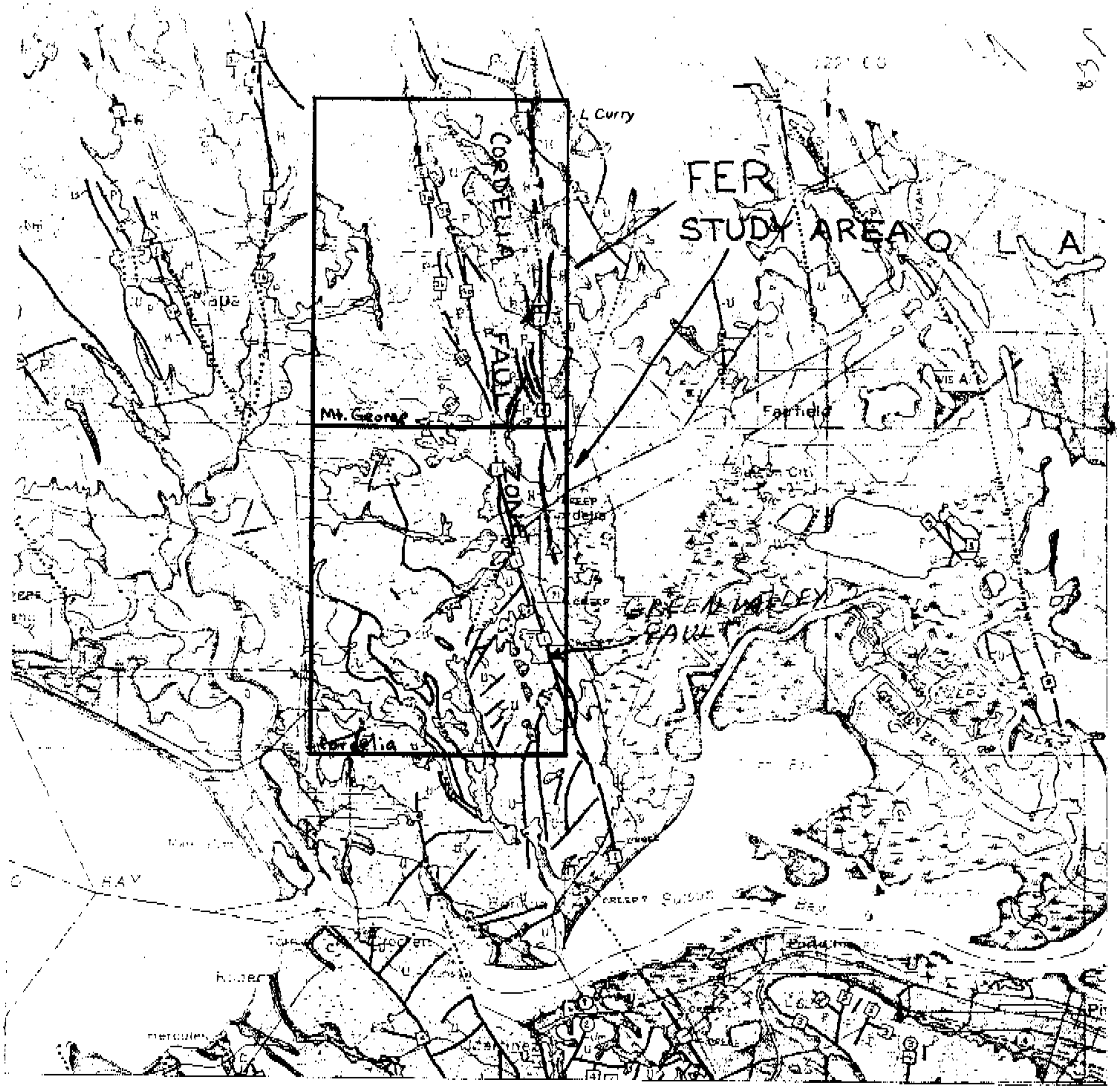

Figure 1 (to FER-127). Location of Cordelia fault zone evaluated in FER-127.