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REPORT OF GEOLOGIC AND FAULT  
RECONNAISSANCE

VICINITY OF OCEANSIDE,  
CALIFORNIA

Conducted for:

SOUTHERN CALIFORNIA EDISON COMPANY  
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## INTRODUCTION

This report presents data to Southern California Edison Company, of the reconnaissance, geologic mapping to identify any faulting in a 120-square mile area of Oceanside and Camp Pendleton, California. The area of study is shown on the Location Map, Plate 1.

During the period of March 20 - 30, 1972, data was collected by visits to outcrops; air-photo mapping of geomorphic expressions and previous proposed, probable faults. This information is compiled and presented with this report as a Data Map, Plate 2.

The stratigraphic nomenclature used in this report is the same as the stratigraphy presented on the Geologic Map of California, Santa Ana sheet. Stratigraphic mapping was undertaken in limited areas only and where the stratigraphy could aid in identifying relationships of faulting.

## GENERAL

Plotting of information obtained during this study results in two lineaments with paralleling east of north trends and 4,000 to 6,000 feet apart. The western lineament is defined at its southern portion by several outcrops of sheared rock between and in the vicinity of Oceanside Boulevard and San Luis Rey Road, in Oceanside, California. The San Luis Rey River makes a sharp change in its drainage direction in this

general area. The lineament is traced northward into the Camp Pendleton Marine Base to near the Supply Depot by means of a geomorphic alignment of gullies and ridges, and possible terminated bedding. At the Supply Depot and northward to Camp De Luz the lineament is defined by several ways of expression. These are outcrops exhibiting faulted, sheared, and highly jointed rock; changes of natural slopes; and the east of north drainage of the Santa Margarita River. Earlier workers have mapped a possible fault in the area from the Supply Depot to Camp De Luz (Geology of Southern California, Bull. 170, Ch. II, Plate 3).

The second and eastern lineament is defined by sheared rock found in outcrops between Oceanside Boulevard and Mission Avenue in Oceanside, California. This lineation is traced northward on to Camp Pendleton by a geomorphic alignment of San Luis Rey River and Windmill Canyon. Mapping by earlier workers placed a possible fault in the thalweg of Windmill Canyon (Geology of Southern California, Bull. 170, Ch. II, Plate 3). The lineament is traced from the head of Windmill Canyon northward to Vandegrift Road by shears found in outcrops. Access to the Naval Reservation north of Vandegrift Road was not permitted. Thus the lineament could not be traced north of Vandegrift Road with any control.

### OUTCROP DATA

The following presents a description of some exposures inspected during the field work for this study. The numbers refer to locations which are indicated on the Data Map, Plate 2.

1. North of Camp De Luz and adjacent to a dirt road intersection, pre-Tertiary igneous rock is sheared and highly jointed in an approximately 30-foot wide zone. Several shears with two-inch wide gouge were identified striking N 5° E to N 10° E, and dipping 80° - 85° W.

2. At this location, a 3-foot wide sheared section containing gouge and angular breccia separates a reddish brown, weathered, igneous rock from a light green, weathered igneous rock. The attitude of shearing is N 10° E, 90°.

3. A quarry has been developed at this location to mine sound pre-Tertiary igneous rock on the west side of an approximate 17-foot wide sheared section. The shearing is exposed on the north and south sides of the quarry.

The northern exposure defines a 17-foot thick shear zone with gouge on the eastern portion of the zone, in the igneous rock. In the upper part of the exposure Quaternary river terrace sands and gravels are deposited over igneous rock and against the eastern limits of the sheared section (Plate 3, Fig. 1). Gouge is found between the lower portion of the terrace deposits and the fractured igneous rock (Plate 3,

Fig. 2). The long axes of some of the gravels adjacent to the igneous/terrace contact and above the gouge, are found in a vertical rather than a horizontal orientation. In the southern exposure the sheared igneous rock and gouge material can be seen. However, no terrace deposits were found. The attitude of the shearing in both exposures is N 10° E, 84° W.

4. In this outcrop in the vicinity of the Supply Depot, sandstones and clays of the Eocene, La Jolla Formation are possibly faulted (Plate 4, Fig. 1). A thin gouge-like material was found along the supposed fault planes. The attitude of the fault planes is N 10° E, 85° W.

5. In this outcrop two faults about 50 feet apart are identified in the middle Miocene, San Onofre Breccia.

The planes on the country rock have slickensides with apparent left lateral, strike-slip movement. A 1.5-foot wide section of gouge is also associated with these faults. Bedding between the faults has a change of attitude. Some vertical movement along the faults is possible, but an apparent 4-foot vertical offset of beds may be partially due to the change of dip of bedding. The strike of the fault planes ranged from N 10° W to N 5° E and dipped vertically.

6. Sand, silt, and clay beds of the Eocene, La Jolla Formation were thinned and truncated by a fault zone, about 30 feet wide. The attitude of faulting is N 20° E, 90°.

7. In a south-facing cut to develop the road alignment for Oceanside Boulevard, middle Miocene San Onofre Breccia is in contact with probable younger marine terrace deposits (Plate 4, Fig. 2). The strike of this contact plane is  $N 5^{\circ} E$  and dips moderately to the west. The geometry of this outcrop can be explained by a geologic interpretation; where the San Onofre Breccia was faulted before or during deposition of the probable younger marine terrace materials.

8. This outcrop is found in a north-facing road cut for Vandegrift Boulevard on Camp Pendleton Marine Base. A moderate westward dipping siltstone is found in fault contact with a moderate westward dipping sandstone. Both units are within the Eocene, La Jolla Formation. The amount of displacement or relative movement could not be determined in this outcrop.

A small horst is found in a south-facing road cut along Vandegrift Boulevard a few hundred feet west of the above outcrop.

9. In a north facing outcrop in Rattlesnake Canyon a siltstone is in fault contact with a sandstone (Plate 5, Fig. 1). The faulted units are within the La Jolla Formation. Direction of movement and amount of displacement were not determined during this inspection.

10. This outcrop is in a cut slope for an uncompleted housing development. Eocene sands and silts of the La Jolla Formation are sheared and beds are truncated. The attitude of the shearing is  $N 14^{\circ} E, 70^{\circ} E$ .

The shear is 3 to 4 inches wide with a clay and caliche<sup>1 e</sup> filling.

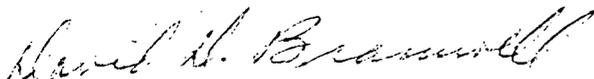
### CONCLUSION

In the recent field work many outcrops were inspected in the study area. Some of the visited exposures evidenced rock in a faulted or sheared condition. These fractured rocks ranged in age from the pre-Tertiary igneous rock to the middle Miocene San Onofre Breccia. Marine and river terrace deposits, possibly Holocene in age, also appear affected by faulting. Study of stereographic air photos of the Oceanside-Camp Pendleton area identified geomorphic expressions at acute angles to regional geology and areal erosion.

The fractured rock exposures and geomorphic data were plotted and established two parallel, east of north trending lineaments from Camp De Luz to the community of Oceanside. Portions of the lineaments are associated with the earlier mapped, possible faults in the east of north trending Santa Margarita River and Windmill Canyon (Geology of Southern California, Chapter II, plate 3).

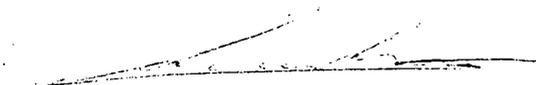
Based on data of the recent study the earlier, possible faults in the Camp Pendleton area can be traced southward to the vicinity of the coast at Oceanside, California. The faults strike east of north and dip vertically or steeply to the west and east (Trace of Possible Faults, Plate 6). However, at this time the magnitude of displacement or relative direction of movement of these structures has not been determined.

Respectfully submitted,



David D. Bramwell

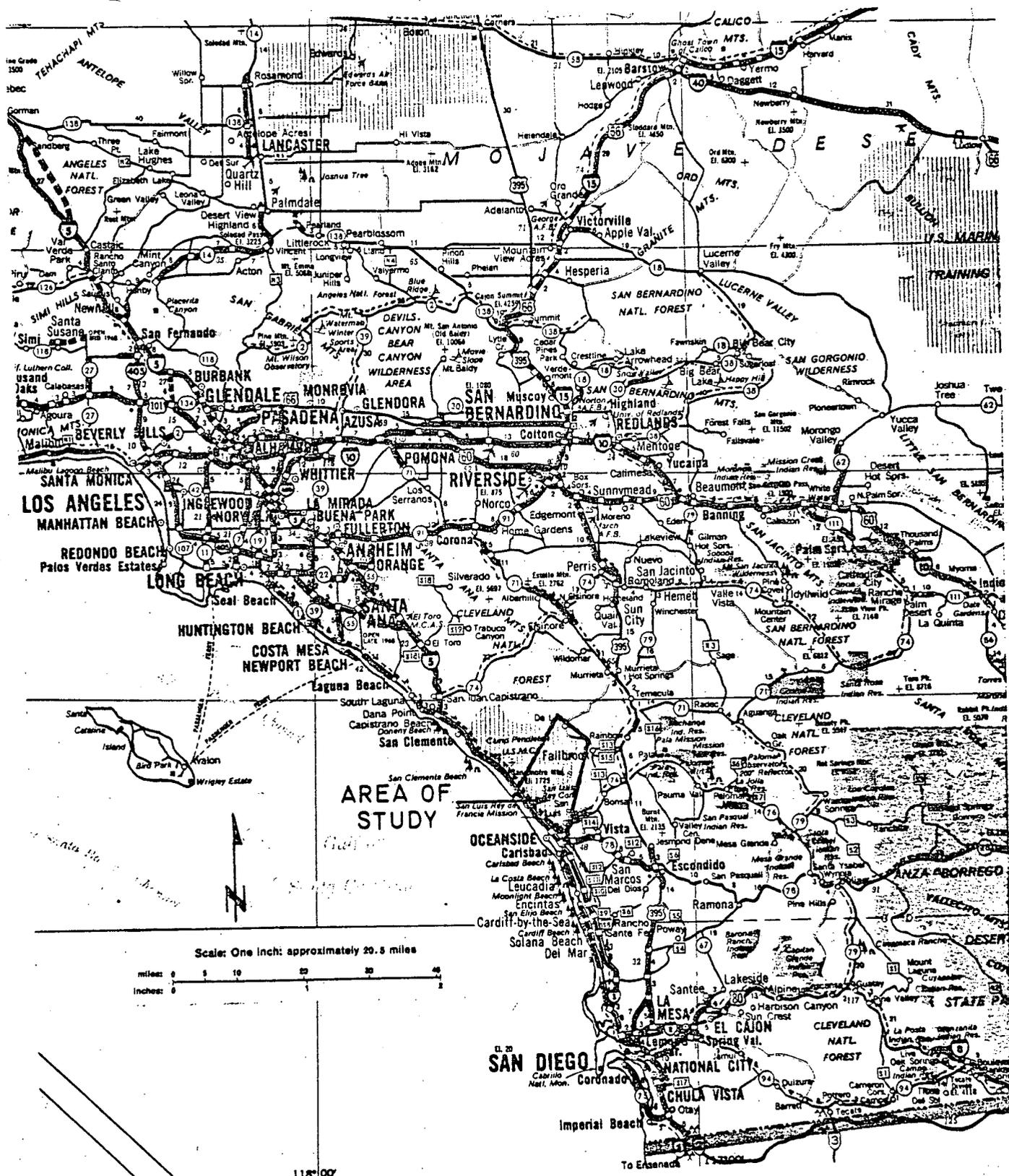
Reviewed and approved,



Jack J. Schoustra

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Location Map



FIGURE 1

Location 3 : North Side of Quarry



FIGURE 2

Location 3 : North Side of Quarry

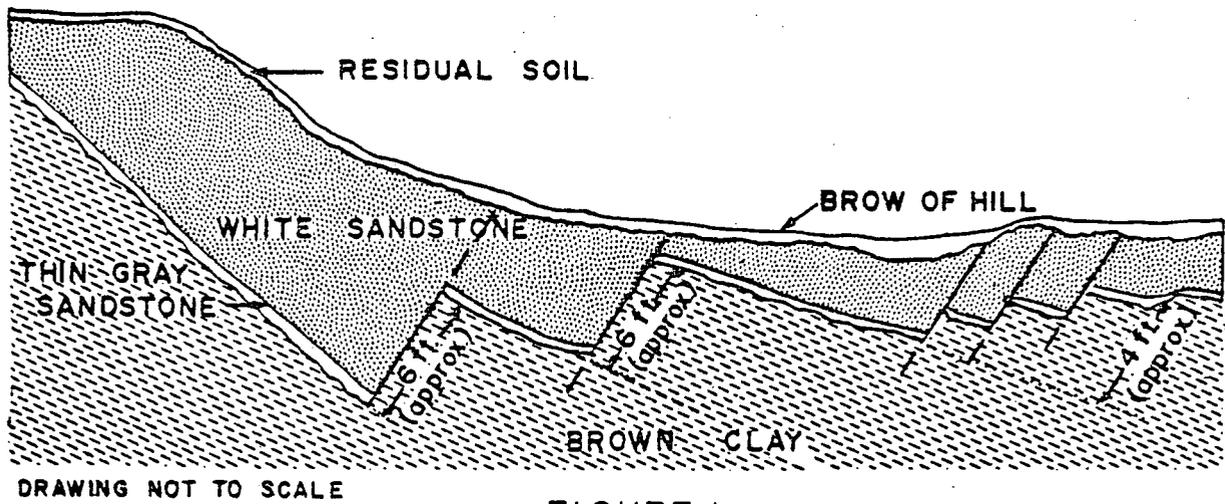


FIGURE 1

Location 4: Possible Faulted Sandstone and Clay of the La Jolla Formation.

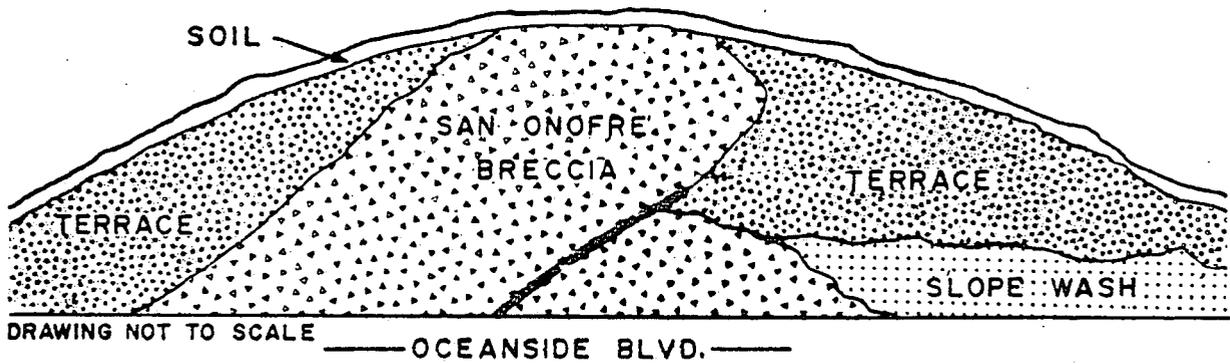


FIGURE 2

Location 7: Contact of San Onofre Breccia and Probable Terrace

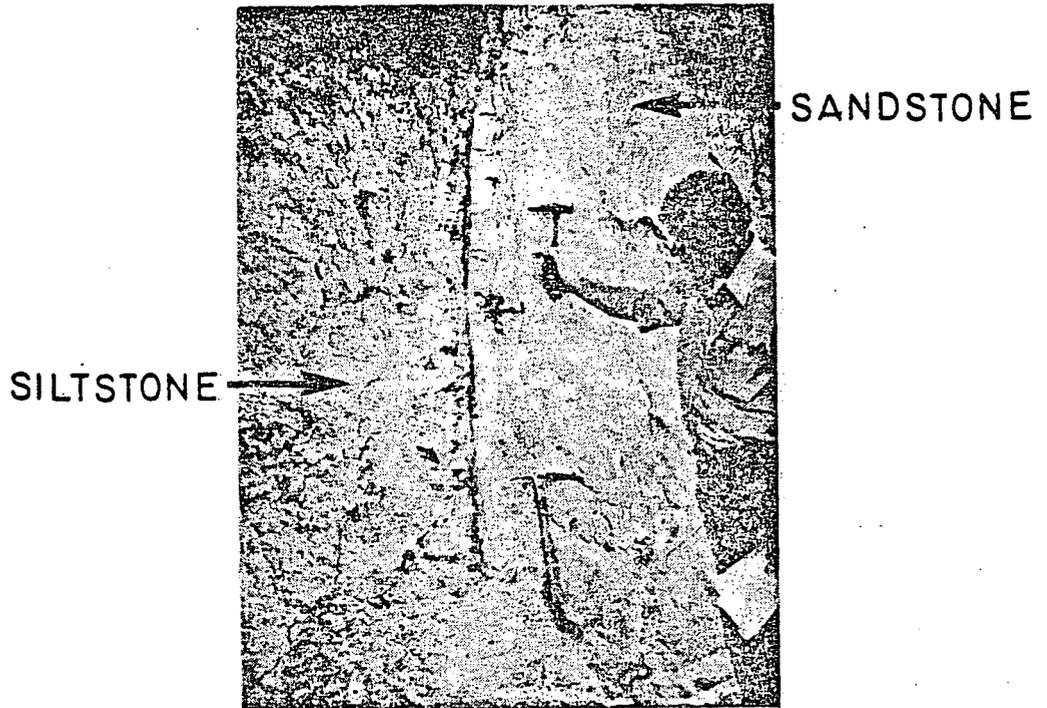
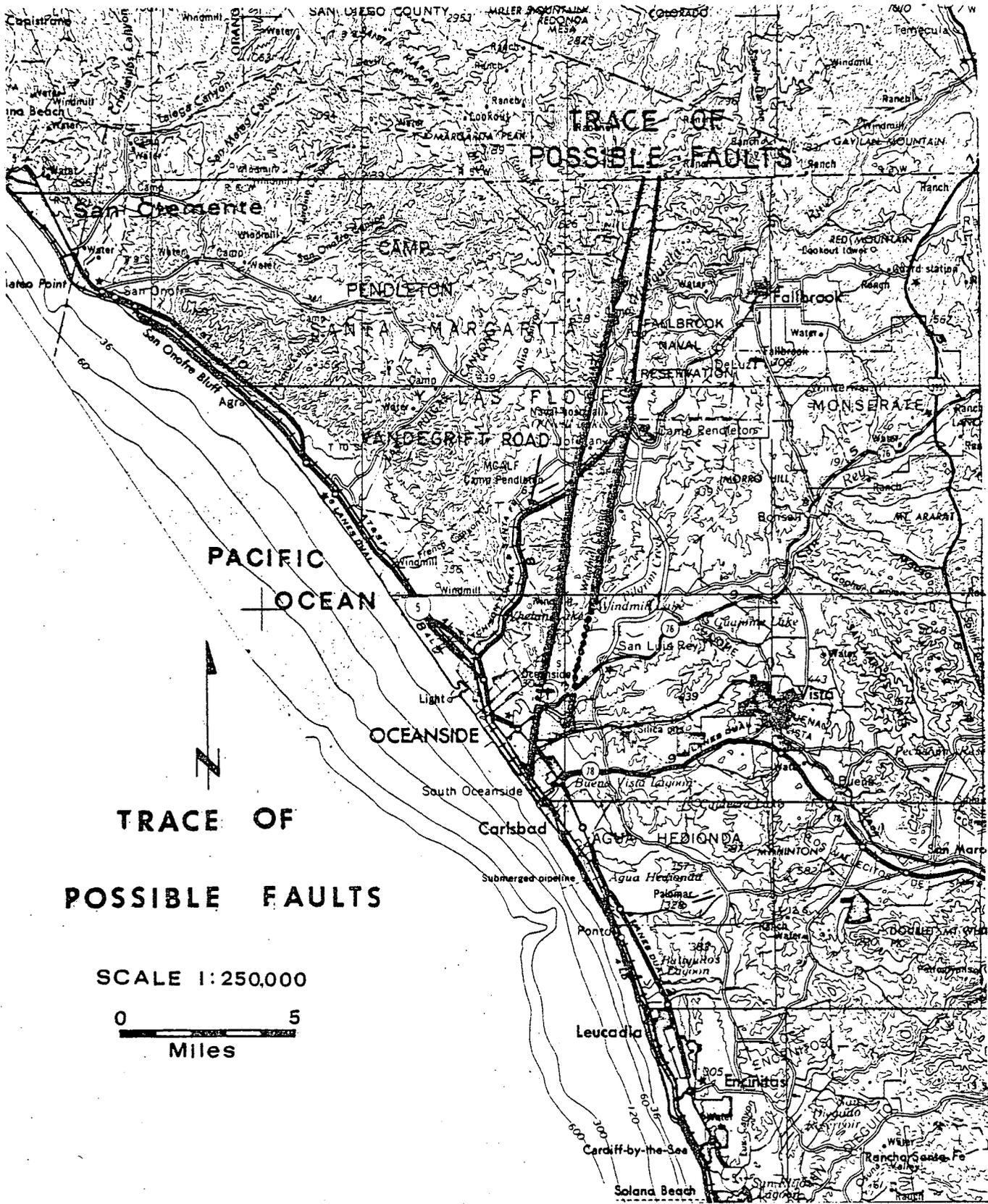
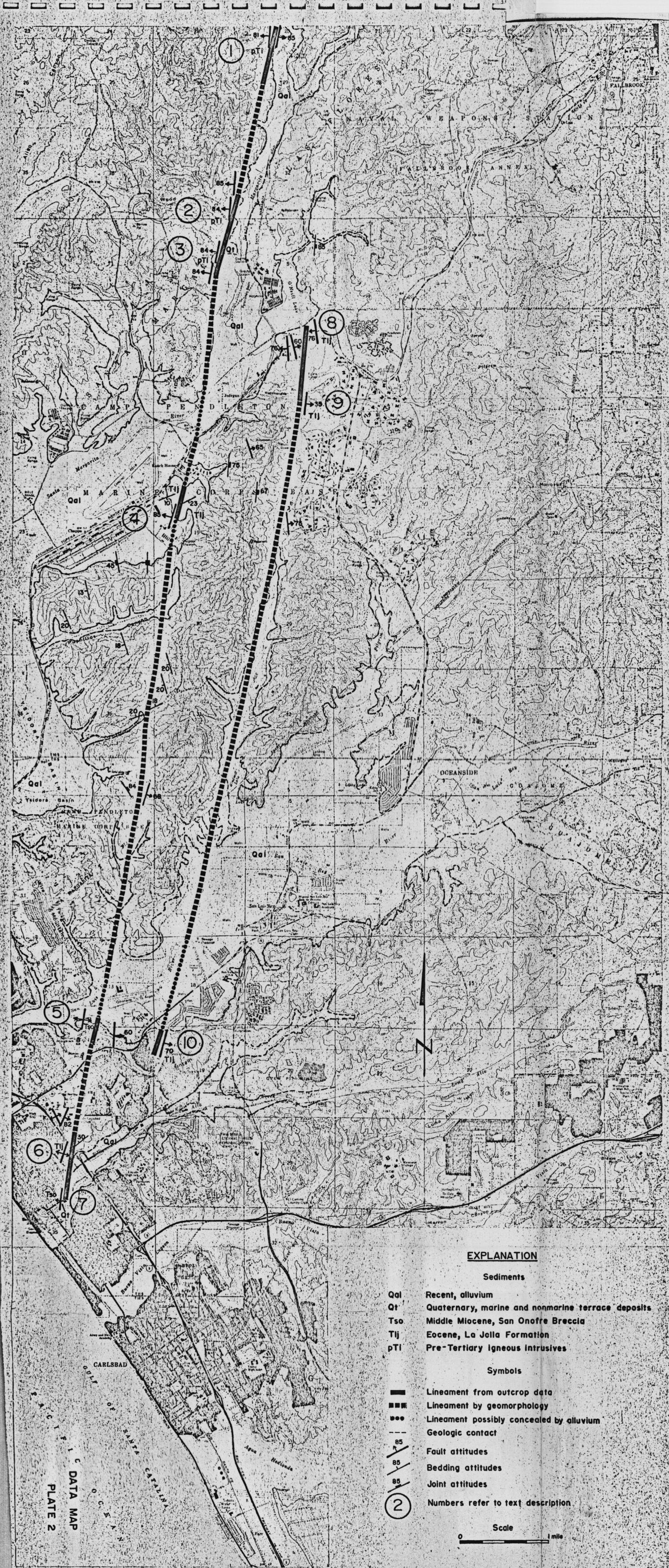


FIGURE 1

Location 9 : Fault Contact of Siltstone  
and Sandstone





**EXPLANATION**

**Sediments**

- Qal Recent, alluvium
- Qt Quaternary, marine and nonmarine terrace deposits
- Tso Middle Miocene, San Onofre Breccia
- Tlj Eocene, La Jolla Formation
- pTi Pre-Tertiary Igneous Intrusives

**Symbols**

- Lineament from outcrop data
- ▣ Lineament by geomorphology
- Lineament possibly concealed by alluvium
- - - Geologic contact
- 85 Fault attitudes
- 85 Bedding attitudes
- 85 Joint attitudes
- ② Numbers refer to text description

Scale  
0 1 mile