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SUPPLEMENT TO THE  
GENERALIZED SUB-SURFACE  
GEOLOGICAL AND GEOPHYSICAL STUDY

CAPISTRANO AREA  
ORANGE COUNTY, CALIFORNIA

NOVEMBER 1975

JANUARY 1979

Docket # 50-361  
Control # 800131014  
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## INTRODUCTION

In partial response to NRC question 361.35 regarding the Capistrano Embayment, this report was prepared to supplement and revise my November 1975 report "Generalized Sub-Surface Geological and Geophysical Study, Capistrano Area, Orange County, California" (6). The present report centers on interpretations of the relationship between onshore and offshore geologic structure in the vicinity of the San Onofre Site. The illustrations included in this report are based upon newly acquired onshore seismic data, recent geologic surface mapping, formerly acquired offshore seismic data (2), and re-examination of all former surface geology and all available onshore and offshore well data. A general discussion of the illustrations follow in order to demonstrate the bases of interpretation, but in particular, this report addresses response to parts (c), (d), and (e) of the above NRC question.

DISCUSSION OF ILLUSTRATIONSEXHIBIT A-1 - Generalized Contours Near Top of  
Monterey FormationGeneral Comments

To present a comprehensible picture that reflects relatively late tectonics involving an area partly covered by water, a regional sub-surface contour map, based upon the most shallow and youngest information, is necessary.

After reviewing horizons within the Capistrano Embayment, the top of the Monterey Formation was selected as the best and most shallow horizon that could be mapped onshore and offshore. The contact of the top of the Monterey onshore outcrop, as mapped by surface workers (1) is shown on this exhibit. Microfaunal data indicate beds near this contact range in age from the lower part of the Upper Mohnian to Lower Mohnian. Sub-surface control on this horizon is provided by wells (microfaunal and electric log data) and seismic profiles. Where applicable, contouring of this horizon has been guided by folds observed in outcrop.

Western Geophysical's seismic "B" horizon (2), which is a "time map" was used to compile the offshore part of this map. Time "picks" on Western's map have been converted to depth using Western's velocities.

An area of "no data" exists between the most landward offshore seismic shot points and the shoreline. However, information from Mobil "San Clemente" No. 1 core hole, depth values from the seismic profiles, and extrapolation of onshore surface and well data to the offshore area--indicate that Western's seismic "B" horizon is approximately equivalent

to the top of the Monterey as contoured onshore. In my opinion, the accuracy of the onshore and offshore contours being equivalent is within 200 feet in elevation of each other.

A faulted anticline is interpreted to lie within the "no data" area mentioned above because of the southwest dip of seismic reflectors and the northeast dip of beds exposed along the shoreline. The dip of onshore beds decreases southeasterly along the shore and becomes nearly horizontal at the San Onofre Site. Quaternary deposits cover most of the older sediments, and surface dip data is quite sparse in the San Mateo Point--San Onofre area.

My structural interpretation of the offshore area is approximately the same as Western's with the exception of the fault near the Mobil "San Clemente" No. 1 core hole. Western, on their "time" map of the "B" horizon, has interpreted a fault southwest of the core hole. I agree that minor faulting may be present southwest of this hole. However, considering the age of the formation (Lower Mohnian) near the sea floor at this location together with the seismic data on Line No. 123, I interpret the main and significant fault to be northeast of the core hole as shown on this exhibit. Evidence of this fault lies between shot points 87 and 99 where:

1. An offset of reflections appear along the axis of a syncline, and
2. The bottom of the syncline has no reflections that flatten as they normally do.

In addition, spurious events (possibly reflected refractions), that could have been generated by this fault, occur between shot points 123 and 99 (see Structure Section K-L).

GENERAL STRUCTURE

From the El Toro area to San Juan Capistrano the overall structural setting of the Capistrano Embayment is a north-south synclinal basin interrupted by some west to northwest trending arches and some minor northwest trending faults. From San Juan Capistrano southward into the offshore area the synclinal basin becomes a series of northwest trending folds and faults nearly parallel to the shore line. Farther to the southeast and southwest the dominant structure is a more homoclinal, dipping southwestward. The South Coast Offshore fault zone comprises the major fault structure offshore.

FAULTING - Response to part (e) NRC question 361.35

Faults that more or less bound the Capistrano Embayment, or are exposed in outcrop outside the Embayment, are the Cristianitos fault on the east and the many faults of the San Joaquin Hills on the west. Faults cutting the Monterey Formation interior to the embayment are relatively rare, but several are shown in Exhibit A-1 generally south of San Juan Capistrano. The more important of these are discussed below. For discussion purposes three new fault names are introduced; these are, from east to west, the "Carr", "Vaciadero", and "Offshore Dana Point" faults.

Evidence for the "Carr" fault includes surface mapping (3), (4), and (5), and sub-surface contour spacing based on closest well control. The fault strikes north-northwest and dips steeply southwest. Its vertical displacement is down to the southwest (see Structure Section C-B). Its trace is obscured on the surface over one mile onshore from the shoreline. However, the shoreward extremities of seismic

lines No. 108 and No. 125 have evidence of faulting with "down-to-the-southwest" displacement. This displacement may possibly be the offshore extension of the "Carr" fault.

At one local area near the onshore surface trace of this fault a thin veneer of Niguel Formation has been mapped showing possible disturbance by this fault (4). The age of the Niguel Formation is probably Late Pliocene (5). Although we find that, in general, the Niguel Formation in the Capistrano Embayment is relatively undisturbed, this possible evidence suggests that the latest movement on the "Carr" fault may have been during the Late Pliocene.

Evidence for the "Vaciadero" fault consists of sub-surface contouring based on local well control (dipmeter, paleontological, and electric log data). The fault plane is not exposed at the surface and is, therefore, believed to be older than the "Carr" fault. Its apparent direction of displacement, although larger, is the same as the "Carr" (see Structure Section C-B). Evidence of its strike is lacking. Its strike has been assumed to be similar to the "Carr" fault.

Evidence for the "Offshore Dana Point" fault consists of the low structural position of the seismic "B" horizon (approximate equivalent to the top of the Monterey) near the intersection of seismic lines No. 110 and No. 129 compared to the older surface rocks (San Onofre Breccia) cropping out at Dana Point. This suggests considerable vertical movement, down to the south (see Structure Section C-B). Evidence of "offset" of seismic reflections near the intersection of

line No. 110 and line No. 127 (SP 40), where a down-to-the-southwest displacement is indicated, is interpreted as the southeast extension of the "Offshore Dana Point" fault. If this fault is part of the Laguna Canyon fault zone onshore, as suggested by its alignment, and the two faults are contemporaneous, then the last movement of the "Offshore Dana Point" fault is probably no later than Upper Miocene.

The Dana Point fault has been mapped at the ground surface (1). Its dominant displacement appears to be vertical and down to the northeast, resulting in a horst block in the Dana Point area. Latest movement on this fault was also probably during the Upper Miocene.

The South Coast Offshore fault has been interpreted as a zone of faulting including displacements that are down to the southwest and down to the northeast. In occasional areas possible lateral displacement has been interpreted. Horst blocks within the fault zone have resulted from this variable direction of displacement. The fault zone also varies considerably in width (see Western's Horizon C map (2)). In addition, different age of movement has been involved since only older beds are disturbed in certain areas along the fault zone (see Structure Sections C-B, H-G, and I-J).

Only that part of the South Coast Offshore fault zone nearest the shore is seen at the seismic "B" horizon (near top Monterey). Evidence for this part of the fault zone is seen on seismic line No. 127, where labeled the "South Coast Offshore Fault", and on alignment toward the southeast, on seismic lines Nos. W-10, 145, WS 70-18, and 123.

However, the fault does not continuously displace this horizon although older beds may be disturbed. For example, the fault does not displace seismic horizon "B" on seismic lines Nos. 129 or 125. Some lateral movement (possibly 2500 feet) is suggested by offset contours near the intersection of seismic lines Nos. 145 and WS 70-18.

The Cristianitos fault appears to die out southerly at Monterey depth. However, along the projection of the Cristianitos fault, evidence of faulting of older beds can be observed on seismic line No. 106 (see Structure Section K-L).

Considerable minor faulting based on surface mapping (1) is shown in the central part of T8S, R7W, where Monterey crops out. Due to the lack of significant displacement of the top of the Monterey contact in outcrop, these faults are considered minor. At Monterey depth at more basinward positions the contours accordingly show minor to no displacement on these faults. Since the Niguel Formation, located farther north and west within the Capistrano Embayment has had relatively little fault disturbance, it is believed that movement on these faults in this area probably ceased during the Late Pliocene.

#### EXHIBIT B - Contours on Top of Cretaceous (Revised)

This exhibit, when formerly submitted under reference (6), was intended basically to demonstrate the Cristianitos fault at Cretaceous depth and its relationship to the January 1975 earthquakes.

The revised map, insofar as available data permits,

represents a better and more accurate regional interpretation of the area at Cretaceous depth because of newly acquired data and further study of faults in conjunction with the construction of the Monterey map, Exhibit A-1.

Most of the revisions of this map are confined to the southwestern portion from the Dana Point--San Clemente area northward into the northern part of T7S, R8W.

Newly acquired seismic data, specifically line No. 147 (discussed further below), contains information that supports the presence of a syncline, an anticline, and possibly, the Shady Canyon fault. The location of this line is plotted on this map and the interpretation of the structure at Cretaceous depth has been revised as shown by the contours.

The position of the Shady Canyon fault has been revised to conform with its interpreted location on line No. 147; that is, it is now shown about 1,000 feet northeast from its former location in the vicinity of line No. 147, but otherwise remains as shown on the original map.

The possible extension of the Shady Canyon fault southeast from the location of line No. 147 is based on Cretaceous well points to the east and estimates of Cretaceous depths west of the fault. More specifically, the Cretaceous depth, -5,360 feet at Roy Gill Krum No. 1, Section 7, T8S, R7W, is regionally fairly shallow. There are no deep holes southeast of the Shady Canyon fault except Roy Gill Forster No. 1, Section 13, T8S, R8W. This hole did not reach the Cretaceous, but it is estimated at -7,000 feet. I interpret this large difference of Cretaceous elevations between the above holes to be due to faulting--partly by the "Carr" fault (discussed above) and partly by the Shady Canyon fault (see Structure Section C-B).

The direction and length of the "Carr" and "Vaciadero" faults at Cretaceous depth have been changed to conform with the Monterey map where their displacement, direction, and length have been discussed above. These faults were not named in the original 1975 report but they can be identified on the original map by referring to Structure Section C-B.

An interpretation at Cretaceous depth of the Laguna Canyon and Temple Hill faults, plus some additional minor faulting have been added in the San Joaquin Hills area because they have been shown by former workers (1) and (4). They probably disturb the Cretaceous, and they show the direction of faulting in this area.

An interpretation is also shown at Cretaceous depth of the offshore anticline (near the shore line) cut by the "Dana Point", "Vaciadero", and "Carr" faults, (discussed above at Monterey depth).

Further Cretaceous mapping offshore was not attempted since the horizon would fall below the "Acoustic Basement" mapped by Western Geophysical (2). Seismic data is undiagnostic below this horizon offshore.

#### STRUCTURE SECTIONS

Sections A-B, D-E, C-B, and H-G accompanied the 1975 report (6) but they have been corrected to reflect revisions made on Exhibit B and to conform with the Monterey contours and faults shown on Exhibit A-1. Sections C-B and H-G have been extended seaward along seismic lines (2) and two additional sections, I-J and K-L have been prepared along

seismic lines to further demonstrate the geologic interpretation and relationship between the onshore and offshore in the vicinity of the San Onofre Site. Seismic horizons "B" and "C", mapped by Western Geophysical (2), have been converted to depth on these sections. The location of the South Coast Offshore fault zone, discussed above, is noted on the offshore portion of each section.

Section C-B shows the offshore anticline originating with a horst block (projected from Dana Point) and with considerable relief. Also, note that Section C-B shows the "B" horizon undisturbed by the South Coast Offshore fault zone. However, this horizon is shown offset by the landward edge of this fault zone on Section H-G.

Structure Section I-J was selected to fall directly under the San Onofre Site where a shallow hole bottomed at 989' in San Mateo Sands that appear in age to be equivalent to the lower part of the Capistrano. The offshore portion of this section is tied to seismic line No. WS 70-18, which illustrates the South Coast Offshore fault zone that forms a large horst block. The interpretation is partially supported by two shallow core holes, No. 92 and No. 93. These holes were drilled in 1968 by an oil group that was gathering data in preparation for offshore sales. These holes support the presence of a thin veneer of Quaternary and Uppermost Tertiary sediment in the offshore area. Based on these data, a thin, shallow interval of similar age sediments is presumed to be present also in the offshore portion of Section H-G and Section K-L.

Structure Section K-L is supported by the Mobil "San Clemente" No. 1 offshore core hole, total depth 6,130 feet,

seismic offshore data, and onshore surface geology. For reasons given under general comments, Exhibit A-1, the location of the fault immediately shoreward of the above core hole differs from Western Geophysical's interpretation (2). This fault is the landward edge of the South Coast Offshore fault zone.

#### Annotated Onshore Seismic Reflection Profiles

The following profiles (lines) have been annotated with geology and are discussed below in response to part (c), NRC question 361.35. The line locations are shown on Exhibits A-1 and B.

In general, these profiles have some value in relation to the dip of shallow beds and they have been used to support contours on Exhibit A-1. However, seismic reflections at Cretaceous depth are very poor and have less value. Line 147, the eastern part of line 152, and the Mobil vibroseis lines have partially aided the construction of the Cretaceous map, Exhibit B.

#### Seismic Line No. 152

The original records (1964), even with modern processing (1975), have resulted in very poor data to interpret. The eastward one-half of this line shows reflections with westward dip. The westward one-half has unreliable data at Cretaceous depth, however, some indication of minor folding at shallow depths occurs between shot points 21 and 28. Evidence of faulting is very weak and, without the benefit of surface geology and well data, the fault interpretation on the Cristianitos fault zone and branch faults

as shown on the annotated section could not be made. Only with the knowledge of the fault locations at the ground surface can the fault planes be extended in depth in the manner shown based upon the appearance of reflections. The dips shown on the fault planes are partly influenced by regional geologic evidence of westward dipping "down-to-the-west" movement on the Cristianitos and associated branch faults. Therefore, the seismic line alone, with no geologic supplementary data, has very little value in determining the age and capability of faults. It does, in general, help to confirm the west dip of the sediments east of the Cristianitos fault.

#### Vibroseis Line No. 8

This seismic section (1971) has slightly more useful data than N-152. Some evidence of faulting exists which can be interpreted without the aid of surface and sub-surface supplementary geologic information. The best fault evidence consists of the termination and apparent offset of reflections between shot points No. 190 and No. 200, which coincides with a surface fault that is a branch of the Mission Viejo fault. The Mission Viejo fault, however, which is a large fault, has little evidence of offset in the reflections. With the aid of surface geology and well data that falls on this line, a fairly good geologic interpretation is shown on this annotated seismic section. However, in respect to defining and evaluating the age and capability of faults, this seismic line alone--without surface and sub-surface geology has little value. Geologic structure section C-B, which falls partly on this seismic line, suggests that the Mission Viejo Fault and its branches

occurred sometime after the Lower Tertiary. With the surface geology, however, the reflections on vibroseis line No. 8 aid in determining the amount of fault displacement.

#### Seismic Line No. 147

This line was shot in 1954 and reprocessed in 1964 by Standard Oil. More useable data is present on this line than any other onshore seismic line examined in this area. Still the reflections are comparatively of low quality, but they do define an anticline and a syncline. Faulting is indicated where shown as the possible extension of the Shady Canyon Fault that is mapped on the surface in the San Joaquin Hills area to the northwest. A predominance of northward dipping reflectors (1.5 to 2.5 seconds) is shown on the section--mainly on the southern half. These data probably do not represent geology in the plane of the section. They are believed to be refractions from a source away from the plane of the section--possibly from faults located to the west on the eastern slope of the San Joaquin Hills. The section is supplemented by well data shown annotated along with an interpretation of the geology. Fault evidence is not strong, but the reflections indicate disturbance in the area where the Shady Canyon Fault is interpreted as possibly present. In this case the seismic data suggest that the latest movement on the Shady Canyon Fault was just prior to the deposition of the Monterey, probably during the Middle Miocene.

#### Seismic Line No. 160

This line was recently acquired from Standard Oil along with line No. 147. It was also shot in 1954 and reprocessed

in 1964 by Standard. Reflections on this line are very poor and there does not appear to be any substantial evidence to support faulting. Some minor folding is suggested in the more shallow beds as shown by the annotated geology. The poor data does partly support the general geology where the line is located on the contour maps-- Exhibits A-1 and B.

#### Well Data

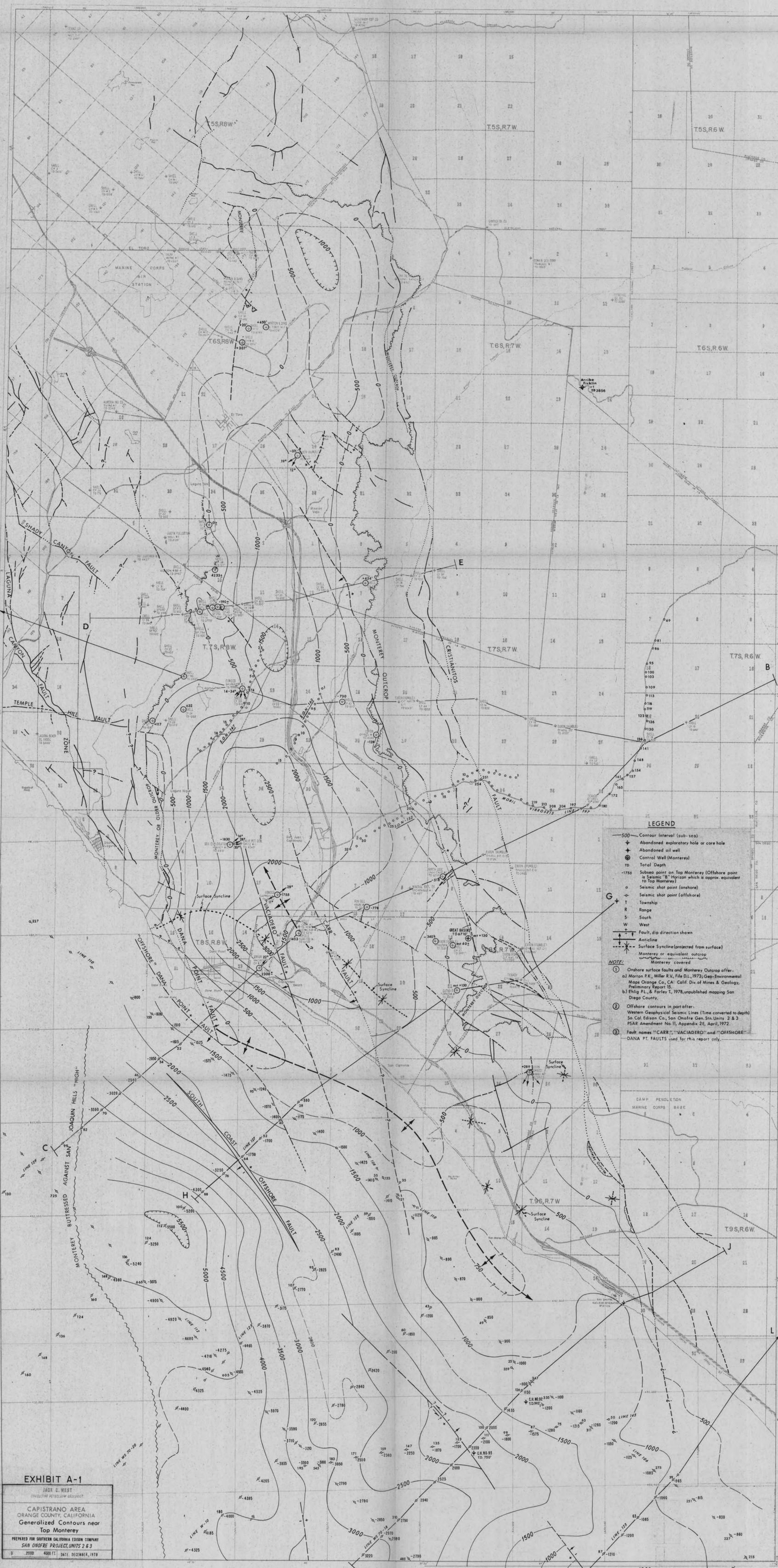
Well data comprise all available information pertaining to logs of "borings" requested under part (d) of NRC question 361.35. In August of 1977 all of the well data was compiled and annotated on electric logs of all holes that had run electric logs. The annotations showed in briefed form all significant data such as dipmeter, cores, sidewalls, tops of geologic horizons, fault interpretations, and paleontology. Where electric logs were not run the history and drillers log were compiled. All of these data were forwarded to the NRC in December 1977.

#### CONCLUSION

In addition to responses to specific portions of NRC question 361.35, this report includes an illustration (Exhibit A-1) of the most extensive, shallow, and mappable sub-surface horizon onshore and offshore in the San Onofre region. The interpretations shown on this and the additional illustrations suggest that the major tectonic activity within ten miles of the site took place prior to the termination of the Pliocene epoch, possibly two million years before present; and since that time the area has been tectonically quiet-- with the exception of the South Coast Offshore fault zone along which some movement probably occurred in the Late Pleistocene. Data that I have examined reveal no additional faults of this or younger age within about five miles of the San Onofre site.

SELECTED REFERENCES

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2. So. Calif. Edison San Onofre Nuclear Generating Station  
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3. VEDDER, J.G. 1959- Geologic Map of The San Joaquin Hills,  
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SCHOELLHAMER, J.E. County, California: U.S. Geological  
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4. EDGINGTON, W.J. 1974- Geology of The Dana Point Quadrangle,  
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Report 109
5. VEDDER, J.G. Revised geologic map, structure  
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Hills--San Juan Capistrano area,  
California; USGS Open File Report  
75-552
6. So. Calif. Edison San Onofre Nuclear Generating Station  
Company Units 2 and 3--Recent Geotechnical  
Studies, Southern Orange County,  
California, Vol. II, Enclosure 3,  
February 1976
7. EHLIG, P.L. Geology Map Adjacent to San Onofre  
FARLEY, T. Nuclear Generating Station--  
Unpublished 1978



**LEGEND**

- 500 Contour Interval (sub-sea)
- Abandoned exploratory hole or core hole
- Control Well (Monterey)
- Total Depth
- 1758 Subsea point on Top Monterey (Offshore point is Seismic "B" Horizon which is approx. equivalent to Top Monterey)
- Seismic shot point (onshore)
- Seismic shot point (offshore)
- Township
- Range
- South
- West
- Fault, dip direction shown
- Anticline
- Surface Syncline (projected from surface)
- Monterey or equivalent outcrop
- Monterey covered

**NOTE:**

- 1 Onshore surface faults and Monterey Outcrop after:
  - a) Morton P.K., Miller R.V., File D.L., 1973, Geop-Environmental Maps Orange Co., CA: Calif. Div. of Mines & Geology, Preliminary Report 15.
  - b) Ehlig P.L. & Farley T., 1978, unpublished mapping San Diego County.
- 2 Offshore contours in part after:
  - Western Geophysical Seismic Lines (Time converted to depth)
  - So. Cal. Edison Co., San Onofre Gen. Sta. Units 2 & 3 PSAR Amendment No. 11, Appendix 2E, April, 1972.
- 3 Fault names "CARR", "VACIADERO" and "OFFSHORE" DANA PT. FAULTS used for this report only.

**EXHIBIT A-1**  
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**CAPISTRANO AREA**  
 ORANGE COUNTY, CALIFORNIA  
 Generalized Contours near  
 Top Monterey  
 PREPARED FOR SOUTHERN CALIFORNIA Edison COMPANY  
 SAN ONOFRE PROJECT, UNITS 2 & 3  
 0 2000 4000 FT. DATE: DECEMBER, 1978





UNION

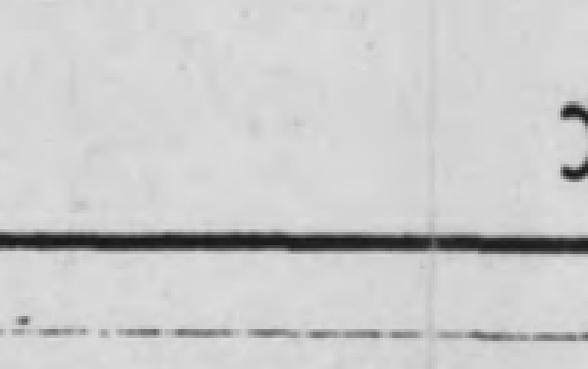
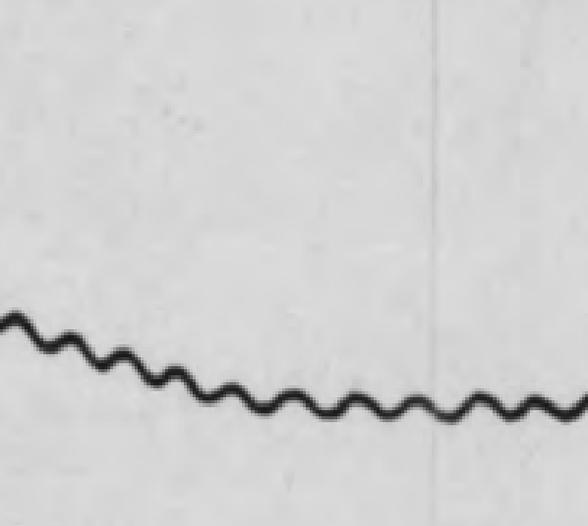
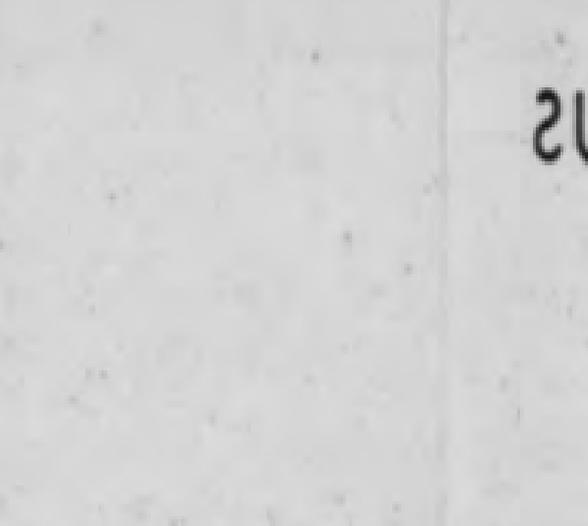
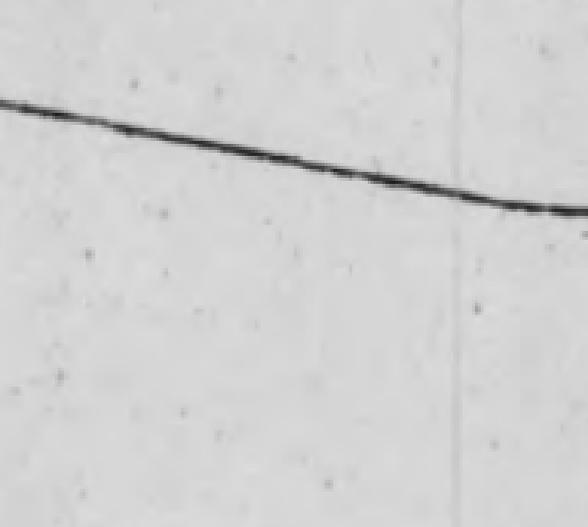
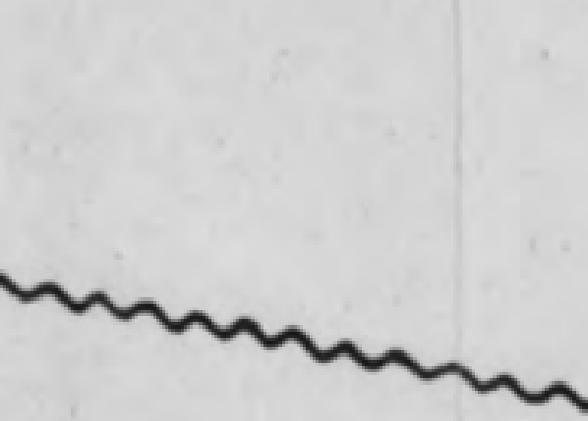
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MIGUEL

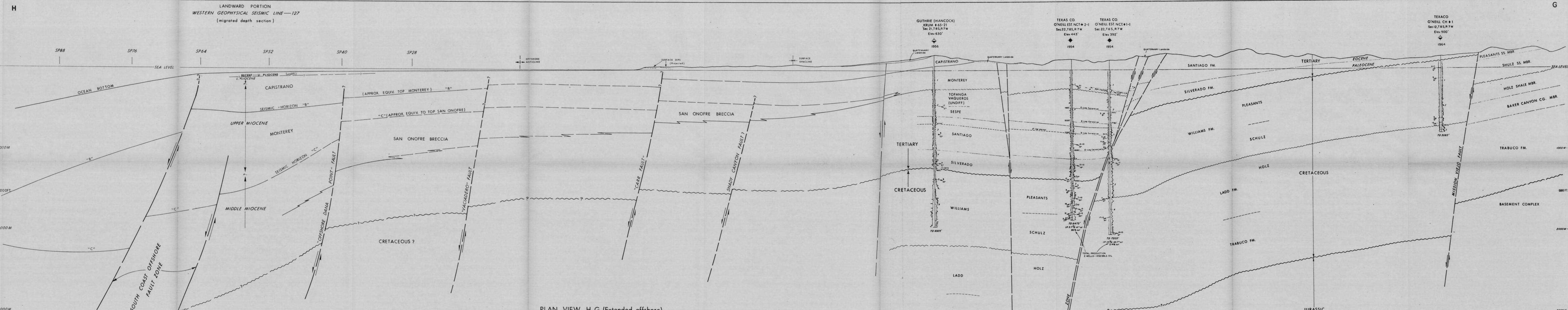
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MINERAL EXP

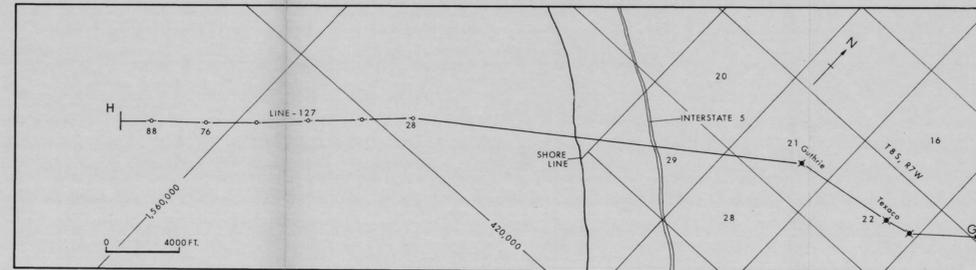
QUATERNARY Landslide





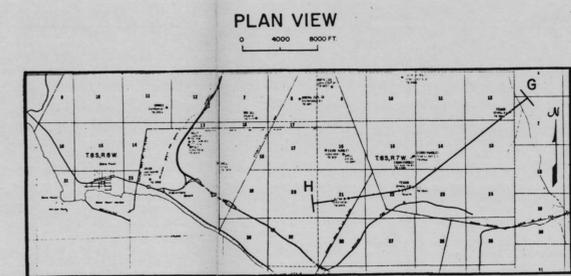


PLAN VIEW H-G (Extended offshore)



Offshore Sub-Surface Geology after Western Geophysical Company, in part: So. Calif. Edison Co., San Onofre Gen. Stn. Units 2 B 3, PSAR, Amendment No. 11, Appendix 2E, April 1972

SP = Seismic Shot Point



**LEGEND**

- ◆ Abandoned Oil Well
- ◊ Abandoned Exploratory Hole or Core Hole
- 1969 Year of Abandonment
- Electric Log Curve
- Core Direction (oriented to line of section 10° counter-clockwise)
- Core Direction (unoriented)
- Unconformable formation contact
- Conformable formation or member contact
- Interbedded or gradational marine and non-marine formation or member contact

TD = Total Depth  
 SEC = Section  
 T = Township  
 R = Range  
 S = South  
 W = West

SS = Sandstone  
 SH = Shale  
 CG = Conglomerate  
 LS = Limestone  
 FM = Formation  
 MBR = Member  
 (Undiff) = Undifferentiated

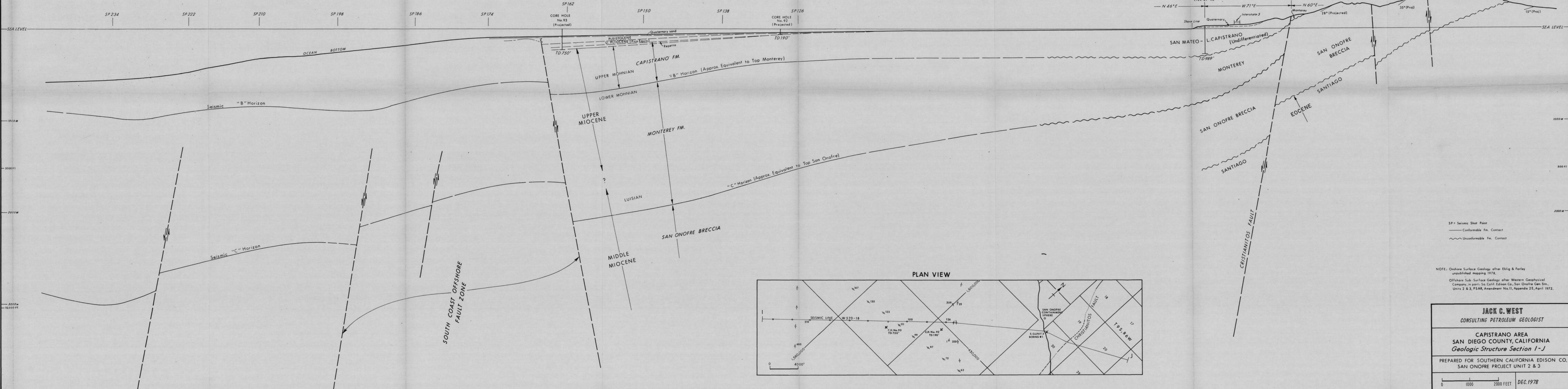
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**CAPISTRANO AREA**  
ORANGE COUNTY, CALIFORNIA  
GEOLOGIC STRUCTURE SECTION  
H-G

PREPARED FOR: SOUTHWESTERN CALIFORNIA EDISON COMPANY  
SAN ONOFRE PROJECT (LINE 127)

REV. DEC. 1978

LANDWARD PORTION  
WESTERN GEOPHYSICAL SEISMIC LINE WS 70-18  
(Migrated Depth Section)



SP = Seismic Shot Point  
 ——— Conformable Fm. Contact  
 ~~~~~ Unconformable Fm. Contact

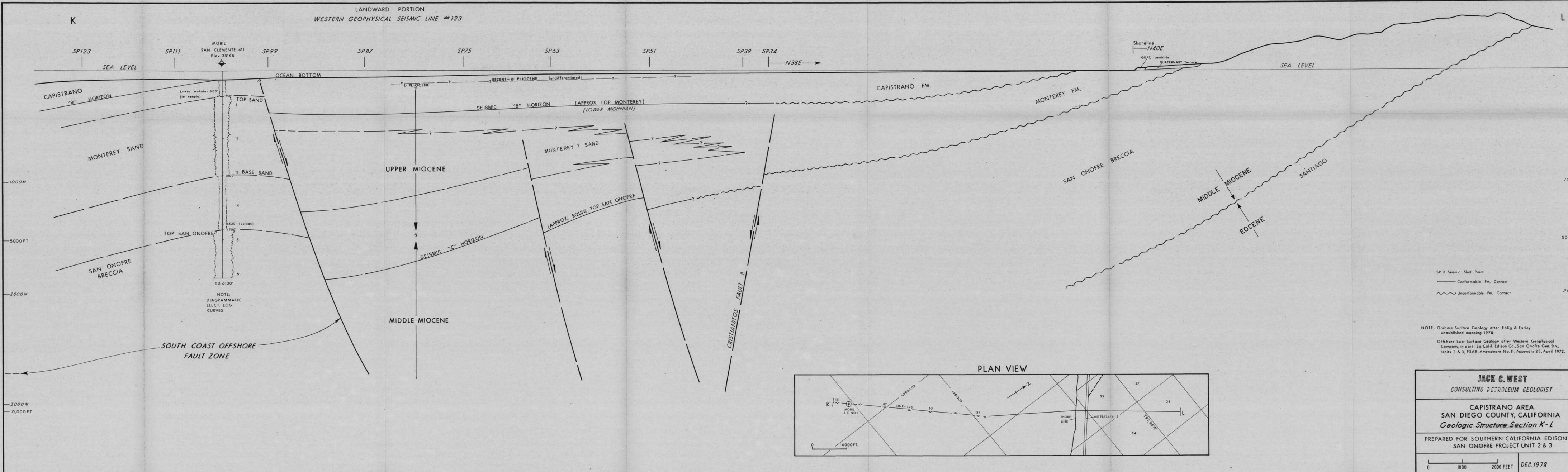
NOTE: Onshore Surface Geology after Ehlig & Farley unpublished mapping 1978.  
 Offshore Sub-Surface Geology after Western Geophysical Company, in part, So. Calif. Edison Co., San Onofre Gen. Stn., Units 2 & 3, PSAR, Amendment No. 11, Appendix 2E, April 1972.

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**CAPISTRANO AREA**  
 SAN DIEGO COUNTY, CALIFORNIA  
*Geologic Structure Section I-J*

PREPARED FOR SOUTHERN CALIFORNIA EDISON CO.  
 SAN ONOFRE PROJECT UNIT 2 & 3

0 1000 2000 FEET DEC. 1978



SP = Seismic Shot Point  
 ——— Conformable Fm. Contact  
 ~~~~~ Unconformable Fm. Contact

NOTE: Onshore Surface Geology after Ehlig & Farley unpublished mapping 1978.  
 Offshore Sub-Surface Geology after Western Geophysical Company, in part: So. Calif. Edison Co., San Onofre Gen. Stn., Units 2 & 3, PSAR, Amendment No. 11, Appendix 2E, April 1972.

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**CAPISTRANO AREA**  
 SAN DIEGO COUNTY, CALIFORNIA  
*Geologic Structure Section K-L*

PREPARED FOR SOUTHERN CALIFORNIA EDISON CO.  
 SAN ONOFRE PROJECT UNIT 2 & 3

0 1000 2000 FEET    DEC. 1978

LINE: N 152  
S.P.: 1-31

← SW

SOUTHERN CALIFORNIA EDISON COMPANY

PARTY 32  
SAMPLE RATE 4 MS.  
PROCESS: DIGITAL 100% RECORDS

LINE: N 152

DATUM PLANE: SEA LEVEL

RECORDING  
AMPLIFIER : FAST  
A. V. C. :  
DATE : SEPTEMBER, 1954  
SYSTEM : DYNAMITE  
FILTER : 25-47 50%  
SPREAD : 600-0-600  
S.P. INT. : 600 (VARIABLE)  
GRP. INT. : 55 (VARIABLE)  
PHONES / GRP : 3

PROCESSING  
1. TRANSCRIPTION  
2. REFORMAT  
3. DECONVOLUTION  
4. FILTER  
5. DYNAMIC AND STATIC CORRECTIONS  
6. DISPLAY

DECONVOLUTION INFORMATION  
TIME VARIANT MINIMUM PHASE INVERSE FILTER : MS.  
AUTO CORR. INT. : 3 ZONES OF 1675 32 MS.  
SEARCH ZONE : 32 MS.  
OPERATOR LENGTH : 172 MS.  
TIME ZONE : 0.0-5.0 SEC.

PLAYBACK  
DATE : JULY 17, 1975  
REEL : 52840

| TIME ZONE      | S.F. (FPS) | MS    |
|----------------|------------|-------|
| 0.0 - 0.5 SEC. | 50/54      | 58/56 |
| 0.5 - 1.0 SEC. | 14/24      | 44/38 |
| 1.0 - 1.5 SEC. | 10/24      | 32/36 |
| 1.5 - 2.0 SEC. | 8/24       | 20/36 |

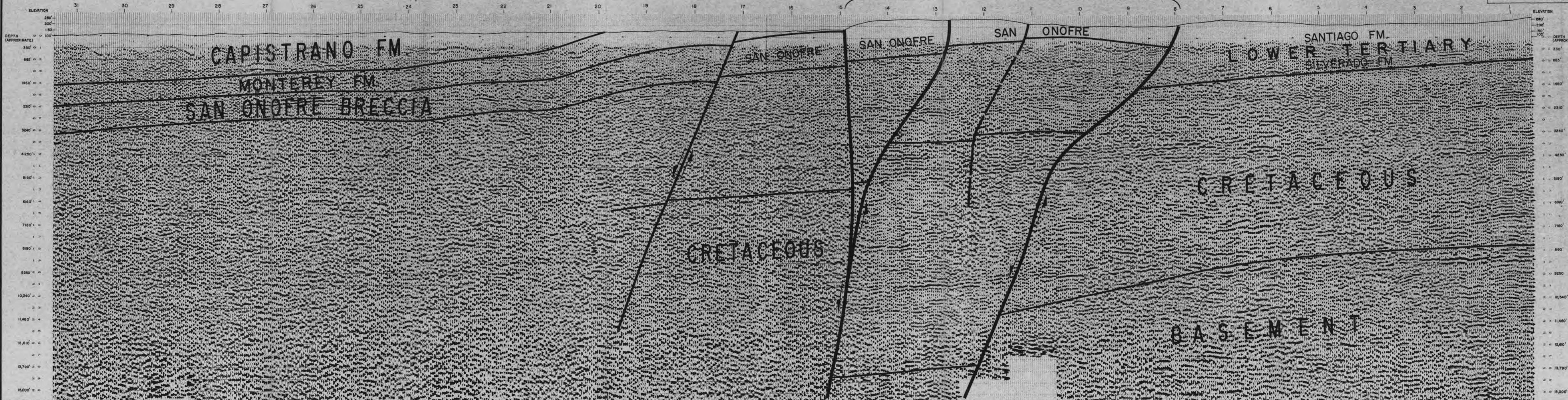
SOUTHERN CALIFORNIA  
EDISON COMPANY  
Seismic Line No. N 152  
PURCHASED FROM CHEVRON

GEOLOGIC ANNOTATIONS

By  
Jack C. West  
Consulting Petroleum Geologist  
Note: Original records shot in 1954

For shot point locations refer  
to map - contours near top  
Monterey - scale 1" = 4000'  
by J.C.W.  
December 1978

# CRISTIANITOS FAULT ZONE



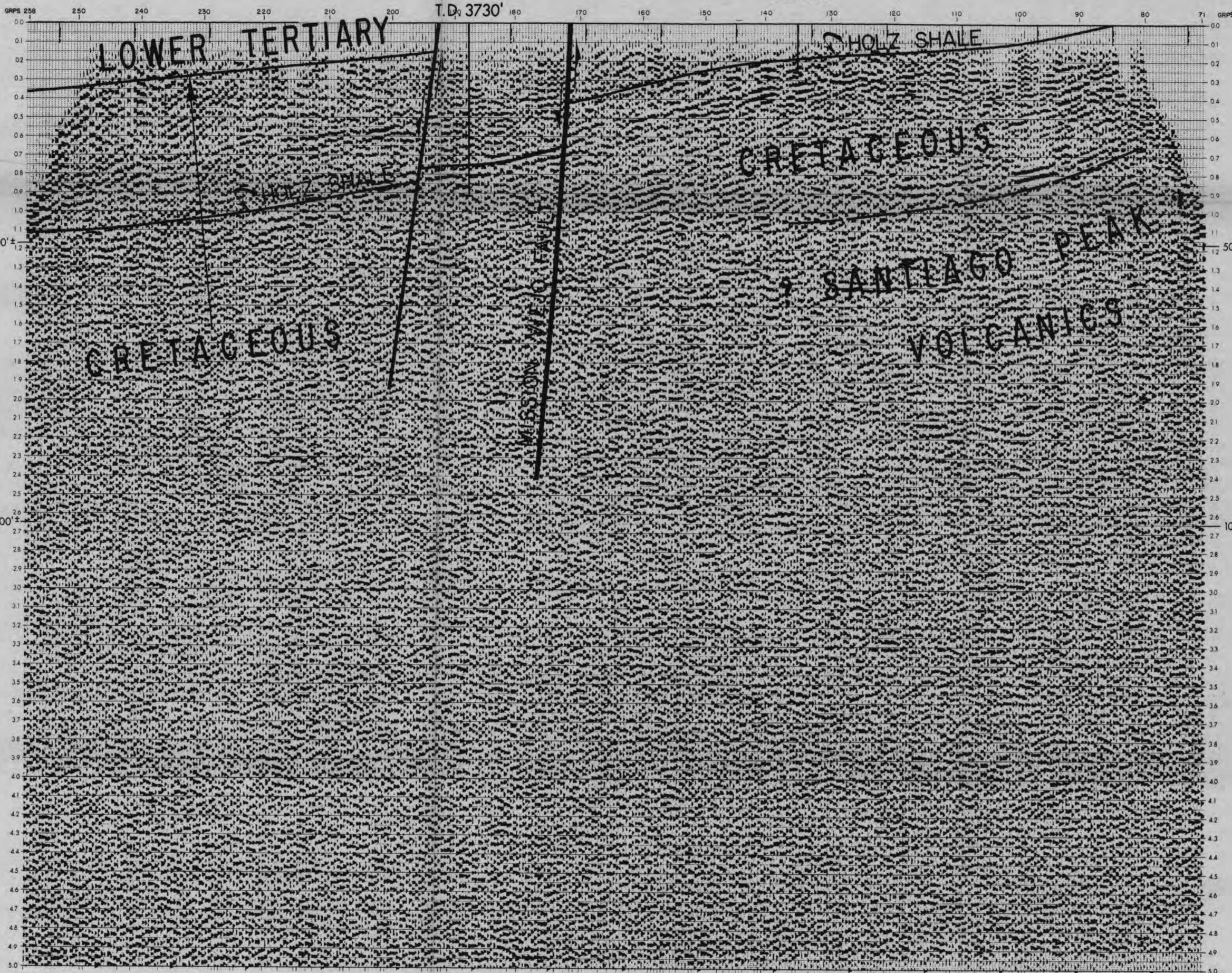


TEXACO  
ONEILL No. 2  
T.D. 3730'

SHELL CF No. 18  
T.D. 904'

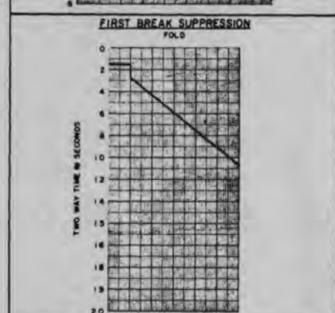
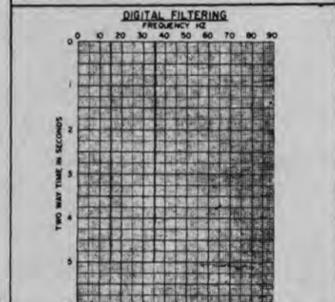
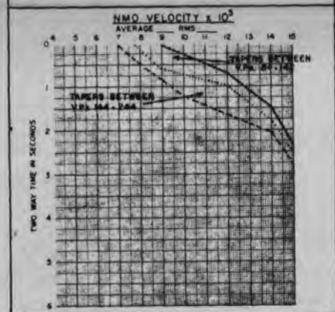
LINE 8  
V.P. 84-244  
AREA ORTEGA  
LOCATION ORTEGA HWY 74  
DATUM 320'

MOBIL OIL CORP.



**FIELD RECORDING DATA**  
RECORDED BY G.S. PARTY 02 DATE JAN. 1971  
ENERGY SOURCE VIBROSEIS SWEEP FREQ. 12.5 SWEEP LENGTH 1.5 SEC  
ENERGY PATTERNS VIBROSEIS IN LINE INSTRUMENT'S 0.000  
GROUP INTERVAL 500' GROUP PATTERN 3 LINE  
STANDARD SHOT POINT INTERVAL 400'  
STANDARD SPREAD 1800' 900' 0' 900' 1800'  
MULTIPLY 1/2 FOLD RECORDING FILTER 12/24.52  
AMPLITUDE CONTROL STRAIGHT SAMPLE RATE 3.00

**DIGITAL PROCESSING SEQUENCE**  
PROCESSING SAMPLE RATE 3.00  
1. DIVERSITY STACK  
2. CORRELATION  
3. TRACE EDIT  
4. GAIN REMOVAL AND TRUE AMPLITUDE RECOVERY  
5. VELOCITY ANALYSIS  
6. DATUM STATIC CORRECTION (CORRECTION VELOCITY 5000 FAL)  
7. NORMAL MOVEOUT CORRECTION  
8. RESIDUAL MOVEOUT CORRECTION  
9. RESIDUAL STATIC CORRECTIONS  
10. TIME VARYING TRACE EQUALIZATION  
11. 1/2 FOLD COMMON DEPTH POINT STACK  
12. FIRST BREAK SUPPRESSION  
13. TIME VARIANT DECONVOLUTION 12. PTS 3.00 MS  
NUMBER OF OPERATORS 4 GATE 4.500 SEC  
TIME VARIANT DIGITAL FILTER 12. PTS 3.00 MS  
14. DIGITAL FILTER 12. PTS 3.00 MS  
15. TIME VARIANT SCALING



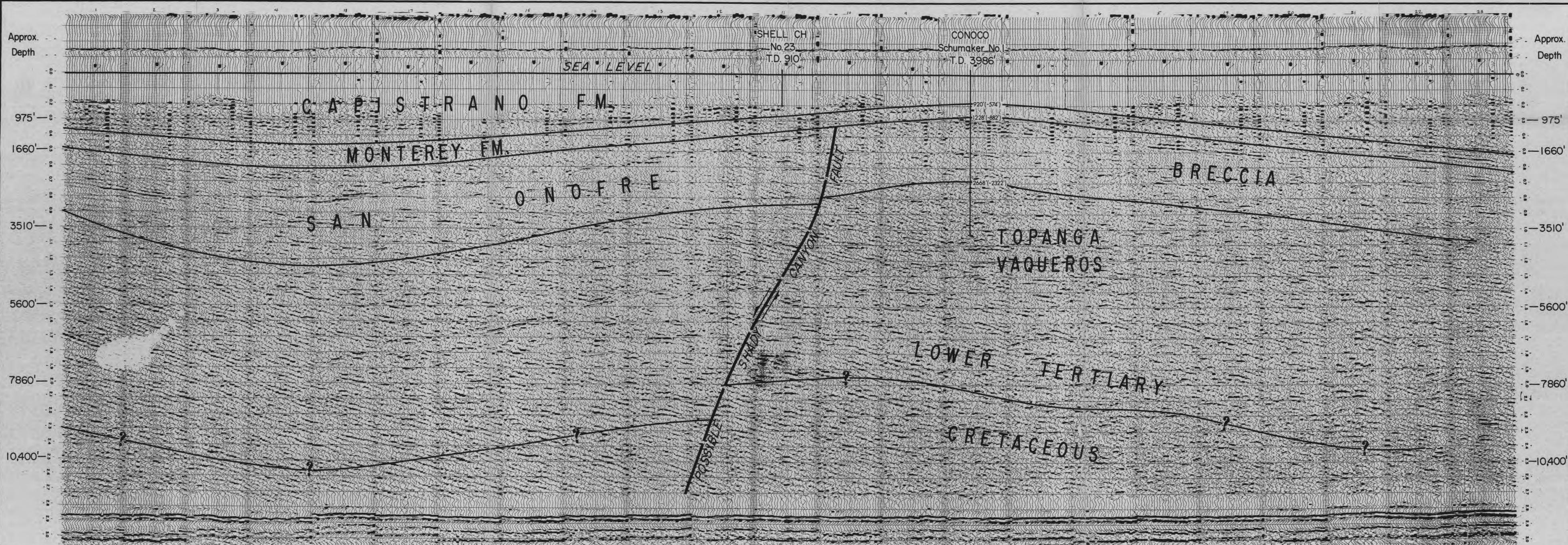
**DISPLAY DATA**  
ANALOG FILTER HIGH DULL LOW DULL  
ANALOG GAIN 12.5 2.5 ANALOG MIX NONE  
NORMAL X  
SCALE 100000 12 1000 10000 5 2000  
REC NO 1882 HTNO 0 138 830 REC NO 344 371  
QUALITY CONTROL CHECK  
APPROVED BY



SOUTHERN CALIFORNIA  
EDISON COMPANY  
Mobil Vibroseis Line No. 8  
PURCHASED FROM MOBIL

GEOLOGIC ANNOTATIONS  
By  
Jack C. West  
Consulting Petroleum Geologist

Note: Shot in 1971  
For shot point locations refer  
to map contours near top  
Monterey-shale 1" = 4000'  
by J.C.W.  
December 1978



LOG No. 147  
 PROFILES 1/23  
 AREA VENTURA  
 STATE OF CALIFORNIA  
 FOR W.G.T.  
 REQUESTED BY  
 RECORD PLAYBACK  
 FILTER CORR. 18/17K  
 WIG ST  
 GAIN 20  
 AMPS  
 DATE 1-21-62  
 ALTERN  
 FUNCTION LOG-F-028 CAM 3-17  
 GEOPHONE TYPE 802/AM  
 REMARKS

CHEVRON OIL COMPANY  
 DALLAS ANALYSIS GROUP

SOUTHERN CALIFORNIA  
 EDISON COMPANY  
 Seismic Line No. 147  
 PURCHASED FROM CHEVRON

GEOLOGIC ANNOTATIONS  
 By  
 Jack C. West  
 Consulting Petroleum Geologist

Note: Original records shot in 1954  
 For shot point locations refer to  
 map - contours near top  
 Monterey-shale 1" = 4000'  
 by J.C.W.

December 1978

