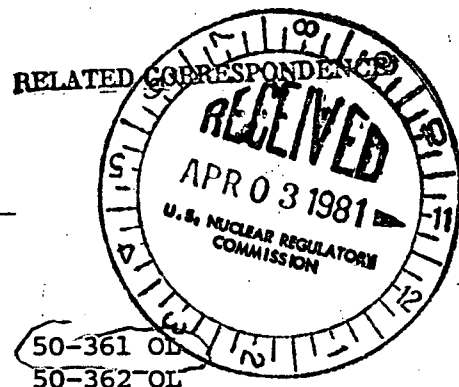


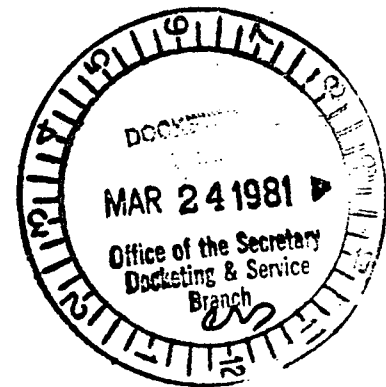
3/18/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



In the Matter of)
)
SOUTHERN CALIFORNIA EDISON COMPANY,)
)
ET AL.)
)
(San Onofre Nuclear Generating Station,)
)
Units 2 and 3)

Docket Nos. 50-361 OL
50-362 OL



INTERVENOR, FOE ET AL.
ANSWERS TO INTERROGATORIES
PROPOUNDED BY SOUTHERN CALIFORNIA EDISON

TO: SOUTHERN CALIFORNIA EDISON COMPANY, ET AL.:

Pursuant to Title 10, Part 2, Section 2.7406 of the Code of Federal Regulations, Intervenor, Friends of the Earth et al., in the above -entitled action hereby respond to the Third Set of Interrogatories to Intervenor, FOE, et al.

INTERROGATORY NO. 1

Do you contend that there exists geomorphic expressions or other geologic evidence on the OZD that could have resulted from ground motion related to an earthquake on the OZD of magnitude: (a) M 6.5?; (b) M 7.0?; (c) M 7.5?; and (d) M 8.0?

RESPONSE TO NO.1

- (a) Yes
- (b) Yes
- (c) Yes
- (d) Yes

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INTERROGATORY NO. 2

If any of your answers to Interrogatories 1 a,b,c, or d is yes, for each yes answer, (a) State each and every fact upon which you base this contention; (b) identify each and every document or communication upon which you base this contention; (c) identify each and every person with knowledge of the factual basis or bases for this contention, or on whose opinions, or testimony you base this contention; and (d) identify each and every person, expert or otherwise, whom you expect to call as a witness at the hearing before the Atomic Safety and Licensing Board in support of this contention, and as to each potential witness so identified provide the following information: (i) state the substance of the facts and opinions to which you expect the witness to testify; (ii) summarize the factual and theoretical basis, as well as any other grounds, for each opinion to which the witness is expected to testify; and (e) identify each and every event which you base this contention on.

RESPONSE TO NO.2

(a) Intervenor's contend that the geomorphic expressions and other geologic evidence on the OZD that could have resulted from ground motions related to earthquakes on the OZD of Magnitudes M 6.5, M 7.0, M 7.5 and M 8.0, do exist in the mapped length of geomorphic expressions, geologic evidence and mapped subsurface zones of deformation offshore on the OZD which indicate a continuous Zone of Deformation from Santa Monica to Baja. The mapped length of the OZD, also known as the Santa Monica to Baja Zone of Deformation, is approximately 390 kilometers long, because it extends into Baja along the Agua Blanca Fault Zone.

Intervenors agree with the statements in the NRC Staff Safety Evaluation Report of December 31, 1980, which describe Dr. Burt Slemmons' method of determining the maximum earthquake magnitudes by assuming that a fraction of the total length of a causative fault ruptures during an earthquake on that fault.

Dr. Slemmons' methodologies as described in the NRC Staff SER, allow calculations of earthquake magnitudes on the OZD in the range of Magnitudes 6.5 to 8.0. Using subsurface rupture lengths observed by means of seismic reflection profiles, Dr. Slemmons was able to use the earthquake magnitude versus length method to determine magnitudes on the OZD.

One approach used by Dr. Slemmons was to assume that the OZD is segmented and that the segments are indicated by the length of main rupture not at the surface or at shallow horizons, but at depth. The trace of the OZD at Horizon C as shown in the Applicant's consultant report (WCC, 1979, Figure D-1), for example shows that the segment of the OZD offshore of the San Onofre site has a total length of 62 kilometers. Applying the relationship of strike slip faults to magnitudes (Slemmons, 1977), leads to a maximum earthquake magnitude of $M_s = 7.1$. Assuming the values for segment lengths of 36, 27, and 48 kms provided by the Applicants in Table 361.66.1 of the FSAR, the maximum earthquake magnitudes are $M_s = 6.7$, 6.6 and 6.9, respectively.

"Another approach," as described in the NRC SER, 1980, "to determining maximum earthquake magnitudes is to assume that a fraction of the total length of a causative fault will rupture " (or has ruptured in the past historic earthquakes). "Since the fraction of the fault that is assumed to rupture varies over a wide range, Dr. Slemmons reviewed the world-wide data for strike slip faults to determine the fraction of total fault length that has accompanied earthquakes of $M_s=6$ or greater (Appendix E). The mean of the highest percentage for each fault was determined to be 22 percent of the total length of strike-slip faults. Dr. Slemmons applied this method to the OZD, assuming that the zone extends from the Santa Monica Fault to the San Diego Bay area. Based on a total length of 200 km, and assuming the mean fractional rupture length of 22 percent (44 km), a maximum magnitude $M_s=6.9$ is obtained. Using the fractional rupture length corresponding to the mean plus one sigma of 30 percent (60km) a maximum magnitude of $M_s= 7.1$ results."

"However, Greene and others (1979) define the OZD as a discrete belt that extends at least 240 km from near the Santa Monica Mountains into Baja California...The USGS in their 1972 report to the AEC (NRC) concluded that the OZD appears to

extend southeastward to at least the Mexican border and is at least 240 km in length."

"Dr. Slemmons indicates a possible connection of the OZD with the Coronado Banks fault and ultimately to the Agua Blanca Fault. If such a connection exists, the OZD would be 247 km long where it connected with the Coronado Banks Fault, and 300 km long where it extended to the Agua Blanca Fault. Assuming the mean fractional rupture length (22 per cent of the fault length), the respective earthquake magnitudes would be $M_s = 7.0$ and $M_s = 7.1$. The mean plus one sigma fractional rupture length (30 per cent of the fault length) results in estimated magnitude of $M_s = 7.2$ and $M_s = 7.3$, respectively."

Intervenors agree with the statements in the SER describing Dr. Slemmons' method of determining the maximum earthquake magnitudes by assuming that a fraction of the total length of a causative fault ruptures during an earthquake on that fault.

Thus, Intervenors contend that the geomorphic expressions and other geologic evidence on the OZD that could have resulted from ground motions related to an earthquake on the OZD of Magnitudes 6.5, 7.0, 7.5, and 8.0 exists in the mapped length of geomorphic expressions, geologic evidence, and mapped subsurface zones of deformation offshore on the OZD.

When you use Dr. Slemmons' methodology and assume that the OZD is continuous at depth with the Agua Blanca Fault Zone, the entire length of the zone is in excess of 390 kilometers, which yields magnitude estimates in excess of $M 8.0$. Also considering the possibility that the Agua Blanca is structurally related to the plate boundary spreading center in the Gulf of California, the Agua Blanca could be a major structural element in the plate boundary, which would result in magnitude estimates in excess of $M 8.0$, because of the effect of plate tectonics.

There is geologic evidence supporting the continuation of the OZD-Rose Canyon Fault Zone offshore to a structural relationship with the Coronado Banks and Agua Blanca Fault Zones. Kennedy and Welday (1980)

have mapped three strands of the Rose Canyon Bault Zone which continue offshore to the west of the San Diego Bay, and are named the Spanish Bight Fault, the Coronado Fault and the Silver Strand Fault. These faults are en echelon wrench faults and these faults apparently form a structural relationship between the OZD and the Agua Blanca Fault Zone. They first seem to intersect offshore from the Mexican American Border or to the south of the border.

A northward continuation of the Agua Blanca Fault has been shown by Legg and Ortega (1978) and by Krause (1965). There seems to be a large clustering of seismic activity on the Agua Blanca Fault offshore near Punta Salsipuedes. "This cluster of epicenters is dominated by an earthquake swarm occurring in April 1968 comprised of four events with magnitudes between 4.0 and 4.5 and many smaller events". (Legg, 1980).

Historic seismicity records indicate that the Newport-Inglewood-OZD Fault Zone experienced earthquakes of approximately 6.5 in 1800, 1812, and 1933. However, there are no Holocene geomorphic expressions or other geologic evidence remaining to document those ground motions that resulted from these earthquakes on the OZD, even as recently as 1933.

On the offshore portions of the OZD, the geomorphic expressions and geologic evidence near the surface of the ocean bottom, including the surficial offshore materials near San Onofre, are such that plastic deformation conceals the effects of the earthquakes of Magnitudes 6.5 to 8.0 which have occurred in the past on the OZD, in terms of shallow geologic features. The fact that ocean waters cover the offshore portions of the OZD tends to obscure the geologic evidence near the surface. Thus it is necessary to rely on other evidence for determining the geologic evidence at depth, such as the offshore seismic reflection profiling methods used by the Applicant, USGS, CDMG, et al.

(b) The NRC Staff Geosciences Branch SER, issued on December 31, 1980, including Appendix E by Dr. Slemmons; the USGS Open File Report # 81-115, 1981, "Scenarios of Possible Earthquakes Affecting Major California Population Centers, with Estimates of Intensity and Ground Shaking"; "Implications of Fault Patterns of the Inner California Borderland between San Pedro and San Diego, by Greene, et al., 1979, published by the San Diego Associations of Geologists for the Geological Society of America, in November, 1979, in a book entitled "Earthquakes and Other Perils in the San Diego Region"; that book also contained the following three reports, "Faulting Offshore San Diego and Northern Baja California" by Mark R. Legg and Michael P. Kennedy; "Active and Potentially Active Faults: San Diego County and Northernmost Baja Cal.," by Gordon Gastil et al; "Seismicity and Tectonics of the Inner Continental Borderland of Southern California and Northern Baja California Mexico" by Mark R. Legg, Master's Thesis, 1980, UCSD-SIO-IGPP; plus all documents cited in Intervenor's Answers to Interrogatory no. 24 (b) dated February, 1981; plus research by Mexican scientists at CICESE in Ensenada, Baja, Mexico, regarding the offshore extensions of the Agua Blanca Fault Zone, between Ensenada and Tijuana, Mexico.

(c) The authors of the reports listed in 2 b above.

(d) The authors of the reports listed in 2 b above.

(d)(i) The witnesses are expected to testify to the basis of the facts and opinions as stated in their published documents and communications listed in 2 b above plus any facts and opinions which may develop during additional new research between now and the ASLB hearings.

(d) (ii) The witnesses are expected to testify to the factual and theoretical basis, as well as other grounds, for each opinion summarized in the documents and communications listed in 2 b above plus any new research between now and the hearings.

(e) There are no specific events upon which this response and contention are based, other than the numerous earthquakes which have been recorded and noted in the historical seismicity records regarding the OZD and other Southern California and Baja fault zones.

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1. That he is Counsel for Intervenors, F.O.E. ET AL.
in this proceeding.

3. That he is informed and believes and upon such information and belief affirms that the foregoing "INTERVENORS ANSWERS TO THIRD SET OF INTERROGATORIES PROPOUNDED BY SOUTHERN CALIFORNIA EDUCATION" is true and correct.

Executed March 18, 1981 in San Diego, California.

Richard J. Wharton
RICHARD J. WHARTON, Attorney
for Intervenor,
F.O.E., ET AL.

CERTIFICATE OF SERVICE

I hereby certify that on the 18th day of March 1981, a copy of the foregoing INTERVENOR, E.O.E. ET AL. ANSWERS TO INTERROGATORIES PROPOUNDED BY SOUTHERN CALIFORNIA EDISON, Attorney, RICHARD J. WHARTON was served upon each of the following by depositing in the United States mail, first-class, postage prepaid, addressed as follows:

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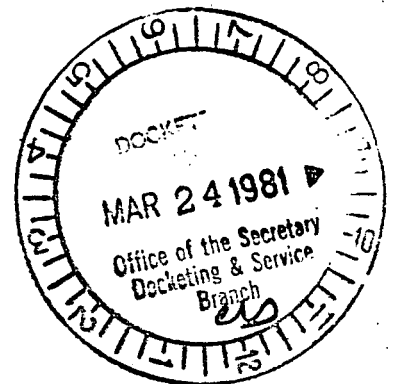
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Dated: March 18, 1981


RICHARD J. WHARTON, Attorney
for Intervenor
FRIENDS OF THE EARTH, ET AL.