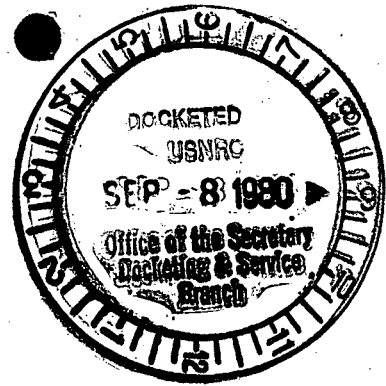


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9-4-80

6
7 UNITED STATES OF AMERICA
8 NUCLEAR REGULATORY COMMISSION

9 BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

10 In the Matter of)
11 SOUTHERN CALIFORNIA EDISON) Docket Nos. 50-361 OL ✓
12 COMPANY, ET AL.) 50-362 OL
13 (San Onofre Nuclear Generating) F.O.E. ET AL INTERROGATORIES
Station, Units 2 and 3) TO N.R.C. STAFF

14 F.O.E. ET AL hereby requests that the N.R.C. Staff, pursuant
15 to 10 CFR §2.740b, answer separately and fully, in writing under
16 oath or affirmation, the following interrogatories within four-
17 teen (14) days after service hereof. Each response to the
18 interrogatories below shall be under oath or affirmation of the
19 individual(s) who contributed thereto. For all references re-
20 quested in these interrogatories, identify them by author, title,
21 date of publication and publisher if the reference is published,
22 and if it is not published, identify the document by the author,
23 title, the date it was written, the qualifications of the author
24 relevant to this proceeding, and where a copy of the document
25 may be obtained.

26 The interrogatories set forth below are to be considered
27 N.R.C. Staff's continuing obligation. Accordingly, if, after
28 the N.R.C. Staff has answered these interrogatories, additional
information comes to their attention with respect to one or more

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1 of the answers, the answers should be amended in a timely manner
2 to provide such additional information.

3 INTERROGATORY NO. 1:

4 Is it possible that the Cristianitos fault has other sub-
5 parallel branches that have not yet been mapped?

6 INTERROGATORY NO. 2:

7 What data do you have to disprove the hypothesis that the
8 type A features observed in the site of excavation beneath Unit
9 2 are evidence of a branch of the Cristianitos fault?

10 INTERROGATORY NO. 3:

11 What data do you have to disprove the hypothesis that the
12 shear zones observed in the quarry and sea cliff approximately
13 1.7 miles northwest of the site are evidence of another branch
14 of the Cristianitos fault?

15 INTERROGATORY NO. 4:

16 What evidence do you have to disprove the hypothesis that
17 because the San Onofre Nuclear Generating Stations is underlain
18 by conjugate sets of fractures and shear joints, and because
19 these features are more exposed by excavations, that the struc-
20 tures and ground surface may experience greater seismic shaking
21 effects than when they were still buried?

22 INTERROGATORY NO. 5:

23 Has any study been made of those fractures known as feature
24 A, feature B, feature C and feature D which relates them to
25 potential rupture due to seismic shaking?

26 If so, please give a summary of the result of that study.

27 INTERROGATORY NO. 6:

28 What evidence do you have to disprove the hypothesis that an

1 earthquake offshore from SONGS with its epicenter several km south
2 of the reactors and south of the point at which the Cristianitos
3 and its branches intersect with the Offshore Zone of Deformation
4 could cause rupture propagation directed towards the branches of
5 the Cristianitos Fault and could cause amplification of ground
6 motions on the shoreline where the Cristianitos goes out to sea?

7 INTERROGATORY NO. 7:

8 Have you or your consultants ever requested the Applicants
9 to analyze the ground motions that would result at the SONGS 2 &
10 3 site from focusing effects (as described by Dr. Brune in
11 Testimony on Ground Motions at the Diablo Canyon hearings) that
12 could cause sympathetic ground motions on the Cristianitos fault
13 or its branches during an offshore earthquake on the Off-shore
14 Zone of Deformation?

15 "If the answer to the above question is yes, please submit
16 the results of such analysis."

17 INTERROGATORY NO. 8:

18 What evidence does the NRC Staff have to disprove the
19 hypothesis that the Newport-Inglewood-Rose Canyon-San Miguel
20 fault zone could generate an earthquake of M8 or larger because
21 of its structural relationship to the San Andreas System and the
22 transform Plate Boundary tectonics of the Gulf of California?

23 INTERROGATORY NO. 9:

24 What evidence does the NRC Staff have to disprove the
25 hypothesis that the Cristianitos Zone of Deformation and its
26 branches are part of a seismic gap?

27 INTERROGATORY NO. 10:

28 If either of the Off-Shore Zone of Deformation or the

1 Cristianitos Fault were in a seismic gap, what do you estimate
2 would be the recurrence interval for a Magnitude 6.8 earthquake?

3 INTERROGATORY NO. 11:

4 What research have you analyzed on the basement rocks be-
5 neath the depth of 10,000 feet on the Off-Shore Zone of Deforma-
6 tion to determine if there is one continuous fault at that depth?

7 INTERROGATORY NO. 12:

8 Have you considered the possibility of thrust faulting on
9 the Off-Shore Zone of Deformation?

10 INTERROGATORY NO. 13:

11 What peak ground acceleration at SONGS would you predict
12 from the maximum possible EQ due to thrust faulting on the
13 Offshore Zone of Deformation?

14 INTERROGATORY NO. 14:

15 Would you consider thrust faulting unusual or typical of
16 active wrench tectonic systems with conjugate faulting?

17 INTERROGATORY NO. 15:

18 Do you agree that microseismicity can indicate the presence
19 of active faults?

20 If you disagree please state the basis for your disagreement.

21 INTERROGATORY NO. 16:

22 Do you agree that accumulated stress on major faults can
23 be transferred to secondary faults or to en echelon strands or
24 to branches?

25 INTERROGATORY NO. 17:

26 How wide do you calculate the plate boundary system to be
27 in Southern California?

28 ////

1 INTERROGATORY NO. 18:

2 Do you agree that in a wrench tectonic model there is
3 rotation on the structural blocks?

4 If you do not agree, state the basis of your disagreement.

5 INTERROGATORY NO. 19:

6 Do you agree that wrench tectonic systems are characterized
7 by en echelon and subparallel faulting, and plastic deformations?

8 INTERROGATORY NO. 20:

9 Do you think that faulting at great depths on a plate
10 boundary would necessarily cause surface rupture?

11 INTERROGATORY NO. 21:

12 Do you have any data or evidence that would contradict the
13 hypothesis that movement on a single continuous fault in the base-
14 ment rocks of the Newport-Inglewood-Rose Canyon Fault Zone would
15 not necessarily cause surface faulting in the ductile sedimentary
16 deposits near the surface?

17 If so, please provide us with such data and evidence.

18 INTERROGATORY NO. 22:

19 Do you have any evidence that there is not one continuous
20 fault in the basement rocks along the Newport-Inglewood-Rose
21 Canyon-San Miguel-Zone?

22 INTERROGATORY NO. 23:

23 Do you agree with the statement, "little strong motion
24 data is available at distances of less than 10 km from the rup-
25 ture surface. Hence, estimates of ground motion at San Onofre
26 from a major earthquake along the hypothesized zone of deforma-
27 tion approximately eight km offshore from the site would have
28 significant uncertainty when based on empirical data"?

1 If not, state the basis for your disagreement.

2 INTERROGATORY NO. 24:

3 Do you believe that you have adequate data to predict
4 future seismicity on the Off-Shore Zone of Deformation by anal-
5 yzing historic records?

6 INTERROGATORY NO. 25:

7 How far would you estimate to be the extent of ground
8 strains and land deformations associated with the San Andreas
9 Fault System?

10 INTERROGATORY NO. 26:

11 Have you researched the report by Dr. Wayne Thatcher of the
12 USGS entitled "Horizontal Crustal Deformation From Historic
13 Geodetic Measurements in Southern California"?

14 INTERROGATORY NO. 27:

15 What evidence do you have to disprove the hypothesis that
16 faults parallel to the San Andreas Fault, such as the San Jacinto,
17 Elsinore and Newport-Inglewood, absorb stress from the seismic
18 motions on the plate boundary?

19 INTERROGATORY NO. 28:

20 How deep would you estimate to be the hypocenter of a
21 postulated earthquake on the Offshore Zone of Deformation?

22 INTERROGATORY NO. 29:

23 Explain your analysis of the relationships between the
24 hypocenter, epicenter, surface ruptures, and peak ground accel-
25 erations in the San Fernando earthquake?

26 INTERROGATORY NO. 30:

27 Have you or your consultants predicted ground accelerations
28 at SONGS 2 & 3 from an earthquake on the Offshore Zone of Defor-
mation with a magnitude of M7.0?

1 If so, what is said prediction?

2 INTERROGATORY NO. 31:

3 Have you or your consultants predicted ground accelerations
4 at SONGS 2 & 3 from an earthquake on the Offshore Zone of Deformation with a magnitude of M7.0?

6 If so, what is said prediction?

7 INTERROGATORY NO. 32:

8 Have you or your consultants predicted ground accelerations
9 at SONGS 2 & 3 from an earthquake on the Offshore Zone of Deformation with a magnitude of M7.5?

11 If so, what is said prediction?

12 INTERROGATORY NO. 33:

13 Have you or your consultants predicted ground accelerations
14 at SONGS 2 & 3 from an earthquake on the Offshore Zone of Deformation with a magnitude of M8.0?

16 If so, what is said prediction?

17 INTERROGATORY NO. 34:

18 Have you or your consultants predicted ground accelerations
19 at SONGS 2 & 3 from an earthquake on the Offshore Zone of Deformation with a magnitude greater than 8.0?

21 If so, what is said prediction?

22 INTERROGATORY NO. 35:

23 Do you agree that it is possible that a rupture propagating
24 on the Off-Shore Zone of Deformation could be oriented so as
25 to focus energy at the SONGS 2 & 3 site?

26 INTERROGATORY NO. 36:

27 Do you have any plans to conduct a microearthquake survey
28 of the Cristianitos Fault Zone?

If not, why not?

1 INTERROGATORY NO. 37:

2 Has the NRC Staff done a class 9 Accident Analysis for SONGS
3 1?

4 INTERROGATORY NO. 38:

5 Has the NRC done a site-specific class 9 Accident Analysis
6 for SONGS 2 & 3?

7 INTERROGATORY NO. 39:

8 What evidence does the NRC Staff have to disprove the
9 hypothesis that the "OZD" and its branches are part of a seismic
10 gap?

11 INTERROGATORY NO. 40:

12 Does the NRC Staff believe that an adequate data base
13 existed in 1964 at the time the AEC issued the construction
14 permit for siting nuclear reactors at San Onofre to determine
15 or predict the ground motions that could occur at the site?

16 INTERROGATORY NO. 41:

17 Does the NRC Staff believe that an adequate data base
18 existed in 1973 when the AEC issued the construction permit for
19 SONGS 2 & 3 to determine or predict the ground motions that could
20 occur at the site?

21 INTERROGATORY NO. 42:

22 Does the NRC Staff agree with scientists that it was not
23 until 1969 that the theory of plate tectonics was widely accepted
24 as the most logical explanation of earthquakes that occur around
25 the Pacific Ocean rim?

26 INTERROGATORY NO. 43:

27 What is the Richter Magnitude for the Design Earthquake
28 which the Applicants established with the AEC Staff for Unit One

1 during the Operating License Proceedings?

2 INTERROGATORY NO. 44:

3 Did the NRC Staff provide a formal written notice to the
4 AEC Staff, ASLB, or Commissioners, in the context of the
5 Operating Licensing Proceedings for SONGS Unit One, that in
6 October 1967, the Department of Interior published a report
7 which would require the Bolsa Island reactor to be designed for
8 a Safe Shutdown Earthquake of Magnitude 8.0 on the Newport-Ingle-
9 wood Fault Zone? If the answer is yes, cite the precise reference
10 where this notice was given.

11 INTERROGATORY NO. 45:

12 Did the NRC Staff ever provide a formal written notice
13 to the AEC, ASLB, or Commissioners, in the context of either the
14 Construction Permit or Operating License Proceedings for SONGS
15 Units 2 and 3, that in October 1967 the Department of Interior
16 had published a report that stated that the Bolsa Island Reactor
17 should be designed for a Safe Shutdown Earthquake of Richter
18 Magnitude 8 on the Newport-Inglewood Fault Zone?

19 INTERROGATORY NO. 46:

20 What Richter Magnitude have the NRC Staff predicted for the
21 Safe Shutdown Earthquake for Units 2 and 3 during the Operating
22 License Proceedings. Cite the precise reference for this pre-
23 diction.

24 INTERROGATORY NO. 47:

25 What Richter Magnitudes did the AEC Staff predict for the
26 Safe Shutdown Earthquake for Units 2 and 3 during the Construction
27 Permit Proceedings?

28 ////

1 INTERROGATORY NO. 48:

2 Does the NRC Staff agree that the OZD near SONGS 2 and 3
3 is an active fault capable of causing strong ground motions at
4 the reactor site?

5 INTERROGATORY NO. 49:

6 Does the NRC Staff agree that the OZD is structurally re-
7 lated to the Newport-Inglewood Fault Zone?

8 INTERROGATORY NO. 50:

9 Does the NRC Staff agree that the Newport-Inglewood Fault
10 Zone is an active fault which is capable of causing strong ground
11 motions at the SONGS site?

12 INTERROGATORY NO. 51:

13 When will the NRC Staff ask to initiate a research contract
14 with a consultant to analyze the ground motions at the site of
15 SONGS 2 and 3 that would result from a Magnitude 8.0 earthquake
16 on the Newport-Inglewood Fault Zone?

17 INTERROGATORY NO. 52:

18 Does the NRC Staff agree that one of the applicants consul-
19 tants, Woodward-Clyde, has recently published a report to the
20 California Coastal Commission regarding the siting of a LNG
21 facility at Camp Pendleton just south of SONGS, which predicted
22 that the facility would need to be designed for a Magnitude 7.25
23 earthquake on the Offshore Fault Zone?

24 INTERROGATORY NO. 53:

25 When will the NRC Staff request the Applicants to initiate
26 a research contract with a consultant to analyze the ground motions
27 at the site of SONGS 2 and 3 that would result from a Magnitude
28 [sic] 7.25 earthquake on the OZD?

1 INTERROGATORY NO. 54:

2 Has the NRC Staff considered the possibility that the SONGS
3 2 and 3 facilities are not designed to withstand an earthquake
4 on the OZD that is greater than a Magnitude of 6.5?

5 Cite a reference for such consideration.

6 INTERROGATORY NO. 55:

7 Does the NRC Staff agree that in the California Coastal
8 Plan issued in December 1975, the California Coastal Commission
9 stated that the California Coastal Zone is not a proper zone to
10 site nuclear reactors because of the severe seismic risks and
11 the proximity of population concentrations which would be ex-
12 posed to radiation hazards following earthquake damages to a
13 reactor?

14 INTERROGATORY NO. 56:

15 If the Applicants had not yet begun construction of SONGS
16 2 and 3, would the NRC Staff approve of an application for a
17 construction permit to construct more reactors at San Onofre,
18 considering the seismic hazards at that site?

19 INTERROGATORY NO. 57:

20 Given the Southern California tectonic setting, would the
21 NRC Staff agree that there is a component of stress on the
22 Cristianitos Fault?

23 INTERROGATORY NO. 58:

24 What evidence does the NRC Staff have that personnel at
25 SONGS 2 and 3, during future operations, could perform necessary
26 emergency procedures during and following a severe earthquake,
27 when their lives are being threatened by the circumstances?

28 ////

1 INTERROGATORY NO. 59:

2 Have the NRC Staff analyzed the tidal wave effects on
3 coastal structures for the earthquake which occurred [sic] in
4 the offshore region along the Pacific Coast of Colombia on Decem-
5 ber 12, 1979? If the answer is no, does the NRC Staff plan to
6 initiate an analysis of that earthquake?

7 INTERROGATORY NO. 60:

8 Does the NRC Staff agree that personnel [sic] would be more
9 likely to make mistakes in procedures, during an earthquake
10 scenario than under "normal accidental conditions"?

11 INTERROGATORY NO. 61:

12 What psychological studies can the NRC Staff cite [sic]
13 that support their arguments that operating personnel could re-
14 spond effectively to Earthquake circumstances at SONGS 2 and 3,
15 during a threat to their safety?

16 INTERROGATORY NO. 62:

17 What peak and effective ground accelerations (g values)
18 were the spent fuel rod pools at SONGS Unit 1 designed and built
19 for?

20 INTERROGATORY NO. 63:

21 Have the NRC Staff contracted with consultants to analyze
22 the directivity and focusing effects observed in the seismic
23 wave propagations and instrumental data in the records for each
24 of the following earthquakes:

- 25 a. The Long Beach earthquake of 1933;
- 26 b. The Santa Barbara earthquake of August 31, 1978;
- 27 c. The Coyote Lake earthquake of August 6, 1979;
- 28 d. The Imperial Valley earthquake of October 15, 1979;

1 and,

2 e. The Livermore Valley earthquake of January 24, 1980.

3 INTERROGATORY NO. 64:

4 Does the NRC Staff agree that the Applicants for SONGS 2 & 3
5 have maintained at least through March 1980 (see Applicants
6 Response of March, 1980 to Intervenor's Interrogatory #15, sub-
7 mitted on February 15, 1980) that (in their words) "the maximum
8 earthquake magnitude that may be conservatively associated with
9 OZD is M.6-1/2..." which is quoted from Applicants' Response
10 to NRC Staff Question 361.33?

11 INTERROGATORY NO. 65:

12 Does the NRC Staff agree that during the meeting with
13 Applicants and their consultants at the USGS headquarters in
14 Menlo Park, California, on September 12, 1979, that the Staff
15 advised the Applicants to consider the ground motions at the
16 SONGS site for earthquakes on the OZD with Magnitudes of 7, 7.5,
17 8.0, and 8.5, as noted in media accounts of that meeting?

18 INTERROGATORY NO. 66:

19 Why did the NRC shutdown the Vallecitos Nuclear Reactor
20 (GETR)?

21 INTERROGATORY NO. 67:

22 Why did the NRC shutdown the Humboldt Bay Reactor?

23 INTERROGATORY NO. 68:

24 Why had the NRC delayed operations at the Diablo Canyon
25 Reactors from 1973 until the present?

26 INTERROGATORY NO. 69:

27 Please compare the amounts and types of research on offshore
28 geology and seismology done by the Applicants at Diablo Canyon,

1 to that done by the Applicants for SONGS 2 and 3.

2 INTERROGATORY NO. 70:

3 Describe in detail the SEP Seismic Review for SONGS One,
4 including a list of what documents and reports or quarterly
5 summaries have been published in that review. Provide a copy
6 of each of these.

7 INTERROGATORY NO. 71:

8 Does the NRC Geosciences Branch agree with the following
9 statement made by NRC Staff Seismologist in a meeting with
10 earthquake engineers and geophysicists in San Diego County on
11 February 14, 1978, as published with the title "The Needs of
12 the NRC in the Field of Strong Motion Seismology":

13 "The most difficult problem we face today is estimating
14 strong motion in the vicinity of the earthquake source, i.e.,
15 the near-field. No nuclear power plant is intentionally placed
16 near a known earthquake source or "capable" fault but subsequent
17 investigations have revealed new faults and resulted in reassess-
18 ment of some old faults. The Humboldt Bay, Diablo Canyon, San
19 Onofre, and Vallecitos sites in California are the prime examples.
20 In order to determine whether facilities at these sites are
21 sufficiently safe as designed, need to be upgraded or need to be
22 abandoned, requires an assessment of motion near earthquake
23 sources where we have few measurements most of which are from
24 small earthquakes."

25 ///

26 ///

27 ///

28 ///

1 INTERROGATORY NO. 72;

2 What evidence do you have to disprove the hypothesis that
3 the San Miguel fault zone is structurally related to the Plate
4 Boundary System or Transform Zone in the Gulf of California?

5 DATED: September 4, 1980.

6 WHARTON & POGALIES

7
8 By: Janis K. Pogalies
9 RICHARD J. WHARTON,
10 Attorney for Intervenors
11 F.O.E. ET AL
12 by: JANIS K. POGALIES
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1 CERTIFICATE OF SERVICE

2 I hereby certify that on this 4th day of September, 1980,
3 a true and correct copy of the following documents:

4 1. F.O.E. ET AL INTERROGATORIES TO N.R.C. STAFF
5 was served upon each of the following by deposit in the United
6 States mail, first-class postage prepaid, addressed as follows:

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