RELATED CORRESPONDENCE

3/10/81

DAVID R. PIGOTT
SAMUEL B. CASEY
JOHN A. MENDEZ
CHICKERING & GREGORY
Three Embarcadero Center
Twenty-Third Floor
San Francisco, California 94111
Telephone: (415) 393-9000

CHARLES R. KOCHER
JAMES A. BEOLETTO
SOUTHERN CALIFORNIA EDISON COMPANY
P. O. BOX 800
2244 Walnut Grove Avenue
Rosemead, California 91770
Telephone: (213) 572-1900

Attorneys for Applicants
SOUTHERN CALIFORNIA EDISON COMPANY
and SAN DIEGO GAS & ELECTRIC COMPANY

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	Docket Nos. 50-361-OL 50-362 OL
SOUTHERN CALIFORNIA EDISON COMPANY, et al. (San Onofre Nuclear Generating Station, Units 2 and 3).	RESPONSE AND OBJECTIONS OF SOUTHERN CALIFORNIA EDISON COMPANY TO INTERVENOR FOE, ET AL.'S FIFTH SET OF INTERROGATORIES

TO INTERVENORS FRIENDS OF THE EARTH, MR. AND MRS. AUGUST CARSTENS, MR. AND MRS. LLOYD VON HADEN, MRS. DONIS DAVEY AND THEIR ATTORNEY OF RECORD:

Pursuant to 10 C.F.R. § 2.740b, Applicant Southern California Edison Company hereby responds to "INTERVENOR, FOE ET AL. FIFTH SET OF INTERROGATORIES TO SOUTHERN CALIFORNIA EDISON" which were served by mail on Applicants on February 19, 1981.

INSTRUCTIONS AND DEFINITIONS

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For purposes of the responses contained herein, the following definitions and instructions shall apply:

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(a) The term "these interrogatories" refers to "INTERVENOR, FOE ET AL. FIFTH SET OF INTERROGATORIES TO SOUTHERN CALIFORNIA EDISON" which were mailed to Applicants on February 19, 1981.

(b) The term "FOE et al." refers jointly to the intervenors propounding these interrogatories; namely, Friends of the Earth, Mr. and Mrs. August Carstens, Mr. and Mrs. Lloyd Von Haden, and Mrs. Donis Davey.

(c) The term "Applicants" refers jointly to the co-owners of San Onofre Nuclear Generating Station, Units 2 and 3, Southern California Edison Company and the San Diego Gas & Electric Company.

(d) The term "SONGS 2 and 3" refers to the San Onofre Nuclear Generating Station, Units 2 nd 3.

(e) The term "SCE" refers to the Southern California Edison Company. The term "SDG&E refers to San Diego Gas & Electric Company.

(f) The term "NRC" refers to the United States Nuclear Regulatory Commission.

(g) The term "FSAR" refers to the "Final Safety Analysis Report, San Onofre Nuclear Generating Station, Units 2 and 3," which Applicants believe is currently available to the public in the Public Documents Room of the Mission Viejo Public Library.

(h) Applicants occasionally refer to "Response to NRC Questions, San Onofre Nuclear Generating Station, Units 2 and 3." The Responses are formal submittals prepared by Applicants in response to formal written questions of the NRC. The Responses are found in four separate volumes and are included as

part of the FSAR. Applicants believe that the Responses are currently available to the public in the Public Document Room of the Mission Viejo Public Library.

(i) In all instances, SCE in response to these interrogatories has provided such relevant, unprivileged, non-confidential information that is responsive to each of these interrogatories and that has either been submitted to the NRC by or on behalf of SCE or is available from SCE files and personnel.

(j) Where the interrogatories ask whether Applicants have "analyzed" a document or subject, Applicants have defined analysis to be where Applicants or its consultants have reveiwed the document or subject in the context of SONGS 2 and 3 and have submitted a report of that review.

(k) The term "PSAR" refers to the "Preliminary Safety Analysis Report, San Onofre Nuclear Generating Stations, Units 2 nd 3" which Applicants believe is currently available to he public in the Public Documents Room of the Mission Viejo Public Library.

(l) Offshore Zone of Deformation ("OZD") as used in this proceeding is a hypotherized zone of deformation which as defined by the United States Geological Survey ("USGS") consists of the Newport-Inglewood Zone of Deformation, the South Coast Offshore Zone of Deformation and the Rose Canyon Zone of Deformation.

(m) The following named individuals have provided answers to these interrogatories on behalf of the Applicants:

Interrogatory Nos. 1, 2, 3, 4, 5, 8, 9, 12, 13, 23, and 24: Jay L. Smith;

Interrogatory Nos. 6, 18, 21, and 22: Hershel G. Hawkins;

Interrogatory Nos. 7 and 10: Edward G. Heath;

Interrogatory Nos. 11, 14, 15, 16, and 17: Perry Ehlig;

Interrogatory Nos. 19 and 20: John Barneich.

The objections have been asserted by Chickering & Gregory, counsel for Applicants.

(n) Where the interrogatories ask Applicants to: (i) state the substance of the facts and opinions to which you expect the witness to testify; and (ii) summarize the factual and theoretical basis, as well as any other grounds, for each opinion to which the witness is expected to testify, unless otherwise stated in Applicants response, it will be assumed that the individuals listed as potential witnesses will testify to the facts and opinions stated in the response to the specific interrogatory.

INTERROGATORY NO. 1:

Define the following terms:

(a) structurally related

(b) wrench fault

(c) wrench fault system

(d) wrench fault tectonics

(e) active tectonic system

(f) branch or splay

(g) seismic gap

(h) en echelon

(i) plate boundary

RESPONSE TO INTERROGATORY NO. 1:

(a) Structurally Related - Applicants consider this phrase to have the same meaning as "Structural Relationship" which Applicants have defined as a close association in terms of origin, tectonic style, or of a common source in space and time. "Tectonic style," is the total character of a group of related structures that distinguishes them from other groups of structures, in the same way that a building or art object distinguishes it from others of different periods or influences.

(b) Wrench Fault - A steeply inclined strike-slip fault.

(c) Wrench Fault System - A group of genetically related, sub-parallel, wrench faults occurring within a zone of crustal deformation. Members of the wrench fault system must all have experienced the same sense of displacement within a single tectonic regime but need not have formed at the same time nor have been active during the same time interval.

(d) Wrench Fault Tectonics - Crustal deformation resulting from strike-slip displacement along a deep-seated wrench fault. In the area of interest, the deformation typically involves sedimentary formations that were deposited across the top of the wrench fault.

(e) Active Tectonic System - Is a descriptive phrase rather than a technical term. Applicants construe the phrase to be a group of interrelated, large structural elements of the earth's crust characterized by demonstrable current or recurrent movement or seismic activity.

(f) Branch fault - A minor fault abutting against or

branching from a major one. Syn: Auxiliary fault. A splay fault, on the other hand, is one of a series of minor faults at the extremities of a major fault, representing the dying-out of a fault by dispersal into a number of smaller breaks.

(g) Seismic gap, has essentially two definitions. Specifically, it is an area along an active plate boundary that has not experienced a large thrust or strike-slip earthquake for more than 30 years (McCann and others, 1978). It has been more generally applied as a segment of an active fault zone that has not experienced a principal earthquake during a time interval when most other segments of the zone have (AGI, 1980).

(h) En echelon is the term used to describe geologic features that are in an overlapping or staggered arrangement, e.g. faults, each is relatively short, but collectively they form a linear zone in which the strike of the individual features is oblique to that of the zone as a whole; a steplike arrangement.

(i) Place boundary - The border or limit where two plates come together.

INTERROGATORY NO. 2:

For each of the terms listed in Interrogatory No. 1:

(a) Identify each and every document written authority or communication upon which you rely in defining each term;

(b) Identify each and every person, expert or otherwise, upon whom you rely in defining each term; and

(c) Identify any writings, opinions, or testimony of the person(s) you have listed in Interrogatory No. 2(b) upon which you rely in defining each term.

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RESPONSE TO INTERROGATORY NO. 2:

(1) Structurally Related.

(a) AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Webster's, 1978, New World Dictionary of the American Language, Second College Edition, D.B. Guralnik, Ed.; William Collins-World Publishing Co., Inc.

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(2) Wrench fault.

(a) AGI, 1980 Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Wilcox, R.E., Harding, T.P., and Seely, D.R., 1973, Basic Wrench Tectonics: AAPG Bull., v. 57(1).

Harding, T.P., 1973, Newport-Inglewood Trend, California- An example of Wrenching Style of Deformation: AAPG Bull. v. 57(1).

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(3) Wrench fault system.

(a) AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Webster's, 1978, New World Dictionary of the American Language, Second College Edition, D.B. Guralnik, Ed.; William Collins-World Publishing Co., Inc.

Wilcox, R.E., Harding, T.P., and Seely, D.R., 1973, Basic Wrench Tectonics: AAPG Bull., v. 57(1).

Harding, T.P., 1973, Newport-Inglewood Trend, California- An example of Wrenching Style of Deformation: AAPG Bull. v. 57(1).

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(4) Wrench fault tectonics.

(a) AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Webster's, 1978, New World Dictionary of the American Language, Second College Edition, D.B. Guralnik, Ed.; William Collins-World Publishing Co., Inc.

Wilcox, R.E., Harding, T.P., and Seely, D.R., 1973, Basic Wrench Tectonics: AAPG Bull., v. 57(1).

Harding, T.P., 1973, Newport-Inglewood Trend, California- An example of Wrenching Style of Deformation: AAPG Bull. v. 57(1).

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(5) Active tectonic system.

(a) AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Webster's, 1978, New World Dictionary of the American Language, Second College Edition, D.B. Guralnik, Ed.; William Collins-World Publishing Co., Inc.

Slemmons, D.B., Mckinney, R., 1977, Definition of "Active Fault"; Misc. Paper s-77-8, U.S. Army Engineer Waterways Experiment Station, Soils and Pavements Laboratory, Vicksburg, Miss., May 1977.

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(6) Branch fault; Splay fault.

(a) AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

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(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(7) Seismic gap.

(a) McCann, W.R., Nishenko, S.P., Sykes, L.R., Krause, J., 1978, Seismic gaps and plate tectonics: Seismic potential for major plate boundaries, (Abstract): EOS (Transactions of the American Geophysical Union), v. 59(12), p. 1124.

AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(8) En echelon.

(a) AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Webster's, 1978, New World Dictionary of the American Language, Second College Edition, D.B. Guralnik, Ed.; William Collins-World Publishing Co., Inc.

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

(9) Plate boundary.

(a) Dennis, J.G., and Atwater, T.M., 1974, Terminology of geodynamics: American Association of Petroleum Geologists; Bulletin, v. 58, p. 1030-1036.

AGI, 1980, Glossary of Geology, Second Edition, by R.L. Bates and J.A. Jackson, Editors, American Geological Institute, Falls Church, Virginia.

Webster's, 1978, New World Dictionary of the American Language, Second College Edition, D.B. Guralnik, Ed.; William Collins-World Publishing Co., Inc.

(b) and (c) The authors of the above plus Perry Ehlig and Jay L. Smith.

INTERROGATORY NO. 3:

Do you contend that the Cristianitos Fault does not extend southward for a distance greater than 6000 feet offshore from its coastal expression? If so,

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 3:

Yes.

(a) Applicant's position is based on the following:

(1) Seismic reflection profiles showing no evidence of faults having comparable characteristics and which are aligned with the Cristianitos fault beyond about 6000 feet from its coastal exposure;

(2) Surface and subsurface geologic mapping in the Capistrano Embayment indicating the style of movement on the Cristianitos fault is such that its greatest displacement is near its midpoint, approximately 10 miles north of SONGS, and dies out toward the south; and

(3) The maximum displacement of about 3000-4000 feet near its midpoint, when taken with only 600 feet of displacement to the south near the seacliff indicates that the Cristianitos fault should die out completely within a few thousand feet offshore.

(b) Appendix No. 1 - List of References is attached hereto and by this reference incorporated herein. Said Appendix lists and numbers many of the documents relied upon by Applicants in these responses. In response to Interrogatory 3(b), Applicants rely on document Nos. 1, 2, 7, 11, 14, 17, 20, 29, and 31.

(c) The authors of the above plus David G. Moore, Perry Ehlig and Jay L. Smith.

(d) David G. Moore, Perry Ehlig, Jay L. Smith.

INTERROGATORY NO. 4:

What do you contend is the minimum age of last displacement on the Cristianitos Fault?

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 4:

(a) The minimum age of last ground displacement on the Cristianitos fault is greater than 125,000 years, based on the Stage 5e marine terrace platform and deposits of that age which are not disrupted across the fault. In view of the fault's formation during a tectonic regime different from the modern one, and in a depositional environment that ceased during Late Pliocene time, the Cristianitos fault has probably not moved during the last 3 million years. At places where younger movement was suspected, investigation by trenching and mapping disclosed the absence of displacements of Holocene or older surficial deposits by the Cristianitos fault.

(b) These contentions are based on the following documents listed in Appendix No. 1; 1, 2, 7, 10, 11, 15, 16, 17, 20, 21, 30, 31 (I).

(c) Persons having knowledge of the factual bases for these contentions are the authors of the above plus Jay L. Smith, Perry Ehlig and Roy Shlemon.

(d) Potential witnesses at hearing are Jay Smith, Perry Ehlig, and Roy Shlemon

INTERROGATORY NO. 5:

Do you contend that the Cristianitos Fault is not a "capable fault". If so,

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 5:

Yes.

(a) Applicants' position is based on the facts that:

(1) There is demonstrable evidence in the seacliff

of no movement in at least the last 125,000 years,

(2) There is regional evidence of no movement during the last 3 million years,

(3) There is no historic seismicity associated with the fault,

(4) The Cristianitos fault is not structurally related to capable faults in the region, and it formed in an ancient tectonic environment and stress regime quite different from the modern one, and

(5) The mechanism of the fault's formation (listric normal, or gravity gliding westerly into the Los Angeles Basin) is no longer operating, and sediments filling the Basin effectively preclude further movement of the Cristianitos fault.

(b) Applicants position is based on the following listed in Appendix No. 1; 1, 2, 7, 10, 11, 15, 16, 17, 18, 20, 21, 30 and 31(1).

(c) Persons having knowledge of the factual basis of Applicants' position are the authors of the documents listed in (b), above, as well as Perry Ehlig, Roy Shlemon, Stewart Smith and Shawn Biehler.

(d) Potential witnesses at hearing are Perry Ehlig, Jay Smith, Roy Shlemon, Stewart Smith and Shawn Biehler.

INTERROGATORY NO. 6:

Do you contend that the OZD is the controlling geologic structure for seismic design of SONGS 2 and 3? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 6:

Yes. Applicants' position is based on the following:

(a) (1) The OZD is the closest, nearby geologic structure that can reasonably be associated with the Newport-Inglewood Zone of Deformation.

(2) The OZD has been assumed capable of generating very large earthquakes (M_s = 7.0)

(3) The OZD controls the peak spectral values as well as the peak ground acceleration.

(4) When compared to other sources of seismic activity in the region, the relative contribution from the OZD to the total probability of exceedance was 84-99%.

(5) Predicted MM intensities at SONGS from a major earthquake on the OZD are significantly higher than those from a

major earthquake on other nearby faults including the San Andreas.

(b) Applicants' position is based on the following documents listed in Appendix No. 1; 17 and 29. Additional references are:

(i) U.S. Atomic Energy Commission, 1972, Safety Evaluation Report, San Onofre Nuclear Generating Station, Units 2 and 3.

(ii) U.S. Nuclear Regulatory Commission, 1981, Safety Evaluation Report, San Onofre Nuclear Generating Station, Units 2 and 3.

(iii) Woodward-Clyde Consultants, 1980, Development of Instrumental Response Spectra with Equal Probability of Exceedence for SONGS, Units 1, for Southern California Edison Co.

(iv) U.S. Geological Survey, 1980, Scenarios of Possible Earthquakes Affecting Major California Population Centers, with Estimates of Intensity and Ground Shaking, Open-File Report 81-115.

(c) The authors of the above reports plus David Moore and Edward G. Heath.

(d) Potential witnesses are David Moore and Edward G. Heath.

INTERROGATORY NO. 7:

What do you contend is the maximum magnitude earthquake that could occur on the OZD?

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 7:

(a) The Applicant has concluded that a magnitude of M_s 6-1/2 is a reasonable maximum earthquake magnitude consistent with the geologic and seismologic features of the NIZD. Because the NIZD is considered to conservatively represent the earthquake potential of OZD, transferring M_s 6-1/2 to the OZD provides a degree of conservatism for the maximum magnitude estimate for the OZD opposite the site. Based on incorporation of additional conservatism through evalulation of ranges in slip rate data and review of other elements for assessing the degree of fault activity of the hypothesized OZD, the most conservative maximum magnitude is M_s 7. A larger earthquake is inconsistent with the geologic and seismologic features of the hypothesized OZD.

(b) Applicants rely on the references in Appendix No. 1; 9 and 18 as well as

(i) Response to NRC Questions 361.37 through 361.52, 361.60, 361.61, 361.66 and 361.67.

(ii) Statements and supporting data presented to the NRC Geoscience Branch at a public hearing at the Quality Inn, Los Angeles, Ca. on March 4, 1980.

(iii) U.S. Nuclear Regulatory Commission, 1981, Safety Evaluation Report for San Onofre Nuclear Generating Station, Units 2 and 3.

(c) The authors of the above referenced documents and more specifically, Edward G. Heath, Paul D. Guptill, Lloyd Cluff, W.U. Savage, Paul Sommerville, (all of whom are associated with Woodward-Clyde Consultants) David Hadley of Sierra Geophysics, and Karen McNally.

(d) Probable witness would be Edward G. Heath.

INTERROGATORY NO. 8:

What do you contend is the maximum magnitude earthquake that could occur on the geologic structural relationship between the OZD and the Cristianitos Zone of Deformation?

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 8:

(a) Applicants object to Interrogatory No. 8 on the ground that it is ambiguous and unintelligible. Said Interrogatory calls for assessment at a maximum magnitude earthquake that would occur on a "relationship." Earthquakes do not occur on "relationships." In order to expedite the licensing process, Applicants construe the interrogatory to call for an estimate of the maximum magnitude earthquake that could occur on the postulated Cristianitos Zone of Deformation. As so construed, Applicants contend that there is no geologic structure which relates the OZD to what intervenors postulate to be a Cristianitos Zone of Deformation and that there is no such structure capable of generating significant earthquakes.

(b) Applicants position is based on the totality of geologic evidence gathered as a part of the review of this site, none of which evidences a capable "Cristianitos Zone of Deformation."

(c) The person best able to address the issue on behalf of Applicants is David Moore.

(d) David Moore would be Applicants principal witness on the subject of offshore geology.

INTERROGATORY NO. 9:

What do you contend is the minimum age of last displacement on the South Coast Offshore Zone of Deformation portion of the OZD?

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 9:

(a) The minimum age of last ground displacement on the South Coast offshore fault is probably Pleistocene, and possibly

Holocene (within about the last 11,000 years). This is based on the fact that in some places the fault extends upward to the seafloor. The age of the seafloor and its sediments along the SCOZD is not known absolutely, but is probably Holocene. The SCOZD anticline developed during late Miocene through Pliocene time, with minor amounts of axial elevation during Pleistocene time, based on the pinch-outs of post-Monterey formations (Capistrano equivalents) against the anticline and on the apparent absence of all but the most recent marine terrace platform on the flanks and of crest at the anticline.

(b) Applicants rely on the documents listed in Appendix No. 1; 1, 2, 7, 11, 14, 17, 20, 29, and 31.

(c) The authors of the above plus David G. Moore, Perry Ehlig and Jay L. Smith.

(d) David G. Moore, Perry Ehlig, Jay L. Smith.

INTERROGATORY NO. 10:

What do you contend is the minimum age of last displacement on the Newport Inglewood Zone of Deformation portion of the OZD?

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 10:

(a) The latest displacement on faults of Newport-Inglewood zone of deformation occurred in the subsurface in association with the M_S 6.3 earthquake on March 11, 1933. The main shock and aftershock sequence from the 1933 earthquake have been assigned to the Newport-Inglewood zone of deformation. Appendix E of the Woodward-Clyde Consultants June 1979 report (see (b) below) anaylzes the displacement which occurred during the 1933 event.

(b) Woodward-Clyde Consultants' 1979 Report of the Evaluation of Maximum Earthquake and Site Ground Motion Parameters Associated with the Offshore Zone of Deformation, San Onofre Nuclear Generating Station, Appendix E; prepared for Southern California Edison Company, Rosemead, California.

(c) W. U. Savage, P. Sommerville, Edward G. Heath, and P. D. Guptill from Woodward-Clyde Consultants; K. C. McNally from California Institute of Technology; and D. Hadley from Sierra Geophysics.

(d) It is our present intention that Edward G. Heath and D. M. Hadley may be called as witnesses on this subject in the ASLB hearing.

(e) The March 11, 1933 earthquake centered near the Newport Beach occurred on the Newport-Inglewood zone of deformation.

INTERROGATORY NO. 11:

What do you contend is the minimum age of last displacement on the Rose Canyon Fault Zone portion of the OZD?

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 11:

(a) The oldest sediments reported to be not offset by the Rose Canyon fault were in San Diego where Ferrand and others (1981) reported that soils deposited 7800 + 500 years B.P. were not offset by the fault zone. The youngest sediments reported to be offset by the Rose Canyon fault zone are in the Mission Bay area where Liem (1977) reported fault separation younger than 27,000 years on the basis of radiocarbon dating.

(b) Ferrand, G. T., Bemis, C. G., and Jansen, L. T., Radiocarbon Dates of Alluvium, Rose Canyon Fault Zone, San Diego Co., Abstracts with Programs, 1981. G.S.A. International Meeting, March 25-27, 1981, Hermosillo, Sonoya, Mexico. T. J. Liem, 1977, Late Pleistocene Maximum Age of Faulting, Southeast Mission Bay Area, San Diego, California, in, Farrand, G. T., (ed.) Geology of Southwestern San Diego County, California and Northwestern Baja California; San Diego Association of Geologists Guidebook; and in Gastill, R. G., Kies, R., and Melius D. J., 1979, Active and Potentially Active Faults: San Diego County and Northernmost Baja California, in, Abbott, D. L., and Elliott, W. J., 1979, Earthquakes and Other Perils, San Diego Region, prepared for Geological Society of America Field Trip by San Diego Association of Geologists, November, 1979.

(c) The authors of the above documents plus Daryl Streiff of Woodward-Clyde Consultants and Perry Ehlig.

(d) The principal witness on this subject would be Perry Ehlig.

INTERROGATORY NO. 12:

Is it your contention that the postulated zone of

deformation which extends from the coastal exposure of the Cristianitos Fault toward the OZD dies out before reaching the OZD? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 12:

(a) As stated in the response to Interrogatory No. 8, we contend there is no Cristianitos Zone of Deformation as postulated by Intervenors. There are discontinuous gentle folds and short intraformational faults that trend north to northwest offshore between the coast and the SCOZD, but these: 1) are not extensions of the Cristianitos fault, 2) they veer southeastward to parallel the SCOZD before reaching it, and 3) their closest

approach to the South Coast Offshore fault is about 3000 feet. These folds and faults do not extend northerly to be exposed in the seacliff or elsewhere onshore indicating that they either die out landward or they are older than the San Mateo Formation (4-11 million years).

(b) For the factual bases of these contentions, and the documents and persons relevant to them, see responses to Interrogatory Nos. 3(b), 4(b), 5(b), and 8(b).

(c) The authors of the above references as well as David Moore, Perry Ehlig, Jay L. Smith, and Roy Shlemon.

(d) The principal witnesses would be David Moore, Perry Ehlig, Jay L. Smith and Roy Shlemon.

INTERROGATORY NO. 13:

Do you contend that there is not a structural relationship between the Cristianitos Fault and the OZD? If so:

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 13:

(a) Applicants contend there is no structural relationship between the Cristianitos fault and the OZD. This contention is based on the following:

1. They are not connected;

2. They have different tectonic styles (dip-slip/listric gravity glide vs. right-lateral slip);

3. Activity on the Cristianitos fault ceased about 3-4 million years ago and has not recurred for at least 125,000 years; the South Coast Offshore fault of the OZD has been active through Pleistocene and probably Holocene time;

4. The modern tectonic regime is dominated by general north-south compression that is not compatible with movement on the Cristianitos fault; and

5. Late Pleistocene/Holocene displacements on the South Coast Offshore fault of the OZD have demonstrably not been accompanied by movements on the Cristianitos fault for the last 125,000 years.

(b) The documents, communications and knowledgeable persons relevant to this contention are referenced in sub-part (b) to the responses to Interrogatory Nos. 1, 2, 3, 4, 5, 8, 9, 10, 12, 23, and 24.

(c) The authors of the documents referenced to in (b), above as well as David Moore, Perry Ehlig and Jay L. Smith.

(d) The principal witnesses on this issue would be David Moore, Perry Ehlig and Jay L. Smith.

(e) Not applicable.

INTERROGATORY NO. 14:

Do you contend that the OZD does not extend south of the Rose Canyon Fault Zone? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 14:

Yes - the bulk of evidence for faulting at the south end of the Rose Canyon fault zone consists of faults identified

by acoustic profiling in San Diego Bay and offshore of San Diego. This evidence strongly suggests that the RCFZ extends offshore of San Diego and not to the south through San Diego Bay. The character of faulting within the RCFZ changes in the southern portion of San Diego and becomes a wide zone of faulting characterized primarily by dip slip displacement. Current data indicates that the faulting within this wide zone dies out to the southwest prior to reaching the offshore projection of the U.S. - Mexican border (Moore and Kennedy, 1975, Kennedy and others 1977, and Kennedy and Welday, 1980).

Refraction, gravity and ground magnetic surveys conducted in the area south and southeast of San Diego Bay by Kennedy and others (1977) found no significant anomalies across possible southeast projections of fault mapped within the R.C.F.Z. Thus there is no evidence that the R.C.F.Z. extends south of San Diego Bay in the onshore area.

(b) Woodward-Clyde Consultants, June 1979, Report of the Evaluation of Maximum Earthquake and Site Ground Motion Parameters Associated with the Offshore Zone of Deformation, San Onofre Nuclear Generating Station; Southern California Edison Company and San Diego Gas and Electric, 1980, San Onofre Nuclear Generating Station Units 2 and 3, Responses to NRC Questions 361.41, 361.60, and 361.66; other pertinent documents are discussed in the above-mentioned reports.

(c) Edward G. Heath, Daryl Streiff, Perry Ehlig, M. P. Kennedy, E. E. Welday, G. W. Moore, H. G. Greene.

(d) The principal witnesses would be Perry Ehlig and Edward G. Heath.

INTERROGATORY NO. 15:

Do you contend that there is no structural relationship between the Rose Canyon Fault Zone and the Vallecitos Fault in Baja, California? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 15:

(a) Yes - Field mapping shows that the Vallecitos fault does not extend northwestward into the eocene bedrock terrane in Northern Valle De Las Palmas. Based on this evidence the Vallecitos fault is either pre-eocene in age or terminates south of the eocene terrane. This large separation in either time or space precludes a structural relationship between the two zones.

(b) This conclusion is based on data and references used in Responses to NRC Questions Nos. 361.41b, 361.60, and 361.66. Published documentation comes from references listed for each of the above listed responses to NRC questions.

(c) Daryl Streiff, Perry Ehlig, Gordon Gastill, Kennedy, M. P., R. P. Phillips, E. C. Allison, R. Kies, D. J. Malius, E. E. Welday.

(d) The principal witness would be Perry Ehlig.

INTERROGATORY NO. 16:

Do you contend that there is not a structural relationship between the Rose Canyon Fault Zone and the San Miguel Fault in Baja, California? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 16:

(a) Yes - Field mapping indicates the San Miguel fault terminates to the northeast of Valle San Rafael without affecting Cretaceous dikes in this region. The northern termination of the San Miguel fault is 54 miles from the southern terminous of the Rose Canyon fault zone. This large separation of the two fault zones precludes a structural relationship between them.

(b) This conclusion is based on data and references used in Responses to NRC Questions Nos. 361.41b, 361.60, and 361.66. Transcript of Presentation to ACRS subcommittee on January 31, 1981.

(c) Perry Ehlig, D. Streiff, Gordon Gastill, R. P. Phillips, E. C. Allison, R. Kies, D. J. Melius, M. P. Kennedy, G. Shor, E. E. Roberts.

(d) The principal witness would be Perry Ehlig.

INTERROGATORY NO. 17:

Do you contend that there is not a relationship between the OZD and the San Andreas? If so:

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 17:

There is no structural relationship between the San Andreas fault and the OZD. The San Andreas is a relatively simple transform fault forming the boundary of the Pacific and North American plates for a distance of 1100 km between the Gulf of California spreading system and the Mendocino triple junction (Atwater, 1970; Allen, 1981).

The OZD does not interconnect with the San Andreas fault or the Gulf of California spreading system and is not part of the present Pacific and North American plate boundary. The northern end of the OZD terminates against reverse faults along the Southern edge of the Santa Monica Mountains (Barrows, 1974). There is no interconnection between the southern termination of the OZD and the Gulf of California spreading system. The OZD is a secondary feature within the Pacific plate and not part of the San Andreas fault.

(b) (1) Allen, C.R., 1981, The Modern San Andreas; in W. G. Ernst (ed.) The Geotectonic Development of California,

Prentice-Hall, p.511-534.

(2) Atwater, Tanya, 1970, Implications of Plate Tectonics for the Cenozoic Evolution of Western North America; Geol. Soc. A. Bull., V.81, p.3513-3536.

(3) Barrows, A.G., 1974, A Review of The Geology and Earthquake History of the Newport Inglewood Structural Zone, Southern California; Calif. Div. Mines and Geology, Special Report 114, 115 p.

(c) The authors of the above documents as well as Perry Ehlig, Jay L. Smith and Edward G. Heath.

(d) The principal witness on this subject would be Perry Ehlig.

INTERROGATORY NO. 18:

Do you contend that .67 g is the proper design acceleration value for SONGS 2 and 3?

RESPONSE TO INTERROGATORY NO. 18:

As more fully discussed in Applicants response to Interrogatory No. 19, Applicants consider .67g to be an overly conservative design value for SONGS 2 and 3.

INTERROGATORY NO. 19:

If your answer to Interrogatory No. 18 is Yes:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 19:

(a) Factual data upon which the conservatism of 0.67g as a design basis have been summarized in the 31 January 1981 Advisory Committee for Reactor Safeguards (ACRS) subcommittee meeting held in Inglewood, California, and the 5 February 1981 ACRS full committee meeting held in Washington, D.C. Specifically, Dr. McNeill's testimony in both meetings summarizes the conservatism utilized in both meetings in developing the 0.67g design acceleration and describes studies that have been carried out over the past several years that test the conservatism of the 0.67g. Basically, the elements of conservatism were tested based on three categories of study: (1) empirical data evaluations; (2) deterministic evaluation by physical modeling; and (3) probabilistic consideration of the data. The results of these studies unequivocally show the 0.67g acceleration to be a very conservative design basis for SONGS 2 and 3.

(b) The following documents are the basis for the above stated contention.

1. Preliminary Safety Analysis Report (PSAR) for Volume 2, 3, and 4, San Onofre Nuclear Generating Station, Units 2 and 3.

2. Final Safety Analysis Report (FSAR) for San Onofre Nuclear Generating Station, Units 2 and 3, Volumes 4, 5, 6, 7, 9, and 10.

3. Responses to NRC question 361.52 through 361.59, 361.62, 361.64, 361.65, and 361.68 for San Onofre Nuclear Generating Station, Units 2 and 3.

4. Report of the Evaluation of Maximum Earthquake and Site Ground Motion Parameters associated with the Offshore Zone of Deformation, San Onofre Nuclear Generating Station, prepared by Woodward-Clyde Consultants, June 1979.

5. Evaluation of Peak Horizontal Ground Acceleration Associated with the Offshore Zone of Deformation at San Onofre Nuclear Generating Station, prepared by Tera Corporation, July 1980.

6. Transcripts of the 31 January 1981 ACRS subcommittee meeting and 5 February 1981 ACRS full committee meeting.

7. Development of Instrumental Response Spectra with Equal Probability of Exceedance for SONGS Unit 1.

(c) The authors of the above documents as well as J. A. Barneich, K. W. Campbell, G. A. Frazier, I. M. Idriss, R. L. McNeil, K. Sadigh, W. U. Savage, S. W. Smith, L. H. Wight.

(d) The principal witnesses on the above subject would be R. L. McNeill, G. A. Frazier, I. M. Idriss, and S. W. Smith.

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INTERROGATORY NO. 20:

Do you contend that there is no possibility of ground displacement within the plant site? If so:

(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 writings, 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 upon which you base this contention.

RESPONSE TO INTERROGATORY NO. 20:

(a) Yes, we contend that, in the context of 10 CFR 100, Appendix A, ground displacement within the plant site need not be considered. The bases of this contention are as follows:

1. No capable faults exist within five miles of the site;

2. No faults cut the San Mateo Formation, which is the foundation rock at the site and is 4-11 million years old;

3. Fractures and joints in the San Mateo Formation are rare, but even those few existing at the site are closed and tight rather than open and loose; and

4. Joints displaying small amounts of offset at the site are confined to the San Mateo Formation and do not extend into overlying terrace deposits, indicating their development occurred more than 125,000 years ago, and probably several hundred-thousands of years ago.

(b) The documents and communications on which this contention is based are listed in Appendix 1 as follows: Nos. 1, 2, 3, 4, 7, 9, 12, 13, 17, 20, 31 (1, 2, 3, 5).

(c) The authors of the documents referenced to in (b), above as well as David Moore, Perry Ehlig and Jay L. Smith.

(d) Witnesses Jay L. Smith, Perry Ehlig.

INTERROGATORY NO. 21:

Have you contracted with or contacted any consultants to analyze any aspect of the Imperial Valley earthquake of October 15, 1979? If so:

(a) Identify each and every consultant who has conducted such analysis on your behalf.

(b) Identify each and every document, writing or communication arising out of the analysis performed by your consultants on the Imperial Valley earthquake which you expect to use at the hearing on the seismic contention before the Atomic Safety and Licensing Board;

(c) Summarize the substance of the findings and/or

conclusions of your consultants which they have derived from their analysis of the Imperial Valley earthquake.

(i) with respect to SONGS 2 and 3

(ii) with respect to any other nuclear power plant site in California; and

(d) Summarize the factual and theoretical bases as well as any other grounds upon which your consultants base their findings and/or conclusions on the Imperial Valley earthquake

(i) with respect to SONGS 2 and 3

(ii) with respect to any other nuclear power plant site in California.

RESPONSE TO INTERROGATORY NO. 21:

(a) Yes; Woodward-Clyde Consultants, Tera Corporation, Del Mar Technical Associates, Sierra Geophysics, Inc.

(b) 1. Del Mar Technical Assoc., 1980, Simulation of Earthquake Ground Motions for San Onofre Nuclear Generating Station, Unit 1, Supplement III, for Southern California Edison Co.

2. Tera Corporation, 1980, Evaluation of Peak Horizontal Ground Acceleration Associated with the Offshore Zone of Deformation at San Onofre Nuclear Generating Station, for Southern California Edison Company.

3. Woodward-Clyde Consultants, 1980, Examination of Vertical Ground Motion Characteristics of the October 15, 1979 Imperial Valley Earthquake, for Southern California Edison Company.

4. Southern California Edison Co., 1980, Response to NRC Questions Nos. 361.55, 361.57 and 361.64.

5. ACRS, 1981, Transcripts of meetings Feb. 4, 1981 and Feb. 11, 1981.

(c&d) Consultants' conclusions are set forth in the above documents which speak for themselves. Applicants object to a request to summarize said reports and on that basis decline to answer these subparts of this Interrogatory No. 21.

INTERROGATORY NO. 22:

Do you contend that the Cristianitos Fault is only about 32 kilometers (20 miles) in length? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 22:

(a) No, the Cristianitos fault trends approximately

north 20 degrees west for a distance of about 42 kilometers (25 miles). The south end lies about 2 kilometers offshore and it extends some 40 kilometers north of the coast. The last mapped exposure of the faults is in Santiago Canyon where it juxtaposes cretaceous against lower tertiary rocks, and is truncated by the 4-S Ranch fault.

(b) Morton, P.K., Miller, R.V., and Fife, D.L., 1973, Geo-Environmental Maps of Orange County, California, Calif. Div. Mines and Geology, Preliminary Report 15.

(c&d) Not applicable.

INTERROGATORY NO. 23:

Do you agree that the OZD is located 7 kilometers offshore as described by Dr. Gary Greene and Dr. Michael Kennedy in their report to the NRC in August 1980? If you do not agree, state the basis for your disagreement including all documents on which you rely and identify all expert witnesses on whom you rely and the substance of their expected testimony.

RESPONSE TO INTERROGATORY NO. 23:

(a) In view of the large-magnitude earthquake assumed to occur on this long (200 km) zone of deformation, it is reasonable to consider that displacement would occur along pre-existing faults rather than along folds, and would follow the main strand or central portion of the distinctly-faulted part of the zone rather than propagate along subsidiary branches. Furthermore, for a zone of this dimension, the resolution of locating the main, center or boundary faults of the zone are generally no better than about 1 km, thus making an approximate assignment of "about 5 miles", or 8 km. appropriate for the OZD's proximity to

SONGS as has been often stated.

The nature, width, and clarity or distinctiveness of the OZD varies considerably along its overall length. In the part offshore SONGS the main trace of the South Coast Offshore fault on Horizon C (Western Geophysical, 1972) is a zone of faulting that lies 9.2 km offshore opposite SONGS. A short branch bounding an elevated block opposite the SONGS site lies about 7 km from shore, but it is distinctly subsidiary to the main break. In Horizon B (Western Geophysical, 1972) the same elevated block is bounded by the main and subsidiary faults at distances from shore of 8 km and 7.2 km, respectively. In this vicinity of the OZD's closest approach to SONGS (see NEKTON, 1980, Plate 2) there are many short and discontinuous folds and faults, very few of which can be extrapolated or extended across two or more closely spaced profile lines. The closest of these faults is 8.4 km from SONGS.

(b) Applicants rely on documents listed in Appendix 1 as follows: 1, 2, 7, 14, 17, 18, 29, and 31(2)

(c) Applicants would present witnesses David Moore, Perry Ehlig, Jay L. Smith, Stewart Smith, G. Frazier, and Edward G. Heath in support of various aspects of the position set forth in Part (a), herein.

INTERROGATORY NO. 24:

Do you contend that the Cristianitos Zone of Deformation's structural relationship with the OZD is not the controlling geologic structure for the seismic design of SONGS 2 and 3? If so:

(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 writings, 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.

RESPONSE TO INTERROGATORY NO. 24:

(a) Applicants contend there is no structural relationship between the postulated Cristianitos Zone of Deformations and the OZD, as described in the responses to numerous of the previous Interrogatories. Applicants also contend that the postulated Cristianitos Zone of Deformation is not the controlling

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geologic structure for the seismic design of SONGS 2 and 3, as described in responses to previous Interrogatories. The OZD is the controlling structure.

DATED: March 10, 1981

DAVID R. PIGOTT
SAMUEL B. CASEY
JOHN A. MENDEZ
CHICKERING & GREGORY

CHARLES R. KOCHER
JAMES A. BEOLETTO
SOUTHERN CALIFORNIA EDISON COMPANY

By David R Pigott
David R. Pigott
One of Counsel for Applicants
SOUTHERN CALIFORNIA EDISON COMPANY
and SAN DIEGO GAS & ELECTRIC COMPANY

APPENDIX NO. 1

LIST OF REFERENCES

1. Southern California Edison Co., 1970, Preliminary Safety Analysis Report, San Onofre Nuclear Generating Station, Units 2 and 3.

2. Fugro, 1972, Report of Geology and Fault Reconaissance Vicinity of Oceanside, California for Southern California Edison Co.

3. Fugro, 1974, Analysis of Geologic Features at the San Onofre Nuclear Generating Station, for Southern California Edison Co.

4. Fugro, 1974, Analysis of C and D Type Features at the San Onofre Nuclear Generating Station for Southern California Edison Co.

5. TERA, 1975, Earthquake Ground Motion Simulation, SONGS, Unit 1, for Southern California Edison Co.

6. Fugro, 1975, Geologic and Teltonic Characteristics of the Cristianitos Fault, for Southern California Edison Co.

7. Hunt, G.S., and Hawkins, H.A., 1975, Gelology of the San Onofre Area and Portions of the Cristianitos Fault.

8. Fugro, Inc., 1975, Recurrence Interval of the 0.22g Operating Basis Earthquake at San Onofre Nuclear Generating Station, Unit 1, for Southern California Edison Co.

9. Fugro, 1976, Final Report on Geologic Features at the San Onofre Nucelar Generating Station, Units 2 and 3, for Southern California Edison Co.

10. Southern California Edison Co., 1976, Recent Geotechnical Studies, Southern Orange County, California San Onofre Nuclear Generating Station, Units 2 and 3.

11. Southern California Edison Co, 1977, Geotechnical Studies, Northern San Diego County, California, San Onofre Nuclear Generating Station, Units 2 and 3.

12. Fugro, 1977, Supplemental Report of Geologic Investigations, Trail Six Landslide (Area 1), Southeast of SONGS, for Southern California Edison Co.

13. Fugro, 1978, Geologic Investigation of Fault E, Southeast of SONGS, San Onofre, Calif., for Southern California Edison Co.

14. Woodward-Clyde Consultants, 1978, Unpublished Seismic Reflection Profiles, Developed for California Coastal Commission, LNG Terminal Sites.

15. Shlemon, R.J., 1978, Late Quaternary Evolution of the Camp Pendleton-San Onofre State Beach Coastal Area, Northwestern San Diego County, California, San Onofre Nuclear Generating Station, Units 2 and 3, for Southern California Edison Co.

16. _____, 1978, Late Quaternary Rates of Deformation, Laguna Beach-San Onofre State Beach, Orange and San Diego Counties, California, SONGS, 2 and 3, for Southern California Edison Co.

17. Southern California Edison Co, 1979, Final Safety Analysis Report, San Onofre Nuclear Generating Station, Units 2 and 3.

18. Woodward-Clyde Consultants, 1979, Report of the Evaluation of Maximum Earthquake and Site Ground Motion Parameters Associated with the Offshore Zone of Deformation, San Onofre Nuclear Generating Station, Units 2 and 3, for Southern California Edison Co.

19. TERA, 1979, Simulation of Earthquake Ground Motion for San Onofre Nuclear Generating Station, Unit 1, Supplement 1, for Southern California Edison Co.

20. WEST, J.C., 1979, Supplement to the Generalized Sub-surface Geological and Geophysical Study, Capistrano Area, Orange County, California, for Southern California Edison Co.

21. Shlemon, R.J., 1979, Late Cenozoic Stratigraphy, Capistrano Embayment Coastal Area, Orange County, California, SONGS 2 and 3, for Southern California Edison Co.

22. Abbott, P.L., 1979, Baja California Geology, Geol. Soc. of America Annual Meeting, San Diego California.

23. Abbott, P.L., 1979, Earthquakes and Other Perils, San Diego Region, Geol. Soc. of America Annual Meeting, San Diego, California.

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31. Oct 6, 1980, Enclosure 1, Edited Transcript of Dr. P.L. Ehlig,
Sept 23, 1980.

Enclosure 2, Edited Transcripts of Dr. D. Moore, Sept 25, 1980.

Enclosure 3, ABC & D Features

Enclosure 4, Question 361.54

Enclosure 5, Trail 5 Landslide, San Onofre State Beach, Oct 2, 1980.

VERIFICATION

DAVID R. PIGOTT, being first duly sworn, deposes and says:

1. That he is a member of the law firm of Chickering & Gregory, San Francisco, California.

2. That he is Counsel for Applicants Southern California Edison Company and San Diego Gas & Electric Company (hereinafter "Applicants") in this proceeding.

3. That he is authorized by Applicants to execute and verify the foregoing "RESPONSE AND OBJECTIONS OF SOUTHERN CALIFORNIA EDISON COMPANY TO INTERVENOR FOE, ET AL'S, FIFTH SET OF INTERROGATORIES".

4. That he is informed and believes and upon such information and belief affirms that the foregoing "RESPONSE AND OBJECTIONS OF SOUTHERN CALIFORNIA EDISON COMPANY TO INTERVENOR, FOE, ET AL'S, FIFTH SET OF INTERROGATOARIES" is true and correct.

DATED: March 10, 1981.

David R Pigott

David R. Pigott

Subscribed and sworn to before me this 10th day of March, 1981.

Marion M. N. Fong

Notary Public
In and for the City and County of San Francisco, State of California

OFFICIAL SEAL
MARION M.N. FONG
NOTARY PUBLIC — CALIFORNIA
San Francisco County
My Commission Expires Nov. 30, 1984

PROOF OF SERVICE BY MAIL

I declare that:

I am employed in the City and County of San Francisco, California.

I am over the age of eighteen years and not a party to the within entitled action; my business address is Three Embarcadero Center, Twenty-Third Floor, San Francisco, California 94111.

On March 10, 1981, I served the attached Response and Objections of Southern California Edison Company to Intervenor FOE, Et Al.'s Fifth Set of Interrogatories on the following in said cause, by placing a true copy thereof enclosed in a sealed envelope with postage thereon fully prepaid, in the United States mail at San Francisco addressed as follows:

Ivan S. Smith, Esq.,
Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Cadet H. Hand, Jr.
Director, Bodega Marine Laboratory
University of California
P.O. Box 247
Bodega Bay, California 94923

Dr. Emmett A. Luebke
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

David W. Gilman
Robert G. Lacy
San Diego Gas & Electric Company
P.O. Box 1831
San Diego, California 92112

Robert Dietch, Vice President
Southern California Edison Company
P.O. Box 800
2244 Walnut Grove Avenue
Rosemead, California 91770

Alan R. Watts, Esq.
Rourke & Woodruff
California First Bank Building
10555 North Main Street
Santa Ana, California 92701

Lawrence J. Chandler, Esq.
Office of the Executive Legal Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Janice E. Kerr, Esq.
J. Calvin Simpson, Esq.
Lawrence Q. Garcia, Esq.
California Public Utilities Commission
5066 State Building
San Francisco, California 94102

Mr. Loyd von Haden
2089 Foothill Drive
Vista, California 92083

Mrs. Lyn Harris Hicks
G U A R D
3908 Calle Ariana
San Clemente, CA 92801

James F. Davis
State Geologist
Division of Mines and Geology
1416 Ninth Street, Room 1341
Sacramento, California 95814

Richard J. Wharton, Esq.
University of San Diego
School of Law
Alcala Park
San Diego, CA 92110

Phyllis M. Gallagher, Esq.
1695 W. Crescent Avenue, Suite 222
Anaheim, California 92801

Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docketing and Service Section
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

John A. Mendez

John A. Mendez
One of Counsel for Applicants
SOUTHERN CALIFORNIA EDISON COMPANY
and SAN DIEGO GAS & ELECTRIC COMPANY