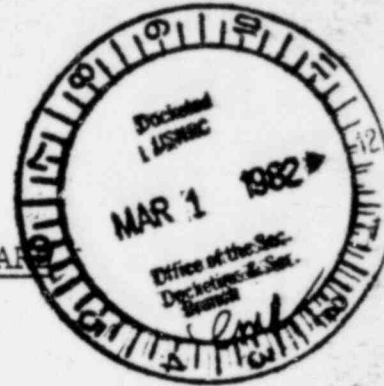


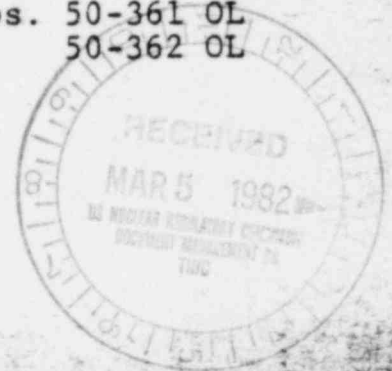
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL 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



INTERVENORS' CARSTENS ET AL. BRIEF
IN SUPPORT OF EXCEPTIONS
(10 CFR 2.762)

Richard J. Wharton
Attorney for Intervenors Carstens et al.

February 25, 1982

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ERRATUM TO
INTERVENORS BRIEF IN SUPPORT OF EXCEPTIONS

Page 25 should follow page 24 and pages 25(a), 25(b), 25(c)
and 25(d) should follow immediately after page 25.

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THE BOARD ERRED IN FORECLOSING THE ISSUE OF THE CAPABILITY OF THE CRISTIANITOS FAULT AND STRIKING THE TESTIMONY OF RICHARD SIMONS IN THAT NONE OF THE ELEMENTS FOR FORECLOSURE ARE MET, THE TESTIMONY OF SIMONS IS HIGHLY PROBATIVE, THERE ARE MATERIAL CHANGES IN FACTUAL CIRCUMSTANCES, FORECLOSURE WAS WAIVED, AND PUBLIC POLICY, SAFETY INTERESTS AND PROPER CONDUCT OF THE PROCEEDINGS REQUIRE THAT THE ISSUE OF THE CAPABILITY OF THE CRISTIANITOS FAULT BE DECIDED.

A. The Licensing Board Erred in Foreclosing the Issue of the Capability of the Cristianitos Fault.

On pages 20 to 21 of their Partial Initial Decision (herein "PID"), the Board reveals a grave mistake made at the licensing hearing. First, the Board holds that "if the Cristianitos were shown to be a capable fault, it would certainly be significant, and perhaps crucial, to the safety of the San Onofre facility." (PID, p. 20) Two sentences later, the decision notes that at the hearing, "the Board determined that the prior opportunity to litigate the capability of the Cristianitos at the construction permit stage foreclosed the relitigation of that question in this...proceeding..." (PID, p. 21).

The Board adopted a concept of "Foreclosure" which is based upon the guidelines of res judicata/collateral estoppel (Tr. p. 5191), and excluded evidence which was offered by Intervenors and closed the door on any further evidence regarding the issue of Cristianitos' capability. This was done despite the fact that the factual situation had changed, the Cristianitos capability had not and could not have been litigated at the construction permit hearing (CPH) in 1973, the applicants and the Board both waived the objection, and public policy requires thorough examination of this issue.

The record and the applicable law --discussed below-- show that the Board misused this concept based upon res judicate and collateral estoppel in foreclosing any consideration of the Cristianitos issue. The Board also erred in striking the evidence presented by Mr. Simons and Mr. Legg in reference to the Cristianitos. (See Tr. p. 5187-96 and 5313-14) The most distressing thing, however, is that the Board used an erroneous procedural technicality, not only to keep out certain evidence regarding the Cristianitos fault, but also to eliminate any consideration of an issue that the Board itself finds

"is crucial to the safety of the San Onofre facility."

It defies reason to issue an operating license without ever considering or litigating the issue of the capability of the fault closest to the San Onofre facility. (Note: The Cristianitos fault is less than 1,000 yards from Unit #2).

This issue was not litigated at the construction hearing, and the Board prevented its litigation at the Operating License Hearing. The Appeals Board should remand the matter to a new licensing board so that this crucial issue can be litigated once and for all.

B. The Necessary Requirements for Invoking Res Judicata (Foreclosure) to wit, That The Matter Has Been Litigated or Could Have Been Litigated, and There is Identity of Parties, Have Not Been Met.

The Licensing Board applied "foreclosure", based on res judicata, to the issue of the capability of the Cristianitos Fault. The problem -- recognized by the Board on p. 24 of their decision -- was the lack of a prior adjudication of the capability of the fault and lack of identity of parties. The Board notes that the capability of the Cristianitos was not at issue in the construction permit hearing. It states "no contention was raised and no explicit findings were made about the Cristianitos. The single seismic contention concerned the ground vibrations to be anticipated from the OZD." (PID,p.25). The Board holds that "Clearly, the capability of the Cristianitos could have been litigated at the construction permit stage. . ." (PID, p. 25). This finding, however, is in error.

The following sections regarding the change in factual circumstances discuss the new information which has become available since the CPH in 1973. Given the improved locating techniques and the number of earthquakes recorded on and about the Cristianitos fault since 1973, the issue of capability could not have been fully litigated in 1973.

The Board also recognizes that there is no identity of parties here. The present Intervenors were not Intervenors in the CPH and had no opportunity to litigate the issue. (See PID, p. 23 and 24).

Clearly, the issues of the capability of the Cristianitos fault were not litigated at the CPH and could not have been fully litigated

at that time, and certainly could not have been litigated by the present Intervenor.

As stated in Philadelphia Electric Co., et al (Peach Bottom Atomic Power Station, Units 2 and 3) 13 NRC 487, 488 (1981) "Participants in a proceeding cannot be held bound by the record adduced in another proceeding to which they were not parties." This requirement of identity of parties for invoking res judicata or collateral estoppel is further addressed in Consolidated Edison of New York (Indian Points, Units 1, 2, and 3) 76/1, p. 1, p. 5 (1976), where the Board states "There are no principles of res judicata or collateral estoppel which could make legally binding upon them any decision which we reach on factual issues in this proceeding if they do not participate here."

In the present case, the Board is attempting to bind the present Intervenor to actions other parties did not take, and to foreclose an issue because a previous Intervenor did not litigate the issue. This is a legal absurdity which should not be sanctioned by the Appeals Board.

C. The Testimony of Richard Simons Does Have Probative Value Regarding the Capability of the Cristianitos Fault, and Should Have Been Included in the Record.

The Board held that the evidence presented by Richard Simons had no probative value. This was one of the bases for excluding the evidence (p. 17) The analysis of the reasons given by the Board for finding no probative value illustrates the error of the decision. The reasons given were:

- a. "sketchy qualifications in a report"
- b. "superficiality and questionable accuracy of his... evidence" and
- c. "Mr. Simons' demeanor on cross-examination." (See PID, p. 18)

1. Qualifications as an expert witness.

Consideration of "academic training" or "relevant experience" or "some combination of these factors" establishes the qualifications of an expert witness in an NRC proceeding. Pacific Gas and Electric Co. (Diablo Canyon Nuclear Plant) 8 NRC 567,570 (1978).

The written testimony of Mr. Simons shows that his educational background is strong-- having a Bachelor's Degree from the prestigious Massachusetts Institute of Technology in the fields of Geophysics and Geology. His relevant experience is very strong -- working since 1969 at University of California at San Diego Institute of Geophysics and Planetary Physics, at Scripps Institute of Oceanography. (Written Testimony of Richard Simons, Biographical Sketch).

The experience at U.C.S.D. is especially important because Mr. Simons was involved in data retrieval and research of the seismicity of certain areas including Southern California (Written Testimony, p. 1). This is what was basically done by Mr. Simons for the Licensing Hearing. He plotted data from the Cal Tech computer regarding earthquakes in an area around the Cristianitos fault onto a map. Then he drew the "error bars" around each epicenter. This gave the area in which each of the earthquake's epicenters could be located with 68% accuracy. (Written Testimony, p. 4)

An explanation of the work done by Mr. Simons and the information provided is relevant to a discussion of his qualifications. This is because, "The ultimate test of a witnesses' qualification is whether his knowledge of the matter in relation to which his opinion is sought is such that it probably will aid the trier of the question to determine the truth." Illinois Power Co. (Clinton Power Station) NRCI 75/9 p. 579, 588 (1975). The information provided by Mr. Simons indicates that his opinion was sought as to the seismic occurrences on and near the Cristianitos fault. His analysis goes no further than this. And this is just the type of work which he has done for the past eleven years at U.C.S.D. -- researching the seismicity of specific areas. This relevant experience, at a most prestigious institution, certainly qualifies Mr. Simons to present the testimony given to the Board.

2. Value and Accuracy of Mr. Simons' Evidence.

The evidence presented by Mr. Simons was not made available to the Board by any other witness. The information in Mr. Simons' testimony came from a very reliable source. And the information was relevant to a very significant issue in this proceeding. Mr. Simons' testimony has probative value and should have been admitted.

On pages 18 to 19 of their decision, the Board belittles Mr. Simons' work. They note that the work was simplistic and could have been done by anyone. It may be true that showing the circles signifying the error bars did not require special skill. The retrieval of the data, however, from Cal Tech.'s computer, and interpreting the information so as to find locations and standards of error for each earthquake did require special training. It was this type of work that Mr. Simons has been doing at Scripps Institute for eleven years.

Regardless of the skill required to assemble this information, it is valuable to the Board in determining the capability of the Cristianitos fault. The data comes from Cal Tech, unquestionably a very reliable and accurate source, and the uncertainties in positioning the epicenters are illustrated in Figure 2 of Mr. Simons' Written Testimony. This information is not presented in any other testimony.

As can be seen by examining Figure 2 of the Written Testimony, the information provided by Mr. Simons cannot be ignored. The diagram shows that since 1932, seventeen earthquakes have occurred which could be placed with 69% accuracy upon the Cristianitos fault. Since 1973, nine earthquakes could have occurred (with 68% accuracy) on the Cristianitos based only on its position at the surface.

For purposes of conservatism, given that the error bars indicate within 68% accuracy where the earthquakes occurred, and given that 26 error bars encompass the Cristianitos fault including 9 since 1973, it must be assumed for purposes of conservatism that those earthquakes occurred on the Cristianitos fault.

A map showing the location and error bars around each epicenter based upon data from Cal Tech. and showing seismic activity on and about a fault running very near to the San Onofre plant meets the standard for admissibility. This standard is found at 10 CFR 2.743 (c): "Only relevant, material and reliable evidence which is not unduly repetitious will be admitted." This testimony is certainly relevant to the issues of safety and the capability of the Cristianitos fault as the Board notes on page 20 of their decision. The testimony is also material because the issue of activity on the Cristianitos was raised (as will be discussed below) by the Applicants (Testimony of

Dr. Biehler) and the Board itself (Tr. p. 3999). And it is reliable as noted above. It is true that two errors were noted in Figure 2. A figure "6" was misread and transcribed onto Figure 2 as an "8" (Tr. p. 4825-6) and one error bar was drawn one kilometer in diameter too large (Tr. p. 4830). Two transcribing imperfections do not, however, render a document unreliable, and certainly are not grounds for ignoring the serious consequences of the information contained therein. The testimony is important and should have been admitted.

3. Demeanor of the Witness.

The Board, on Page 20 of their decision, says that they based their decision not to admit Mr. Simons' testimony partly upon his "demeanor". In Public Service Company of New Hampshire (Seaboard Station) NRCI 76/2 p. 123 (1976), the Chairman of the Licensing Board was replaced in the middle of the hearing. The Intervenors moved for a de novo hearing because the new chairman would not have heard some testimony personally and so could not make a judgment as to the witnesses' demeanor. The Board denied the motion saying:

We do not agree that in the instance case (a licensing hearing) the demeanor and conduct of the witnesses are important in determining their credibility. . . Rather than weighing of personal credibility of witnesses, what is important is the qualifications of witnesses from experience and training...(NRCI 76/2 p. 126)

The Board in the New Hampshire case was criticising the making of decisions in licensing hearings on the basis of this "rather ephemeral factor", as Judge Kelley calls it. (PID, p. 20).

This "ephemeral factor" may well be that, for whatever reason, Judge Kelley took a personal dislike to the witness. This is not a basis for excluding what Mr. Simons had to say about a "crucial" issue and foreclosing the entire issue where the witness is obviously qualified to testify and testifies that his scientific review of the data indicates that earthquakes have occurred on the Cristianitos fault.

D. Evidence of Earthquakes Occurring On and Near the Cristianitos Fault After the Construction Permit Hearing Constitutes a Material Change in the Factual Circumstances and Foreclosure is Inapplicable.

Mr. Simons' testimony gives strong showing from a reliable

source (California Institute of Technology) of activity along the Cristianitos fault. It is important to note that of the approximately 200 earthquakes listed in Appendix A of Mr. Simons' Written Testimony, 62 have occurred since 1973 (the time of the CPH). Figure 2 of Mr. Simons' testimony also shows that 9 of the earthquakes occurring since 1973 could be placed upon the Cristianitos fault within 68% accuracy.

Figure 2 also illustrates the improved accuracy by which these post-1973 quakes were located in comparison to the earlier quakes. The smaller error bars (circles on Figure 2) indicate the more accurate plottings of epicenters by Cal Tech. Mr. Simons explains that after 1971 and especially since 1975, the technology and methodology for locating epicenters has improved greatly. (Written Testimony, p.2-3)

The occurrences of these post-1973 earthquakes on and near the Cristianitos fault and the change in methodology to improve locating epicenters prohibit the application of foreclosure of the Cristianitos issue. The Licensing Board cites Alabama Power Co. (Farley Nuclear Plant) 7 AEC 210 (1974) as an example of the use of res judicata/collateral estoppel in an NRC proceeding (PID, p. 23). In Alabama, however, the Appeals Board notes that there is an exception to the application of these doctrines when there have been "specific material changes in factual and legal circumstances subsequent to the [previous] decision." (7 AEC at 215). The exception in cases of changed circumstances was applied again in Duke Power Co. (McGuire Nuclear Station) 5 NRC 680 (1977). The Licensing Board in this case held that:

Res judicata and its allied doctrine of collateral estoppel have no application where circumstances have changed from when issues were formerly litigated...as to the facts material to the dispute.
(5 NRC at 682)

In Duke Power, the Intervenor's evidence was not foreclosed because there was new information on matters previously discussed. The Board did limit its taking of evidence, but in a reasonable manner. It accepted evidence which had not been presented in prior proceedings, and, if previously presented evidence was necessary for clarification, it could be used provided it was "specifically identified." (5 NRC at 683).

There is no showing that the Licensing Board, in the CPH, had ever seen the information presented by Mr. Simons. Even if the evidence

of the pre-1973 quakes had been introduced, it would still be allowed under Duke Power Co. This is because they are necessary to understand the history of seismicity in the area, and they are specifically identified by date.

The evidence of the post-1973 earthquakes with the improved methods of plotting were certainly not available at the CPH. This was new evidence regarding a material change in factual circumstances. One of the most highly regarded sources of earthquake information (Cal Tech) provided data which was plotted by the witness, Mr. Simons, (whose qualifications are discussed above) revealing seismological activity on and near the Cristianitos fault. The Licensing Board said "if the Cristianitos fault were shown to be a capable fault, it would certainly be significant, and perhaps crucial, to the safety of the San Onofre facility." (PID, p. 20) Yet the Board refused to consider the evidence. It closed its eyes to a very serious danger.

E. The Applicant and the Board Waived the Right to Assert Foreclosure by Presenting and Requesting (Respectively) Evidence as to the Issue Foreclosed, to wit, the Capability of the Cristianitos Fault.

Waiver of an objection "along res judicata lines" was discussed by the Board. Judge Kelley said, addressing the Applicants: "going back to the Cristianitos fault it would be possible for you to waive an objection along res judicata lines by getting into a matter in your own testimony." (Tr. p. 955) Later, he says: "if you open up a topic then it will stand as opened up and the other parties would be entitled to get into it." (Tr. p. 956). Mr. Pigott, for the Applicants, attempted to distinguish what evidence the Applicants were going to present on the issue of the capability of the Cristianitos fault. (Tr. p. 956-957). A fault is "capable" if it is shown to have moved-- to have caused an earthquake. As will be seen, the Applicants presented a great deal of evidence to show that a number of earthquakes did not occur on the Cristianitos fault. There would be no other way in which Applicants could waive foreclosure on this issue.

The Applicants open the door to the Cristianitos issue in Enclosure 4 (Applicants' Exhibit #31) prepared by Dr. Biehler in

November, 1975. On page 2, conclusions 1-4 refer to the Cristianitos fault. He concludes that two earthquakes of January, 1975 did not occur on the Cristianitos and that the evidence "supports the inactivity of the Cristianitos fault." Later, in the same report, Dr. Biehler says "[p]resent inactivity of the Cristianitos fault is confirmed by the microseismic studies." (Enclosure 4, p. 3). Page 7 of the same report repeats this conclusion. The remainder of the report is dedicated to explaining why a number of earthquakes could not have been located on the Cristianitos.

In Written Testimony of Dr. Biehler, the Cristianitos is again discussed. On pages 6-8, Dr. Biehler is asked again to state his conclusions as to whether the 1975 earthquakes were associated with the Cristianitos. Again, he concludes that they are not. At the hearing, Dr. Biehler in direct testimony refers to 5 earthquakes occurring in 1977 near the Cristianitos. He describes his analysis of the quakes and of the Cristianitos and concludes the quakes are "not associated with the Cristianitos fault." (Tr. p. 3656).

It is difficult to imagine what more could be done by the Applicants to open the issue of the capability of the Cristianitos. They presented evidence of all of the earthquakes occurring in the region since 1934 (Biehler's Enclosure 4, p. 3) an analysis of this evidence, and a conclusion as to the activity of the Cristianitos. The only thing Applicants did not ask Dr. Biehler was "Is the Cristianitos a capable fault?" This was done by the Board. At the end of Dr. Biehler's direct testimony, Judge Kelley asked "Do you have an opinion today about the capability or not of Cristianitos fault...?" (Tr. p. 3999) The Board accepted a large amount of testimony from the Applicants regarding the Cristianitos fault's lack of activity and even opened the issue completely by asking what Dr. Biehler concluded about the capability of the Cristianitos. When evidence was presented, however, to rebut the Applicants' evidence, the Board refused to admit it and foreclosed the entire issue from the litigation.

The right to assert foreclosure has been waived here. The issue was opened by the Applicants' presentation of evidence, and it

was error to foreclose the issue. The reason for the waiver here is found in the case cited on page 2 of Applicants' Answer to Intervenor's Application for Stay. The citation from Carmen gives two situations in which the defense of foreclosure is waived. The second reason is when the party has "acted in a manner which renders the allowance of the defense inequitable." Carmen Industries, Inc. v. Wahl, 472 F. Supp. 877 (1976). It was not equitable for the Applicant to offer testimony and the Board to accept testimony and request a specific conclusion as to the capability of the Cristianitos from a witness for the Applicants and then to refuse to admit evidence from the Intervenor and to foreclose litigation of the issue entirely.

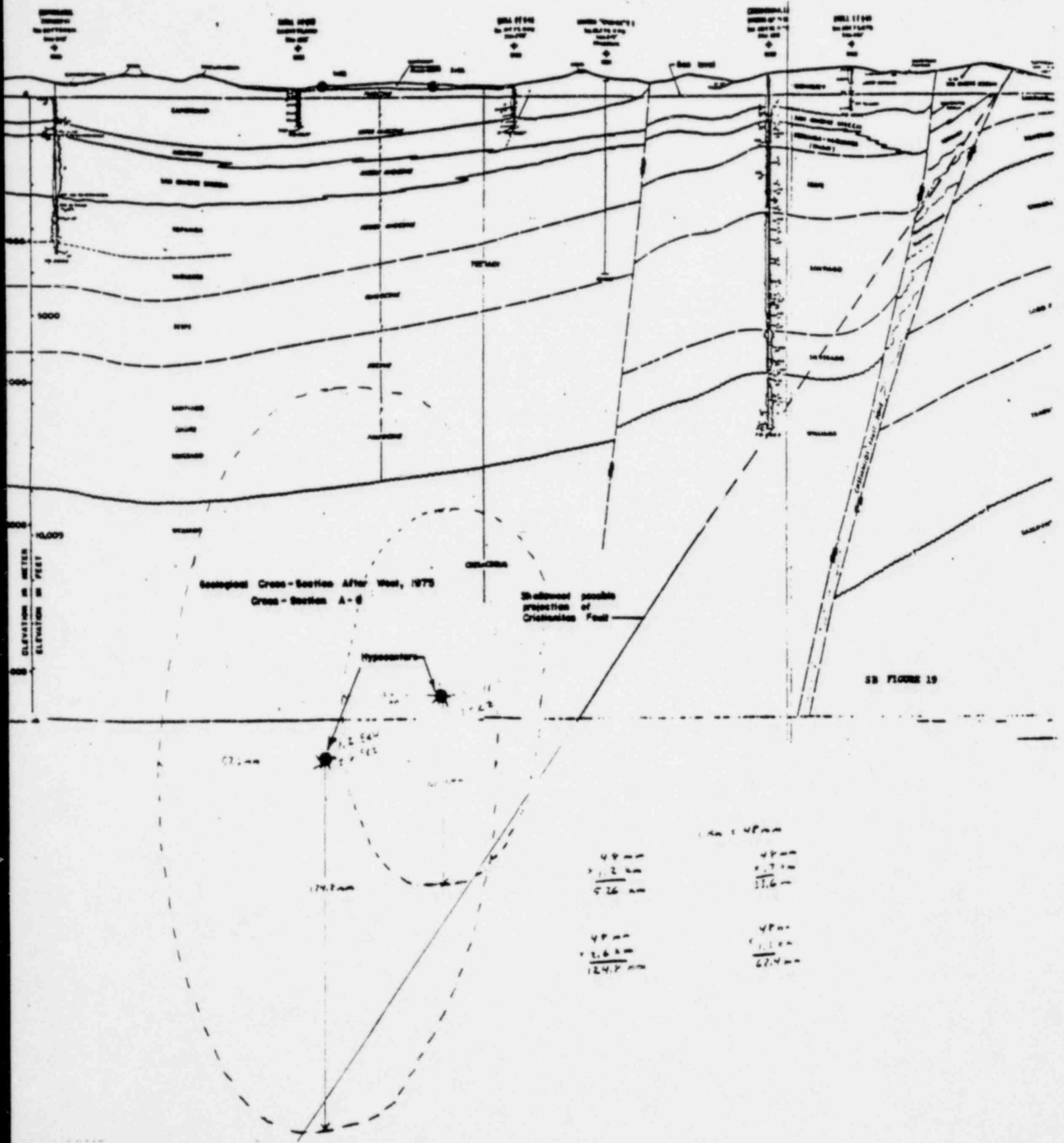
F. Data Presented by Two of Applicants' Witnesses Shows, Given the Conservatism Required of the Board, that Two Earthquakes in 1975 Should Be Considered To Have Occurred on the Cristianitos Fault.

The testimony of Dr. Shawn Biehler plots the location of two earthquakes occurring on January 1, 1975 at 5:54 and 6:01 Greenwich Mean Time. The hypocenters of these earthquakes are shown on Figure 19 of Dr. Biehler's written testimony.

Margins of error were calculated by Dr. Biehler in Tables 14 and 15 of his 1975 report, "Seismological Investigation of the Sa-Juan Capistrano Area." ERH signifies horizontal error and ERZ signifies vertical error. Error bars were drawn for the two earthquakes by Intervenor pursuant to the Board's ruling on pages 3962-64 of the Transcript of the hearing. Figure 19 with these error bars included in attached on the following page, as p. 10a.

Figure 19 clearly shows that the projection of the Cristianitos fault as plotted by Dr. Biehler runs through the error bars of the hypocenters of both earthquakes. Given the conservatism required, it must be assumed that the hypocenters of the earthquakes occurred on the Cristianitos fault which establishes it as a capable fault.

The Board is supposed to apply conservatism in the interest of public safety. Doing so should have led the Board to the conclusion that the Cristianitos fault was to be considered active.



Further support of this finding comes from Applicants' witness Dr. Perry Ehlig. He testified that the Cristianitos fault is a listric normal fault. This means that it flattens at depth. (Tr. p. 1090, l. 4-7). The fault bends or "flattens" in a westerly direction. (Tr. p. 1097, l. 5-6). This would move the fault in the direction of the hypocenters as plotted by Dr. Biehler.

On cross-examination, Dr. Ehlig said that the Cristianitos fault would probably flatten at the base of the cretaceous region. (Tr. p. 1095-96). Dr. Ehlig also says that "The flattening normally is a progressive sort of thing and when you say when would it start to flatten, it is curved." (Tr. p. 1091, l. 6-8). The fault, according to Dr. Ehlig, curves to the west eventually flattening at the base of the cretaceous region. But it starts to curve above the cretaceous. This westward curve puts the fault closer to the hypocenter as plotted by Dr. Biehler, and further within the error bars.

The hard evidence presented by Dr. Biehler and Dr. Ehlig shows that it is very likely that the hypocenters of the 1975 earthquakes in fact occurred on the Cristianitos fault. At the very least, such evidence indicates that the activity of the Cristianitos should be fully litigated.

G. Public Policy and Safety Interests

The rationale behind the suppression of evidence, whether it is done through res judicata, collateral estoppel, or "foreclosure", is that there is a public policy interest that "matters once tried shall be considered forever settled as between the parties." Baldwin v. Iowa State Traveling Mens Association, 283 U.S. 522, 525, 51 S. Ct. 517, 518, 75 L.Ed. 1244 (1931). Since the doctrine is based upon public policy, it has been recognized that when the public interest is not being served by the suppression of evidence, the doctrines should not be applied. The Board here has applied "foreclosure" where res judicata and collateral estoppel would not have applied, but in doing so, it has worked against the public interest by closing its eyes to "crucial" issues.

The ALAB noted that courts have held that collateral estoppel and res judicata principles should not be invoked where

there are public policy factors which outweigh the factors supporting the application of the two doctrines. Alabama Power Co. (Farley Nuclear Plant) 7 AEC 210, 215. The Board cited Spilker v. Hankin, 188 F. 2d 35 (D.C. Cir., 1951) and the idea has been affirmed in Mac v. East Baton Rouge Parish School Board 584 F. 2d 594, 597 (5th Cir. 1977). This principle that consideration of an issue should not be suppressed when there are reasons for it to be heard was put this way by the 6th Circuit Court of Appeal in Tipler v. E. I. duPont de Nemours & Co., 443 F. 2d 125, 128 (6th Cir. 1971) :

Neither collateral estoppel nor res judicata is rigidly applied. Both rules are qualified or rejected when their application would contravene an overriding public policy.

The public policy which is competing in this case with the rule of "foreclosure" is the safety of the public. The purpose of the hearing and the purpose of the Intervenors' presence is to assure that the San Onofre site is safe. If there is new evidence which shows that the threat of earthquakes from the Cristianitos Fault is a distinct possibility, then the protection of the public welfare demands consideration of this point. The Board has taken the rules of res judicata and collateral estoppel (the elements of which they admit have not been met (PID, p. 24)) and applied them to the circumstances in this proceeding. Not to gain information which would be "perhaps crucial to the safety of the San Onofre facility" (PID, p. 20), but to close the door on such information. The Board is not heeding the rule set forth in Cleveland Electric Illuminating Co. (Perry Nuclear Plant) 5 NRC 133 (1977) which says:

Collateral estoppel cannot be binding where the public interest in assessing whether an unconditioned license should be granted in these proceedings would be disaccommodated through closing our eyes to the facts. (p. 205, Note 105)

H. The Foreclosure of the Cristianitos Fault Issue Constitutes But One Example of the Board Improperly Treating Intervenors as "Interlopers" and "Opponents" Rather Than as an Ally in Seeking the Truth About a Crucial Safety Issue.

In Note 40 of the PID, the case of Office of Communication of United Church of Christ v. F.C.C., 425 F. 2d 543 (D.C. Cir. 1969) is cited in support of the modification of res judicata by the Board. The case, however, is valuable beyond this limited issue.

The case involved the renewal of a broadcaster's license by the F.C.C. The United Church of Christ (U.C.C.) was Intervenor in the proceeding and produced evidence which suggested that the renewal should be refused. The Commission renewed the license, and the Court of Appeal reversed on the grounds that the Examiner had refused to consider some of the Intervenor's evidence. Two major factors in the Court's decision were the manner in which the Intervenor was treated by the Examiner, and the fact that the Examiner used the concept of burden of proof to thwart the Intervenor's effort to present evidence. The Court did not approve, as Justice Burger states:

We did not intend that the intervenor's representing of a public interest be treated as interlopers. Rather, if analogies can be useful, a Public Intervenor who is seeking no license or private right is, in this context, more nearly like a complaining witness who presents evidence to the police or prosecutor...
(Id., p. 546)

The Court cites as an example of the Examiner's error an instance where the Intervenor's evidence was dismissed by the Examiner as "worthless" (Id., p. 547). Another time the Court noted that the Examiner found that there was no evidence supporting an allegation of the Intervenor. In the transcript, however, there was evidence supporting the allegation which the Examiner refused to admit on hearsay grounds. (Id., p. 547-8).

The Court was displeased with the Examiner's treatment of the Intervenor's participation, noting that:

As we view the record, the Examiner tended to impede the exploration of the very issue which we would reasonably expect the Commission itself would have initiated; an ally [the Intervenor] was regarded as an opponent. (Id., p. 549).

In the present action, the Board has refused to accept testimony on the basis of "foreclosure". The attitude of the Board toward the Intervenor is evident upon examination of the Decision. At p. 26, the Board says "To be sure, a construction permit intervenor probably will not seek to raise every conceivable seismic contention. As a matter of litigation tactics and boundary of resources, an opponent of the plant might choose questions selectively

among possible vulnerabilities in the site." (PID, p. 26) (emphasis added). Also, on page 20 of the PID, the Board says ". . . we question whether any useful conclusions can be drawn about the seismicity of the Cristianitos fault itself from this circle drawing exercise." (emphasis added)

By characterizing Intervenors as "opponents", the Board shows that it has misconstrued the function of the Intervenors -- as was done in the U.C.C. v. F.C.C. case, supra. The Intervenors here were not plotting "tactics" to keep the plant from opening. The Intervenors here, as in U.C.C., do not have any financial interest in this matter. The work and money invested by the Intervenors is in the interest of being certain that the Nuclear Plant at San Onofre is safe. The interest of the Intervenors is the public interest. The interest of the Board should be the same.

The Intervenors are concerned about the plant site's "vulnerability", as the Board should be. When evidence is presented which suggests that the plant is very near to an active fault, the Board should show concern and consider it carefully. Instead, the Board scoffed at it -- calling it a "circle drawing exercise" -- and disregarded it -- foreclosing it from the record.

This is just one example of the Board treating the Intervenors as "interlopers" and "opponents", not as an ally. The interest of the Intervenors is the same as the interest of the Board under 10 CFR -- to assure the safety of the plant.

The record in its entirety reflects the attitude of the Board that the Intervenors were considered as "Interlopers" to be thwarted in their efforts wherever possible. Such conduct should not be condoned.

II

THE BOARD ERRED IN FINDING THAT OFFSHORE ZONE OF DEFORMATION IS SEGMENTED IN THAT IT WAS DECIDED AT THE CONSTRUCTION HEARING THAT THE OZD WAS NOT SEGMENTED AND BOTH APPLICANTS AND NRC STAFF WERE PARTIES TO THAT HEARING; THERE WAS AN AGREEMENT AND STIPULATION ON THE RECORD OF THIS HEARING THAT SEGMENTATION OF THE OZD WAS NOT AT ISSUE AND THE BOARD MISCONSTRUED THE CONCEPT OF A ZONE OF DEFORMATION.

In 1973, the Licensing Board made explicit findings regarding the OZD. They found:

[The Applicants and staff] agreed to the stipulation... which specifies that the adequacy of the design basis earthquake will be litigated in the framework of [the model]...set forth by the USGA in the quoted sections of report in paragraph 59, supra. The Board has reviewed the information in the record and the staff's evaluation of that information and finds the staff's model is the appropriate one... (6 AEC 929 (1973))

Paragraph 59, referred to in the decision, states in part:

...the Newport-Inglewood zone of folds and faults, the South Coast offshore fault, and the Rose Canyon fault zone cannot be dissociated. Instead an extensive linear zone of deformation, at least 240 km long extending from the Santa Monica Mountains to at least Baja California, seems well established by the present evidence...the Santa Monica to Baja California zone of deformation must be considered potentially active and capable of an earthquake whose magnitude could be commensurate with the length of the zone. (6 AEC 942)

The Licensing Board explicitly found that the model to be used for design purposes was that of one continuous zone of deformation approximately 240 km long. It did not find three separate and segmented zones, in fact, it stated the zones "cannot be disassociated."

The Applicants and staff agreed that this model was to be used in the Licensing Hearing as well. In fact, the Applicants made it clear a number of times that the OZD is a continuous zone of deformation and not subject to litigation. The issue was discussed on June 23, 1981. Mr. Wharton for Intervenors raised the point that segmentation of the OZD was not an issue. Applicants responded:

And [the characteristics of the OZD] are being discussed, but I think you will find they are being discussed without drawing the conclusion as to whether or not they are in fact connected. We are assuming as a part of the earthquake potential that they are connected. (emphasis added) (Tr. p. 1047, l. 14-18)

Mr. Pigott also states "We are not attempting to relitigate that particular question at this time, and it does not appear in any of the issues." (Tr. p. 1046, l. 19-25). And, he continues "We are not looking for this Board to undertake a determination that the zone is in three segments...That is not an issue." (Tr. p. 1047, l. 6-9). (emphasis added)

At Transcript page 1054, line 16, Mr. Pigott is asked by Judge Kelley if he is "arguing that the geology is open and is litigable as such?" Mr. Pigott responds that the Applicants are not litigating segmentation. "We are assuming that it is linear. We are assuming that it is not blocked off." (Tr. p. 1054, l. 10-16).

The NRC Staff also agreed with Intervenors and Applicants that the segmentation of the OZD was not at issue. Mr. Chandler for the staff says "We continue to be of the view that what we are talking about is a continuous zone of deformation." (Tr. p. 1051, l. 1-2). The Staff also said "It would be impermissible at the operating license stage to relitigate...the basic characteristic of the OZD as an extensive linear zone of deformation at least 240 kilometers long." (Memo. 6-19-81, submitted to Licensing Board).

The Board, however, on pages 72-78 of their PID, found the OZD to be segmented. Finding 32 says "The weight of the evidence convinces the Board that the OZD is a segmented branching system of faults and folds..." (PID, p. 72). The Board then discusses the three segments of the OZD. In Finding 38, the Board says that the Newport-Inglewood Zone of Deformation (NIZD), one of the three supposed segments, terminates at its southern end. In Finding 45, the Board says that the NIZD and the South Coast Offshore Zone of Deformation are not continuous. The Board has concluded that these are both segments of the OZD and do not connect.

A direct comparison illustrates the absurdity of the Board's finding that the OZD is segmented. On page 1047 of the Transcript, lines 6-8, Mr. Pigott for Applicants says "we are not looking for the board to undertake a determination that the [OZD] is in three segments."

Finding of Fact 50, however, says in part, "The SER, the witnesses for the Applicants, the USGS and the Staff all characterized the OZD as a discontinuous zone divided into three segments. (PID, p. 77) And this is the view that the Board accepted (Finding 32, PID, p. 72) The Board's decision on this issue is blatantly unfair. It found the opposite of what was agreed to by the parties. It was also legally unsound and is totally unsupported by the evidence cited for support.

The Board erred by failing to foreclose this issue, and by refusing to abide by the stipulations of the parties that the segmentation was not at issue.

The doctrines of res judicata/collateral estoppel are applicable to licensing proceedings as noted by the Board in its PID. (p. 23) The Board cites Alabama Power Co. (Farley Nuclear Plant) 7 AEC 210 (1974) in which all of the elements of collateral estoppel were present. These elements are found in the present proceeding as well. The issue of segmentation received a final adjudication in 1973 -- as seen above in the explicit finding -- and "the adjudication was by a tribunal empowered to consider and decide [the issue]." 7 AEC 213. The two elements noted by the Board as missing in regard to the Cristianitos -- identify of parties and prior adjudication -- are present on this issue. Segmentation of the OZD should have been foreclosed, but the Board found it to be segmented. The Board failed to follow its own concept of "foreclosure -- which it created on page 20 et seq. of the PID. The Board did not need, however, to rely upon "foreclosure", it merely had to recognize the agreement made by the parties -- as shown above -- that segmentation of the OZD was not at issue.

A stipulation has been defined as an "agreement between counsel with respect to business before the court..." United States v. Hall, 424 F. Supp. 508, 547 (W.D.Okla, 1975) aff'd, 536 F. 2d 313. It is clear that the parties agreed that the OZD was to be considered a continuous zone of deformation for purposes of the hearing. And "[I]t is well settled that stipulations of fact fairly entered into are controlling and conclusive, and courts are bound to enforce them". United States v. 3,788.16 Acres of Land, More or Less in Emmons County, N.D., 439 F. 2d 291, 294 (8th Cir. 1971). Another decision has held that a party who has admitted a fact should not be permitted to introduce evidence to contradict the existence of such fact, nor can a party deny facts previously admitted by a stipulation which remains in force. Collwood v. Virgin Islands National Bank, 121 F. Supp. 379, 391 (D.C.V.I., 1954), vacated 221 F. 2d 770 (3rd Cir. 1954).

This principle, that parties are bound by a stipulation, is also found in a reported NRC case. A case analagous to the present is found in Cleveland Electric Illuminating Co. (Perry Nuclear Plant) NRCI 75/8 p. 365 (1975). The Licensing Board disallowed an appeal of a Special Master's determination on certain issues. Id. at p. 365. It was found "that the parties voluntarily made an agreement or stipulation that the decision of the Master would be binding." Id. at p. 368.

One of the reasons given for disallowing the appeal was that the "issue is one of fairness and of according due process to the parties who have adhered strictly to the terms of the...agreement..." Id. at p. 369. It would have been unfair to the parties who had believed that there would be no appeal and took action on the basis of that belief.

The fairness and due process spoken of in Cleveland Electric was not provided to Intervenors in this case. The Intervenors relied upon the agreement that segmentation was not at issue. They properly presented no evidence on this non-issue. The Board then found the opposite of the agreed upon model, and even used the Intervenors failure to introduce evidence of Findings of Fact on the issue as part of the basis for their decision. (See, PID Findings 38-39, p. 74; Finding 50, p. 77; Finding 51, pp.77-78). The Board has totally ignored basic principles of fairness and due process. The Board has applied "foreclosure" to the Cristianitos fault issue -- which was not litigated in 1973 at a hearing in which Intervenors were not a party -- the Board, however, refused to apply foreclosure or even recognize a stipulation to the closing of the segmentation issue -- which had been explicitly decided in 1973. At the very least, the Applicants should be bound by basic principles of equitable estoppel which dictates that a party should be bound by their own words and actions if another party reasonably relies on such words and actions. Here, Applicants repeatedly stated that segmentation of the OZD was not at issue and Intervenors relied on that statement and did not present evidence showing that the OZD was not segmented because it was understood it was not an issue.

The Finding at the CPH hearing that the OZD is to be considered a continuous zone of deformation is of utmost significance. The Board adopted the findings of the USGS. The report of the USGS in 1973, discussed above, concluded that the OZD was at least 240 km long and "capable of an earthquake whose magnitude could be commensurate with the length of the zone." (6 AEC 929, 942) This finding is totally contradicted if the finding of the Board, that the OZD is segmented, is accepted. The USGS said magnitude could be commensurate with the length -- which it gave as 240 km. The Board's findings of three zones

that do not connect means that an earthquake would be commensurate with the length of one of those zones -- not the full 240 kms. The OZD may not be a single throughgoing fault in the sense of a single narrow uninterrupted fault line. It was compared by the NRC Staff witness Dr. Slemmons to the San Andreas fault which is "up to a couple kilometers in width, in many places..." (Tr. p. 6317). Dr. Slemmons goes on to say:

Whether the [OZD] is a single narrow plane or a zone of perhaps somewhat greater width of a kilometer or so, I am not certain, but I think it can be interpreted as though it were a single continuous fault." (Tr. p. 6317)

Again, on page 6317 of the Transcript, Dr. Slemmons says that the fact that the OZD is a zone rather than a single fault is not as important as what is found at depth in the bedrock. And, he says "for conservatism in my own mind, I assume it to be a fault." (Tr. p. 6317, l. 22-23)

This same conservatism and concern for what happens at depth if found in the interpretation of the 1973 USGS by James Devine. Mr. Devine is Assistant Director for Engineering Geology, USGS, and testified as to what was intended in the 1973 report. Mr. Devine testified that:

We argued that three discrete zones should not represent individual fault zones and earthquake magnitudes dependent on each of those individual segments, but instead should consider them all in one segment, for the purpose of estimating earthquake size. (Tr. p. 5333, l. 12-17)

The same conservatism is found again when Mr. Devine was asked if the USGS considered the OZD to be a single fault capable of rupturing all at once. He was asked two questions and answered in two parts. First he says that the USGS was not of the opinion that "the entire length would rupture at once." (Tr. p. 5333, l. 22). This is the extreme conservatism for the OZD and it was not considered feasible by the USGS. Mr. Devine continues his answer saying that the USGS did assume "that there was indeed some relationship probably at depth, of these three segments, such that it all should be considered one zone." (Tr. p. 5333, l. 22-25). Although it was not believed that the entire length of the OZD would rupture at once, it was assumed that it was one zone for the purpose of estimating earthquake magnitudes

based upon a rupture of part of the entire zone. This means that a rupture of the OZD could extend from one of the segments recognized by the Board into another segment.

It does appear that the Board also misinterpreted the intent of the testimony of Dr. Brune, on page 12 and 13 of his Written Testimony. Dr. Brune was pointing out that given the ruling by the Board at the CPH (that the OZD is a throughgoing zone of deformation 240 kms long, capable of an earthquake commensurate with the length of the zone), that the most conservative estimate based on the length of the zone is the earthquake that would occur if the entire length ruptured, or a magnitude of 8.6. This was presented to establish a benchmark of the most conservative estimate. As Dr. Brune states, "the choice of a smaller fraction (and consequently choice of a smaller earthquake) is a probabilistic choice with some greater level of risk implied." (Written Testimony, pp 12, 13).

The Board attempts to portray the Intervenor's position to be that the OZD will rupture along its entire length. The Board is obviously trying to set up a "straw man" for the purposes of discounting the possibility of a 100% rupture of the OZD, and thereby disposing of the issue. It ignores the central issue of what percentage of the total OZD could rupture and, illogically and without basis, concludes that the OZD is segmented. Dr. Slemmons and Mr. Devine both testified that the OZD was to be considered as continuous or as "one zone". The Board, however, has concluded that the OZD is made up of three unconnected zones (PID, p. 77 et seq.) Perhaps the best explanation for this finding is provided by Applicants in their Answer to Intervenor's Application for Motion to Stay. On page 4 of the Answer, Applicants say:

The ASLB's ruling with respect to the segments was one of several necessary steps in reaching the final determination of $M_s 7$ as the appropriate maximum magnitude to be assigned to the OZD.

Applicants admit here that if the model from the 1973 CPH is used and the OZD is considered one zone, then the evidence shows that an earthquake of magnitude greater than $M_s 7$ is likely. The Board had to find the OZD to be in three unconnected segments in order for Applicants' design standard of $M_s 7$ to be found adequate. The Board did this even though it had to ignore a stipulation by the parties and its own concept of "foreclosure" to do so.

III

THE BOARD ERRED IN RULING THAT AN M_s 7 EARTHQUAKE IS AN APPROPRIATELY CONSERVATIVE MAXIMUM MAGNITUDE THAT COULD OCCUR ON THE OZD.

The Board, in its Initial Decision, page 104, Finding 137, states:

We have found, based upon the geologic and seismic characteristics of the OZD, that an M_s 7 earthquake is an appropriately conservative maximum magnitude that could occur on the OZD. It is within the meaning of the regulations the safe shutdown earthquake for the San Onofre site.

10 CFR Part 100, Appendix A, III, C, defines the "Safe Shutdown Earthquake" as "that earthquake which is based upon an evaluation of the maximum earthquake potential..." (emphasis added)

As stated in Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant) 13 NRC 903, 913 (1981):

Seismology is an evolving science. Reflecting this, the Commission's regulations calling for its application to the siting and design of nuclear plants are complex and perhaps even abstruse. But their purpose is clear: to estimate the magnitude of the strongest earthquake that might affect the site of the nuclear power plant during its operating lifetime; to determine the most intense ground motion that a seismic event could cause there, and to insure that the nuclear facility is designed and built to survive such an event without undue risk to the public.

The central issue in the present case is whether the Safe Shutdown Earthquake has been properly assigned. That is, is a magnitude M_s 7 earthquake the strongest earthquake that might occur and affect the site of SONGS 2 and 3. As previously decided by the Licensing Board, in denying a motion to compel answers to interrogatories brought by Intervenors, the design and construction of SONGS is not at issue in this case.

The language of the above cited regulations and decisions makes clear that in determining the SSE, the Board must consider the maximum earthquake potential and the earthquake that might occur. This requirement is addressed in a superficial way by the Licensing Board by its repeated use of the word "conservative" in the Initial Decision. However, the Board fails to set forth a definition or give any meaning to the term "conservative". The Intervenors have attempted to define the term conservative by proposing as a conclusion of Law the following:

The Board does not consider the mean earthquake which a fault is capable of producing to be a sufficiently conservative standard for purposes of nuclear power plant design because in using such a standard, half of the events which occur will exceed this figure. It is appropriate to use the mean plus one sigma or 84th percentile to determine the maximum magnitude based on earthquake fault length.

The Board in its decision totally ignored this important issue and failed to even attempt to establish an appropriate level of conservatism. This issue of the appropriate standard of "conservatism" is raised as an introduction to the following section regarding the determination of the maximum magnitude earthquake because it is a thread that runs through the entire fabric of the appropriateness of assigning $M_s=7$ as the maximum magnitude earthquake which might occur during the operating life of the plant. As will be demonstrated, the evidence presented at the hearing reveals, that $M_s=7.0$ is not conservative and does not meet the requirements of the regulations.

The Intervenors respectfully request that this Appeals Board address and decide the issue of whether the mean standard earthquake is appropriately conservative or whether the mean plus one standard deviation or 84th percentile earthquake (e.g. 84% below and 16% above) is the appropriately conservative determination of the Safe Shutdown Earthquake.

A. The Testimony of Dr. Slemmons Clearly Demonstrates that the Assignments of $M_s=7$ as the Safe Shutdown Earthquake is Not Conservative and the Board Erred in Misconstruing His Testimony and in Ignoring Dr. Slemmons' Corrections to His Written Testimony.

The Board in Finding 42 (p. 12 of Initial Decision) relies almost exclusively on the testimony of Dr. Slemmons to conclude that $M_s 7$ is the maximum earthquake that could occur on the OZD. A review of the testimony of Dr. Slemmons reveals that this reliance is unfounded and the evidence presented by him does not support the conclusion reached by the Board.

Dr. Slemmons in his testimony on page 6231 of the Transcript, starting at line 2, was asked a question regarding his assigning

M_s 6.8 as the maximum magnitude earthquake on the OZD with a 40 km length and the Rose Canyon fault zone with a 37 km length:

By Mr. Wharton:

- Q Okay, going to the -- again to the maximum magnitude 6.8, you stated that was a mean value, is that correct?
- A (WITNESS SLEMMONS) Yes.
- Q And by mean value, you mean that 50 percent of the earthquakes could be above that, 50 percent would be --
- A That is correct.
- Q --below, given that data. And if we did want to find the 84th percentile with this data, would we add 0.694 to the figure on that particular chart?
- A Plus or minus."

This testimony establishes what Dr. Slemmons means by "mean value", that is, that 50 percent of the earthquakes would be above that figure of M_s 6.8 and 50 percent below that figure. It also establishes what is meant by 84th percentile as being .694 (later rounded off to .7) higher than M_s 6.9. This basic scientific procedure is further explained and analyzed by Dr. Brune, the highly qualified expert witness for Intervenors who testified that:

Slemmons (SER, App.E) has used a regression curve developed by Slemmons (1977) to assign magnitudes to ruptures of a given length. In the calculations given by him in Appendix E, however, he uses the mean curve rather than the curve for a mean plus one standard deviation. Thus, the magnitude values he cites for a given rupture length would be expected to be exceeded 50% of the time. The mean plus one standard deviation value is .694 magnitude units higher than the mean for strike-slip earthquakes. For example, for an assumed rupture length of 62 km (SER, p.E-11) for SCOZD the mean estimated magnitude is 7.07 (expected to be exceeded 50% of the time), the mean plus one standard deviation is 7.77 (expected to be exceeded by about 16% of the data for faults with a rupture length of 62 km) and the mean plus two standard deviations is 8.46 (expected to be exceeded by about 2% of the data for faults with a rupture length of 62 km) (Written Testimony of Dr. James Brune, p. 23)

Dr. Slemmons, in his oral testimony, confirms Dr. Brune's assessment: (See Transcript pp. 6232, 6233, 6234, and 6235, indexed hereto as pages 23a, 23b, 23c, and 23d.

1 An assumed length is defined on the south, and by an inflection
2 point and a break in continuity as shown in figure D-1 of WCC,
3 the point of marked change in the fault strike about 27
4 kilometers south-southeast of SONGS, to the north of the change
5 in the rupture pattern in junction with transverse faults
6 about 35 kilometers northwest of SONGS. Total length of this
7 fault segment is 62 kilometers. The relationship with strike-
8 slip faults indicates the following earthquake magnitudes, and
9 you have for the south coast offshore zone of deformation a
10 62-kilometer length.

11 Is that still your testimony that it is a 62-
12 kilometer length --

13 A (WITNESS SLEMMONS) This is based on an assumed
14 length from essentially looking at the pattern analysis of
15 horizon C, and making the assumption that my subjective
16 impression of what appears to be a unit is correct, if that
17 segment, if that were to break as a segment during a single
18 earthquake, then the figure 7.1 minus represents my best
19 estimate of a probable value. It is based on the various
20 assumptions that lead into deriving that length.

21 Q The 7.1 figure here is a mean figure also?

22 A Yes.

23 Q And if you wanted to determine the 84th percentile
24 figure, you would add to the 7.1, a 0.694, is that correct?

25 A That is correct.

1 Q And that is simply a mechanical operation, adding
2 0.694 to 7.1?

3 A (WITNESS SLEMMONS) That is correct.

4 Q Going down to the third estimate.

5 A I might mention that I would not add 0.694. I
6 would probably round it off to the nearest tenth, because
7 what I have tabulated there contains more significant figures
8 than the data warrants, and to round it off to the nearest
9 tenth would probably be more appropriate.

10 Q You then refer to a third estimate of earthquake
11 magnitude is derived using values listed in the response to
12 question 36 -- 361.66, with lengths of 36 kilometers for the
13 Newport-Inglewood zone of deformation.

14 How did you arrive at the 36-kilometer figure?

15 A These were derived from the table, table 361.66-1.
16 This was the basis on which in the Woodward Clyde report, 1979,
17 they subdivided the offshore zone of deformation. It is based
18 on my assumption that there was some geologic basis in their
19 selecting of those particular spots to divide the zone into
20 three segments. They are given with three different numbers.
21 They didn't split it into equal thirds.

22 I have no idea of what, from the report itself,
23 what the criteria or basis for selecting those figures might
24 be, and I have indicated that, then, as an assumed rupture
25 length, and the validity of these three numbers is of course

1 directly dependent upon the criteria, unspecified criteria
2 that entered into their selection of these three values.
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1 Q So you do not have any independent knowledge of
2 the validity of these figures?

3 A No, I do not.

4 Q Now, using the assumed rupture length again for
5 the NIZD of 36 kilometers, 6.7 plus, again, is this a mean
6 figure?

7 A Yes.

8 Q And to find the 84th percentile from this mean
9 figure you would mechanically add to that plus or minus .694?

10 A Correct. And similarly for the 6.6 minus and
11 the 6.9.

12 MR. WHARTON: Mr. Chairman, I think this is an
13 appropriate time I will be getting into the next area --

14 MR. BEOLETTO: Mr. Chairman, can I ask just one
15 I know it is not our turn, but there is -- I am confused by
16 one thing. In reaching the 84th percentile, once the Witness
17 said plus or minus that figure, and the next two times he
18 said plus only. Is it plus and minus in each case to reach
19 the 84th percentile of all the data?

20 WITNESS SLEMMONS: Let me check that and perhaps
21 if we recess bring the answer to that.

22 MR. BEOLETTO: I was just confused by the way
23 that came in.

24 JUDGE KELLEY: That is fine. Then perhaps
25 tomorrow morning you can provide an answer to that.

It is unrefuted then, and confirmed by Dr. Slemmons' testimony that all of the "maximum" values he cites for a given rupture length would be exceeded 50% of the time. If one wants to raise the level of conservatism to 84% one would add .7 to the values given for the mean earthquake. This would yield the following results:

| <u>Fault Length</u> | <u>Mean</u> | <u>Mean Plus 1 (84%)</u> |
|---|--------------------|--------------------------|
| 1. OZD with 40 km rupture: | M _s 6.8 | M _s 7.5 |
| 2. South Coast Offshore Zone of Deformation (directly offshore of SONGS site) with 62 km rupture: | M _s 7.1 | M _s 7.8 |
| 3. Newport Inglewood Zone of Deformation with 36 km rupture: | M _s 6.7 | M _s 7.4 |

It can be readily seen then, that using Slemmons' indirect method by Fault Segment Lengths methodology as found on pages E-10 through E-12 of the SER, that the mean plus one standard (84 percentile) maximum magnitude earthquake (that can be exceeded 16% of the time) ranges from a low of M_s 7.4 to a high of M_s 7.8. Unless one is willing to accept a 50-50 chance of exceeding M_s 7.0 as conservative, it appears to be unreasonable to accept M_s 7.0 as a reasonably conservative Safe Shutdown Earthquake.

The most significant portion of Dr. Slemmons' testimony, and the part to which Intervenors direct the Appeals Board's attention, is that portion of his testimony found, starting on page 6277 of the Transcript. Dr. Slemmons realizes the lack of conservatism in his Written Testimony and literally recants his Written Testimony in favor of a more appropriate method of determining the maximum earthquake on the OZD. On page 6265 of the Transcript, Dr. Slemmons is asked about his testimony on page E-12 of the SER:

- Q There you have determined a length of 190 kilometers (of the OZD) or a 22 percent length of 42 kilometers. Using the 22 percent value derived above, this corresponds with a surface rupture length of 44 kilometers and an earthquake of M_s 6.9. Now would this 6.9 be a mean figure?
- A This would be the best fit or mean figure, yes.
- Q Okay and one method of arriving at a one standard deviation, again would be to add your standard deviation from your chart, .69?

KJ 1 BY MR. WHARTON:

2 Q Dr. Slemmons, what I would like to get into now
3 is this chart, again on E-14, and there you have come up
4 with a mean for highest percent on each fault underlined,
5 22.1, standard deviation. Now, is this standard deviation,
6 is this an accounting for the scatter in the data which
7 essentially is a standard error bar? Is that what you are
8 talking about?

9 A Yes. It is simply a mathematical plot of the
10 dispersion of the underlined figures from the mean.

11 Q Okay, now, so in using this particular 22 percent
12 figure, in using it at all, you should be adding to it plus
13 or minus 7.45 to account for possible error, --

14 A Yes.

15 Q -- the scatter in the data?

16 A If I were to redo -- rewrite this section, I
17 would not use the plus or minus value and then calculate a
18 magnitude for the deviated value. I think I would simply
19 at each stage show the best fit number, the mean number, and
20 then indicate what a standard deviation is, and on tracking
21 from this through to the estimates that you see on page E-13,
22 I would delete -- I would not use that calculation on the
23 very last line there for inclusion in the Agua Blanca fault.
24 Let's see now, that is not --

25 Q I am sorry. I did not --

1 A -- correct.

2 Q -- follow you here.

3 A I am not following myself. I have made within
4 the report some use of applying a standard deviation and a
5 30 percent length, and then calculating a magnitude for that.
6 I would not choose to do that at the present time, but simply
7 show the 22 plus a standard deviation of the 7.5, approxi-
8 mately, and again, it would probably be advisable to -- for
9 the magnitude value, indicate what the sigma is, .7, but I
10 would not apply a double step calculation with standard
11 deviations, on standard deviations.

12 Q Well, I am not sure that I follow you. If you --
13 now, if you take 22 percent of a 275 kilometer length, and
14 come up with a 7.1, are there any standard deviations built
15 into that figure?

16 A No.

17 Q So that is a mean figure?

18 A Yes.

19 Q Now, I believe you are changing what your testi-
20 mony is a little bit and I want to make sure I understand
21 what you are saying. Now, to find the mean plus one sigma,
22 if it 7.1, you say you don't increase the size of the fault
23 by seven percent?

24 A You do increase it by seven percent, but what I
25 am attempting to say is that I would now delete that

1 particular sentence and not use that particular adjustment.

2 Q But to reach the 84th percentile based upon your
3 1977 work, you would add .694 to that figure?

4 A Yes.

5 Q So it would be approximately 7.7?

6 A Yes.

7 Q And can we use the same mechanical method --

8 MR. PIGOTT: I have an objection to this continu-
9 ing line of questions that -- as to how to appropriately
10 misuse the Slemmons curves. I believe it has been asked
11 several times and answered several times that this witness
12 does not agree with this kind of a manipulation of the curves
13 and it just doesn't seem to add any kind of a probative
14 value to the record. It is becoming extremely repetitious
15 and I think objectionable.

16 MR. WHARTON: Mr. Chairman --

17 JUDGE KELLEY: Mr. Wharton --

18 MR. WHARTON: We are going on the basis of
19 Mr. Slemmons' testimony and Dr. Brune's testimony. He has
20 testified he comes up with a mean standard.

21 JUDGE KELLEY: Yeah.

22 MR. WHARTON: And these are the means.

23 JUDGE KELLEY: Right.

24 MR. WHARTON: And from that point he does have a
25 standard deviation chart that gives a one sigma.

- A Yes
Q Okay. And that would yield approximately 7.6?
A That is correct. I would not utilize such a figure in that the numbers that I have here included are already if one examines the data base of the table on E-14 are already conservative."

This is the part of the testimony that the Board relied on (See pages Tr. 6230-6232, 6265, 6270) in finding that Slemmons did not find it appropriate to use the standard deviation. However, the Board totally ignored the later testimony of Dr. Slemmons on page 6275 where he retracted his written testimony and this, and other previous oral testimony after a thoughtful review, and agreed with Intervenors position as to how to use the standard deviation to compute the maximum earthquake. For the benefit of the Board, we are in indexing to this page the verbatim Transcript of pages 6275, 6276 and 6277 with emphasis added. We request the reader to read these pages at this time, it is crucial testimony.

This is a dramatic change in testimony by a thoughtful witness who while testifying realized his error and lack of conservatism and admitted it. It is of utmost significance because the Applicants and the Staff relied almost solely on Dr. Slemmons' testimony to show that M_s 7.0 was a conservative estimate of the maximum earthquake on the OZD. The Board still relies on his testimony but apparently does not fully comprehend what he said.

In order for the Appeals Board to fully understand the significance of this change of testimony, a review of Dr. Slemmons Written Testimony and how it is changed is appropriate. On Page E-14 of the SER, Dr. Slemmons explains his Fractional Fault Length method of determining the maximum earthquake that can occur on the OZD. Dr. Slemmons gathered data from world wide strike-slip earthquakes and determined the average percentage of rupture length for strike-slip faults. (See Chart on page E-16 of SER). The average rupture length was found to be 22%. He used this 22% figure to determine the maximum earthquake that could occur on a fault based on its length. For example, if the OZD is 200 kms. long a rupture length of 22% would be 44 kms. which would generate an earthquake of M_s 6.9. This is an average or mean earthquake (See SER, p. E-14). In the SER, Dr. Slemmons adds a standard deviation to account for the scatter in the data by which he arrived at the 22%

rupture length and adds 7.5% to the rupture length for a rupture length of 30%. This produces a rupture length of 60 kilometers which is equivalent to an M_s 7.1 earthquake. No other conservatism is added in his Written Testimony. The Intervenor contended that .7 should be added to the M_s 7.1 figure to account for the scatter of data in Dr. Slemmons' formula in determining magnitude from the rupture length. Dr. Slemmons, in his testimony, at page 6276, agrees with Intervenor where he states, at line 3, "I have made within the report some use of applying a standard deviation and a 30 percent length, and then calculating a magnitude for that. I would not choose to do that at the present time but simply show the 22% plus a standard deviation of the 7.5 approximately, and again it would probably be advisable to -- for the magnitude value, indicate what the SIGMA is .7. is .7..." (Note: The "SIGMA" referred to is another name for one standard deviation.)

When asked if he is changing his testimony, Dr. Slemmons agrees and says "I would now delete that particular sentence and not use that particular adjustment" (referring to 7.5% of rupture length) (See Tr. p. 6276, l. 19-27, p. 6277, line 1). He goes on to say that instead he would add .694 to the magnitude obtained from the 22% rupture length. In the case of the 275 km length, that would yield a maximum magnitude of approximately 7.7 (See, Tr. p. 6277, l. 2-7). With this change in testimony, we can simply go to Dr. Slemmons' Written Testimony, contained in the SER on P. E-14 and add .7 to the following magnitudes obtained from the 22% rupture length mean earthquakes:

| <u>OZD Length</u> | <u>Mean Earthquake</u> | <u>Mean Plus One Standard Deviation Earthquake</u> |
|--|------------------------|--|
| OZD with a length from Santa Monica to San Diego 200 km | 6.9 | 7.6 |
| OZD with a length connection to Coronado Banks or 247 km. | 7.0 | 7.7 |
| OZD with a length extending to Agua Blanca fault or 300 km | 7.1 | 7.8 |

Dr. Slemmons testified that it is appropriate, in estimating the maximum earthquake on the OZD, that a mean plus one standard be used. Using such a standard the maximum earthquake which can occur on the OZD is M_s 7.6 - 7.8. The Testimony of Dr. Slemmons clearly shows that the acceptance of M_s 7.0 as the Safe Shutdown Earthquake is not in any way conservative, but is merely a 50-50 proposition.

In order for the Appeals Board to uphold the Licensing Board's decision, it will have to ignore Dr. Slemmons' admission of his error in conservatism and will have to adopt a 50% standard as an "appropriately conservative" standard for licensing a nuclear power plant in a region in which ten million people live. As can be readily seen, Dr. Slemmons' testimony and his table on page E-16, do not in any way demonstrate that an M_s 7 is an appropriately conservative maximum magnitude earthquake which can occur on the OZD. His testimony demonstrates that, at the very least, an M_s 7.5 is the appropriately conservative maximum magnitude earthquake that can occur.

We call upon this Appeals Board to use its independent judgment based upon the hard evidence presented, not the conclusionary opinions of biased witnesses as to the ultimate policy decision to be made as to whether M_s 7.0 is an appropriately conservative Safe Shutdown Earthquake. In doing so, the Board should decide, and set forth in findings, the level of risk the population of Southern California is willing to accept.

The Licensing Board side-stepped this issue. It must be addressed since this Appeals Board is making a decision, and making a value judgment, which will affect all of the citizens of Southern California. Ultimately, this Appeals Board must decide, assuming that an earthquake will occur on the OZD during the operating life of the plant (which you must do under the regulations); and, given that the chance of that earthquake exceeding the earthquake for which the plant is designed are 50%; whether such a 50 percent standard is appropriately conservative to protect the public health and safety of ten million people. Intervenors submit, and the record clearly reflects, that an $M_s=7.0$ SSE is not "appropriately conservative" and that the SSE should be $M_s = 7.5$.

B. The Boards Reliance on the Slip-Rate Method to Determine the Maximum Magnitude Earthquake Constitutes Reversible Error, In That, This Method is Untested; Lacks a Sufficient Data Base; Leaves Out Critical Data, and Does Not Demonstrate That M_g 7.0 is a Conservative Estimate of the Maximum Magnitude Earthquake Which Can Occur on the OZD.

The Board recognizes the obvious problem with utilizing the Slip-Rate method for determining the maximum magnitude earthquake. The Board explains the methodology used by the Applicants as follows:

"They compiled information on slip-rates of faults relevant to the San Onafre analysis; . . . They then compiled historic earthquake magnitude data on the selected faults and plotted both the slip rates and magnitude data. By drawing a line bounding the maximum observed earthquake, they established "a historic earthquake limit" (HEL). They then performed a second analysis designed to take into account ranges of error in slip rate and other factors. The bounding line of this analysis produced a "maximum earthquake limit" (MEL) for the range of faults studied. (see Initial Decision P. 33-34).

The Board recognizes one of the major flaws of this method. It states a page 34, "One of the principal concerns about the validity of the slip rate method was whether there was an adequate historical data base. This is a valid concern. The historic record of California earthquakes extends back only about 200 years, and the instrumental world record only about 50 years. This is a relatively short record from which to extrapolate conclusions about earthquakes that often have much larger recurrence periods."

The board then points out that "for purposes of this study, it was assumed that the OZD had a slip rate of .5 mm per year . . . Estimates of the slip rate on the NIZD have ranged up to a high value of .68 mm per year. Using

this slip rate the maximum earthquake prediction for the OZD would be $M_s 7$." (see Initial Decision page 35)

The Board goes on to state: "The Board concludes that while the MEL and HEL are based upon a less than optimal data base, it is sufficient to assist the Board in determining the SSE for San Onofre."

(Initial Decision p. 94 #105)

The question then remains that if the slip rate method, at best, merely assists the board in arriving at the SSE, what else can they rely on to determine the Safe Shutdown Earthquake. The testimony of Dr. Slemmon clearly shows that the only appropriately conservative SSE using the Fault rupture and magnitude is at least $M_s 7.5$.

Not one single witness testified that the slip rate method, by itself is a reliable method to predict the maximum earthquake on the O.Z.D.

The evidence against the reliability and appropriateness of using the Slip rate method is overwhelming and comes from all three sides.

Applicants witness testimony

1. The "slip-rate" methodology was formulated by Edward Heath in 1978 and this particular method of determining maximum earthquake on a given fault has never been used before in any way. (Testimony of Edward Heath, Tr. p. 1267, l. 17-25, p. 1268, l. 1-25).

2. According to the person that developed this particular methodology, Edward Heath, The methodology is limited by the observational time of historic earthquakes. (Testimony of Edward Heath, Tr. p. 1269, l. 22-24)

3. The "slip-rate" methodology, prior to its presentation to the NRC, was not reviewed by the U. S. Geologic Survey or the California Division of Mines and Geology. (Testimony of Edward Heath, Tr. p. 1274, l. 10-17).

4. There was no peer review of the "slip-rate" methodology outside of Woodward & Clyde and Southern California

Edison Consultants. The method was devised in haste to meet a deadline. (Testimony of Edward Heath, Tr. P. 1276, l. 1-6).

5. Up to the time of the hearing in this matter, the slip-rate technique has not been published in technical journals nor has it had any peer review, formal or informal. (Testimony of Edward Heath in answer to question posed by Judge James Kelley, Tr. p. 1276, l. 8-14).

6. The proponent of the "Slip-rate" methodology, in his testimony, states that he has no credentials or qualifications in the area of probabilities and statistics. (Testimony of Edward Heath, Tr. P. 1256).

7. The proponent of the slip-rate method Mr. Heath has not looked into what the acceptable level of rise to the public is in making his determination regarding conservatism of his predictions (Trans. P. 1260, l. 9-25).

8. It is not appropriate to use the slip-rate method alone to determine the maximum magnitude of earthquakes on the OZD because of the uncertainties in the data base for the OZD. (Testimony of Mr. Heath, P. 1272, l. 12-25, P. 1274, l. 1).

9. Mr. Heath agrees that the historic geologic time is very short and we are certainly seeing only a portion of the total seismic record (Trans, P. 1352, l. 1-95).

10. The interpretation used for developing horizontal geologic slip-rates are not definitive. (Testimony of Mr. Heath, P. 1378, l. 18-24, P. 1379, l. 1-17).

11. We have not been able to determine a **solid** slip-rate for the SCOZD (that portion of the OZD 4 miles offshore from the plant) (P. 1379, l. 17-18, testimony of Mr. Heath).

12. Mr. Heath has not been able to determine a good slip-rate for the Rose Canyon Fault portion of the OZD (Trans, P. 1384, l. 9-12).

Intervenor Witnesses Testimony

1. Dr. John G. Anderson testified that the data set used in the slip-rate chart is not necessarily sufficient to demonstrate a physical upper limit to a magnitude that can occur on a given slip-rate. Since there is only fifty years of data sample on the Newport-Inglewood fault, Dr. Anderson doubts that a 6.3 earthquake, recorded in that fifty-year period, reflects the maximum earth-

quake, that can occur. (Testimony of Dr. John G. Anderson, Tr, P. 4641, l. 1-16).

2. Dr. John G. Anderson reviewed the Woodward & Clyde consulting report dated June, 1976, which contains the data and findings of slip-rate methodology and is not convinced that it is valid (Testimony of Dr. John G. Anderson, Tr. P. 4632, l. 19-15. P. 4633, l. 1-3).

3. The use of the geologic slip-rate method proposed by Woodward & Clyde Consultants is not valid for estimating the maximum earthquake that could occur on the OZD, since there is no known reason why a fault zone of a given length with a low slip-rate cannot have as large an earthquake as a fault zone of the same length with a vast slip-rate. The use of such method could be considered a probabalistic method for determining the maximum probable event in a given time period, but not a deterministic method for estimating the maximum magnitude which could occur at any time. (Written testimony of Dr. Brune P. 14).

4. Figure 361.38-4 of the Woodward & Clyde Consultants response to NRC questions shows a "line bounding extremes of braketed data (MEL)." This line is taken by the Applicants to represent a bounding curve which gives an $M = 7.0$ earthquake for the OZD, taken to have the same slip-rate as the Newport-Inglewood zone of determation, .5 mm per year. The slope of the bounding curve is controlled by only two points at slip rates below 1 mm per year and thus, is scientifically quite uncertain. As indicated by Dr. David G. Slemmons in the SER, p. E-7, "The data base for these figures is based on a very short historic record of earthquake activity; future earthquake and new data are likely to extend the limits to some indeterminate higher value." (Written testimony of Dr. James N. Brune, p. 14 and 15.)

5. Dr. Clarence R. Allen reiterated the uncertainties in extrapolating from the historical record of seismicity in California and made clear that we must be exceedingly cautious in extrapolating from this very short history. It is Dr. Allen's opinion that we must be exceedingly cautious in extrapolating future earthquake activity from the short historic seismicity record in California. (Testimony of Clarence R. Allen, Tr. P. 4685, l. 21-24, P. 4686, l. 2-24).

6. The use of the data in the slip-rate methodology begs the question in that one point on the graph, namely, the point for the 1933 Long Beach earthquake controls the bounding curve. If

the magnitude for the 1933 Long Beach earthquake had been a little over one unit higher, $M_s = 7.5$, the slope of the bounding curve would have indicated $M_s = 7.5$ as the maximum magnitude for a slip-rate of .5 mm per year and for the OZD. Thus, the slip-rate methodology assumes a priori that the 1933 Long Beach earthquake is the controlling earthquake for a slip-rate of .5 mm per year. There is no scientific justification for this because the historic record is too short. (Written testimony by Dr. James Brune P. 15).

7. There is no scientific justification for one data point controlling the MEL line in the slip-rate chart because the historic record is too short. For example, the 1956 El Alamo earthquake had a magnitude of 6.8, yet the slip-rate average over the last several million years is less than for the Newport-Inglewood zone of deformation. It can be noted that if we had only two data points from the data above a slip-rate of .5 mm per year, you might have inferred a bounding curve with the opposite slope. For example, maximum magnitude increasing with decreasing slip-rate, a result which might be expected from a rock mechanic's point of view, since it is observed in the laboratory that rock strength along faults increases with time between successive failures. (Written testimony of Dr. James N. Brune, p. 15). In Dr. James N. Brune's opinion, the MEL curve merely represents the result of limited sampling of seismicity. (Dr. Brune, written testimony P. 16).

8. The slip-rate methodology as presented is suspect in that the Applicants removed all Japanese data from consideration. The removal of the Japanese data from consideration has a serious affect on the conclusions concerning the slip-rate method. Since the Japanese data represents most of the data at low slip-rates, the data base is weakened in precisely the range where it is most uncertain and where the data is most important to the conclusions concerning the maximum earthquake limit. Since much of the Japanese data exceeds the present proposed MEL, its elimination has shifted the MEL curve to lower magnitude values for low slip-rates. Considering the claims made for the slip-rate method by the Applicants and the NRC Staff, it is important to thoroughly justify such dismissal of data. There is no established reason why Japanese strike-slip earthquake mechanics should differ from California strike-slip earthquake mechanics. (Written Testimony of Dr. James

N. Brune, P. 25).

9. According to Dr. J. Enrique Luco, the fact that the theoretical prediction contained in the Woodward-Clyde slip-rate study coincides with the proposed line of connecting maximum magnitude with slip-rate could mean one of two things: it could mean that the return period of the maximum magnitude earthquake is independent of the slip-rate. The second possibility is that that curve relating maximum magnitude earthquake and slip-rate simply reflects the limited time of observation that we have had, it probably is on the order of one hundred to one thousand years, so that the curve obtained by Woodward-Clyde then would not really reflect an upper bound for magnitude versus slip-rate, but is simply an indication that we have not observed long enough. (Testimony of Dr. J. Enrique Luco, P. 5034, 1. 7-21).

10. The calculated slip-rate for the San Miguel fault zone depends on the time interval over which the averaging is done. If the average is taken since Cretaceous, a value less than .01 mm per year is obtained. On the other hand, if we assume that displacement occurred within the last one million years, a rate as high as .25 mm per year is obtained. The higher rates would be consistent with the thesis that the OZD-San Miguel linear zone is a highly active incipient fault zone. The 1956 San Miguel earthquake is further evidence that the slip-rate methodology is invalid for estimating maximum magnitude for the OZD. The occurrence of an M = 6.8 earthquake in this region on a fault of such low total displacement and with such a short historic record argues that the maximum magnitude earthquake on the OZD could be considerably larger. (Written Testimony of Dr. James N. Brune, P. 18).

N. R. C. Staff Witnesses

1. According to Dr. Slemmons' review of the slip-rate chart, one earthquake shifting to the right could shift the data base to the right hand corner. (Tr. testimony of Dr. Slemmons' P. 6289, 1. 3-9).

2. Dr. David B. Slemmons couldn't recall any examples in his scientific experience where a curve line in a statistical chart would move directly proportional to the change in any one significant data point. (Testimony of Dr. David B. Slemmons, Tr., P. 6190, 6191, 1. 1).

3. Dr. David B. Slemmons agrees that the probability would be very low that the earthquake which occurred on the NIZD within fifty years is the maximum earthquake that could occur on that fault at

any time. (Testimony of Dr. David B. Slemmons, Tr. P. 6178, l. 19-25).

4. Further evidence that the slip-rate methodology as developed by Woodward-Clyde is an unproven and unreliable methodology on which to base a decision regarding the operating of a nuclear power plant is contained in the testimony of Dr. Slemmons who stated that the slip-rate methodology has never been published and has not been presented to the scientific community and that it is an untested methodology. (Testimony of Dr. David B. Slemmons, Tr. P. 6176, l. 11-19, P. 6177, l. 9-12).

5. The unreliability of the Woodward-Clyde slip-rate methodology is shown in Figures 361.45-1 and 361.45-2 is testified to by Dr. Reiter of the NRC Staff. He stated that there is a "paucity of data at lower slip-rate magnitudes." (Testimony of Dr. Leon Reiter, Tr. P. 5808, l. 15-22).

6. Dr. Reiter further testified that the historical record was not long enough to evaluate earthquake potential. (Testimony of Dr. Leon Reiter, Tr. P. 5824, l. 21-21, P. 5825, l. 9-13).

7. Dr. Reiter testified that the slip-rate methodology itself is not enough to come to a reasonable and conservative determination that the maximum earthquake on the OZD is appropriately a magnitude 7.0 (Testimony of Dr. Leon Reiter, Tr. P. 5826, l. 5-15).

8. Dr. Slemmon testified that the Woodward-Clyde Slip-rate method is being used for the very first time in this proceeding; it has not been published or subjected to the scientific community and is an untested methodology (Trans, P. 6176, l. 6-19; P. 6177, l. 4-12).

9. Dr. Slemmons testified that the slip-rate method suffers from a lack of data below one mm per year and that the error bars do not contain a factor accounting for that lack of data. (Tran, P. 6193, l. 1-10).

It is respectfully submitted that the evidence is overwhelming that the slip-rate method is totally inappropriate for making a conservative assessment of the maximum magnitude earthquake which can occur on the OZD. It is untested; is devoid of sufficient historic data base; is based on unfounded assumptions, deals in probabilities not determinations and has not ever been submitted to the scientific community for review let alone accepted.

If the slip-rate methodology has any value at all it can only be as a comparison to maximum values derived by using other methods for purposes of determining if there is a correlation.

Intervenors have consistently asserted that the SSE should be $M_s = 7.5$. The evidence presented by Dr. Slemmons fully supports this. The Slip-rate methodology also supports this conclusion if you add the data from the San Miguel fault to the data base. As pointed out in Intervenors Finding of Fact #84, citing the testimony of Dr. Brune, Dr. Gastil and Dr. Ehlig:

Because of the proximity and the geologic and tectonic relationship of the San Miguel earthquake to the OZD, they should have been given important weight in testing the slip-rate method. The slip-rate on the Newport-Inglewood zone of deformation, as given in the Woodward-Clyde Consultants' Appendix B, is about 3.5 km in the last seven million years giving an average slip-rate of .5 mm per year. On the other hand, the slip-rate on the San Miguel fault zone in the last seven million years is only approximately 250 meters. (Testimony of Gordon G. Gastil, Tr. P. 5126, Ll 8025, P. 5122 Ll-28, P. 5123 l. 1-25). This gives a slip-rate of about .04 mm per year. According to the bounding curve given in the FSAR, Figure 361.38-4, .04 mm per year corresponds to a maximum magnitude of less than $M = 5.5$. This magnitude derived from plugging this data into the slip-rate chart is in total disagreement with the magnitude of the actual earthquake occurring on the San Miguel fault (M up to 6.8). This further supports the conclusion that the bounding curve in Figure 361.38-4 of the FSAR is a result of sampling limitation, not a physical limitation on the magnitude of earthquakes.

Using the available data from the slip-rate on the San Miguel fault zone (verified by both Gordon G. Gastil and Perry Ehlig), .04 mm per year averaged over the last seven million years and include the magnitude 6.8 earthquake recorded in 1956 and insert this data into the Woodward Clyde Consultants' Report's bounding curve, given in Figure 361.38-4 of the FSAR, we obtain a new bounding curve which gives a magnitude of about 7.5 for the OZD. (Written testimony of Dr. James N. Brune, p. 17).

As testified to by Dr. Ehlig: "In the San Miguel fault in the area just southeast of what was the community of San Miguel, the displacement appears to be on the order of oh, at the most 200 meters . . ." (Tr., P. 1068, l 15-22).

Dr. Ehlig further confirms that the San Miguel fault has "a relatively low slip-rate" (Tr, P. 1071, l. 22-23).

If the slip-rate method is to have any value it should include all relevant data. The data from the San Miguel fault is highly relevant in that it is a strike slip fault in Baja California, as is the OZD. (see testimony of Gordon Gastil, P. 5128 and written testimony of Dr. Brune, P. 18). To exclude this fault from the data, in light of the fact that it experienced a fairly recent earthquake of M_s up to 6.8 and with knowledge that it has a very low slip-rate and has a tectonic relationship to the OZD, raises severe doubts as to the reliability of the report and even the motives and bias of the preparer of the report.

When the data we do have about the San Miguel fault is included in the slip-rate method data base, we obtain a new MEL boundary line which agrees with Dr. Slemmons mean plus one standard deviation Safe Shutdown Earthquake, namely $M_s = 7.5$.

Section 361.38(b) of the FSAR is a comparison of the slip-rate and half length methods for estimating magnitude earthquakes. The purpose of this section of the FSAR is to show that there is some correlation between the predictions from the synthetic slip-rate and the half length method for estimating magnitudes. This was done using a synthetic slip-rate versus magnitude plot based on two correlations: the magnitude versus rupture length of Slemmons (1977) and a correlation of slip-rate versus length (Figure 361.38-3) to obtain a synthetic one-half length line (Figure 361.3-4, 361.3-5, 361.38-6). However, both these correlations represent an average value and thus this synthetic slip-rate versus magnitude plot also represents an average line. If the data of Slemmons' (1977) for strike-slip faults is transferred in the same manner, 50% of the data will fall to the right of the curve indicating that the bounding curve from the slip-rate does not "bound" the data. A more conservative estimate would include a one standard deviation correction (+ or - .694 magnitude unit) giving a maximum magnitude of about 7.35. Further, if one were to add data from the San Miguel fault (a slip-rate of .04 mm per year averaged over the last seven million

years) for the 1956 earthquake registering 6.8 , one would obtain a bounding curve on the slip-rate chart which gives a magnitude of about 7.5 for the OZD. (Brune P. 24, 17).

C. The Appropriateness of Assigning $M_s = 7.5$ as the Safe Shutdown Earthquake is Confirmed by Other Studies.

Numerous other studies have been prepared regarding the maximum earthquake potential of the OZD. They were all performed independent of the Applicant and the NRC staff and they all confirm that the maximum earthquake which can occur on the OZD exceeds $M_s = 7.0$.

1. The U.S.G.S. Open File Report 81-115 "Scenarios of Possible Earthquakes Affecting Major California Population Centers with estimates of intensity and ground shaking" published by the United States Geologic Survey in 1981 estimates a maximum magnitude of $M_s = 7.5$ on the NIZD portion of the OZD. (see written testimony of Dr. Brune, P. 13, written testimony of Mark Legg, P. 16).

2. A 1967 report to the Secretary of the Interior Stewart Udall, regarding the Bolsa Island Nuclear Power Plant states, in the section entitled "Seismological Considerations", that:

In specifying the maximum earthquake for which public safety must be assured, a highly conservative approach has been adopted for two principal reasons: One, the consequences of some types of serious failures in a nuclear facility must be guarded against even if the likelihood is very remote. Two, the historic record of earthquake occurrence is so short that it cannot encompass the entire spectrum of possible events. In view of the mandatory conservatism, we suggest that the maximum earthquake for which public safety must be assumed should be a magnitude 8 shock on the Newport-Inglewood fault or on one of the parallel offshore faults.

Similarly, other studies have suggested an $M = 7.5$ and $M = 7.25$ as the OZD design magnitude. (USGS, Open File Report, 81-115 (1980): Woodward and Clyde Consultants, LNG Report (1978).) (Written Testimony of Dr. James N. Brune, p. 12 and 13; Testimony of Edward Heath, Tr. P. 1320, 1. 11-24).

(See Intervenor exhibit #16 entered into evidence on page 4741, written testimony of Dr. Brune, P. 12 and 13.)

3. According to Applicants witness Mr. Heath, an environmental report prepared by Orange County proposed a maximum magnitude of $M_S = 7.5$ for the OZD. (See Tran, P. 1324, l. 12-15).

4. The Applicants own consultants, Woodward Clyde, in a report published by them in 1978 entitled "Geotechnical Evaluation of Potential Island and Offshore California L. N. G. Import Terminal Site," evaluated the earthquake potential of the South Coast Offshore Zone of Deformation off Camp Pendleton and estimated a maximum earthquake of $M_S = 7.25$. (See Tr. Testimony of Mr. Heath, P. 1320, l. 11-24).

It is interesting to note that the only estimate of the maximum magnitude for the OZD of $M_S = 7.0$ is for purposes Nuclear Power Plant design. A facility which would appear to require the most conservatism is in fact relying on the least conservative estimate.

The overwhelming weight of the evidence and common sense dictates that the appropriately conservative maximum earthquake is $M_S = 7.5$. At the very least the Applicants have not sustained its burden of proof that the maximum earthquake is appropriately $M_S = 7.0$. (See also written testimony of Dr. James N. Brune, P. 12, 13, 20, 21, 22, 23, 24 and written testimony of Mark Legg, P. 13, 14, 15, 16, in their entirety).

THE EVIDENCE PRESENTED BY THE ONLY INDEPENDENT SEISMOLOGIST TO TESTIFY, DR. DAVID BOORE, CLEARLY ESTABLISHES THAT THE ASSIGNED DESIGN BASIS OF A .67g WILL BE EXCEEDED BY GROUND ACCELERATION FROM BOTH AN $M_s=7$ and $M_s=7.5$ EARTHQUAKE ON THE OZD AND THE BOARD FAILED TO STATE ANY VALID GROUNDS FOR IGNORING THIS EVIDENCE.

A. The Only Evidence in the Record Regarding Ground Acceleration From A $M_s=7.5$ Earthquake Establishes That Such An Earthquake Will Generate Ground Acceleration of 1.1 g.

As set forth above, in Section III , the appropriately conservative safe shutdown earthquake should be established as $M_s = 7.5$. The Board in its findings of fact failed to address the ground accelerations which will occur from a $M_s = 7.5$.

Even though the Board found that an $M_s = 7.0$ was appropriately conservative, they should have at least addressed the issue of what ground accelerations could be expected from an $M_s = 7.5$ event on the OZD.

The record clearly establishes that, whatever estimates are given regarding maximum magnitude and ground acceleration, such estimates carry with them a certain level of uncertainty. As stated by Dr. Brune, in his written testimony:

The state of our scientific knowledge concerning geology, tectonics, faulting mechanisms, and generation of strong ground motion is too limited to allow us to predict with confidence the maximum ground accelerations to which a critical facility such as the San Onofre Power Plant may be exposed during its lifetime. (Dr. James Brune, Written Testimony, p. 7)

This view regarding inherent uncertainties is supported by both the NRC Staff and Dr. Clarence Allen (See Safety Evaluation Report, p. 2-54, 2-59; testimony of Clarence Allen, p. 4664, 4665, 4669).

Given this inherent uncertainty and the strong evidence in favor of a $M_s = 7.5$ S.S.E, the Board should have at least reviewed the ground accelerations from an $M_s = 7.5$ for purposes of establishing conservatism. Perhaps the Board failed to do this

because all of the evidence in the record clearly shows that the peak horizontal ground acceleration (P.C.A.) determination of .67g will be greatly exceeded by an Ms = 7.5 earthquake.

None of the applicants' witnesses address the issue of ground acceleration from an Ms = 7.0 earthquake. The Board in its finding (see p. 134) relies on applicants witnesses Wight, Idress and Frazier. None of these witnesses testified as to ground acceleration from an Ms = 7.5 earthquake 8 kilometers from the plant. It should also be noted that 2 of the witnesses the Board relied on are not qualified to make such predictions because neither is a seismologist; they are engineers (Wight & Idress). The testimony of Doctor Frazier, the only seismologist to testify for the applicants, was not endorsed by the Board (See, PID at p. 132) so the Board must then rely primarily on the testimonies of engineers, who do not have the qualification to predict ground accelerations. (See, Transcript p. 1632 where Wight testifies he is not testifying as a seismologist, and page 1718 where Idress testifies that he is testifying as an engineer, not a seismologist.)

The only seismologist to testify for the staff was Doctor Reiter. Again, he offers no testimony whatsoever regarding the ground accelerations from an Ms = 7.5 earthquake at 8 kilometers.

The only truly independent seismologist to testify at this proceeding was Dr. David Boore. Dr. Boore is employed by the U.S.G.S. and was subpoenaed to testify by the Intervenors. The subpoena was objected to by Dr. Boore's employer, the Department of the Interior which moved to quash. Chairman Kelley denied the motion and allowed Dr. Boore to testify (See, Transcript)

Intervenors introduced into evidence as Intervenors exhibit no. 2d the work by William B. Joyner and David M. Boore of the U.S. Geological Survey, Menlo Park, California, entitled Peak Horizontal Acceleration and Velocity from the Strong Motion Records Including Records From the 1979 Imperial Valley, California Earthquake. This document has been accepted for publication by the Seismological Society of America. (Transcript p. 6550, 6543.)

As stated in the publication, "the authors have taken advantage of the recent increase in strong motion data at close distance to derive new attenuation relations for peak horizontal acceleration

and velocity. New data, particularly from 1979 Coyote Lake and Imperial Valley Earthquakes in California provide a much improved basis for making ground motion predictions at small distances from the source." (Intervenors Exhibit No. 28, p. 1-2).

The data set for peak accelerations consists of 182 recordings from 23 earthquakes. The data set are specific to earthquakes in Western North America with M greater than 5 with fault rupture above a depth of 20 km. (Exhibit 28, p. 7, transcript p. 6552, line 18-25). To determine peak values Boore and Joyner use the larger of two horizontal components. Others (Campbell 1980) have used the mean of the two components. (Intervenors exhibit no. 28, p. 8).

Using the equation found on p. 1 of the report and explained by Dr. Boore on p. 6556 of the transcript they are able to predict peak horizontal accelerations given the magnitude and distance from the fault. The equation gives a mean figure and if one wants to determine the mean plus one standard deviation one adds .26 to the number one gets on the right hand side and then take 10 to that power. One can also refer to the graph on Figure 4 of their publication (Exhibit #28) to determine the mean and 84th percentile ground accelerations, (Transcript Dr. Boore p. 6556, 6557, line 1-13). In addition, to determine peak velocity for a soft soil site you would add .17 to the figure (Transcript p. 6558, line 8-9).

For a magnitude 7 at a distance of 8 kilometers the mean acceleration is .46g and the mean plus one sigma acceleration predicted is .83 g. (Transcript page 6559, line 2-5). If San Onofre is a soft soil site you would add .17 for a mean plus one sigma ground acceleration of .99 (Transcript p. 6558, line 8-9).

For purposes of comparison only to methods used by others using the mean of two horizontal components, Campbell suggests reducing this figure by a factor of 1.13. Using Campbell's method the figure would be .73 g not including a factor for soft soil. (Transcript p. 6559, line 2-10, p. 6560, line 4-14).

For magnitude of 7.5 earthquake at 8 km the peak ground acceleration would be .61 g for the mean peak and 1.11 g for the mean plus one sigma. For soft soil sites the mean plus one would be 1.29.

(Dr. Boore transcript, p. 6612, line 1-7). Using Campbells's method for comparison purposes only, you would arrive at a mean plus one of .98 g. (Transcript p. 6612, line 3-5).

This is the only testimony in the record regarding expected P.G.A. from an Ms = 7.5 earthquake. It clearly shows that peak acceleration of 1.11 g can occur from a Ms = 7.5 earthquake on the OZD. Even using the mean of the horizontal data the ground accelerations will be .98 g.

Both figures are far in excess of the design basis .67g P.G.A.

B. THE TESTIMONY OF DR. BOORE CLEARLY ESTABLISHES THAT A MS = 7.0 WILL GENERATE P.G.A.'S IN EXCESS OF .67 G AND THE BOARD FAILS TO ADEQUATELY JUSTIFY IGNORING THE TESTIMONY OF THE ONLY TRULY INDEPENDENT SEISMOLOGIST WHO TESTIFIED.

As pointed out above, Dr. Boore testified that an Ms = 7.0 earthquake at 8 km will generate (at mean plus one sigma level of conservatism) a P.G.A. of .83 g. Even reducing the conservatism by using Campbell's method of including only the mean of the horizontal data the resulting P.G.A. of .73 exceeds Design Basis P.G.A. of .67 g.

The Board dismisses these results but in so doing mischaracterizes, and mis-states the evidence presented.

The Board on page 119 states, "U.S.G.S. Open File Report 81-365, authored by D. M. Boore and W. B. Joyner, is the latest in a series of reports on continuing research by the U.S.G.S.' scientist." This statement is simply not true. The report testified to, relied on and admitted into evidence is entitled, "Peak Horizontal Acceleration and Velocity From Strong Motion Records Including Records From the 1979 Imperial Valley, California Earthquake." This report has been accepted for publication by the Seismological Society of America (Transcript p. 6543, line 11-14). It has been subject to peer review. (Transcript 6543, line 18-19), and it supercedes the U.S. G. S. 81-365 and makes 81-365 absolute (See Transcript p. 4755, line 4-5, and P. 6578, line 11-13). For some inexplicable reason the P.I.D. continually refers to the evidence relied on by the Interveners as O.F.R. 81-365. The document admitted into evidence as

Intervenors #28 is not an open file report. It is a final document, subjected to the full peer review required before its publication in the Bulletin of the Seismological Society of America. To refer to it as an open file report is totally misleading. Dr. Boore testified when asked about O.F.R. 81-365, "No, the open file report is absolute. Let us not even talk about that." (See Transcript p. 6578, line 11-13).

The Board obviously chose to ignore the authors opinion of which document to rely on.

The Board makes much of the statement on page 17 of Exhibit #28. "For distances less than 40 km from earthquakes with M greater than 6.6 the prediction equations are not constrained by data, and the results should be treated with caution."

As previously set forth in the quoted opinion of Drs. Brune, Allen, and Reiter this lack of close in data from large earthquakes is the problem with all methods of predicting ground acceleration. This caveat applies even more so to studies the Board relied on prepared by Engineers Wight and Idress (See P.I.D. p. 134). In fact the report of Boore and Joyner contain the most recent close in data obtainable, and is the latest and most up to date study. As the authors state, "We have taken advantage of the recent increase in strong-motion data at close distances to derive new attenuation relations for peak-horizontal acceleration and velocity." (See, Intervenors Exhibit #28 page 1).

This report is the most complete and latest methodology in what is an inherently uncertain process.

The criticism of the Boore and Joyner study relied on by the Board in findings 31, 32, 33 and 34 on pages 120 and 121 of the P.I.D. are criticisms of U.S.G.S. open file 81-365, not Intervenors Exhibit #28. (Note, the existence of Exhibit #28 was not known until Boore testified on page 4754 and all criticisms cited, reference the transcript prior to that).

Finally, the Board notes that "When Boore and Joyner exclude from their analysis data beyond 50 km (as recommended by S. Smith Transcript page 3263)." [Note, prior to Boore's testimony and Smith's knowledge of the existence of Exhibit #28] the mean and 84th percen-

tile values for P.G.A. become 0.31 and 0.57 respectively for $M = 7$ at 8 km (Boore to 6609)."

While Dr. Boore did perform these mechanical calculations, he did so at the request of the Applicants' attorney. He did not think it proper to do so. Dr. Boore stands by his report as published when asked by Mr. Pegott:

"Q Okay. If it is assumed one is to -- one were directing his attention to a close-in site -- let's not be silly. We are talking about an 8 kilometer distance in this proceeding -- is the data beyond 50 kilometers of real significance in that kind of an investigation?

A If we had a lot of data in close, then of course it wouldn't be significant because we would just use the data we had in close to see what was going to happen in close. Since we don't, we postulate a model for what the attenuation curve might look like and then we try to determine parameters in that model. Some of those parameters have to do with the attenuation coefficients, that B factor you were referring to earlier, and the H factor as well. In that case, the distance data do provide values for those parameters which we can then use in the extrapolation to the close-in data points.

So given the lack of data that we have at this point, we felt that it was important to use the data from greater distances, particularly because that enabled us to look at some of the larger magnitudes, for which we have very little data in close.

Q With respect, though, to the scatter that you come up with, would it not be correct that the use of the very distance data beyond 50 kilometers may have an untoward effect on the calculated scatter for application to close distances?

A Well, we've looked at that, or we've tried to, by repeating the analysis for data just within 50 kilometers. The way we look at the standard deviation, the standard deviation is made up in two parts, one is due to the regression we have against distance, and then one of them is a second regression against magnitude. The first regression when we -- these are in log units now -- when we did the analysis in the paper we came up with a standard deviation of 0.22; and we did the analysis without data points beyond 50 kilometers and came up with 0.21, which is a very small difference in the standard deviation.

So on that basis, we don't feel that the standard deviation is biased greatly by the addition of data points at greater distances."

It is respectfully submitted that the Board has shown no valid reason to ignore the testimony of the only independent geophysicist/seismologist to testify regarding peak ground accelerations from a Ms = 7.0 and Ms = 7.5 earthquake. His testimony clearly establishes that the Design Basis P.G.A. of .67 g will be exceeded by both an Ms = 7 and Ms = 7.5 earthquake on the OZD.

THE BOARD ERRED IN RELYING ON THE NUMERICAL MODELING STUDIES OF DR. FRAZIER TO PREDICT PEAK GROUND ACCELERATIONS, AND IN DISREGARDING THE TESTIMONY OF DR. LUCO.

The PID at p.134 provides a chart showing predictions by four investigators of PGA for Instrumental Spectrum for an $M_s=7$ event on the OZD.

As pointed out above, both Wight and Idress testified as engineers and are not qualified to make such predictions.

In relying on Dr. Frazier, the Board refers to the criticism of Frazier's methodology as criticisms of refinements in methods, not fundamental flaws. The main criticism of the method was that the spectra obtained from Dr. Frazier's study should be multiplied by a factor of about 2 in order to account for uncertainties in the modeling process. This was suggested by three of the four members of the ACRS Panel who reviewed the model (Testimony of L. Reiter to p. 5845, l. 8-17).

Dr. Reiter testified that if you doubled the 84th percentile of the spectra, the resulting figure for acceleration from the TERA-DELTA study would be .74g (Tr. p. 5845, l. 19-25; p. 5847, l. 2-4).

This is certainly a fundamental flaw; in that making this adjustment results in a spectra above .69g.

Dr. Enrique Luco, a member of the ACRS Panel which reviewed San Onofre was called as a Board witness. He testified as follows:

The separation of sources one to three kilometers is inadequate for proper representation of a continuous rupture process. It is his opinion that the study does not want to represent a continuous rupture. (Testimony of Dr. J. Enrique Luco, Tr. p. 4987, l. 1-10).

The results of the TERA-DELTA modeling study do not agree with the observed results. A difference existed of factors on the order of 2. From this Dr. Luco determined that the standard deviation value would not be much lower than 2. (Testimony of Dr. J. Enrique Luco, Tr. p. 4991-4992, l. 10).

The effects of Q (of attenuation in the earth) are more pronounced than originally thought. Dr. Luco believes that the initial velocity could change more than he thought when he first

reviewed the study. It is Dr. Luco's opinion that a factor of 2 is a reasonable estimate of standard deviation. (Testimony of Dr. J. Enrique Luco. Tr. p. 4994, l. 4-13).

It is Dr. Luco's expert opinion that for an earthquake with a local magnitude of 6.5, DELTA's estimate should be multiplied by a factor on the order of 2. Response spectra consistent with peak accelerations of .8 g and peak velocities of 60 cm per meter would be appropriate for the possible conditions at SONGS. (Testimony of Dr. J. Enrique Luco, Tr. p. 4996, l. 18-25, p. 4997, l. 7-19).

It is Dr. Luco's expert opinion that earthquake with surface wave magnitude of 7 could generate accelerations higher than .8 g and particularly the peak velocities would be more affected. (Testimony of Dr. J. Enrique Luco, Tr. p. 5011, l. 11-14).

At high frequencies, the observed spectral values are about twice as large as the values calculated by the TERA-DELTA modelling study. Dr. Luco also points out that the calculated values underestimate the observed horizontal peak accelerations, peak velocities and response spectra by a factor of 2. (Testimony of Dr. J. Enrique Luco, Tr. p. 5024, l. 1-16, p. 5025, l. 18-25, p. 5026, l. 1-11.)

The reason that the observed horizontal peak acceleration, peak velocity and response spectra are higher than the calculated values is because the attenuation that they are using assumes too much attenuation of energy in the earth. (Testimony of Dr. J. Enrique Luco, Tr. p. 5026, l. 7-11).

It should be noted that Dr. Luco is a structural engineer, and has participated in the review of several of the design response spectra, including Diablo Canyon. (Tr. p. 5017, l. 6-25; p. 5018, l. 1-11).

Dr. Luco has reviewed the design basis for San Onofre and testified that: "I have seen the proposed design response spectrum and of course it is -- well at high frequencies it leads to a peak acceleration of .67 g. In my opinion the peak acceleration on the free field could be higher than that." (Tr. p. 5019, l. 15-19).

It is also Dr. Luco's opinion the design response spectra should be controlled by the free field response spectra. He states:

. . . I believe that for the design of certain structural components, it is possible to modify the free field response spectrum, particularly if you consider nonlinear response of those structural components. It is possible that in that case, and for the purpose of designing those structural components, you could use design response spectrum with perhaps lower high frequencies, but I would not do that at the beginning of the analysis.

The reason is that you have equipment mounted at the base of the structure. The response -- or the response of those elements, if there is no soil/structure interaction, would be controlled by the free field response spectra.

Odd elements, such as the structural elements, in that case perhaps you could reduce the design spectrum, but I am opposed to a distinction between the free field response spectrum and design spectrum at the very beginning of the analysis, because that cuts the input to all of the elements in the structure, and all of the pieces of equipment. (Tr. p. 5021, l. 14-25; p. 5022, l. 1-6).

It would appear clear, then, that the evidence presented by the only independent seismologist and structural engineer to testify, supports Intervenor's contention that a design basis of .67 g is insufficient to protect the public health and safety.

THE BOARD ERRED IN RULING THAT THE DESIGN CRITERIA FOR THE PLANTS HAS NOT BEEN AFFECTED BY EVIDENCE FROM RECENT EARTHQUAKES WHICH INVALIDATES THE ASSUMPTION THAT VERTICAL ACCELERATION DO NOT EXCEED 2/3 OF HORIZONTAL ACCELERATIONS DURING AN EARTHQUAKE.

As pointed out by the Board, the design spectrum for San Onofre is anchored at .44 g vertical acceleration (PID, p. 138, #65). This anchor point was chosen because it was "held by many seismologists...that the vertical accelerations component of strong ground motion would be 2/3 the horizontal component." (PID, p. 138, #64). The Board agrees that "Analysis of data from large earthquakes since 1973 has shown several instances of nonconformance with this assumption, notably in the 1979 Imperial Valley and in the 1980 Mammoth earthquakes." (PID, p. 138, #65). It is Dr. Brune's view that this new evidence is very significant (Written Testimony of Dr. James Brune, p. 62) and that we cannot be sure that such high vertical accelerations are unusual. He also points out that the 1933 Long Beach earthquake, which occurred on the OZD, had a ratio of vertical to horizontal acceleration of 1.45 at 6 km from the fault and 1.0 at 9 km from the fault. (Written Testimony of Dr. James Brune, p. 62-63). The Board dismisses Dr. Brune's concern because, according to the Board, "he did not attach any specific significance to such an exceedance from the standpoint of the design of the plants. (PID, p. 139). This finding takes Dr. Brune's testimony out of context.

Dr. Brune testified that he is willing to compare the instrumental spectrum with the design spectrum "But as to the significance of that, that's beyond my expertise." (Tr. p. 4224, l. 2-5) As Dr. Brune explains, "the statements I have made in my testimony relate to whether peak ground acceleration could be higher or less than some value" (Tr. p. 4227, l. 3-7). It should be noted that in the present case, the instrumental spectrum was used directly for the design (See PID, p. 136, #60) That being the case, it appears most significant that instrumental data from recent earthquakes contradicts a basic premise used to establish the design spectrum for San Onofre as .44 g vertical acceleration (2/3 g of the P.G.A. of .67g). As Dr. Brune in his Written Testimony

states, the vertical design acceleration of .44 g "has already been exceeded in several earthquakes and there is no reason to believe it cannot be exceeded during an earthquake on the OZD. (Written Testimony of Dr. James Brune, p. 63-64).

The significance of this should be apparent to the Board and that was Dr. Brune's intention. When asked what significance there is to instrumental peak ground acceleration (PGA) recordings in excess of the design spectrum, he answered "The Board has to decide what significance, probabilities to attach to it." (Tr. p. 4230, l. 21-23). It is important to note that Dr. Brune feels that it is a "risk-taking decision to decide what significance you want to make of that" (Tr. p. 4229, l. 13-14) Dr. Brune declines to state what level of risk the public is willing to accept. He properly leave that up to the Board.

The Board, however, casually dismisses this concern and fails to adequately address the fact that a basic design assumption used in establishing the .44g vertical acceleration design spectrum (that vertical acceleration do not exceed 2/3 of horizontal accelerations) has been shown to be false. The Applicants have failed to meet the burden or proof on this issue that the design spectrum of .44 g vertical acceleration is sufficient to protect the public health and safety.

VII

THE APPLICANT HAS FAILED TO CONDUCT THE INVESTIGATION REQUIRED BY 10 CFR, PART 100, APPENDIX A IN THAT THEY HAVE FAILED TO DETERMINE THE STRUCTURAL RELATIONSHIP BETWEEN THE NEWLY DISCOVERED CRISTIANITOS ZONE OF DEFORMATION AND THE OFFSHORE ZONE OF DEFORMATION AND THEY HAVE FAILED TO FULLY INVESTIGATE THE TECTONIC RELATIONSHIP BETWEEN THE CZD AND THE A AND B FEATURES IN THAT THERE ARE DATA VOIDS AT THE POINT WHERE THE CZD IS POSTULATED TO MERGE WITH THE OZD AND THERE ARE DATA VOIDS WHERE THE CZD PROJECTS ONSHORE AND COULD CONNECT WITH THE A AND B FEATURES.

It is interesting to note that while the Board has made conclusions of law relevant to "Required Investigations", it has made no specific Findings of Fact regarding the subject except those found on page 13, 13a and 14. These findings merely conclude that all that is required

at the operating stage is an "update". (PID, p. 13). At footnote 27, the Board finds that 10 CFR, Part 100, Appendix A, does not apply to Applicants for operating licenses. However, they ignore 10 CFR, Part 100, Appendix B, II, which states:

These criteria which apply to nuclear power plants, describe the nature of the investigations required to obtain the geologic and seismic data necessary to determine site suitability and provide reasonable assurance that a nuclear power plant can be constructed and be operated at a proposed site without undue risk to the health and safety of the public. They describe ...information needed to determine whether and to what extent a nuclear power plant need be designed to withstand the effects of surface faulting. (emphasis added)

It is Intervenor's position that the Applicants have the burden of proof to show at the operating licensing hearings that the plant can operate without undue risk to the public health and safety and they must address the issue of surface faulting and either totally discount the possibility of surface faulting or show that the plant is designed to withstand the effects of surface faulting. They have done neither and the Board has not addressed this issue in findings in any way.

This issue is raised by the Intervenor in their Conclusion of Law, D-1, citing the evidence in the record and the regulatory requirements. Legal requirements aside, the issue of surface faulting under the plant is perhaps the most crucial issue of all. The evidence is clear that there are small faults, (euphemistically called "features") underneath the plant that were discovered during excavation of the plant site (SER, p. 2-35; Applicants' Exhibit JLS-N, Tr. p. 2771). These faults (features) extend out to sea toward the CZD and no seaward extent or ending of the faults (features) can be determined. (Tr. p. 2804, l. 17 et seq.). The CZD (Cristianitos Zone of Deformation) and associated folds to the east combine to form a broad structural zone (up to three kilometers in width) which project onshore to the north (NRC Staff, Exhibit #1, p. 2-46). "The strike of Feature A is parallel to the trend of the CZD." (Tr. p. 2758, l. 20).

There remain serious, unanswered questions, the answers to which are critical to the safety of the San Onofre facility. Some

of these unanswered questions are:

1. Is the Cristianitos Zone of Deformation a branch of the Offshore Zone of Deformation (OZD) and a capable fault under 10 CFR Part 100, A, III, g?
2. How far onshore does the CZD extend?
3. How far offshore do the A and B features extend?
4. Is there a tectonic relationship between the OZD and the CZD and the A and B features, such that movement on one could be accompanied by movement on the other?

A. The CZD Merges With the OZD and For Purposes of Conservatism Should Be Considered a Branch of the OZD and a Capable Fault.

As stated by Thomas Cardone of the NRC Staff:

On May 8, 1980, we (NRC Staff) requested that a comprehensive review be made by the USGS of all marine geophysical data relevant to the character and recency of faulting along the offshore extension of the Cristianitos fault in the vicinity of San Onofre 2 and 3. This request was concerned specifically with a proposed structural relationship between the Cristianitos Zone of Deformation and the OZD. The NRC requested that this review be made jointly by H. G. Green of the USGS and M. Kennedy of the California Division of Mines and Geology.

Their review and a subsequent report were completed on July 18, 1980. This report entitled "Review of Offshore Seismic Reflection Profiles in the vicinity of Cristianitos Fault, San Onofre, California is appended to Appendix F to the SER. (Tr. p. 6450, l. 22 through p. 6451, l. 14)

A further report by Greene and Kennedy (found in Appendix G of the SER and admitted as Staff Exhibit #1) was submitted by the USGS on November 26, 1980 along with a report prepared by Mr. Robert H. Morris and Mr. James F. Devine with assistance from Drs. Greene and Andrews of the USGS (Tr. p. 6451, l. 19; p. 6452, l. 9). In addition, a map prepared by Drs. Greene and Kennedy, dated September, 1980, was admitted into evidence and can be found on Page F-24 of the Staff Safety Evaluation Report (NUREG-0712). This map should be referred to in order to fully understand the location of the CZD

and the relationship of the CZD to other features.

The conclusions of Greene and Kennedy, in their August, 1980 report, is that:

Interpretation of marine continuous seismic-reflection profiles in the vicinity of SONGS and concentrated along the projected, offshore trace of the Cristianitos fault indicates to us that two structural zones of deformation are present in this area. The first and most well defined zone is a segment of the "OZD" a recognized Quaternary fault zone (Greene and others, 1979, citations omitted). The second is less well defined but nevertheless exhibits characteristics similar to those of the "OZD". This second zone, the "CZD", consists principally of highly fractured and faulted asymmetrical anticlinal structures.

The "CZD" and associated folds to the east combine to form a broad structural zone (up to 3 km in width) which projects onshore to the north. The southeast end of the "CZD" could become incorporated with a major syncline of the "OZD", however, the structural relationship with the "OZD" is unconfirmed because of a "data void." (SER, pp. F-7, F-8)

In their addendum to the above cited report, found on page G-8 to G-11 of the SER, Greene and Kennedy conclude that:

The CZD merges with or is truncated by the OZD in the area offshore from SONGS...The June, 1980 NEKTON data support the conclusions previously reported by Greene and Kennedy.

It is noted by the Board in its ruling that there is a data void which precludes making a positive determination that the CZD merges with the OZD (See PID, p. 179, #13). However, the opinion of Greene and Keenedy is that the CZD merges with or is truncated by the OZD.

The evidence shows that it is characteristic of the Newport-Inglewood Zone of Deformation portion of the OZD and the South Coast portion of the OZD to have north trending branch faults near the basement (See Tr. p. 6494, l. 4-11; p. 6495, l. 2-11). Mr. Cardone of the NRC Staff agrees that the CZD may be a branch of the OZD. (Tr. p. 6495, l. 19-25, p. 6496, l. 7-9).

Intervenors' witness Mark Legg's testimony, which was ignored by the Board, clarifies the nature of the relationship between the OZD and the CZD. He states, in his Written Testimony, page 11:

On the basis of the evidence that the "structure (of the OZD) noticeably changes southeast of the OZD-CZD intersection" (Addendum (1980) Greene and Kennedy), I conclude that the OZD and the CZD form a structural relationship such that movement or deformation in one has been influenced by the presence of the other, and it is possible that movement on one zone has caused movement on the other, as is frequently seen in strike-slip (and other types) earthquakes where secondary faulting is observed at some distance from the main fault (Examples omitted). The sense of this secondary faulting may be of similar style, or of a different type than the slip on the main rupture, such as was observed in 1868 on the Hayward fault, where normal faulting was observed on a secondary fault (citation omitted).

North trending branch and secondary faults are common in the northwest trending right-lateral wrench fault zones of California (See Figure 1 of Legg and Kennedy, 1979) and these are frequently normal faults. For example, in the Newport-Inglewood fault zone, the Sunset Beach oil field structure (citation omitted) note how the north trending normal faults do not cut the surface of the upper Miocene, just as is suggested by Moore for the CZD. This structure is remarkably similar to the CZD and its relation to the OZD. A map view of this relationship is shown in Figure 2 of Yeates (1973). Greene, et al (1979) note that "short, en echelon, second-order faults are associated with each major fault zone and commonly splay from primary faults at angles from 20 to 40 degrees. Second order fold axes are similarly related to these fault zones. These structural relationships follow the stress patterns of wrench faulting..." (Table 361.38-3 FSAR) also note the similarity between the south coast offshore zone of deformation and the Newport-Inglewood Zone of Deformation, in particular the "north trending branch faults near basement." These statements further support my conclusions regarding the standard relationship between the OZD and the CZD.

It would appear from all the evidence available, that the CZD is a branch zone of deformation of the Offshore Zone of Deformation. The Board dismisses this concern by concluding that the CZD is inactive. This conclusion is based solely on the testimony of Dr. Shlemon who testified that the fault had not displaced terraces the inferred age of which are 40,000 to 80,000 years before present.

He is the only person who has inferred this age. (Tr. p. 6056, l. 18).

10 CFR, Part 100, Appendix A, III, g. defines "capable fault"

as:

A fault which has exhibited one or more of the following characteristics:

- 1) Movement at or near the ground surface at least and within the past 35,000 years or movement of a recurring nature within the past 500,000 years.
- 2) A structural relationship to a capable fault according to characteristics (1) or (2) of this paragraph such that movement on one could be reasonably expected to be accompanied by movement on the other.

Intervenors submit that under this definition, the CZD must be considered a capable fault since there is evidence to show that there has been recurrent movement on the CZD but we simply do not know the age of the most recent faulting (See SER, p. F-8, 2nd paragraph). There is absolutely no evidence on the record, and NRC Staff witness Cardone testified that there is no evidence, to his knowledge, which would show that the CZD has not moved more than once in the last 500,000 years (Tr. p. 6513, l. 11-14). Further, it has been established by Greene and Kennedy and Mark Legg, that the CZD has a structural relationship with the OZD such that movement on the OZD could reasonably be expected to cause movement on the CZD.

The Applicants have failed to meet its burden of proof on this issue and absent further investigations, it must be assumed that the CZD is a capable fault.

B. It Is Not Known How Far Onshore the CZD Extends or How Far Offshore the A and B Features Extend and Without This Knowledge, It Cannot Be Found that the Site Has Been Investigated In Sufficient Scope and Detail.

As can be seen from the Greene and Kennedy map on page F-24 of the SER, the CZD is mapped from its projected junction with the OZD and extends landward and is mapped to about 12,000 feet from the

plant location. It can also be seen from the map that if you were to project the CZD closer to shore that it would come on shore in the close vicinity of the plant.

The CZD is not mapped closer to shore because there is a Data Void (See area marked Data Void on Plate 1, SER, p. F-24). It cannot be determined how far onshore the CZD projects, but Greene and Kennedy state it "projects onshore to the north". (See SER p. F-8, 2nd paragraph). The term Data Voids, according to Dr. Greene means "...basically two things. One thing is that either there is a lack of data, no lines have been run in that vicinity, or that lines have been run in that vicinity, but they were not of good enough quality to be useable for our mapping." (Tr. p. 2136). Figure F-25 of the SER shows the tracklines that were used to gather the data. It shows that the closest track lines to the plant are 6,000 feet and that the data collection points are very sparse out to 12,000 feet away where the closest mapping of the CZD was performed.

This would appear to be the most critical area of all to study in order to determine if the CZD runs under the plant. Instead, there is no data out to 6,000 feet and very sparse data out to 12,000 feet. This is precisely the area that must be investigated to determine if there is a possibility of surface faulting under the plant. It simply was not done and it cannot be said that the required investigations for surface faulting have been adequately performed when we do not even know the closest location of the fault closest to the plant and which is aimed at the plant.

The onshore extension of the CZD is especially significant in light of the fact that Dr. Ehlig testified that the end of the "A" feature could not be found because of the thickness of saturated beach sand which precluded trenching (See Tr. p. 2803, l. 6-8). It is also his opinion that "A" feature may continue in the southerly direction out into the ocean and there may be new "A" features that start up. (Tr. p. 2804, l. 17-24).

At page 2806, l. 8, Mr. Barlow asks Dr. Ehlig:

Q If you looked at the width of the A features as they crossed the Unit 2 foundation, would you agree that as they progress from north to south the width on your map widens?

A There is a zone of individual sheers and small shear zones a few inches wide which collectively could be described as a zone and is wider to the south.

The evidence shows that there are faults called "A" features which run north and south and form a zone of features crossing Unit 2's foundation and are mapped as far as the sand beach where it is assumed they run out into the ocean for an unknown distance. The strike of the "A" features is parallel to the trend of the CZD, that is north/south trending. (Dr. Ehlig, Tr. p. 2758, l. 8-20). The CZD is structurally related to the OZD and runs north/south and is mapped to within 12,000 feet of the plant site. It appears clear that the critical area for investigation is that area between the landward extension of the CZD as presently mapped and the oceanward exterior of the "A" features as mapped. This area is presently, and for purposes of the hearing, referred to as a DATA VOID. Without knowledge of the landward extension of the CZD and the oceanward extension of the "A" features a critical data base is missing.

If there is a relationship between the CZD and the "A" features it means that the plant may be subject to surface rupture in the very foundation of the plant. This question cannot be determined because of the Data Voids. Absent a showing by the Applicants that features are not actually the onshore extension of the CZD, it cannot be said that the Applicant has sustained its burden of proof or that all required investigations for surface faulting have been performed.

THE BOARD ERRED IN ADMITTING INTO EVIDENCE THE F.S.A.R. IN ITS ENTIRETY AND SPECIFICALLY THOSE SECTIONS PERTAINING TO GEOLOGY, AND SEISMOLOGY FOR THE TRUTH OF WHAT IS CONTAINED IN THOSE DOCUMENTS IN THAT THE DOCUMENTS WERE NOT AUTHENTICATED; THE AUTHORS OF THE DOCUMENTS WERE NEVER IDENTIFIED AND INTERVENORS WERE NOT PERMITTED TO QUESTION ANY OF THE APPLICANTS' WITNESSES AS TO WHICH PART OF THE F.S.A.R. THEY PREPARED OR WROTE.

The Final Safety Evaluation Report, consisting of 24 volumes of standard content, 5 volumes of questions and answers and one volume of information submitted in response to nureg 0660 was admitted into evidence, over Intervenor's objection, "both to show that they have been compiled and as substantive evidence of the matters treated." (Chairman Kelly, p. 946 lines 23-25, p. 947 line 1).

The only foundation laid for admission of the F.S.A.R. was the testimony of Wesley C. Moody, Manager of Nuclear Licensing for Southern California Edison Company who merely described the general procedure for preparation of information to be included in the application. The witness does not identify any person who assisted in preparing the report or who actually wrote the report. It was submitted on a totally anonymous document. (See transcript pages 709-710).

Mr. Moody also failed to adequately identify and authenticate the document.

At page 710 line 19 of the transcript he is asked by the applicant's attorney:

Q: Is this a true copy of the document that has been submitted to the N.R.C.?

A: Well, I have not reviewed that document page for page. My review of the document this morning indicates that it is a true and correct copy by virtue of the fact that there is evidence that amendments 1 and 2 in the application, the General Information portion, and amendments 1 through 24 have been incorporated in the final safety analysis report."

This is the only testimony in the record which attempts to identify or authenticate this huge document. Such identification is

totally insufficient to meet the requirements of admissibility of documents.

It should be noted that the F.S.A.R. consists of 30 volumes averaging 383 pages each, or a total of approximately 11,000 pages. Intervenor's submit that it is physically impossible for one person to identify and authenticate 11,000 pages of technical writings on the morning of his testimony, and to state that such are true and correct copies of the documents submitted to the N.R.C.

The Board then, admitted into evidence, unidentified, unauthenticated copies of an anonymous document. It compounded the grave error by not allowing the Intervenor's to question the applicants witnesses as to which portions of the F.S.A.R. they wrote by ruling that:

"The Board has concluded that we are not going to require the various witnesses to identify different sections of the F.S.A.R. they may have participated in." (Statement of Chairman Kelly, p. 1010, lines 9-11).

A. THE BOARD ERRED IN ADMITTING AN ANONYMOUS DOCUMENT

The Federal Administrative Procedure Act reads as follows:

Section 556(D). "Any oral or documentary evidence may be received, but the agency as a matter of policy shall provide for the exclusion of irrelevant, immaterial, or unduly repetitious evidence ... A sanction may not be imposed or rule or order issued except on consideration of the whole record or those parts thereof cited by a party and supported by you and in accordance with the reliable, productive, and substantial evidence." (emphasis added)

The language thus quoted provides a general guideline for administrative tribunals. Thus, as a general rule, hearsay evidence is admissible in a Court of law bound by the strict rules of evidence. The evidence in the present case is clearly hearsay (See, p. 713 of June 22 transcript) and is conceded as such by the applicants and the Board.

Despite general rule as to the admissibility, the Courts have held that in some instances hearsay evidence will be inadmissible in administrative proceedings. This occurs when: (1) There is better evidence available than the hearsay objected. (2) The hearsay

is itself unreliable or (3) By admitting the hearsay evidence, a party opponent's right to cross-examination will be denied.

- 1) When There Is Better Evidence Available (i.e. Direct Testimony Of The Author of The Hearsay Document) It Is Error To Accept the Direct Testimony Rather Than The Hearsay.

In Outgamie County v. Town of Brooklyn, 18 Wis. 2d 303, 118 NW 2d 201, 206 (1962), the Court held that "Without deciding under what circumstances hearsay evidence may be admissible before an administrative agency, we hold that it should not be received over objection where direct testimony as to the same facts is obtainable." (emphasis added). The present case presents much the same situation. Here there is hearsay evidence, which was timely objected to by attorney for the Interveners (transcript, June 22, p. 712 lines 6-8) and as previously noted, direct testimony as to the same facts was obtainable. Under these circumstances the Board should have refused to admit the hearsay evidence, or in the alternative forced its authors to give direct testimony as to the facts contained therein.

Further, Colorificio Italiano Max Meyer, S.P.A. v. S/S Hellenic Wave, 419 F. 2d 223, 225 (1969), (an admiralty case which can be directly analogized to administrative proceedings because equally flexible rules of evidence apply in each) held, in response to the introduction of reports by surveyors, unsubstantiated by direct testimony; "The proper proof of the facts ascertained on the surveys is ... the testimony of the surveyors." The F.S.A.R. can be likened to survey report in that both were submitted for the truth of the assertions within them; and the authors of neither were cross-examined, although both sets of authors were presumably readily available. As the Court refused to accept such documents, so should the Board likewise refuse to accept the proffered documents here.

2) The F.S.A.R. Is An Anonymous, Self-Serving,
And Biased Document And Is Unreliable.

It is clear that there are levels of hearsay, and thus some hearsay is "better" than other hearsay. McCormick put it thusly: "The trustworthiness of hearsay ranges from the highest reliability to utter worthlessness." Therefore, the question now becomes: "How reliable is the F.S.A.R. as hearsay, and where does it fit on the scale?" (Cited at 279 in 3 Davis, Administrative Law Text.)

The F.S.A.R. is very unreliable as a document submitted for the truth contained within it. This is so because it was prepared completely by S.C.E. and others in its employ. As set forth in the testimony of Mr. Moody, the applicants had total control of what went into the S.E.R., and it was submitted to the N.R.C. to justify its application for a license. Therefore, the document should be assumed to be self-serving and biased, and its reliability as a basis for a rational decision on matters affected by it should be correspondingly low. Further, the document was prepared by the applicant in anticipation of litigation. In Coloroficio, (supra), the Court ruled that hearsay survey reports were inadmissible, because "their objectivity is suspect because of their intended use in litigation." (supra at 225.) Far from having the "earmarks of trustworthiness" that the Board found it possesses (Transcript, June 23, p. 946 7), the F.S.A.R. should be presumed to be completely and utterly untrustworthy until such time as the applicants' produce the authors of the F.S.A.R., at which time, and after careful cross-examination, the true amount of reliability accorded the document may reasonably be determined.

3) By Admitting Hearsay Evidence, The Intervenors'
Right To Cross-Examination Was Denied.

The Senate Committee which ruled on Section 556(d) of the Administrative Procedure Act (supra) said: "To the extent that cross-examination is necessary to bring out the truth, that party should have it." (Section 14.10 Davis text p. 285). Professor

Davis sees two factors as being very influential on the question of whether to allow hearsay evidence to be admitted when the opponent demands his right to cross-examination. (See, Transcript page 1005, line 25, p. 1006, p. 1007). These are (1) the availability or unavailability of the declarants and (2) the degree of persuasiveness of the hearsay in all circumstances including the lack of opportunity for cross-examination. Davis goes on to say that: "If the declarants were readily available and if the probability that the hearsay might yield to cross-examination of the declarant seemed strong, a holding that a fair hearing was denied may have been justified." (Davis § 14.10, page 296). In the present case, the declarants were readily available, and Intervenors wanted to cross-examine the declarants regarding the contents of the F.S.A.R. and for purposes of Impeachment. Here, the Board would not even allow the witnesses to state which part of the F.S.A.R. they wrote. This is clearly a denial of a fair hearing.

In Tri-State Broadcasting vs. F.C.C., 96 F. 2d 564 (1938), the United States Court of Appeals for the District of Columbia decided a situation analogous to the present one. There a witness attempted to introduce a summation of his conversations with many members of the community as to the feasibility of erecting a radio station. The Court there, after first noting that administrative bodies as a general rule do not need to follow the strict rules of evidence, nevertheless held: "The testimony admitted was clearly hearsay.... It's admission deprived the appellant of the right to cross-examine those, a composite of whose views Roderick was reflecting into the record." Thus, the hearsay testimony was held inadmissible. This statement of the Court, when applied to the present case, may be paraphrased to read: "The F.S.A.R. is clearly hearsay.... Its admission deprived Intervenors (Carstens, et. al.) of the right to cross-examine those (the authors) a composite of whose views Mr. Moody was reflecting into the record." The hearsay evidence was denied admissibility in Tri-State, and should be denied here.

In Southern Stevedoring Co. vs. Vorhis, 190 F. 2d 275 (5th Cir. 1951) the Court took a different tack to end up with the same result. Here the Court said that, as to administrative proceedings, "The more liberal the practice in admitting testimony, the more

imperative the obligation to preserve essential rules of evidence by which rights are asserted or defended." (p. 277). There, two ex-parte letters were the disputed evidence. The Court made several important findings. It was important to the Court that the opponents vigorously asserted their right to cross-examination. Secondly, the Court found that even if it was assured that the two authors of the letters would testify on the stand exactly as they had written in the letters, "appellants are still entitled to ascertain on cross-examination whether there are any additional or explanatory facts, and to test the witnesses' knowledge and competence and the basis for their professional opinions" (p. 278). The Court here did not engage in speculative characterization of evidence as having "ear marks of trustworthiness", but rather concedes that even if what the declarants say is true the opponent should still be allowed to determine how the declarant arrived at that conclusion and whether there are any other facts or circumstances which he may not have mentioned. When the opponent sees this, and vigorously asserts his right to cross-examination, this right should not be denied him.

Furthermore, as this Board was very liberal in admitting testimony as shown by its admission of the 11,000 page, 30 volume F.S.A.R. for the truth of the matters contained within it as an anonymous document prepared entirely by S.C.E. or its employees, it should therefore preserve and not eliminate, the hearsay rule and thus allow the authors of the F.S.A.R. to be identified and cross-examined. Anything less would be patently unjust.

B. THE AUTHOR OF A DOCUMENT INTRODUCED IN EVIDENCE MUST BE DISCLOSED IN ORDER FOR A PARTY OPPONENT TO HAVE THE OPPORTUNITY TO REBUT THAT DOCUMENT AND TO PROVIDE THE BASIS FOR A FAIR HEARING.

The Administrative Procedure Act specifically preserves the right to cross-examine witnesses in agency adjudications when it states, in § 7(c): "A party is entitled ... to conduct such cross-examination as may be required for a full and true disclosure of the facts." McCormick, in his classic treatise on the law of evidence, cites that provision and states, "Through this provision the APA recognizes one of the fundamentals of a fair hearing--namely, a reasonable opportunity

to test and controvert adverse evidence" (2 McCormick § 356, p 857). Obviously, McCormick feels that the ability to impeach the evidence itself, via cross-examination, is a prerequisite to a fair hearing, and this is true even though he concedes that in most cases cross-examination will not do any good.

Written evidence is equally subject to cross-examination as testimonial evidence. The Attorney General's Manual on the APA states (at p. 77): "Thus, technical and statistical data may be introduced in convenient written form subject to adequate opportunity for cross-examination and rebuttal." (emphasis added). The Manual, by using the words, "may" and "convenient" recognizes that evidence, even in administrative hearings must have some foundation to be admissible. When the evidence is a document (like the F.S.A.R.) then the basis for that document is raw data coupled with thoughts and calculations of the author. To have an adequate opportunity for cross-examination of a document, therefore, a party must have the opportunity to question its author.

McCormick expressly states that this is true, especially in the case of documents like the F.S.A.R.: "Statistical compilations and surveys are admissible only if the person responsible for-- and having full knowledge of the preparation of--the exhibit is available" (2 McCormick §§ 356, p 858 - emphasis added). In the present case, the F.S.A.R. should not have been admitted because the persons responsible for creating the F.S.A.R. (i.e., its authors) were not identified. In fact, it was admitted that the applicants' sponsoring witness, Mr. Moody, had not even reviewed all of the documents and had not written any of it. (Transcript pp. 709-710).

By not allowing identification of the authors (Transcript p. 1010, lines 9-11), the Board committed error because the Board effectively denied intervenors what the APA had provided them as a matter of right (i.e., the ability to cross-examine for purposes of rebuttal, or McCormick's "Fair-hearing".)

The case law on this point supports these contentions. In Powhatan Mining Company vs. Ickes, 118 F. 2d 106 (6th Cir 1941), certain coal producing companies were required by regulation to file prices and other data and from this data, tabulations were prepared

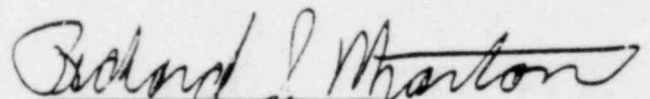
by the companies and received in evidence. Petitioners demanded that the tables be decoded so that, for purposes of cross-examination, they would know the identity of the producers who made the sales and other facts surrounding the transactions. The Court held, at 108) that: "... in all fairness the data should have been disclosed". The Court noted a basic incongruity which is also present in the instant case: "The Division introduced the tabulations as evidence, and objected to giving information (i.e., the identity of the authors) necessary for proper cross-examination (See, Transcript p. 997, lines 19-21). The Court here went on to note that the exhibits were admissible under the broad rule that administrative agencies are not bound by the ordinary rules of evidence, but then notes that because this is so, "all the more should be the effort on the part of the agency to extend to the litigant the right to test evidence thus admitted by the fullest possible cross-examination." (p. 109 - emphasis added). Here the fullest possible cross-examination requires disclosure of names of authors for purposes of rebuttal. As the Court itself stated: "It is difficult to see how the accuracy, authenticity and relevancy of these tabulations could be tested in any way without the disclosure of the names of the code members who reported the data upon which the tabulations are based." (p. 109 emphasis added).

In a more recent case, Carter-Wallace Inc. vs. Gardner, 417 F. 2d 1086 (4th Cir. 1969) the factual situation was remarkably similar to the present case. Here the evidence consisted of an unpublished document of recent origin. Its author was not called as a witness. The appellant, rather than producing the author, sought to introduce the document through a vice-president. (The Court also noted that the author had conferred with appellants' attorneys on the night before the document was submitted and was not unavailable). "Under these unusual circumstances (including all circumstances), the examiner did not abuse his discretion by ruling that the paper could not be introduced unless the government had an opportunity to question its author." (p. 1096) (emphasis added). In the present case, the F.S.A.R. was introduced, not by its author, but rather an employee of the applicant, Mr. Moody, their Manager of Nuclear Licensing who doesn't even rise to the level of a vice-president (Transcript p. 709, lines 21-22). The witness/sponsor likewise had no personal knowledge of the

data contained within the F.S.A.R., and hadn't even reviewed all of the document (Transcript p. 710, lines 2-25). Thus, what the Court saw as "unusual," the Board saw here as perfectly legitimate, and indeed even stated they had certain earmarks of trustworthiness. (Transcript p. 947, lines 2 and 3).

To admit the F.S.A.R., without proper identification or authentication; without identifying the authors and by refusing to allow Intervenors to question the authors who actually appeared as witnesses regarding what portion of the F.S.A.R. they wrote, constitutes a denial of Intervenors' right to cross-examine and is reversible error in that it denied Intervenors their right to a fair hearing.

Respectfully submitted,



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DATED: February 26, 1982

CERTIFICATE OF SERVICE BY MAIL

I declare that:

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

I am over the age of eighteen years and not a party to the within entitled action; my business address is University of San Diego School of Law, Alcalá Park, San Diego, CA 92110.

On February 26, 1982, I served the attached INTERVENORS' CARSTENS ET. AL. BRIEF IN SUPPORT OF EXCEPTIONS TO THE INITIAL DECISION (10 C.F.R. 2.762) in said cause, by placing a true copy thereof enclosed in the United States mail at San Diego, California addressed as follows:

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

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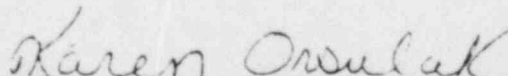
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