

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

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OFFICE OF SECRETARY
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BRANCH

In the Matter of)
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PACIFIC GAS AND ELECTRIC)
COMPANY)
)

(Diablo Canyon Nuclear Power)
Plant, Units 1 and 2))
)

Docket Nos. 50-275 O.L.
50-323 O.L.

IDVP'S ANSWERS TO GOVERNOR DEUKMEJIAN'S
THIRD SET OF INTERROGATORIES

The following are the IDVP's Answers to "Governor Deukmejian's Third Set of Interrogatories To The Independent Design Verification Program Contractors" dated September 2, 1983.

In answering subparts (a) and (b) of the even-numbered interrogatories, the IDVP has provided in each case a statement of the facts and documents upon which it relies at the present time. However, these statements should be clarified in two respects.

First, the IDVP has not yet completed its review of the contentions for purposes of preparing direct testimony for submittal on October 7, 1983. If the IDVP relies upon additional facts in its testimony, those facts will be stated in the testimony itself. If the IDVP relies upon additional documents in its testimony, those documents will either be referenced in the testimony or these interrogatory responses will be updated.

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Second, in implementing its Program Plans the IDVP developed the positions which are reflected in the responses to the interrogatories. In that effort, the IDVP reviewed extensive information obtained from the DCP (including, but not limited to, DCP Completion and/or Resolution Packages for EOI's and DCP Design Packages) and performed extensive calculations, analyses and evaluations which are contained in the documentation in the IDVP's files (including, but not limited to, EOI files and ITR back-up documentation). It was obviously not feasible to identify such voluminous materials in response to the interrogatories, but they are also relied upon by the IDVP.

Finally, the IDVP has recently received Exhibits C through HH from the deposition of Dr. Reich and Phillipacopalous on September 14 and 15. Since the IDVP has not yet reviewed these materials, they are not taken into account in the responses to these interrogatories.

ANSWER TO INTERROGATORY NO. 1:

Interrogatory 1 is ambiguous because it does not specify the Governor's standard for "too narrow" nor does it define the term "design activity" with respect to such characteristics as scope of the "activity" or the time when the "activity" was performed (e.g., pre-November 1981 or thereafter). Nevertheless, the IDVP denies that the scope of its review was "too narrow" as the IDVP interprets those words.

ANSWER TO INTERROGATORY NO. 2(a):

The IDVP believes that the scope of its review is not "too narrow" because its review complied with the Program Plans for Phases I and II approved by the Commission and the Staff and because its review was sufficient to permit it to obtain reasonable assurance that the design of DCNPP-1 complies with license application criteria, as stated in Sections 2 and 6 of the IDVP Final Report. Therefore, every fact which supports the foregoing belief of the IDVP also supports its denial of contention 1(a). At the present time, in its denial of contention 1(a), the IDVP relies upon the facts summarized in the ITR's and in the IDVP Final Report.

ANSWER TO INTERROGATORY NO. 2(b):

At the present time, in its denial of contention 1(a), the IDVP relies upon the Commission's Order of November 19, 1981, the NRC Staff's letter of November 19, 1981, the IDVP's Program Plans, the ITR's, the IDVP Final Report and Supplement No. 18 to the NRC Staff's SER.

ANSWER TO INTERROGATORY NO. 2(c):

The IDVP is aware that the Governor of California, the Joint Intervenors and their consultants and representatives have criticized the IDVP's efforts in these contentions and elsewhere. Thus, it is likely that their pleadings, affidavits, letters, statements, etc., and transcripts of meetings, hearings,

prehearing conferences, etc. contain asserted facts or allegations disputing the IDVP's denial of this contention. The IDVP has not searched its files to find such documents since they are equally available to the Governor of California.

The IDVP is not aware of any other documents which contain facts or allegations suggesting that the IDVP's scope of review is "too narrow," except to the extent that, in minor respects, Supplement No. 18 to the SER suggests additional efforts by the IDVP.

However, in developing and implementing its Program Plans, including reaching decisions involved in opening an EOI, resolving an EOI, drafting and finalizing an ITR, and drafting the IDVP Final Report, the IDVP had to apply judgment in the evaluation of factual information and in determining whether to take additional action. Such information is contained in documents received from the DCP and in the calculations, analyses, notes and other documentation of the IDVP's work in the files of the IDVP participants and their consultants and employees. Since the IDVP is unable to determine how any other person or organization would apply its judgment to such factual information, it cannot identify which of these documents might, in the Governor's view, contain facts or allegations of the type referred to in this interrogatory.

ANSWER TO INTERROGATORY NO. 2(d):

Although the IDVP has not yet determined the exact scope of its testimony, at the present time it anticipates that its witnesses concerning the denial of contention 1(a) would be Dr. W. E. Cooper (TES), Dr. Robert L. Cloud (RLCA), Mr. John E. Krechting (SWEC) and Mr. Roger F. Reedy (RFR).

ANSWER TO INTERROGATORY NO. 3:

Interrogatory No. 3 is ambiguous because it does not specify the Governor's standard for "too narrow," nor does it define the terms "design activities" and "design groups" as used in the interrogatory. Nevertheless, the IDVP denies that the scope of its review was "too narrow" as the IDVP interprets those words.

ANSWER TO INTERROGATORY NO. 4(a):

The answer to Interrogatory No. 2(a) is applicable to Interrogatory No. 4(a), with the substitution of a reference to contention 1(b) instead of contention 1(a). Among the facts relied upon in support of the IDVP's decisions to review specific aspects of the design of the DCNPP-1 are those stated in Sections 3.5 and 4.1 of the IDVP Final Report and in the IDVP Program Plans.

ANSWER TO INTERROGATORY NO. 4(b):

The answer to Interrogatory No. 2(b) is applicable to

Interrogatory No. 4(b), with the substitution of a reference to contention 1(b) instead of contention 1(a).

ANSWER TO INTERROGATORY NO. 4(c):

See response to Interrogatory No. 2(c).

ANSWER TO INTERROGATORY NO. 4(d):

See response to Interrogatory No. 2(d).

ANSWER TO INTERROGATORY NO. 5:

This interrogatory is ambiguous because the Governor has not specified a standard for "too narrow." Nevertheless the IDVP denies that the scope of its review was "too narrow" as the IDVP interprets those words.

ANSWER TO INTERROGATORY NO. 6(a):

The IDVP did not intend to use statistical sampling in its verification program. However, for the reasons stated in answer to Interrogatory No. 2(a), which is equally applicable here with the substitution of a reference to contention 1(c) instead of contention 1(a), the IDVP does not believe that its review was "too narrow" to accomplish the IDVP's objectives as set forth in the Commission's November 19, 1981 Order and the Staff's letter of that same date as well as the objectives set forth in the IDVP Program Plans. The IDVP did not perform

analyses to determine whether its sampling was "statistically valid" to any particular statistical confidence level. Instead, the IDVP relied upon engineering judgment in choosing the initial and additional samples for verification in its Phase I and Phase II programs. The methodology employed by the IDVP in choosing its initial sample and expanding that sample to ensure that the program met the Program Plans is stated in Sections 3.5 and 4.1.6 of the IDVP Final Report and in the IDVP Program Plans.

ANSWER TO INTERROGATORY NO. 6(b):

The answer to Interrogatory No. 2(b) is applicable to Interrogatory No. 6(b), with the substitution of a reference to contention 1(c) instead of contention 1(a).

ANSWER TO INTERROGATORY NO. 6(c):

See response to Interrogatory No. 2(c).

ANSWER TO INTERROGATORY NO. 6(d):

Although the IDVP has not yet determined the exact scope of its testimony, at the present time it anticipates that its witnesses concerning denial of this contention will be Dr. William E. Cooper (TES), Dr. Robert L. Cloud (RLCA) and Mr. John E. Krechting (SWEC).

ANSWER TO INTERROGATORY NO. 7:

This interrogatory is ambiguous because the Governor has not specified his standard for "too narrow." Nevertheless, the IDVP denies that the scope of its review was "too narrow" as the IDVP interprets those words.

ANSWER TO INTERROGATORY NO. 8(a):

The answer to Interrogatory No. 2(a) is applicable to Interrogatory No. 8(a), with the substitution of a reference to contention 1(d) instead of contention 1(a).

The IDVP independently verified analyses to a sufficient extent to fulfill its Program Plans and to conclude with reasonable assurance that the DCNPP-1 meets license application criteria as stated in the IDVP Final Report. In its verification of seismic design calculations, the IDVP performed a complete independent analysis of the initial sample and additional sample/verification in accordance with the Phase I Program Plan. In its verification of the DCP Corrective Action Program as defined by ITR-8, and in its verification of the DCP activities as defined in ITR-35, the IDVP used independent calculations on a selected basis as part of the design verification process. In every aspect of the IDVP's seismic work, the verification process consisted of much more than merely checking data of inputs to models used by PG&E.

In its verification of the non-seismic design, the IDVP performed independent calculations or analyses, and/or independent review of PG&E calculations and analyses in accordance with the Phase II Program Plan. The majority of the Phase II non-seismic verification consisted of the performance by the IDVP of independent calculations or analyses. The independent calculations and analyses employed by the IDVP used independent models developed by the IDVP and/or different computer programs. In its additional verification of DCP-performed activities as defined by ITR 34 and 35, the IDVP used independent calculations, analyses, and/or field verification for essentially all of the verification effort. In every aspect of the IDVP's non-seismic work, the verification process consisted of much more than merely checking data of inputs to models used by PG&E.

ANSWER TO INTERROGATORY NO. 8(b):

The answer to Interrogatory No. 2(b) is applicable to Interrogatory No. 8(b), with the substitution of a reference to contention 1(d) instead of contention 1(a).

ANSWER TO INTERROGATORY NO. 8(c):

See response to Interrogatory No. 2(c).

ANSWER TO INTERROGATORY NO. 8(d):

See response to Interrogatory No. 6(d).

ANSWER TO INTERROGATORY NO. 9:

This interrogatory is ambiguous because the Governor has not specified his standard for "too narrow." Nevertheless, the IDVP denies that the scope of its review was "too narrow" as it interprets those words.

ANSWER TO INTERROGATORY NO. 10(a):

The answer to Interrogatory No. 2(a) is applicable to Interrogatory No. 10(a), with the substitution of a reference to contention 1(e) instead of contention 1(a).

The IDVP's review was in accordance with the Commission's Order of November 19, 1981 and the Staff's letter of that same date which contemplated only an independent verification of Unit 1. In addition, the IDVP completed its work in accordance with the Program Plans, approved by the Commission, which included only Unit 1. The IDVP was never intended to verify the design of Unit 2.

ANSWER TO INTERROGATORY NO. 10(b):

The answer to Interrogatory No. 2(b) is applicable to Interrogatory No. 10(b), with the substitution of a reference to contention 1(e) instead of contention 1(a).

ANSWER TO INTERROGATORY NO. 10(c):

See response to Interrogatory No. 2(c).

ANSWER TO INTERROGATORY NO. 10(d):

See response to Interrogatory No. 6(d).

ANSWER TO INTERROGATORY NO. 11:

This interrogatory is ambiguous because it does not specify the Governor's standard for "too narrow" nor define the term "design activity." Nevertheless, for the reasons set forth in the answer to Interrogatory No. 12(a), the IDVP denies that the scope of the ITP review was "too narrow," as it interprets those words.

ANSWER TO INTERROGATORY NO. 12(a):

The IDVP believes that the scope of the ITP review was not "too narrow" because the scope of the ITP's analyses and modifications was sufficient to respond to all of the IDVP's concerns, to permit the IDVP to complete its verification in accordance with the Program Plans, and to enable the IDVP to reach the conclusions and evaluations stated in Sections 2 and 6 of the Final Report. The ITP has reviewed all of the design activities and performed the analyses and modifications required to satisfy the IDVP's needs, with some exceptions yet to be completed. This permitted the IDVP to reach the conclusions stated in the Final Report and to carry out the Program Plans. The design work performed by the ITP for verification by the IDVP is set forth in ITR's 8, 34 and 35 and is discussed further in Section 3.5 of the IDVP Final Report. The results of the IDVP's verification of design activities performed by the ITP is or will be set out in ITR's 45-49 (SWEC), ITR 51 (TES) and ITR's 54-61, 63, 65, 67-68 (RLCA), and the IDVP relies upon facts contained in these ITR's in denying this contention.

ANSWER TO INTERROGATORY NO. 12(b):

At the present time, in its denial of contention 2(a), the IDVP relies upon the Commission's Order of November 19, 1981, the NRC Staff's letter of November 19, 1981, the IDVP's Program Plans, the ITR's, the IDVP Final Report and Supplement No. 18 to the NRC Staff's SER.

ANSWER TO INTERROGATORY NO. 12(c):

Except for the documents and for the type of facts and allegations discussed in the response to Interrogatory No. 2(c), the IDVP is not aware of any documents the identification of which is requested by Interrogatory No. 12(c).

ANSWER TO INTERROGATORY NO. 12(d):

See response to Interrogatory No. 6(d).

ANSWER TO INTERROGATORY NO. 13:

As stated in response to Interrogatories Nos. 11 and 12(a), the scope of the ITP was fully adequate to respond to all of the needs and requirements of the IDVP and was therefore not "too narrow" as the IDVP interprets those words.

ANSWER TO INTERROGATORIES NOS. 14(a), (b), (c) and (d):

The answers to Interrogatories Nos. 12(a), (b), (c) and (d) are applicable to Interrogatories Nos. 14(a), (b), (c) and (d), with the substitution of a reference to contention 2(b) instead of contention 2(a).

ANSWER TO INTERROGATORY NO. 15:

See response to Interrogatory No. 13.

ANSWER TO INTERROGATORY NO. 16:

The answers to Interrogatories Nos. 12(a), (b), (c) and (d) are applicable to Interrogatories Nos. 16(a), (b), (c) and (d), with the substitution of a reference to contention 2(c) instead of contention 2(a).

ANSWER TO INTERROGATORY NO. 17:

The IDVP neither admits nor denies contention 2(d) because the IDVP was not intended to verify the ITP's verification of the design of Unit 2 of the DCNPP.

ANSWER TO INTERROGATORY NO. 18:

Not applicable.

ANSWER TO INTERROGATORY NO. 19:

The IDVP denies contention 3(a), to the extent that it alleges deficiencies in the IDVP's use, approval or verification of structures' and materials' properties.

ANSWER TO INTERROGATORY NO. 20(a):

The IDVP is not aware of any use of "mean" material properties in the evaluation of Hosgri effects. The IDVP is aware of

the use of "average" properties in the performance of such evaluations, which is the criterion specifically stated in the license application.

ANSWER TO INTERROGATORY NO. 20(b):

In denying this contention, the IDVP relies upon the Hosgri Report, ITR's 54, 55, 56, 57 and 58, and SER Supplement 7.

ANSWER TO INTERROGATORY NO. 20(c):

Except for the documents and for the types of facts and allegations discussed in the response to Interrogatory No. 2(c), the IDVP is not aware of any documents the identification of which is requested by Interrogatory No. 20(c).

ANSWER TO INTERROGATORY NO. 20(d):

Although the IDVP has not yet determined the exact scope of its testimony, at the present time it anticipates that its witnesses concerning the denial of this contention will be Dr. W. E. Cooper (TES), and Dr. R. L. Cloud (RLCA).

ANSWER TO INTERROGATORY NO. 21:

The IDVP denies contention 3(b), to the extent it alleges deficiencies in the IDVP use, approval or verification of stress load factors for steel used in the containment building.

ANSWER TO INTERROGATORY NO. 22(a):

The IDVP has verified that the stress and load factors for steel used in the containment building satisfy the criteria of the license application to the extent that this work has been completed.

ANSWER TO INTERROGATORY NO. 22(b):

In denying this contention, the IDVP relies upon ITR 54, Rev. 0; the completed work will be reported in ITR 54, Rev. 1.

ANSWER TO INTERROGATORY NO. 22(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 22(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 23:

The IDVP denies contention 3(c), to the extent that it alleges deficiencies in the IDVP's use, approval or verification of damping values in the containment and auxiliary buildings.

ANSWER TO INTERROGATORY NO. 24(a):

(i) With respect to the containment building, the IDVP neither admits nor denies that appropriate damping values were used for DE and DDE analyses, since the IDVP verification sample did not include these analyses.

(ii) With respect to the auxiliary building, the IDVP has verified that the appropriate damping values were stated and

used in the Hosgri modal analysis, but that (conservatively) no damping was used for the soil springs.

ANSWER TO INTERROGATORY NO. 24(b):

In denying this contention, the IDVP relies upon:

- (i) Not applicable.
- (ii) ITR-55.

ANSWER TO INTERROGATORY NO. 24(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 24(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 25:

The IDVP denies contention 3(d), to the extent it alleges deficiencies in the IDVP's use, approval or verification of calculational methods employed by the ITP.

ANSWER TO INTERROGATORY NO. 26(a):

The IDVP has verified that the DCP has used only the Square Root of the Sum of the Squares method in its final evaluations.

ANSWER TO INTERROGATORY NO. 26(b):

In denying this contention, the IDVP relies upon ITR-56.

ANSWER TO INTERROGATORY NO. 26(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 26(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 27:

The IDVP denies contention 3(e), to the extent it alleges deficiencies in the IDVP's use, approval or verification of accelerations, displacements and shell forces in the containment.

ANSWER TO INTERROGATORY NO. 28(a):

The IDVP has verified that the use of time-history modeling techniques in some instances, and the use of Blume response spectra in other instances, satisfies the applicable criteria of the license application.

ANSWER TO INTERROGATORY NO. 28(b):

In denying this contention, the IDVP relies upon ITR-54.

ANSWER TO INTERROGATORY NO. 28(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 28(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 29:

The IDVP neither admits nor denies subparts (i), (ii), and (iii) of contention 3(f) because the IDVP verification sample did not address the issues identified in the contention.

The IDVP denies subparts (iv) and (v) of contention 3(f), to the extent they allege deficiencies in the IDVP's use, approval or verification of the modeling of soil springs.

ANSWER TO INTERROGATORY NO. 30(a):

The IDVP has verified the modeling of the soil springs used for the auxiliary building. With respect to subpart (iv), all of the required properties are specified, except see the response to Interrogatory 24(a) with respect to damping. With respect to subpart (v), the motion inputs to the lower ends of the spring account for all soil structure interaction phenomena which the IDVP considers to be significant.

ANSWER TO INTERROGATORY NO. 30(b):

To the extent it denies this contention, the IDVP relies upon ITR-55.

ANSWER TO INTERROGATORY NO. 30(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 30(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 31:

The IDVP neither admits nor denies contention 3(g), since the IDVP's verification sample included only one position and loading.

ANSWER TO INTERROGATORY NOS. 32(a), (b), (c) and (d):

Not applicable.

ANSWER TO INTERROGATORY NO. 33:

The IDVP denies contention 3(h), to the extent it alleges deficiencies in the IDVP's use, approval or verification of torsion factors employed in the design of the DCNPP-1.

ANSWER TO INTERROGATORY NO. 34(a):

The IDVP has verified the ITP modeling of torsion factors with the exception of the turbine building, where final resolution has been identified as a minor unresolved issue. Final verification of the torsion factor for the turbine building is underway and will be reported in Revision 1 to ITR-56.

ANSWER TO INTERROGATORY NO. 34(b):

In denying this contention, the IDVP relies upon ITR's 54, 55, 57 and 58.

ANSWER TO INTERROGATORY NO. 34(c):

See response to Interrogatory 20(c). In addition, SER

Supplement 18, Section 3.2.5.5, page C.3-26 addresses accidental torsion in the Fuel Handling Building.

ANSWER TO INTERROGATORY NO. 34(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 35:

The IDVP denies contention 3(i), to the extent it alleges deficiencies in the IDVP's use, approval or verification of the modeling of the intake structure.

ANSWER TO INTERROGATORY NO. 36(a):

The IDVP has verified that the modeling of the intake structure is acceptable and is in conformance with the criteria of the license application. Sloshing and hydrodynamic pressure effects were not explicitly considered by the DCP, but the IDVP concluded that the DCP's evaluation was sufficiently conservative to account for these effects.

ANSWER TO INTERROGATORY NO. 36(b):

In denying this contention, the IDVP relies upon ITR-58.

ANSWER TO INTERROGATORY NO. 36(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 36(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 37:

The IDVP neither admits nor denies contention 3(j), because the intake structure crane modeling was not part of the IDVP's verification sample.

ANSWER TO INTERROGATORIES NOS. 38(a), (b), (c) and (d):

Not applicable.

ANSWER TO INTERROGATORY NO. 39:

The IDVP denies contention 3(k), to the extent it alleges deficiencies in the IDVP's use, approval or verification of ductility factors for steel and concrete in the intake structure.

ANSWER TO INTERROGATORY NO. 40(a):

In the sample of the intake structure verified by the IDVP, the ductility factors, including those used in the post-yield analysis of the piers, were in accordance with the criteria of the license application.

ANSWER TO INTERROGATORY NO. 40(b):

In denying this contention, the IDVP relies upon ITR-58.

ANSWER TO INTERROGATORY NO. 40(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 40(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 41:

The IDVP denies contention 3(1), to the extent it alleges deficiencies in the IDVP's use, approval or verification of the computation of modes in the containment building having frequencies between 20 and 33 Hz.

ANSWER TO INTERROGATORY NO. 42(a):

The IDVP has verified that the consideration of various frequencies in the ITP analysis of the containment building is in conformance with the criteria of the license application.

ANSWER TO INTERROGATORY NO. 42(b):

In denying this contention, the IDVP relies upon ITR-54.

ANSWER TO INTERROGATORY NO. 42(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 42(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 43:

The IDVP denies contention 3(m), to the extent it alleges deficiencies in the IDVP's use, approval and verification of the modeling of the containment building using only one horizontal component.

ANSWER TO INTERROGATORY NO. 44(a):

The IDVP has verified that the modeling of only one horizontal component for the DE and DDE analysis of the containment building is in conformance with the criteria of the license application.

ANSWER TO INTERROGATORY NO. 44(b):

In denying this contention, the IDVP relies upon ITR-54.

ANSWER TO INTERROGATORY NO. 44(c):

See response to Interrogatory 20(c).

ANSWER TO INTERROGATORY NO. 44(d):

See the response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 45:

The IDVP denies contention 3(n), to the extent it alleges deficiencies in the IDVP's use, approval or verification of stress value for concrete in the shear walls of the auxiliary building.

ANSWER TO INTERROGATORY NO. 46(a):

The IDVP has verified that the stress values for concrete in the shear walls of the auxiliary building were evaluated in accordance with the criteria of the license application.

ANSWER TO INTERROGATORY NO. 46(b):

In denying this contention, the IDVP relies upon ITR 55, and PG&E letter of August 30, 1983 to NRC (Eisenhut), Enclosure 2, Attachment 5.

ANSWER TO INTERROGATORY NO. 46(c):

See response to Interrogatory 20(c). In addition, see SER Supplement 18, Section 3.2.4.4, page C.3-22.

ANSWER TO INTERROGATORY NO. 46(d):

See response to Interrogatory 20(d).

ANSWER TO INTERROGATORY NO. 47:

The IDVP denies that it has accepted deviations from the licensing criteria without providing adequate engineering justification.

Accordingly, the IDVP denies contentions 4(a) to 4(c) and 4(e) to 4(u), as filed by Governor Deukmejian and the Joint Intervenors on September 8, 1983.

The IDVP neither admits nor denies contention 4(d) because review of these valves to GDC 57 of Appendix A was not within

the scope of the IDVP sample as described in the Phase II Program Plan. However, the IDVP has noted that PG&E letters to the NRC dated 7/27/83 and 8/30/83 stated that these valves and their circuits were purchased and installed as Class I.

ANSWER TO INTERROGATORY NO. 48:

The IDVP's answers for each of contentions 4(a) to 4(u) are set forth below:

Contention 4(a)

48(a) The requirements of FSAR, Section 17.1 regarding "as-built" installation were satisfied as described below:

1. In EOI 8027, the IDVP's concern was that a steam trap shown on a drawing had not been installed. However, this EOI was satisfactorily resolved by determining that startup testing had established that the steam trap was not required. The design change documents adding the steam trap had not been signed by General Construction (G.C.) as complete, and therefore, work was not "officially" complete. Subsequently, G.C. wrote a design change document to supersede the original and to revise the piping schematic. Thus, the "as-built" condition without the steam trap is consistent with the final approved design in accordance with the FSAR.

2. In EOI 8048, the IDVP's concern was that a check valve installed on the long-term cooling water supply line did not appear on the system piping schematic drawing. Further verification by the IDVP indicated that modifications addressed in this EOI were installed in accordance with approved documents. The original copy of the design change did not require removal of the check valve. However, due to a misinterpretation of a xerox copy of the design change, a draftsman mistakenly removed the check valve from the piping schematic drawing. The installation in the field was verified as technically correct by the IDVP. The "drafting error" was corrected on the drawing. Thus, the "as-built" condition is consistent with the final approved design in accordance with the FSAR.

- 48(b) In denying this contention, the IDVP relies upon the FSAR, ITR-22 and the IDVP Final Report.
- 48(c) See answer to Interrogatory No. 20(c).
- 48(d) Although the IDVP has not yet determined the exact scope of its testimony, at the present time it anticipates that its witnesses concerning the denial of contention 4(a) would be Dr. W. E. Cooper (TES) and Mr. John E. Krechting (SWEC).

Contention 4(b)

48(a) The electrical design complied with the intent of the requirements of the FSAR Section 8.3.3 as described below:

1. In EOI 8055, the IDVP's concern was that two pressure indicators (PI53A and PI53B) did not meet the separation criteria of FSAR, Section 8.3.3. PG&E stated that the intent of the FSAR, Section 8.3.3 separation criteria is to provide adequate isolation and insulation between exposed current carrying portions of mutually redundant power control devices. They did not intend the FSAR requirement to apply to low energy instrumentation signals applicable to the concerns of this EOI. The wiring to the two devices is installed and separated in accordance with FSAR, Section 8.3.3. PG&E has committed to a revision to the FSAR, Section 8.3.3 to clarify the requirements for separation of mutually redundant indicating devices on the main control board. Since the intent of the FSAR Section 8.3.3 separation requirements have been satisfied, no deviation from licensing requirements existed.
2. In EOI 8059, the IDVP's concern was that non-safety-related cable was color coded, although IDVP interpreted FSAR Section 8.3.3 as providing

for color-coding only of safety-related cable. Since FSAR Section 8.3.3 was not specific on this point, an EOI was written by the IDVP to ensure clarification. PG&E committed to revise the FSAR, Section 8.3.3 to clarify the color-coding requirements. No deviation from licensing requirements existed.

- 48(b) In denying this contention the IDVP relies upon the FSAR, ITR's 27 and 28, and the IDVP Final Report.
- 48(c) See response to Interrogatory 20(c).
- 48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(c)

- 48(a) No deviation from the licensing requirements or from the single failure criterion of Appendix A to 10 CFR Part 50 occurred. In EOI 8041, the IDVP's concern was due to the possibility of improperly transferring from normal to alternate sources using a switch common to both sources at a location in the CRVP system. PG&E demonstrated that their standard operating practice for transfer switches allows connection of only one of the two sources at any time. A formal operating order specifying the correct transfer procedure will be issued by PG&E for DCNPP-1 which will specifically address this standard practice. No violation of licensing requirements exists since operator action ensures proper switch/breaker operation.

- 48(b) In denying this contention, the IDVP relies upon the FSAR, ITR 26 and the IDVP Final Report.
- 48(c) See response to Interrogatory 20(c).
- 48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(d)

Not applicable. See Answer to Interrogatory 47.

Contention 4(e)

- 48(a) No deviation from licensing requirements occurred. In EOI 8047, the IDVP's concern was that the failure of the non-safety grade relay 3AFWP would prevent the automatic closure of the Steam Generator blowdown valves. The IDVP questioned whether continued blowdown from the four steam generators during a postulated accident requiring auxiliary feedwater system operation had been considered in the accident analysis of the FSAR Chapter 15.

Subsequent verification determined that various Westinghouse accident analyses requiring operation of the AFW System had been done assuming the blowdown valves are isolated. Results of these analyses have been forwarded to the NRC (letter of October 9, 1980, P.A. Crane of PG&E to A. Schwencer of NRC). The assumption of blowdown isolation is used in the analysis to support the conclusions of FSAR Sections 15.2.8 and 15.2.9.

PG&E provided documentation indicating that for the accidents described in FSAR Sections 15.2.8 and 15.2.9 where protection systems do not initiate a diverse safety grade blowdown valve trip signal, adequate auxiliary feedwater flow exists (based on the above referenced October 9, 1980 letter) assuming both a single failure of one train and blowdown valves unisolated. In other accident scenarios of the FSAR, Chapter 15 requiring auxiliary feedwater, the blowdown valves would be tripped closed by safety grade trip signals from diverse sources (such as safety injection). Thus, the blowdown valves would receive diverse safety grade trip signals and close in accordance with the Westinghouse accident analysis assumptions.

The final IDVP conclusion is that no safety limits or licensing commitments (ability to mitigate accidents or remove decay heat and cool the plant) as described in the FSAR, Chapter 15 have been violated. In addition, in the opinion of the IDVP the Westinghouse interface requirements were satisfied.

48(b) In denying this contention, the IDVP relies upon the FSAR, ITR 27, the IDVP Final Report and the PG&E to NRC letter dated 10/9/80 (Crane to Schwencer).

48(c) Page C4-12 of Supplement 18 to the SER. See also the answer to Interrogatory No. 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).
Contention 4(f)

48(a) No deviation from licensing requirements occurred. In EOI 8052, the IDVP's concern was that safety-related flow control valve (FCV-95) and flow transmitter (FT-78) were not qualified for a harsh environment.

PG&E responded that the tag number for FT 78 was changed to FT 200 but the Environmental Qualification Report did not make this clear. PG&E's response also indicated that FT 78 was qualified for a harsh environment. The vendor's report included a qualification summary that provided justification for operation pending completion of the qualification program. PG&E stated that the item is in the vendor's qualification program and that qualification documentation will be added upon completion.

PG&E responded that FCV 95 was erroneously indicated as not being in a harsh environment but that it has been qualified for a harsh environment. They also provided their component evaluation report to document their approval of the vendor's qualification testing.

In the DCNPP-1 SER, Supplement No. 15, the NRC states that they performed a 100% review of the applicant's equipment qualification and found it to meet regulatory requirements. The NRC also acknowledges and accepts the fact that equipment can be conditionally qualified or require additional information to complete qualification.

On this basis, the IDVP concludes that no licensing requirement is violated.

48(b) In denying this contention the IDVP relies upon the FSAR, SER, Supplement No. 15, ITR 27 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(g)

48(a) No deviation from licensing requirements occurred. In EOI 8056, the IDVP's concern was that all CRVP System equipment had not been identified in the Environmental Qualification (E.Q.) Report. Further verification determined that all Class IE equipment for the CRVP System was not included in the E.Q. Report because the list in the E.Q. Report was compiled prior to completion of the schematic drawings

which represented the modified system. (The CRVP System was modified in the 1979-81 time-frame.) The remaining equipment in the CRVP system not in the E.Q. Report was designed for a mild environment in which it is expected to operate. No such CRVP Class I equipment was identified by the IDVP to be required to be qualified for a severe environment. Therefore, the CRVP equipment meets the environmental qualification requirements of NUREG-0588 and no deviation from licensing criteria exists.

- 48(b) In denying this contention the IDVP relies upon the FSAR, ITR 26 and the IDVP Final Report.
- 48(c) See response to Interrogatory 20(c).
- 48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(h)

- 48(a) No deviation from licensing requirements occurred. In EOI 8050, the IDVP's concern was that the CRVP system was not identified as being evaluated for moderate energy line breaks (MELB) in PG&E letters of 9/14/78 and 12/28/78 to the NRC. These letters described the MELB evaluation performed for the DCNPP-1. PG&E provided the IDVP an evaluation describing the effects of MELB on the CRVP system. The analysis indicated that an MELB could cause loss of one CRVP

system train. An assumed single failure of the redundant CRVP system train may degrade Control Room habitability. However, if the Control Room should become uninhabitable, the capability for plant shutdown and cooldown would be available from the hot shutdown panel.

The IDVP concluded that, in the unlikely event that a MELB would cause the Control Room to become uninhabitable, plant shutdown and cooldown capability would be maintained from the hot shutdown panel.

PG&E stated that the reason that the CRVP system was not included in the MELB evaluation was their interpretation that there was no need to evaluate the CRVP system. This interpretation was based on the fact that even if the CRVP system failed, the plant could be shut down from the hot shutdown panel. The IDVP judged that the PG&E interpretation was reasonable and acceptable. No violation of licensing requirements occurred since plant safe shutdown capability is not hindered.

48(b) In denying this contention, the IDVP relies upon the FSAR, ITR 21, IDVP Final Report and the NRC to PG&E letters dated 9/14/78 and 12/28/78.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(i)

48(a) No deviation from licensing requirements occurred as described below:

1. In EOI 8038, IDVP's concern was whether a ventilation opening was identified in the definition of fire zone barriers. Although the FSAR definition was ambiguous, further review indicated that a fire in one zone will not propagate through openings to another zone. The EOI was written because the FSAR language was not "crystal clear" and therefore, subject to misinterpretation if taken literally. The criteria that a fire will not propagate from one fire zone to another is satisfied and plant safe shutdown is not hindered.
2. In EOI 8037, the IDVP's initial concern was whether fire damper FD-24 was UL qualified, and that it had large air gaps. Subsequent IDVP verification determined that the fire damper is UL qualified and that the damper gaps satisfy design requirements and UL qualification.

48(b) In denying this contention the IDVP relies upon ITR 18 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(j)

48(a) No deviation from licensing requirements occurred as described below:

1. In EOI 8019, IDVP's concern was that circuits for the motor driven AFW pumps and the control circuitry for a flow control valve (FCV-95) necessary for operation of the turbine driven AFW pump were located in a single fire zone. Further verification determined that control circuitry for FCV-95 was not located in this fire zone. Therefore, no violation of separation requirements occurred and a single fire cannot prevent proper operation of the AFW system.
2. In EOI 8021, the IDVP's concern was that circuit routings were different than indicated in the SIFPR. PG&E explained that cables had been rerouted subsequent to issuance of the SIFPR, but that such circuits were properly rerouted such that no fire would prevent the AFW system from performing its minimum required function. The IDVP subsequently field verified that all AFW system as-built circuit routing conformed with the licensing commitment, with the exception that FCV-95 DC circuit was improperly located. How-

ever, the FCV-95 circuit routing was in the process of being rerouted and installation was not complete. Therefore, the cable had not yet been relocated to its proper location at the time of the IDVP field verification. The IDVP verified that subsequent completion of routing of the FCV-95 circuit conformed to licensing commitments. Therefore, no violation of separation requirements occurred and a single fire cannot prevent proper operation of the AFW system.

- 48(b) In denying this contention the IDVP relies upon ITR 18 and the IDVP Final Report.
- 48(c) See response to Interrogatory 20(c).
- 48(d) See response to Interrogatory 43(d) for Contention 4(a).

Contention 4(k)

- 48(a) No deviation from licensing criteria occurred. In EOI 8039, the IDVP's concern was whether a ventilation opening was identified in the definition of fire zone barriers. Although the FSAR definition was ambiguous, further review indicated that a fire in one fire zone will not propagate to another fire zone. The EOI was written because the FSAR language was not "crystal clear" and therefore, subject to misinterpretation if taken literally. The criteria that a fire will not

propagate from one fire zone to another is satisfied and plant safe shutdown is not hindered.

48(b) In denying this contention the IDVP relies upon ITR 18 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(1)

48(a) No violation of FSAR Section 3.6 has occurred. In EOI 7002, the IDVP's concern was the lack of documentation indicating that jet impingement effects due to HELB had been considered in the design and qualification of safety-related equipment inside containment. In response to EOI 7002, the DCP has performed a re-analysis of the effects of HELB inside containment. The IDVP reviewed the DCP methodology and on a sampling basis verified the jet impingement analysis, as described in ITR's 34 and 48. The IDVP concludes that the DCNPP-1 design complies with the requirements of FSAR Section 3.6 for jet impingement resulting from HELB inside containment.

48(b) In denying this contention the IDVP relies upon the FSAR and ITR's 34 and 48.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(m)

- 48(a) The IDVP neither admits nor denies contention 4(m) with respect to rupture restraints inside of containment since such rupture restraints are outside of the scope of the IDVP verification sample. The IDVP denies contention 4(m) with respect to rupture restraints outside of containment. The IDVP has verified that the methodology used by the ITP for the design of rupture restraints outside of containment is in conformance with the criteria of the license application. Further IDVP verification of such restraints is in progress.
- 48(b) In denying this contention, the IDVP relies upon ITR 65, and PG&E letter of August 30, 1983 to NRC (Eisenhut), Enclosure 2, Attachment 25.
- 48(c) See response to Interrogatory 20(c). In addition, see SER Supplement 18, Section 4.3.6.2, page C.4-31.
- 48(d) See response to Interrogatory 20(d).

Contention 4(n)

- 48(a) The IDVP denies contention 4(n), to the extent it alleges deficiencies in the IDVP's verification. Table 3.2.4 of the FSAR commits PG&E to use Section III of the ASME Code for the containment penetrations, airlocks and fluid heads. Of those, only a single containment penetration (the equipment hatch) was part of the IDVP sample, and the IDVP verified

that it was evaluated to Section III of the ASME Code.

- 48(b) In denying this contention the IDVP relies upon ITR 54, and PG&E letter of August 30, 1983 to NRC (Eisenhut), Enclosure 2, Attachment 2.
- 48(c) See response to Interrogatory 20(c). In addition, see SER Supplement 18, Section 3.2.3.4, page C.3-17.
- 48(d) See response to Interrogatory 20(d).

Contention 4(o)

- 48(a) Cables and cable splices required to be qualified by NUREG-0588 which could be subject to a harsh environment during an HELB are qualified. The bases for the above conclusion are discussed below:

1. In EOI 8011, the IDVP's concern was that all safety-related cables in the AFW and CRVP systems were not identified as environmentally qualified in Appendix 3.6 of the FSAR (Ref. 5 - dated 1975). PG&E subsequently provided documentation that all safety-related cables used in the AFW and CRVP system were environmentally qualified. Cable other than that listed in Appendix 3.6 (Ref. 5) which is the concern of this EOI, was purchased after 1975, qualified to the temperature defined in the FSAR and included in the plant Environmental Qualification Report.

2. In EOI 8044, the IDVP's concern was that Appendix 3.6 of FSAR (Ref. 5) states that "in general splices were not used". However, the IDVP found splices which could potentially be exposed to the effects of HELCs and further verification was performed which determined:

- 1) Splices used are qualified to 340°F,
- 2) No splices in the AFW or CRVP system are exposed to jet temperature in excess of 340°F, and
- 3) Splices are included in Environmental Qualification Report.

48(b) In denying this contention the IDVP relies upon the FSAR, ITR's 21 and 25 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(p)

48(a) No violation of the requirements of Appendix A to FSAR Section 3.6 occurred. In EOI's 8005 and 8040, the IDVP's concern was that the calculated water levels due to feedwater HELB were not conservative. Further detailed review of the PG&E calculation revealed the maximum flood heights calculated in the

original analysis for area GE/GW at el. 115 ft-0 in. to be conservative, because of PG&E's use of conservative assumptions and methods which overpredicted the water available for flooding. The water volume that was overpredicted is larger than the water volume that was neglected.

48(b) In denying this contention the IDVP relies upon the FSAR, ITR 14 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(g)

48(a) No violation of licensing requirements occurred. In EOI 8014, the IDVP's concern was that two valves (FCV-436 and FCV-437) required to be protected from the effects of MELBs did not have spray shields installed. In response to EOI 8014, PG&E demonstrated that it had determined subsequent to its 12/28/79 letter to the NRC that these two valves were not required to operate in mitigation of the effects of an MELB and had therefore decided not to install the spray protection devices. PG&E will revise the 12/28/79 letter to indicate that protection for the valves is not required.

48(b) In denying this contention the IDVP relies upon the FSAR, ITR 21 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(r)

48(a) No deviation from Appendix 3.6 of the FSAR (Ref. 5) occurred. As described below, minimum system redundancy was maintained and equipment required to mitigate the HELC and safely shut down the plant was not exposed to temperatures in excess of its specification temperature:

1. The IDVP issued EOI's 8028, 8029 and 8030 which are similar and were written because of inconsistencies in Appendix 3.6 of the FSAR and Ref. 5 of this Appendix. Pages 3.6A-22 and 23 (rev. 3) of the Appendix state that HELBs (or HELCs) need not be postulated in line 760 downstream of FCV-95. This is inconsistent with other statements in the FSAR which indicate that breaks were postulated in line 760 downstream of FCV-95. PG&E has committed to correct such inconsistencies in the FSAR by eliminating any postulated HELB or HELC downstream of FCV-95 in line 760. This is consistent with NRC requirements. Since no breaks need be postulated downstream of FCV-95 the equipment identified in these EOI's will not

be exposed to harsh environments as originally postulated in the EOI's.

2. In EOI 8031, IDVP's concern was that an HELC in line 594 could adversely affect AFW system equipment. Further verification indicated that a HELC in line 594 is not a concern because a crack in this line does not cause T/G trip or reactor trip. Thus, offsite power does not need to be assumed lost and the AFW system is not required to operate for crack mitigation in line 594 for plant shutdown. Therefore, equipment identified in this EOI will not be required to operate to mitigate the effects of the HELC in line 594 or to safely shut down the plant, and there is no safety consequence if the equipment is exposed to HELC impingement temperatures.

48(b) In denying this contention the IDVP relies upon the FSAR, ITR's 21 and 27 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(s)

- 48(a) No deviation from licensing requirements occurred. In EOI 8049, the IDVP's concern was that the effects of an HELB jet on an AFW system conduit had not been considered. Further verification demonstrated that

the cable in the conduit identified in the EOI will not be damaged due to the effects of an HELB and that AFW system redundancy is not affected. Jet pressures on the conduit are lower than allowable conduit jet pressure. Cable in the conduit is qualified to 540°F, which is above the enveloping temperature using either the FSAR methodology or ANSI-ANS 58.2 methodology. In addition, since a break in line 594 will not cause a T/G or reactor trip, the AFW system is not required to mitigate the break or shut the plant down. Therefore, the AFW system is not required to mitigate the HELB in question or to safely shut down the plant.

48(b) In denying this contention the IDVP relies upon the FSAR, ITR 23 and the IDVP Final Report.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(t)

48(a) No deviation from licensing requirements occurred. In EOI 8022, the IDVP's concern was that the circuit breaker nameplate interrupting rating was less than the calculated interrupting duty required. Further verification indicated that by using existing test data (test performed in 1976) the manufacturer verified that the 4160V circuit breakers are capable of

interrupting the maximum available short circuit current. Therefore, no deviation from licensing requirements existed.

48(b) In denying this contention the IDVP relies upon the FSAR and ITR 24.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

Contention 4(u)

48(a) In EOI's 8017 and 8057, the IDVP concerns were that the FSAR single failure criteria and cable separation criteria were not met. Subsequent IDVP verification identified these concerns to be potentially generic as discussed in ITR's 27 and 28. Since these concerns were considered by the IDVP to be generic, the DCP reviewed all safety-related systems for similar concerns as discussed in ITR's 34 and 49. The results of the DCP review were verified by the IDVP on a sampling basis. The results of the IDVP verification are described in detail in ITR 49.

48(b) In denying this contention the IDVP relies upon ITR's 27, 28, 34 and 49, the IDVP Final Report and the FSAR.

48(c) See response to Interrogatory 20(c).

48(d) See response to Interrogatory 48(d) for Contention 4(a).

ANSWER TO INTERROGATORY NO. 49:

The IDVP denies contention 5 as it relates to work performed by the IDVP with respect to the DCNPP-1, as described in the response to Interrogatory No. 50(a). The IDVP neither admits nor denies contention 5 as it relates to other work performed by the ITP.

ANSWER TO INTERROGATORY NO. 50(a):

The IDVP program included field verification of modifications performed by the ITP in response to specific EOI's and, on a sampling basis, of both initial construction and of modifications performed by the ITP. Field verifications were performed in accordance with the Phase I and Phase II Program Plans and ITR's 1, 8, 34 and 35. The extent of the IDVP's field verification was sufficient to meet the requirements of the IDVP Program Plans and to provide reasonable assurance that the DCNPP-1 was designed in accordance with applicable license application criteria. In addition all of the ITR's reporting IDVP verification of design work contain a description of the field verification efforts performed by the IDVP in connection with the subject matter of that ITR. At the present time, in its denial of contention 5, the IDVP relies upon the facts summarized in the ITR's and in the IDVP Final Report.

ANSWER TO INTERROGATORY NO. 50(b):

At the present time, in its denial of contention 5, the IDVP relies upon the documents mentioned in the response to Interrogatory No. 50(a).

ANSWER TO INTERROGATORY NO. 50(c):

Except for the documents and for the type of facts and allegations discussed in the response to Interrogatory No. 2(c), the IDVP is not aware of any documents the identification of which is requested by Interrogatory No. 50(c).

ANSWER TO INTERROGATORY NO. 50(d):

See response to Interrogatory No. 6(d).

ANSWER TO INTERROGATORY NO. 51:

Since the IDVP did not review any verification that the ITP may have performed of the design of safety-related equipment supplied to PG&E by Westinghouse, the IDVP neither admits nor denies the portion of contention 6 that relates to any such activities by the ITP. With respect to activities by the IDVP, although the IDVP verified the Westinghouse-PG&E interfaces within the scope of the IDVP programs, it did not verify the design of safety-related equipment supplied to PG&E by Westinghouse.

ANSWER TO INTERROGATORY NO. 52:

Not applicable.

ANSWER TO INTERROGATORY NO. 53:

The IDVP denies contention 7, as it relates to the work performed by the IDVP, as described in the response to Interrogatory No. 54(a). The IDVP neither admits nor denies contention 7 as it relates to other work performed by ITP.

ANSWER TO INTERROGATORY NO. 54(a):

The choice of the IDVP's initial verification samples and the additional samples/verification of seismic and non-seismic work performed prior to the ITP assumed that the design quality assurance program for that design work was deficient. The IDVP reviewed for generic concerns every EOI resulting from that verification effort, as well as every EOI resulting from verification of the work of the ITP, and resolved all such generic concerns. (See Section 3.5.5 of the IDVP Final Report.)

In Section 6.3 of the Final Report, the IDVP identified the "basic" or "root" causes of the design deficiencies identified in its verification efforts. However, these basic or root causes did not result in any new generic concerns. At the present time, in its denial of contention 7, the IDVP relies upon the facts summarized in each ITR which discusses generic concerns and the IDVP Final Report.

ANSWER TO INTERROGATORY NO. 54(b):

At the present time, in its denial of contention 7, the IDVP relies on the Commission Order of November 19, 1981, the Staff letter of the same date, the IDVP's Program Plans, and the documents mentioned in the response to Interrogatory No. 54(a).

ANSWER TO INTERROGATORY NO. 54(c):

Except for the documents and for the type of facts and allegations discussed in the response to Interrogatory No. 2(c),

the IDVP is not aware of any documents the identification of which is requested by Interrogatory No. 54(c).

ANSWER TO INTERROGATORY NO. 54(d):

See response to Interrogatory No. 2(d).

ANSWER TO INTERROGATORY NO. 55:

The IDVP denies contention 8 to the extent that it alleges that the IDVP failed to verify that the ITP implemented in a timely manner a design quality assurance program and to the extent that contention 8 alleges that the IDVP failed to verify that the DCP corrective and preventive action programs were sufficient to assure that the DCNPP-1 will meet licensing criteria.

ANSWER TO INTERROGATORY NO. 56(a):

The IDVP performed an audit of the implementation of the ITP design quality assurance program. The IDVP also performed a design office verification of the implementation of the ITP design quality assurance program as described in Section 4.2.1.7 of the IDVP Final Report. The IDVP's audit of the ITP QA program and the design office verification are contained in ITR 41. In addition, the IDVP verified the design work performed by the ITP as well as the modifications performed by the ITP. The IDVP's review of the ITP is contained in ITR's 45-49 (SWEC), ITR 51 (TES) and ITR's 54-61, 63, 65, 67-68 (RLCA). At the present

time, in its denial of contention 8, the IDVP relies upon the facts summarized in the foregoing ITR's and in the IDVP Final Report.

ANSWER TO INTERROGATORY NO. 56(b):

At the present time, in its denial of contention 8, the IDVP relies on the Commission Order of November 19, 1981, the Staff letter of the same date, the IDVP's Program Plans, and the documents mentioned in the response to Interrogatory No. 56(a).

ANSWER TO INTERROGATORY NO. 56(c):

Except for the documents and for the type of facts and allegations discussed in the response to Interrogatory No. 2(c), the IDVP is not aware of any documents the identification of which is requested by Interrogatory No. 56(c).

ANSWER TO INTERROGATORY NO. 56(d):

See response to Interrogatory No. 2(d).

ANSWER TO INTERROGATORIES NOS. 57(a), (b), (c), (d), (e),
(f) and (g):

(a) Each of the IDVP witnesses provisionally designated above will be offered as an expert witness.

(b) Each person listed in the answers to subpart (d) of the even numbered interrogatories is expected to testify as to the subject matter of the contention discussed in that interrogatory. Also, each witness is expected to testify as to the

scope of his organization's participation in the IDVP program, the results of the program and the portion of the program relevant to each particular contention. In addition, each witness may provide expert testimony within the following areas of his expertise:

<u>Dr. William E. Cooper:</u>	Engineering Mechanics as it applies to nuclear power plants.
<u>Dr. Robert L. Cloud:</u>	Engineering Mechanics as it applies to nuclear power plants.
<u>John E. Krechting:</u>	Nuclear Power Systems design and operation.
<u>Roger F. Reedy:</u>	Design Quality Assurance for nuclear power plants.

(c) Dr. Cooper's resume was provided in connection with the CQC mini-hearing. The most current resumes of the other above-named witnesses are attached to these responses.

(d) Published writings of the above-named witnesses with respect to the subject matters set forth in the answer to Interrogatory No. 57(b) are included with the resumes of the witnesses.

(e) The IDVP has not completed its testimony. However, it expects that the witnesses will refer to and/or rely upon some or all of the documents referenced in subpart (b) of the even-numbered interrogatories, and may refer to and/or rely upon applicable regulations, regulatory guides, codes, and standards.

ANSWER TO INTERROGATORY NO. 57(f)&(g):

Dr. William E. Cooper

- (f) State of Vermont Public Service Board, Docket No. 4115

"Investigation of Costs and Responsibility For Those Costs Associated With Outage at Vermont Yankee Nuclear Power Station During January - February 1976 Pursuant to 30 VSA §227(b)"

- (g) (i) September 17, 1976
(ii) No prefiled testimony
(iii) Yes
(iv) Yes

Mr. Roger F. Reedy

- (f) Texas Utilities Co. (Commanche Peak Nuclear Generating Station, Units 1 and 2) Docket Nos. 50-445, 446
- (g) (i) June 9-11, 1982; July 26-30, 1982; September 13-17, 1982; and May 16-19, 1983.
(ii) Yes
(iii) Yes
(iv) No

Mr. John E. Krechting

- (f) None
(g) None

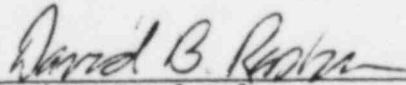
Dr. Robert L. Cloud

- (f) None
(g) None

ANSWER TO INTERROGATORY NO. 58:

Apart from the transcript of an internal IDVP meeting on September 30, 1982, the IDVP is not aware of any documents that may include information of the type requested by Interrogatories Nos. 58(a) to 58(e) except to the extent that such information may be contained in the IDVP or DCP program plans; pleadings, affidavits, letters, statements, etc. filed by the intervenors, PG&E or the NRC Staff; NRC Staff or Commission documents, such as SECY papers; and transcripts of meetings, hearings, pre-hearing conferences, etc. The IDVP has not searched its files to find such documents since they are equally available to the Governor of California.

Respectfully submitted,



Maurice Axelrad
David Raskin

Attorneys For The Independent
Design Verification Program

Date: September 21, 1983

STATE OF MASSACHUSETTS

SS:

COUNTY OF MIDDLESEX

The undersigned, William E. Cooper, being duly sworn this 20th day of September, 1983, upon his oath states that he is employed by Teledyne Engineering Services (TES) as a Consulting Engineer and is assigned as Project Manager for the DCNPP-1 IDVP for which Teledyne Engineering Services is the Program Manager, that he is informed on the matters of inquiry of the Third Set of Interrogatories Propounded to the Independent Design Verification Program by Governor Deukmejian; that in answering the above and foregoing Interrogatories, he has caused information to be gathered from employees and officers of Teledyne Engineering Services, Robert L. Cloud Associates, Stone & Webster Engineering Corporation, and R.F. Reedy, Inc.; and that the answers to the above and foregoing Interrogatories are true and correct as he has been informed and verily believes.

William E. Cooper

William E. Cooper

September 20, 1983

William S. Noonan

WILLIAM S. NOONAN
NOTARY PUBLIC
MY COMMISSION EXPIRES
AUGUST 3, 1987

ROGER F. REEDY, P.E.

Mr. Reedy has worked in the pressure vessel and nuclear power industries since 1956. His experience includes the design, analysis, fabrication, and erection of nuclear power plant components and implementation of the applicable quality systems. His background encompasses boiling water, pressurized water, and BWR nuclear power plants, as well as pressure vessels and storage tanks for petroleum, chemical, and other energy industries. Mr. Reedy is an acknowledged expert in the design of pressure vessels and nuclear components meeting the requirements of the ASME Boiler and Pressure Vessel Code.

He has been involved in licensing, engineering review, project coordination, and training of personnel. He has testified as an expert witness in litigations and before regulatory groups, including USNRC, ASLB and ACRS on topics such as design criteria, applications, fabrication techniques, and material applications.

Mr. Reedy has been an active participant for the past 15 years as a member and as chairman of major nuclear Codes and Standards Committees in the development of design, construction and quality criteria for nuclear power plant components. He has served utilities, architect/engineers, and manufacturers as a consultant on all aspects of nuclear power plant licensing, design, quality considerations, and construction.

Roger F. Reedy is currently chairman of the ASME Section III Code for Nuclear Power Plant Components. He is also a member of the N 626.3 Committee which developed the rules concerning duties and responsibilities of engineers designing ASME Code components for nuclear plants. This standard specifies minimum qualifications and details the engineer's responsibilities with regard to coordinating material application, fabrication details, quality assurance and non-destructive examinations of the component.

He has worked with the Republic of China Atomic Energy Council to set up an independent quality assurance and inspection program for all nuclear components installed in Taiwan. In addition, for about the past ten years, Mr. Reedy has given lectures on the ASME Code and quality assurance to NRC I & E inspectors in each of the Regions.

Mr. Reedy was one of the initial members of the Pressure Vessel and Piping Division of ASME and helped start the ASME Training Programs for engineers. The program was so successful that other engineering groups have developed similar programs.

Professional Background

- American Society of Mechanical Engineers

- Boiler and Pressure Vessel Committee
- Chairman, Subcommittee on Nuclear Power (Section III)
- Executive Committee, member

In 1980, he was awarded the 1980 ASME Centennial Medal by the Policy Board for Codes and Standards in recognition of his decades-long contribution to the development of the Boiler and Pressure Vessel Code.

- Subgroup on Containment, past chairman
- Subgroup on Fabrication and Examination, former member
- ASME Pressure Vessel and Piping Division
- Past Chairman
- Nuclear Codes and Standards Committee, member
- ANSI/ASME N626.3 Specialized Professional Engineers Committee, member

Professional Registration

Professional Structural Engineer - Illinois
Professional Civil Engineer - California, Illinois,
Indiana, Michigan,
Wisconsin

Professional Experience

1981 - present R.F. REEDY, INCORPORATED
Los Gatos, California
President

Currently consulting with utilities, manufacturers and architect/engineers.

1976 - 1981 NUCLEAR TECHNOLOGY, INCORPORATED
San Jose, California
Successively Manager, Special Projects and Chief Consultant

As Manager, Special Projects, he was responsible for coordinating Nutech's quality assurance program and their role as Monitor of the Mark I Containment Modification Project.

His CBI experience and ASME Code (Section III) expertise was a key element in working with the utilities and General Electric to define and execute a modification program acceptable to the U.S. Nuclear Regulatory Commission.

Was then advanced to Chief Consultant, serving as ex-officio advisor to all in-house projects and all clients on design, quality and construction questions concerning application of the ASME Code.

During his term at NUTECH, Mr. Reedy developed and wrote Code Capsule, a biennial commentary on the changes to the ASME Boiler and Pressure Vessel Code.

1956 - 1976 CHICAGO BRIDGE AND IRON COMPANY
Oak Brook, Illinois
Successively Designer, Staff Engineer, Project Engineer, Design Manager and Senior Engineer.

Duties included design of pressure vessels and storage tanks, including cryogenic vessels, vacuum chambers, multi-layer vessels, environmental chambers, and high-pressure chambers. His duties required close liaison with shop and field personnel, providing Mr. Reedy with an intimate knowledge of practical shop and field construction techniques including the applicable quality requirements.

He has designed more than 50 containment vessels and was the responsible Design Manager for most of the nuclear containment vessels fabricated by CBI. He also designed the first field-erected nuclear reactor.

As Senior Engineer, he consulted with the design staff and other departments concerning ASME Code requirements and special projects.

Education

B. S., Civil Engineering, Illinois Institute of Technology, 1956

Qualified Lead Auditor, ANSI N 45.2.23

August 1983

KRECHTING, JOHN E.

PROJECT ENGINEER
POWER DIVISION

EDUCATION

U.S. Naval Academy - Bachelor of Science, Naval Science 1965

LICENSES AND REGISTRATIONS

Professional Engineer - Rhode Island

EXPERIENCE SUMMARY

Mr. Krechting has over 18 years of experience in the engineering field. Currently as Project Engineer for the Diablo Canyon Nuclear Power Plant Independent Design Verification Program, he is responsible for the NRC required design verification to establish that installed safety-related systems meet their licensing and operational commitments.

Since joining Stone & Webster Engineering Corporation (SWEC) in July 1974 as an Engineer in the Power Division, Mr. Krechting has been assigned to positions of increasing responsibility. He has been assigned to the Charlestown Nuclear Power Plant project, which was in the design development and PSAR production stage; to the high temperature gas-cooled reactor (HTGR) 3,000 MWt Reference II Design Study for General Atomic Company which developed a conceptual reference plant design; and to the Sundesert Nuclear Plant project which was in the design development and PSAR production stage. Mr. Krechting was assigned as the Principal Nuclear Engineer on the North Anna Power Station - Units 1 and 2 project, and subsequently as the Lead Power Engineer on the North Anna Power Station project. He was assigned as Supervisor of the Systems Engineering Group responsible for the development and maintenance of fluid system descriptions for the SWEC reference/standard nuclear, fossil, and industrial plants; development and maintenance of fluid system related Power Division Technical Procedures and Guidelines; and resolution of generic fluid system design problems.

Prior to joining SWEC, he was employed by Westinghouse Nuclear Energy Systems as a Senior Systems Engineer on the project to determine the feasibility of floating nuclear power plants. He developed the design of many of the nuclear and reactor auxiliary systems for the Offshore Power Systems' floating nuclear power plants.

His experience includes 6 years in the operation and maintenance of U.S. Navy submarine nuclear power plants, including two years as the Chief Engineering Officer of a nuclear submarine power plant.

DETAILED EXPERIENCE RECORD
KRECHTING, JOHN E. 50109

STONE & WEBSTER ENGINEERING CORPORATION, BOSTON, MA (July 1974 to Present)

Appointments:

Supervisor, Systems Engineering Group - July 1980

Senior Power Engineer - March 1979

Power Engineer - December 1977

Engineer, Power Division - July 1974

Diablo Canyon Nuclear Power Plant, Pacific Gas and Electric Company
(Nov 1982 to Present)

As PROJECT ENGINEER (Nov 1982 to Present), directly responsible for the safety-related system design portion of the NRC mandated Independent Design Verification Program (IDVP) for the Diablo Canyon Nuclear Power Plant (DCNPP). The project is unique because it is the first and most comprehensive IDVP required by the NRC. Responsibilities include the technical supervision of the mechanical, electrical and instrumentation and control verification of selected safety-related systems. Responsible for the analysis to develop environmental temperatures and pressures due to high energy line break outside the containment. Also responsible for staffing; establishing and meeting schedules, estimating and controlling costs; and maintaining client and NRC liaison.

As LEAD POWER ENGINEER (June 1982-Nov 1982), directly responsible for the Independent Design Verification of the mechanical and nuclear design of selected safety-related fluid and HVAC systems. Responsibilities included technical and administrative supervision of Power Division Engineers assigned to the project.

Systems Engineering Group, Power Division (July 1980-Nov 1982)

As SUPERVISOR of the Systems Engineering Group, directly responsible for development of Reference Fossil Power Plant (RFPP) fluid systems design, including preparation and maintenance of system descriptions and P&ID's; development of Reference Nuclear Power Plant (RNPP) fluid systems design, including preparation and maintenance of system descriptions and P&ID's; development of the Industrial Reference Power Plant (IRPP) fluid systems design, including preparation and maintenance of system descriptions and P&ID's; development and maintenance of system-related Power Division Technical Procedures and Guidelines; and resolution of nuclear and fossil plant fluid system related generic engineering and design problem reports and development of preferred solutions.

North Anna Power Station - Unit 2, Virginia Electric and Power Company
(Aug 1977-July 1980)

As LEAD POWER ENGINEER (June 1978-July 1980), directly responsible for the supervision and administrative control of all Power Division personnel assigned to the 900 MWe project, including nuclear, mechanical, facilities

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and piping Engineers and Designers; technical responsibility for the power plant's nuclear systems, steam plant systems, and HVAC systems, including equipment and piping arrangements, conformance to design codes, performance calculations, and drawings; preparation and technical adequacy of nuclear, steam plant and HVAC equipment and process specifications; coordination and approval of project work performed by the Power Division staff groups; development of engineering man-hour estimates and schedules to ensure timely completion of work; and coordination of interface between the Power Division and other engineering disciplines, such as Structural, Electrical, Engineering Mechanics, and Control Divisions.

As PRINCIPAL NUCLEAR ENGINEER (Aug 1977-June 1978), directly responsible for the technical design of the plant's nuclear and nuclear auxiliary systems, including piping arrangements, conformance to design codes, and preparation of design calculations. Also responsible for the supervision and coordination of the Engineers in the Nuclear Engineering Group, including scheduling of work and preparation of nuclear equipment specifications and purchase orders.

Sundesert Nuclear Power Plant, San Diego Gas & Electric Company
(Jan 1976-Aug 1977)

As ENGINEER on the 900 MWe project, directly responsible for coordination of the layout of the annulus building to ensure compliance with system design criteria, conformance with NRC high energy line criteria, optimization of space utilization, and development of layout requirements. Developed PSAR write-ups for the NSSS systems, including reactor coolant system, chemical and volume control, residual heat removal, and safety injection. Responsible for liaison with the NSSS vendor to resolve interface requirements.

3,000 MWt Reference II Design Study, General Atomic Company
(July 1975-Jan 1976)

As ENGINEER, coordinated the design of the piping and equipment arrangement inside the containment with the goal of reducing HTGR plant costs. The various disciplines coordinated to accomplish this cost reduction included structural, pipe stress, engineered safeguards, and engineering mechanics. The work included development of containment structures; analysis of high energy line break (both for pipe restraint and containment design pressure determination); application of high temperature pipe stress criteria to piping arrangement; arrangement and location of pipe whip restraints.

Responsible for developing pipe sizes for the major steam (main, hot, and cold reheat) and the feedwater systems within the constraints of minimum costs, pipe stress criteria, allowable pressure drops, and maximum fluid velocities.

1200 MWe Nuclear Power Plant, New England Power Company and Central Maine Power Company, Power Plant (July 1974-July 1975)

As ENGINEER, responsible for the development of design criteria and implementation of those criteria for the layout and arrangement of the plant's annulus building. Responsible for the development of design bases,

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system description, equipment specifications, and PSAR write-ups for several NSSS and reactor auxiliary systems, including chemical and volume control, residual heat removal, boron recovery, liquid waste, gaseous waste, and solid waste. In addition, coordinated the development of the Source Term section of the PSAR and Environmental Report.

PWR SYSTEMS DIVISION AND OFFSHORE POWER SYSTEMS, WESTINGHOUSE ELECTRIC CORPORATION (Aug 1971 - Jun 1974)

As SENIOR SYSTEMS ENGINEER, responsible for design of the reactor plant auxiliary systems (e.g., component cooling water, service water, spent fuel pool cooling and purification, containment leak detection, combustible gas control). Responsibilities included development of design criteria, conformance to design codes, PSAR write-ups, system descriptions, heat balance and fluid flow calculations, and equipment specifications. Supervised the layout and arrangement of assigned systems.

U.S. NAVY - NUCLEAR SUBMARINE FORCE (June 1965-July 1971)

As CHIEF ENGINEER, responsible for the operation and maintenance of the nuclear submarine's propulsion plant. Directed ship's force and coordinated shipyard work during an extensive submarine overhaul. Supervised 4 officers and 35 enlisted men.

Robert L. Cloud Associates, Inc.

ROBERT L. CLOUD

PRINCIPAL

Professional Resume

Education

Texas A & M College	BSME	1956
Texas A & M College	MSME	1957
Univ. of Pittsburgh	Phd ME	1964

Experience

1979 to Present: Robert L. Cloud Associates, Inc., Berkeley, Ca. Design Criteria, Seismic design and analysis, Piping design criteria, Piping analysis, Project management, Failure analysis

1978-1979: Engineering Decision Analysis Co., Palo Alto, Ca., Exec. Vice President. Project management, Design criteria, Failure analysis, Piping and Mech. Equipment design and analysis.

1971-1978: Westinghouse Electric Corp., PWR Systems Division; Manager of Mechanic and Materials Technology. Responsible for design criteria, stress and dynamic analysis and materials engineering for the primary system of Westinghouse Pressurized Water Reactor Systems.

1969-1971: Teledyne Materials Research, Waltham, Mass. Manager Analytical Engineering, Design criteria, Analysis and research on equipment and piping, Failure analysis.

1962-1969: Westinghouse Electric Corp., Bettis Atomic Power Lab. Stress Analysis Engineer to Manager, Mechanics and Materials Engineering, Design criteria, Fracture Mechanics Studies, Analysis and research on pressure vessels and piping.

1957-1962: Westinghouse Electric Corp., Large Rotating Apparatus Division. Stress analysis and development work on large central station turbo-generators.

1956-1957: Texas A & M University Instructor, Mechanical Engineering.

Membership

1. American Society of Mechanical Engineers
 - a) Past Chairman, Design and Analysis Committee, PVP Division
 - b) Past Chairman, Pressure Vessels and Piping Division
 - c) Past Member, ASME Boiler and Pressure Vessel Code, Subgroup on Openings and Attachments
2. Past member, Pressure Vessel Research Committee, WRC

Lectures

1. Eisenment Lectures, Fracture Control, 1970, American Society for Metals, Philadelphia, Pa.
2. Teledyne Materials Research
ASME Boiler and Pressure Vessel Code Seminar
 - a) Brittle Fracture
 - b) Nozzles, Tubesheets, & Special Problems
 - c) Plastic Limit Analysis
3. Principal Division F. Lecture, "Structural Mechanics Applied to Pressurized Water Reactor Systems", 4th International Conference on Structural Mechanics in Reactor Technology, San Francisco, California, 1977.

Publications

"Minimum Weight Design of a Radial Nozzle in a Spherical Shell,: Transactions of the ASME, Journal of Applied Mechanics, Vol. 32, Series E. No. 2, June, 1965.

"The Limit Pressure of Radial Nozzles in Spherical Shells" Nuclear Structural Engineering, Vol. 1, No. 4, April 1965.

"Interpretive Report on Pressure Vessel Heads:, Welding Research Council, Bulletin No. 119, January 1967.

"Approximate Analysis of the Plastic Limit Pressure of Nozzles in Cylindrical Shells" with E.C. Rodabaugh, Transactions of the ASME, Journal of Engineering for Power, Vol. 90, Series A, No. 2, April 1968.

Thermal Buckling and Frictional Effects on Postbuckling Behavior of Sealed Electric Liners" with J.H. Dittmar, Transactions of the ASME, Journal of Engineering for Industry, Vol. 90, Series B, No. 3, August, 1968.

"Assessment of the Plastic Strength of Pressure Vessel Nozzles" with E. C. Rodabaugh, Transactions of the ASME Journal of Engineering for Industry, Vol. 90, Series B, N. 4, November, 1968.

"Evaluation of Experimental and Theoretical Data on Radial Nozzles in Pressure Vessels" with E. C. Rodabaugh, R. J. Atterbury, and F. J. Witt, U.S. Atomic Energy Commission, TID - 24342, 1968.

"Proposed Reinforcement Design Procedure for Radial Nozzles in Cylindrical Shells with Internal Pressure" with E. C. Rodabaugh, Welding Research Council Bulletin No. 133, September 1968.

"Fracture Mechanics Criteria for the Prevention of Brittle Fracture in Nuclear Reactor Vessels," 1967, (Classified) with others, Bettis Atomic Power Lab., Westinghouse Electric Corporation.

"Pressure Vessel Head Design" chapter in "The Stress Analysis of Pressure Vessels and Pressure Vessel Components" Editor, S. S. Gill, Pergamon Press, 1970.

"Fracture Prevention in Nuclear Plants" ASM Conference on Fracture Control, Philadelphia, Pennsylvania, 1970.

Editor, "Pressure Vessels and Piping: Design and Analysis", 2 Vol., American Society of Mechanical Engineers, 1972.

"Dynamic Analysis of Nonlinear Pipe Whip Restraints" with S. Palusamy, and W. L. Patrick, Pressure Vessels and Piping Conference, Miami Beach, Florida, June 1974.

"Nonlinear Seismic Analysis of the Ice Condenser System" with W. S. LaPay, A. J. Soroka, and G. J. Bohm, Structural Design of Nuclear Plant, ASCE 1975 New Orleans, Louisiana.

"Dynamic Analysis of Structures with Solid-Fluid Interaction" with R. R. Pedrido, A. N. Nahavandi, Transactions of the 4th International Conference on Structural Mechanics in Reactor Technology (Smirt-4), San Francisco, California, August, 1977.

"Structural Mechanics Applied to Pressurized Water Reactor Systems", Vol. 46, No. 2, Nuclear Engrn. & Design, April, 1978.

"Dynamic Events in Nuclear Reactors", Survival of Mechanical Systems in Transient Environments, T. L. Geers et al, Editors, ASME AMD-Vol. 36, 1979.

"Creep Instability in Flexible Piping Joints" with R. D. Campbell and D. Bushnell, 1980. To be published.

"Seismic Performance of Piping in Past Earthquakes:", Specialty Conference on Civil Engineering and Nuclear Power, September 1980, Knoxville, Tenn.

"A Summary and Critical Evaluation of Stress Intensity Factor Solutions of Corner Cracks at the Edge of a Hole" with S. S. Palusamy, Welding Research Council Bulletin No. 276, April 1982.

"Interpretive Report on Dynamic Analysis of Pressure Components - Second Edition", Chapter 3, Welding Research Council Bulletin No. 269, August 1981.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of)
)

PACIFIC GAS AND ELECTRIC)
COMPANY)

(Diablo Canyon Nuclear Power)
Plant, Units 1 and 2))
)

Docket Nos. 50-272 O.L.
50-323 O.L.

CERTIFICATE OF SERVICE

I hereby certify that copies of the Independent Design Verification Program's Answers to Governor Deukmejian's Third Set of Interrogatories have been served on the following by deposit in the United States mail, first class, postage pre-paid, this 21st day of September, 1983:*/

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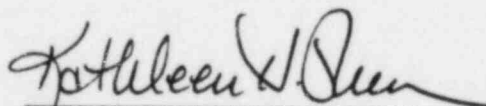
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