October 13, 1989

Docket Nos. 50-275
and 50-323

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Mr. J. D. Shiffer, Vice President
Nuclear Power Generation
c/o Nuclear Power Generation, Licensing
Pacific Gas and Electric Company
77 Beale Street, Room 1451
San Francisco, California 94106

Dear Mr. Shiffer:

SUBJECT: TRANSMITTAL OF DOCUMENTS AND REQUEST FOR ADDITIONAL INFORMATION RELATING TO NRC STAFF REVIEW OF DIABLO CANYON LONG TERM SEISMIC PROGRAM (LTSP) (TAC NOS. 55305 AND 68049)

Enclosed are four items which relate to the NRC staff review of the Diablo Canyon Seismic Reevaluation Program. The enclosed material is as follows:

1. NRC Staff Questions About LTSP Seismic Source Characterization

2. Letter report on the 8-10 August 1989 meeting on Seismic Source Characterization of the Diablo Canyon Long Term Seismic Program, 21 September 1989, by Keiiti Aki, Department of Geological Sciences, University of Southern California, Los Angeles, CA.

3. Letter report on the August 8-10 meeting on Seismic Source Characterization, 25 September 1989, by Robert D. Brown, U.S. Geological Survey, Menlo Park, California.

4. Letter report on the August 8-10, 1989 NRC/PG&E Meeting on Seismic Source Characterization, September 19, 1989, by David B. Slemmons, University of Nevada-Reno, Reno, Nevada.

In order to maintain our review schedule, we request that you provide the additional information identified in Enclosure 1 by November 30, 1989. If you have any questions regarding this request, please contact me.

Sincerely,

original signed by

Harry Rood, Senior Project Manager
Project Directorate V
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures: as stated

cc w/encl: See next page

DRSP/PD5	DRSP/PD5
HRood	GKnighton
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Enclosures: as stated

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ENCLOSURE 1

NRC Staff Questions About Diablo Canyon LTSP Seismic Source Characterization

1. Provide additional support for the choice of logic tree parameters and weights used in the seismic source characterization analyses, including a description of the solicitation process of the PG&E panel from which the weighting of the various source characteristics were derived and applied in the program.

2. The sense of slip PG&E derives for the Hosgri fault is based on evidence of strike-slip observed on the San Simeon fault 50 kilometers north of the Diablo Canyon site. Geologic and geophysical data along the Hosgri fault appear to offer more direct evidence of a thrust or reverse component of slip. This evidence includes:

   a. A thick upper Pliocene and Quaternary marine section west of the fault that is juxtaposed against a basement surface, or a thin cover of upper Quaternary sediment on basement, east of the fault.

   b. Angular unconformities (top Miocene and mid-Pliocene) that are deformed as they approach the fault from the west; southwest dips on the top-Miocene unconformity range up to 40 degrees, those on the mid-Pliocene unconformity up to 20 degrees. These relations indicate that the fault has had a vertical component of slip during the Pliocene and probably well into the Quaternary.

   c. The wedging-out against the western face of the Hosgri (or over its blind western branches) of unconformity-bound packets of Pliocene and younger strata. The wedging, together with the deformation described above, indicates a growth fault that has been active since early Pliocene time. Moreover, it demonstrates that the time values assigned to the two unconformities may become unreliable near the fault and in the block to the northeast of it; in these regions each unconformity represents a much greater depositional, or time, gap than it does to the west, in the offshore Santa Maria basin.

   d. A warped and faulted present-day sea floor and a similarly deformed late Wisconsinan (18Ka) surface follow the same trend, and indicate the same sense of vertical slip, as that defined by the late Pliocene and Quaternary structures along the Hosgri.

   e. The broad Hosgri fault zone now separates a subsiding depositional basin on the southwest from a stable or rising wave-cut platform on the northeast; the present boundary and stratigraphic relations across the fault closely mimic those that prevailed during the earlier history of the Hosgri.

   In light of these factors justify the interpretation of the Hosgri fault as being predominantly strike-slip in character.

NRC Staff Questions About Diablo Canyon LTSP Seismic Source Characterization

3. Provide a detailed discussion of how and why the average displacement estimated for the San Simeon fault was applied to the Hosgri fault as a maximum displacement.

4. The characterization of the Hosgri fault as a predominantly strike-slip fault has been questioned because of the presence of low dip angle reverse faults in the zone. It has been suggested that other faults which are known to be strike-slip may have low dip angle reverse or thrust faults associated with them in a manner similar to that seen along the Hosgri. If there is geophysical evidence for such a situation provide it. The San Gregorio fault in the vicinity of Monterey Bay has been mentioned as a possible candidate.

5. Faults of the southwest boundary zone of the San Luis-Pismo block are the closest faults to the Diablo Canyon site, particularly the San Luis Bay and Olson faults. The most recent analyses of these faults should be submitted. PG&E models the southwest border of the San Luis-Pismo block as a diffuse zone of faulting and considers the small faults expressed at the surface as individual seismic sources. Address the possibility that the entire southwest border zone may be integrated at seismogenic depth and may have the potential for a larger earthquake than the individual faults. What effect would this have?

6. PG&E has interpreted the Los Osos fault on the northeast side of the San Luis-Pismo block; and the Olson, San Luis Bay, and Wilmar Avenue faults on its southwest side as near-vertical, block-boundary faults along which the block has been uplifted. Is this model consistent with the geologic information listed below? Please explain PG&E's interpretation.

   a. Surface geologic data from the Los Osos and San Luis Bay faults, which document low or moderate dips inward, toward the synclinal axis.

   b. Subsurface geologic data from the Honolulu-Tidewater drill hole, which show multiple repetition of Tertiary strata in the lower part of the hole, down to the total depth of about 11,000 feet; dips in the repeated section are low to moderate in sharp contrast to the steeper dips at the surface and in the upper part of the hole.

   c. Surface geologic map relations which require post-Pismo compression, folding and reverse or thrust faulting.

ENCLOSURE 2

DEPARTMENT OF GEOLOGICAL SCIENCES

TELEPHONE: (213) 743-2717

21 September 1989

Dr. Jean Savy
MS L-196
LLNL
P.O. Box 808
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Dear Jean:

This is my belated report on the 8-10 August 1989 meeting on Seismic Source Characterization of the Diablo Canyon Long Term Seismic Program.

With regard to the characterization of events on the Hosgri fault, I confirmed my impression described in my last letter (15 June 1989) reporting on the Geology/Seismology/Geophysics/Tectonics meeting. My assessment of the Hosgri fault is the following. It is not a San Andreas fault, and will never generate fault slip of 6 to 10 meters. On the other hand, it will probably generate a greater earthquake than the Newport-Inglewood fault which slipped by about 30 cm during the 1933 Long Beach earthquake, because the PG and E estimated a single-event slip of 1 to 2 meters for the nearby San Simeon fault. It is very reasonable, therefore, to compare the Hosgri fault with the San Jacinto fault which is intermediate in seismic source character between the San Andreas and the Newport-Inglewood fault as done by Kevin Coppersmith.

I was concerned, however, about the evaluation of seismic hazard for the Los Osos, San Luis Bay and Olson fault. I was most concerned about the fact that there have been absolutely no discussion of these nearby thrust faults in the Ground Motion meetings of LTSP. I understand that the reason is because their contribution to the final "hazard curve" is lower than that of the Hosgri fault due to lower rates of their recurrences. But, the comparison in the final hazard curve depends on the level of ground motion due to events expected on these faults. In view of the uncertainty in the characterization of these nearby thrust faults, I felt that more careful studies on the ground motion expected from these faults are necessary. Perhaps, numerical simulations of thrust fault models with validation against the abundantly observed ground motion during the Whittier Narrows earthquake of 1987 would be useful for this purpose. I hope that we shall have some discussion on this issue during the next Ground Motion meeting scheduled on 25-26 October 1989.

Finally, I was very much interested in the "discrete discriminant analysis" of segmentation data presented by PG and E as a new approach toward more objective characterization of seismic source.

Sincerely yours,

Keiiti Aki

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