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October 14, 1977

James W. Moorman
Acting Assistant Attorney General
Land and Natural Resources Division
Justice Department
Constitution Avenue between 9th
and 10th Streets, N.W.
Washington, D.C. 20530

CONFIDENTIAL

Re: Possible Prosecution of Pacific Gas and Electric Company for Failure to Disclose a Geological Fault (18 U.S.C. §1001)

Dear Jim:

I have before me the excellent memorandum prepared and addressed to you by Bradford F. Whitman, Assistant Chief, Pollution Control Section, regarding a possible prosecution of Virginia Electric Power Company for failure to disclose a geological fault in connection with the North Anna Nuclear Power Plant in Virginia. I am writing to you to call to your attention the possibility that Pacific Gas and Electric Company failed over a period of years to disclose to the NRC staff the existence of the Hosgri Fault near the Diablo Canyon Nuclear Power Plant in San Luis Obispo, California. I believe the evidence suggests that Pacific Gas and Electric Company knew of the existence of the fault for perhaps two years before they disclosed its existence.

It is highly probable that if the information regarding the Hosgri Fault had been disclosed to the NRC shortly after the fault was discovered, the construction licenses may never have issued or may have been rescinded before substantial construction began. I suggest you and your staff conduct an investigation similar to the investigation which you conducted with regard to the North Anna Plant in Virginia.

I have enclosed for your information testimony which I gave before Congressman Mo Udall's Subcommittee on Energy and the Environment, regarding this subject on June 30, 1977.

I direct your attention, in particular, to the chronology which reflects that the discovery of the fault by two Shell Oil Company geologists may have come to the attention of Pacific Gas and Electric Company two years before Pacific Gas and Electric Company disclosed the existence of the fault. During this time, Pacific Gas and Electric Company may have made false filings with the Nuclear Regulatory Commission and may have failed to disclose the material fact of the existence of the fault. I believe a full investigation of this matter is appropriate and I hope that you will undertake such an investigation.

I call your attention also to the attachments to my testimony before Congressman Morris Udall's Subcommittee on Energy and the Environment. These attachments are internal memoranda prepared and circulated among members of the NRC staff. These memoranda are evidence of the NRC staff's irresponsible handling of information regarding the existence of the Hosgri Fault once it was called to their attention. The memoranda also reflect that the NRC staff considered this information material, indeed central, to the issue of licensing Diablo Canyon. The memoranda make clear that the NRC staff was considering highly political considerations rather than public health and safety matters. This is highlighted on page 3 of attachment 7 where the staff sets out that in developing a program to resolve the Diablo Canyon problem, consideration should be given to the impact of the decision on the nation's energy problem, the impact of the decision on the moratorium for the California voters, and the impact of the decision on other plants.

While the fault under the North Anna plant was small and inactive, the Hosgri Fault is capable of a much stronger earthquake (estimated by USGS to be 7.5 on the Richter scale) than the Diablo plant was designed and constructed to withstand. Consequently, its existence has raised a host of serious and unresolved health and safety issues in the operating license proceedings. Realizing that the Hosgri Fault and the safety issues it raises means serious trouble for them in the operating license proceedings, Pacific Gas and Electric Company has applied for an entirely unprecedented full power "interim operating license".

The application is really an attempt to avoid the clear impact of the law and the regulations on the operating license proceedings for the Diablo Canyon plant. Consequently, the investigation, if it is to be timely, must begin at once by your office.

Pacific Gas and Electric Company's possible failure to disclose the material fact of the existence of the fault has led to the situation where a 1.3 billion dollar nuclear power plant sits less than three miles away from a fault capable of an earthquake much stronger than the earthquake for which the plant was designed. This situation borders on the tragic, not only for energy users within the Pacific Gas and Electric Company service area, but more particularly for members of the public who live in the communities near the plant whose health and safety and peace of mind are at stake.

In short, I feel that this situation clearly demonstrates not only "a pervasive bias against the public scrutiny which a project of this importance deserves and is entitled to under federal law" on behalf of the NRC, but also possibly criminal culpability on the part of Pacific Gas and Electric Company.

I would appreciate hearing from you regarding this matter at your earliest convenience.

Very truly yours,

Brent

Brent N. Rushforth

BNR/cft
enclosure
cc: Bradford F. Whitman
Assistant Chief
Pollution Control Section

Testimony Before the Subcommittee on Energy
and the Environment
Regarding Diablo Canyon Nuclear Power Plant
June 30, 1977

Introduction

My name is Brent Rushforth. I am an attorney and one of the founders of the Center for Law in the Public Interest in Los Angeles. We represent several citizens groups and private citizens who have intervened in the NRC licensing proceedings for PG&E's Diablo Canyon nuclear power plant near San Luis Obispo, California.

As you are aware, the Diablo Canyon plant sits just three miles from a major active earthquake fault located offshore, the Hosgri fault. The fault is capable of an earthquake significantly larger than that which the plant has been designed to withstand. We believe it is entirely appropriate, in light of catastrophes like the Teton Dam disaster, for Congress to ask the question how this unfortunate circumstance could come to pass if the NRC staff were doing its job. We believe the circumstances here demonstrate that the regulatory staff has failed and continues to fail to protect the public health and safety with regard to the Diablo Canyon plant. This can perhaps be best understood in the context of the history of regulatory process regarding the Diablo Canyon plant. To assist members of the Subcommittee in understanding the chronology, I have attached a chart to this testimony setting out the significant dates in the Diablo Canyon plant's history.

I. The NRC Staff's Initial Site Investigation Was Seriously Deficient

During the initial site investigation stage the NRC staff failed to follow leads suggesting the need for additional offshore investigation of possible faults. Such suggestions came from Dr. Henry Coulter of the USGS as mentioned in an NRC memorandum dated March, 1967 (Attachment 1) and from Dr. Robert Curry as set out in his letter to the California Public Utilities Commission dated December, 1968. (Attachment 2). PG&E's own consultants admit that geological and seismological data available in 1967 suggested the existence of the Hosgri fault. (Testimony at a meeting of the Advisory Committee on Reactor Safeguards, February 18-19, 1975; Attachment 3).

Nor can the regulatory staff argue that the scientific techniques for further offshore investigation were unavailable during the initial site pre-construction license phase. During the late 1960's two geologists employed by the Shell Oil Company using exploratory techniques offshore from the plant site confirmed the existence of the Hosgri fault. While not wishing to cry over spilled milk, we simply point out that a thorough pre-construction license investigation by the regulatory staff may well have located the fault and the present problems may have been avoided.

II. The NRC Staff Failed To Inform Itself of Important Developments Subsequent To The Issuance of The Construction Licenses (April, 1968 for Unit 1 and December, 1970 for Unit 2).

The existence of the Hosgri fault was reported in the scientific literature in January, 1971 by two Shell Oil

Company geologists. But the regulatory staff apparently did not become aware of the paper until August, 1973 when it was mentioned in one of PG&E's submissions. (Response of NRC to Congressman Udall's questions at p. 8.) This lapse of 2-3/4 years indicates the level of attention the staff was giving this critical matter subsequent to the issuance of the construction licenses.

In November, 1974 intervenors requested the Atomic Safety Licensing Board to issue a "work stoppage" order to permit reconsideration of the adequacy of the seismic design of the Diablo Canyon facility citing the USGS report of August, 1974 which confirmed the existence of the active, 90 mile-long Hosgri fault. The staff claims to have assessed the earthquake potential of the Hosgri fault and concluded that the plant design was adequate. However, the USGS was obtaining preliminary conclusions that the earthquake potential of the Hosgri fault was substantially larger than the NRC assessment. The NRC staff failed to inform the ASLB of this fact at any time and instead opposed intervenors' request for a "work stoppage" order. (NRC Memoranda of 2/11/75 and 2/20/75, Attachments 4 and 5.)

III. The NRC Staff's Present Approach To Licensing The Diablo Plant is Seriously Deficient.

The NRC's sole purpose for existence is to regulate nuclear power in a way which ensures and protects the public health and safety. The United States Supreme Court has stated "that the public safety is the first, last, and a permanent

consideration in any decision on the issuance of a construction permit or a license to operate a nuclear facility." (Power Reactor Co. v. Electricians, 367 U.S. 396 (1961)). However, in regard to the Diablo Canyon plant, the NRC staff has become an advocate for the "as-built" design and its critically important role as protector of the public health and safety has been seriously diluted. This is substantiated by internal NRC memoranda which outline a program for licensing Diablo Canyon. These memoranda show that the NRC staff recognized "horrendous" problems created by the existence of the Hosgri fault, that the staff considered factors having nothing whatever to do with plant safety in deciding to press the case for issuing an operating license and outlined a course of action for licensing the plant as built which it has followed and continues to follow to the present day. This would be perfectly acceptable procedure for an agency whose responsibility is to promote and advocate the development of nuclear power in general and the Diablo Canyon plant in particular. But this is not the proper role of the NRC staff whose duty is to protect the public health and safety.

Once the evidence of the existence of the Hosgri fault became irrefutable, the staff recognized its serious consequences for the Diablo Canyon plant. The staff perceived that requiring the plant to withstand an earthquake (a so-called safe shutdown earthquake or SSE) that would generate a ground acceleration of more than 0.5g would necessitate extensive

and time-consuming re-analysis and "horrendo ' backfitting decisions. (NRC Memorandum 2/11/75, Attachment 4). The staff then spent almost an entire year in an effort to amend or discredit the USGS conclusion that the SSE for Diablo Canyon was greater than 0.5g. (NRC Memoranda 2/20/75; 1/5/76; and 1/12/76; Attachments 5, 6 and 7).

Failing to discredit or amend the USGS conclusions, the NRC staff implemented a strategy designed to provide a basis for licensing the plant "as built". (NRC Memorandum 1/12/76, Attachment 7). This strategy included 1) proposing that the USGS review its findings, 2) assembling a team of experts whose function would be to reduce the g value of a potential earthquake on the Hosgri fault, and 3) turning out a probabalistic study. This is the licensing strategy that the NRC staff has followed to the present day.

In settling on the above strategy, the staff considered and was presumably swayed by factors having nothing to do with the public health and safety of the citizenry who will be affected by operation of the Diablo Canyon plant. These non-safety factors included the following:

1. The impact of our decisions on the nation's energy problems and programs. The impact of potential denial for operation of a plant approved for construction cannot be underestimated, especially where the basis for denial is in controversy.

2. The impact of our decisions on the moratorium before the California voters.

3. The impact of our decisions on the viability of continued operation of plants at other sites with altered seismological bases, such as San Onofre, Pilgrim, etc.

4. The impact of our decisions on the liability of continued operation of plants where it is uncertain that the capability exists to withstand altered design bases in areas other than seismic design, such as containment structural design, pipe whip inside containment, spurious valve failures, etc.

(NRC Memorandum 1/12/76, Attachment 7).

The staff's concern for the politics of their decisions on Diablo Canyon distorted their entire analysis of the seismic hazard to the plant. In June, 1976, the staff and PG&E submitted such an analysis to the Advisory Committee on Reactor Safeguards (ACRS). A consultant to the ACRS wrote that the staff's presentation "makes a mockery of the seismic analyses and sets a dangerous precedent." (Luco, Enrique, Comments on the Proposed Seismic Design Reevaluation of the Diablo Canyon Nuclear Power Plant, A Report to the Advisory Committee on Reactor Safeguards. (November, 1976)).

Continuing in its strict adherence to its program for licensing Diablo Canyon, the staff now proposes to license the plant by obtaining an exemption from the applicable safety regulations. This proposal would permit PG&E to run the plant for two years and determine during that time which parts need modification in order to be able to withstand the safe shutdown earthquake. The regulations, however, require a showing that the plant can withstand the SSE prior to the operation of the plant -- a requirement that coincides with common sense. PG&E and the staff propose to justify the exemption of Diablo Canyon from the safety regulations on the basis that there is an

extraordinary need for the electricity. We believe that there is no sound legal basis for an exemption in this case and that such an exemption, if granted, would establish a very dangerous precedent especially in light of the likelihood of increased instances of such alleged extraordinary need.

Finally, we believe that the idea that modifications necessary to protect the public health and safety can be made after the plant has operated for two years is seriously misleading. Full re-analysis may indicate the need to modify components which will be contaminated with radiation. Further, modification would remove the plant from service for an extended period. The pressure to reduce downtime and to compromise necessary modifications would be enormous. These substantial economic and technical problems render later modifications difficult and highly impractical.

Thank you.

ATTACHMENT 1

DIABLO CANYON POWER PLANT
MEETING WITH AEC STAFF ON ASEISMIC DESIGN
MARCH 21, 1967

Company representatives and their consultants met with representatives of the AEC staff in Bethesda, Maryland on March 21, 1967 for a preliminary discussion of the criteria for aseismic design applicable to Diablo Canyon Nuclear Power Plant. A list of those present at the meeting is attached.

Mr. Kelly opened the meeting by commenting that, because of our need for a construction permit by October or November 1967 and because of the general concern about earthquakes in California, we thought an early, informal discussion of some of the earthquake design questions would be desirable. Mr. Tedesco of the staff responded affirmatively and went on to ask if we were going to discuss tsunami. He said he had just read the tsunami report of Marine Advisers and was not certain he understood its recommendations.

Dr. Stewart Smith then proceeded to summarize his and Dr. Benioff's report on the seismicity of the site and the earthquakes to be expected. Points to which he gave particular emphasis were:

1. In the Western United States one associates major earthquakes with known earthquake faults.

2. There are no faults in the site area (in the sense in which the word "fault" is used in the Smith-Benioff report).

3. He completely rules out the possibility of relative ground displacement and notes that the geologists and seismologists agree, approaching the problem from different points of view.

4. Aftershocks can occur in zones having a width of from 25 to 50 percent of the length of the main earthquake fault. This estimate is subject to possible errors in measurement. With the present state of knowledge we cannot always associate aftershocks with faults. Such evidence as we have on the 1906 San Francisco earthquake shows the aftershock zone to be quite narrow. However, he believes that we should use worldwide data and err on the conservative side.

5. The maximum-size aftershock which could occur at the site was estimated through the following reasoning:

   There have been no earthquakes in the United States in this century of magnitude greater than 6-1/2 which did not produce surface faulting. (There are 6 or 8 documented examples. A possible exception would be the 1952 Kern County earthquake.) There are no earthquakes of magnitude greater than 6-3/4 not associated with known faults. There are no faults at the site. Therefore, Dr. Smith concludes that there can be no earthquake at the site of magnitude greater than 6-3/4.

6. The area in which the plant site is located is one of relatively low seismicity and has a very small earthquake-damage history.

13. Dr. Hall asked for comments as to the use of modal vs time-history analyses for earthquakes. Dr. Blume said either could be used but that he preferred to test the design with a time-history analysis using the earthquakes postulated in his report prorated to the maximum ground acceleration. Dr. Hall asked how many masses would be used for the mathematical model of the containment structure. Dr. Blume said that they had made analyses for boiling water reactors utilizing 30 to 40 masses. The analysis should include major equipment items supported on the structure. Dr. Hall indicated general agreement with Dr. Blume's approach and expressed considerable interest in the application of these principles to the equipment and piping design.

14. Dr. Hall asked for assurance that the saltwater system for core cooling will be designed as a Class I structure and was told that it will be.

Mr. Coulter of the U. S. Geologic Survey then gave his comments. He says he sees absolutely no problem of fault rupture and briefly described the relationships of the marine-terrace deposits to the wave-cut bedrock which support this conclusion. He believes all major structures of the plant are satisfactorily located, geologically speaking. He believes more work should be done with respect to possible focusing effects of the shore line on tsunami. He thinks more soundings should be taken offshore. He then mentioned the slide area on which the switchyard is located, saying that he believes that we have a "wingding" of a problem to stabilize this slide. We said that our geologist had not indicated a serious problem, particularly since the switchyard fill will tend to stabilize the slide material. (However, later in the meeting Mr. Tedesco expressed concern over interruption of the power lines because of slide problems in the switchyard. It appears some additional work may be needed to assure the staff on this point.)

Mr. Murphy of the Coast and Geodetic Survey then gave his comments on the seismological aspects. He said that he is "happy" with the knowlege our reports have expressed of the locations of earthquake faults and the activity on them. The approach of the Company's consultants is very similar to that used by the USC&GS. He agrees that the earthquake sizes postulated are on the high side. The magnitudes are very acceptable. He has no problem with the maximum ground accelerations estimated except for the figure of 0.12 g for Earthquake "B". He would feel better with an estimate of 0.15 g. He realizes that it is difficult to argue about a difference of only 0.03. He believes that the estimated maximum accelerations for the other earthquakes are on the adequate or generous side.

Mr. Murphy commented on the comparison of accelerations with earlier reactors. He said that estimates made for San Onofre and Malibu started from less knowledge of the earthquake situation than is evidenced in our reports and in meetings such as this one. Estimates for earlier reactors had to be on the more conservative side because of lack of data.

ATTACHMENT 4

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 11, 1975

Docket Nos. 50-275
and 50-323

A. Giambusso, Director, Division of Reactor Licensing

DIABLO CANYON REVIEW

The following table provides key dates associated with the Diablo Canyon case:

	Unit 1	Unit 2
CP Application	1/16/67	6/28/68
CP Issued	4/23/68	12/9/70
OL Application	7/10/73	7/10/73

We and our consultants (U. S. Geological Survey and U. S. Coast and Geodetic Survey) concurred with the applicants' selected geological and seismological bases for design. This included an SSE of 0.4g. We and our consultant (N. M. Newmark) concurred with the applicants' selected criteria for seismic design, including the design spectra and damping values and the methods to be used for the design.

At the current time Unit 1 construction is over 90% complete and the fuel load date is estimated to be about November of this year. The fuel load date for Unit 2 is estimated to be about nine months later.

Our OL review is nearing completion. The SER with a few notable omissions was issued on October 16, 1974. The principal omission was our assessment of the geology and seismology for the site. New information had become available during the course of our OL review and our evaluation and that of the U. S. Geological Survey was not complete at the time the SER was issued. An SER Supplement was prepared for issuance on January 31, 1975. The staff had tentatively concluded that, considering the new information available, an SSE value of 0.5g would be appropriate for the site. The staff had also

determined that the as-built facility would be able to withstand such an acceleration but with little or no margin for many elements of the design. The staff expected that its consultant's (U. S. Geological Survey) report would not conflict with its tentative conclusion on the 0.5g value. The Survey's report was received on January 28, 1975, and staff representatives met with representatives of the Survey on January 31, 1975, to discuss the Survey's position. The significant aspect of that position is that the Survey, on the basis of now available information, believes that an acceleration in excess of 0.5g is more appropriate for the Diablo Canyon site.

We have met internally on this problem several times in the recent past up to the Assistant Director level. On the basis of these discussions, my opinion of the situation and steps that need to be considered is as follows:

1. The applicant is aware of the current status and is attempting to acquire additional information to alter the Survey's opinion. It expects to submit additional information about March 1, 1975. The assessment of that information by the Survey and the staff will result in an SER Supplement about May 1, 1975. The ACRS has scheduled a two-day Subcommittee meeting at the site for February 18 and 19. However, the Committee will probably not consider the Diablo Canyon application until its June meeting. Because of the nature of the problem and the "hard" decision that must be made, I would anticipate a second meeting might be necessary two months after the first meeting unless the staff can propose a strong policy-type decision at the first meeting. In any event, the application is strongly contested and I would anticipate that the PDD will be later than the date at which Unit 1 will be ready to load fuel.

2. The current "best guess" of our geology-seismology staff is that the final Survey position may well relax from its present state (the present position would result in an SSE value of about 0.7g) but will not likely result in an SSE value less than about 0.5g. The current "best guess" of our structural-mechanical staff is that the current design will not be able to be demonstrated to be acceptable for a seismic loading in excess of 0.5g. An extensive reanalysis could be undertaken by the applicant but will probably show that some parts of the plant are capable of

withstanding various loadings in excess of 0.4g, 0.5g, 0.6g, and 0.7g, but that other vital parts will not have such capability. Some increase in capability is possible from design changes that might be undertaken but changes sufficient to bring the design up to a 0.6-0.7g capability are impractical. The design reanalysis could take up to a year or two to complete.

3. The staff is faced with a horrendous backfit decision. The decision will likely be based on both technical and policy considerations. While the technical considerations may be altered by additional information that may develop during the next month or so, the degree of alteration is not expected to be significant. Therefore, the basic problems that will exist and the basic decisions that will need to be made are known at this time. Those who will be involved in the policy decisions (the Commission cannot be involved according to T. Englehardt) should become knowledgeable with the situation as soon as practicable. Since the policy decisions will be influenced by the technical facts and practicalities involved, early involvement in the on-going technical review may be prudent. The earliest and most direct means of understanding the technical issues is probably through attendance at the February 18-19, 1975 Subcommittee meeting at the site. The Subcommittee will consist of Dr. Okrent and Dr. Bush (and perhaps L. Fox). In addition, up to eight ACRS consultants will participate. A copy of our meeting notice and the agenda for the meeting is attached. The proposed attendance by Dr. Coulter of the Geological Survey is indicative of the seriousness of the Survey's concern in the matter.

4. Consideration might also well be given to:

   a. Strengthening the legal contingent assigned to the case. In addition, a review might be made of the assigned ASLB to assure the level of credentials and experience is consistent with the task that is to be faced.

   b. Strengthening the engineering staff by providing for special consulting advice from groups and individuals such as Newmark Associates, Franklin Institute, Dr. J. Hendrie, etc.

c. Establishment of a special policy advisory group to aid in the decision-making process. This might include individuals such as Dr. Kouts, D. Knuth, R. Minogue, etc.

I believe the above outlines the present situation as we in LWR-1 view it. I strongly recommend your immediate attention to this problem.

R. C. DeYoung, Assistant Director
for Light Water Reactors Group 1
Division of Reactor Licensing

Enclosure:
Meeting Notice

cc: R. S. Boyd
O. D. Parr
D. Allison
T. Hirons

ATTACHMENT 5 .

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 20, 1975

Note To: A. Giamburso

DIABLO CANYON - SEISMIC ISSUES

An ACRS Subcommittee meeting to review the Diablo Canyon OL application was conducted in San Luis Obispo on February 18 and 19, 1975. The Subcommittee consisted of Dr. Okrent (Chairman) and Dr. Bush. In addition, seven ACRS consultants were in attendance the first day of the meeting which was devoted almost in its entirety to the seismic issue. The specific matters discussed included geology, seismology, seismic design, seismic testing, and seismic scram. On the basis of my attendance at the meeting and side discussions with other staff members, USGS representatives, and applicant and Westinghouse participants, I came away with the following impressions:

1. The two main concerns which will determine the SSE "g" value are (a) the geological definition (extent) of the Hosgri fault zone, and (b) the seismic event that must be assumed to occur on the offshore fault. I believe that the USGS geologists (lead reviewer - F. McKeown) will maintain their currently indicated position. The "new" information described by the applicant and to be formally documented in the near future is not likely to convince the USGS to alter its current finding. I believe that the "new" information will convince the USGS that the 1927 Magnitude 7.3 earthquake occurred on a transverse fault and, therefore, need not be considered as capable of occurring on the Hosgri fault. I believe that the USGS seismologists (J. Devine - lead reviewer) would conclude that the appropriate "g" value for the site would be 0.5g if they could assume that the fault length were limited as the applicant contends and the 1927 event occurred on a transverse fault. However, if the fault length is determined on the basis of the current USGS geological interpretation, then the seismic event that must be assumed by the USGS seismologists, in order to be consistent with the methodology used for the San Onofre 2/3 evaluation, will result in a site "g" value similar to that determined for the San Onofre site (0.67g). It is my opinion

that, unless specific guidance appropriate to this unique situation is provided to the USGS geologists and seismologists, they will proceed with their review basing it upon their standard methods and arrive at a site SSE "g" value well in excess of the 0.4g value approved for the CP and used for the design of the almost completed plant.

2. The as-built plant has significant margins in its design and it is capable of resisting seismic loads well in excess of those associated with the 0.4g seismic event assumed for design. The staff is presently convinced that the design is "good" for a 0.5g event. However, to convince the ACRS and others of this will require 3-6 months of applicant and staff effort. If an event in the order of 0.6g need be considered, it will be possible to show that many parts of the plant can safely resist such loads; however, many parts will need to be modified and very likely for some of these the modifications will not be practical. The evaluations to accomplish such a task, with the rigor that will be required, will entail years of applicant and staff effort.

3. The "tone" of the questions and comments from the ACRS Subcommittee members and the consultants indicated to me that they would find a 0.5g value acceptable and could be convinced that the as-built plant could adequately resist the increased loads associated with the event. However, they are not likely to be convinced unless a rather complete analysis is performed for a 0.5g event and the use of our currently approved seismic design criteria. To date no such analysis is available; the present positions of the applicant and the staff as to the ability of the plant to adequately resist a 0.5g event are based on qualitative assessments supported by a few typical calculations.

In summary, as a result of developments during the past week, I continue to believe that, unless specific guidance, support and direction is provided promptly by the upper management levels at NRC and USGS to the "working" levels in the two organizations, positions that do not necessarily reflect the judgment of upper-level management will be formulated and documented to the extent that later modification will

be difficult. Harold Denton and his people intended to have further discussions with their USGS counterparts during the evening of February 18 and perhaps on February 19. I suggest that upon his return, RL and TR meet at the appropriate level to discuss this critical situation and agree on a course of action to be followed.

R. C. DeYoung

cc: R. Boyd
O. Parr
T. Hirons
D. Allison

ATTACHMENT 6

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D C. 20555

JAN 1976

1/5/76

Docket Nos. 50-275 and 50-323

Roger Boyd, Acting Director, Division of Reactor Licensing

DIABLO CANYON

We strongly recommend that immediate meetings be held with upper management to initiate actions to promptly develop a firm basis for making a decision on Diablo Canyon. Our preliminary thoughts are provided in the enclosure.

R. C. DeYoung, Assistant Director
for Light Water Reactors Group 1
Division of Reactor Licensing

Enclosure:
Diablo Canyon Geology-
Seismology

cc w/enclosure:
R. Heineman
F. Schroeder
H. Denton
R. Hofmann
C. Stepp
O. Parr
D. Allison

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DIABLO CANYON GEOLOGY-SEISMOLOGY

I. GEOLOGY-SEISMOLOGY SITUATION

Based on USGS draft report, Renner Hofmann's assessments to date, as discussed with Dennis Allison, and the meeting of December 30, 1975, between the staff and USGS, we understand the geology-seismology situation is as follows:

1. USGS believes that the 1927 event might have occurred on the Hosgri Fault so we should place a magnitude 7.0 to 7.5 earthquake on that fault. The published magnitudes for the 1927 event are in that range. This would lead to a calculated peak acceleration much higher than 0.5g using standard methods.

   The USGS position is suspect. Renner Hofmann of the staff has reviewed the felt effects of the 1927 event and they seem to be very good data. In all respects they demonstrate that the 1927 event was either much farther out to sea or was much smaller. Either way, the plant, which is adequately designed for 0.5g using standard techniques, could take the effects of this earthquake when it is moved in an appropriate manner.

   We do not have a direct verification of the magnitude determination at this time. Renner Hofmann has reviewed the location data, which indicate that the 1927 event was or could be on the Hosgri Fault, and considers them to be of very poor quality, capable only of determining the location to be somewhere off the coast of Central California.

   The USGS expressed a willingness to take another look at this aspect of the geological situation taking into account Renner Hofmann's and Carl Stepp's comments made at the meeting on December 30, 1975.

2. The USGS believes that the Hosgri Fault is more than 90 miles long and may even be coupled with the San Simeon Fault at the northern end of the Hosgri Fault. This is a somewhat incongruous statement because it appears that one must add the San Simeon fault length to the Hosgri Fault on the north, as well as a few miles on the south, in order to get a 90-mile length. Nevertheless, what we believe they are saying is that other interpretations

than the applicant's can be placed on the geological evidence of fault length. Furthermore, with these other interpretations, the fault length is unknown, except that it is greater than 90 miles.

It is not at all clear where we are going here. This is a question we must deal with even if USGS is convinced of our position with respect to item 1 above. Unfortunately, we do not have a specific earthquake recommendation from USGS based on fault length to deal with.

Renner Hofmann is looking at the seismic profiles but the USGS opinion (that another interpretation is possible) will probably hold water. Perhaps the fault length could be limited to 90 miles or a little more with additional field work. A fault length of up to 120 miles would give a 0.5g peak acceleration, assuming mostly strike slip motion and a rupture length of one half the fault length. We feel that these are reasonable assumptions for this site, but the USGS may well disagree.

3. USGS believes that the standard methods of calculating a peak acceleration and scaling a spectrum to it are not appropriate this close to large earthquakes. While they do not know what would be appropriate, they clearly invite us to find a better way.

   Renner Hofmann is working on two approaches which can shed some light on the subject and may indicate that the plant could take a large earthquake on the Hosgri Fault. One approach is to place the magnitude 8.3 San Francisco earthquake on the Hosgri Fault and use the felt effects to estimate the peak accelerations. The second involves calculations of peak acceleration based on the fact that only the energy released in about four miles of fault length will contribute to the peak acceleration at a distance of four miles from the fault. This type of reasoning could possibly provide a rationale for reconciling the differences of opinion with which we are dealing.

4. The quality of the USGS recommendation, <u>as far as we can tell at this time</u>, is poor.

   a. Their specific recommendation to place a magnitude 7.0 to 7.5 earthquake on the Hosgri Fault is based on an idea which we consider not valid. However, USGS has agreed to consider this matter further in light of our comments to them.

b. Their recommendation does not deal with a magnitude based on fault length, which must be dealt with. Indeed, they do not say that item a above is a worst case or design case, but neither do they say that there might be a worse case. We need something better than this to work with.

c. It seems that we are dealing with the opinion of one to four people and we are not sure which ones. For example, one of these persons (Holly Wagner) is highly respected but we do not even know what he thinks, much less what a consensus of top geologists would be. As another example, Hanks, a Cal Tech professor and part-time USGS employee, published an article stating that the 1927 earthquake was not on the Hosgri Fault, but we have no indication of whether or not this was given any weight. This is not an adequate base for a decision as important as this and is, in our opinion, the best USGS can give us.

d. Holly Wagner is the highly respected geologist making the geological interpretations, yet we have been unable to discuss the matter with him. All we have gotten is second-hand word that good people have reviewed it and this is what they said, without meaningful discussion of the technical reasons.

II. RECOMMENDATION AT THIS TIME

Clearly we can benefit from further discussions with USGS at a lower level before they send their formal recommendation. However, in light of the serious nature of the decision we must make, the unknown quality of the USGS recommendation and the extra difficulty involved in reversing a USGS opinion after it is published, we recommend contacting top management at the Department of Interior and expressing our need for an immediate accelerated reevaluation of the geologic situation, including:

1. The independent opinions of several top USGS geologists not heretofore directly involved in the Diablo Canyon review.

2. A clear expression of the technical reasoning which can be discussed meaningfully with the staff.

In addition, we should immediately retain additional top geologists directly as consultants and initiate further independent review on our own. Depending on which how quickly we take action, the results may or may not be completed in time to support the schedule for licensing.

III. POSSIBLE FUTURE OPTIONS

If we receive the USGS recommendation as it stands now, we will have three basic options, assuming that we will publish the SER Supplement and take a position instead of asking further questions and slipping the schedule. The three basic options are:

1. Oppose the operating license. Leave the door open for further study, etc. Describe why.

   We have a poor basis for this action at this time, other than general conservatism and "PG&E hasn't done enough to make everyone happy." Such arbitrary conservatism would not be an adequate basis in this case because of the large financial loss involved and the severe impact such action would have on the nuclear industry.

2. Favor the operating license. Require further study, etc. Describe why.

   a. If this is done on the basis of rejecting the USGS recommendation because it is poor, there would be difficulty justifying the action.

   b. Alternately, we could possibly accept the USGS advice and justify the action on the basis of probabilities of earthquakes and structural and mechanical damage (treating it as an exception to Appendix A to Part 100). This would probably be coupled with requirements for plastic structural analysis, backfit, further geological study, etc., within specified time periods. There would be some difficulty in justifying this approach also.

   c.

3. Neither oppose nor favor the operating license. Describe the situation.

   Although the ACRS, Hearing Board, Commission, and courts will probably all have to decide this case anyway, it is not satisfactory for us to go to them without a recommendation.

As a third possibility, we might be able to accept the USGS advice and justify the action on the basis of better methods to assess damage close to large earthquakes. This approach [illegible] is working on [illegible] the only [illegible] in this area which would [illegible] the [illegible]

ATTACHMENT 7

A PROPOSED PROGRAM FOR DIABLO CANYON DISCUSSED AT AN INTERNAL STAFF MEETING 1/12/76

FOIA-86-699
B/7

1/12/76

PROGRAM TO ESTABLISH BASIS TO LICENSE DIABLO CANYON

BACKGROUND AND PROPOSED PROGRAM

Construction permits were issued for Diablo Canyon 1 & 2 in April 1968 and December 1970, respectively. Unit 1 is nearly completed; Unit 2 is a year or so behind. The SSE for the site was set by Dr. Newmark, the USGS, and the U. S. Coast & Geodetic Survey. The value selected was 0.4g and the plant has been constructed to that value. The OL applications for both units were docketed in October 1973. Our review was essentially completed by January 1975; at that time we recognized that on the basis of new evidence the SSE would be increased. The staff believed that the USGS would concur with a site "g" value of 0.5g and we had done sufficient work to convince us that the plant could safely withstand such an earthquake. On January 28, 1975, we were surprised by a USGS report that concluded that an acceleration of 0.5g was in its opinion inadequate for the site on the basis of present information.

At that time DRL recommended that two approaches be taken to resolve the issue. First, continue to acquire additional information to convince the USGS of the adequacy of a 0.5g SSE. Secondly, assume the USGS, at the reviewer level, would remain adamant and seek other means to confirm or modify its finding. The decision was made to pursue only the first approach. Today, we are essentially where we were last January except that the plant is almost ready for fuel loading. Once again we are faced with developing a program to establish a basis to permit a decision to be made on the licensing of Diablo Canyon. We believe it would be imprudent to once again pursue a single path based on acquiring additional information to convince the USGS review team (a relatively few individuals) to modify its current position. We again recommend a multi-faceted approach. The program we would propose to pursue is as follows:

1. Formally request that an independent review be conducted within USGS to confirm or modify the current USGS review team finding. This request might be made by Chairman Anders to the Secretary of the Interior and could, if legal considerations demand, be based on generic West Coast concerns rather than the Diablo Canyon issue alone.

2. Concurrently, form a team of consultants consisting of men of national stature in the fields of geology, seismology, and seismic design to evaluate the situation. This team might pursue various paths, including:

a. Assume a "great" earthquake could occur as the USGS review implies and demonstrate by logic, evidence, and judgment that the energy transfer to the site would be limited to within the design capabilities of the nuclear plant.

b. An independent evaluation of the evidence to arrive at a conclusion on the SSE that might be compared to those of the USGS review team and the panel of experts established by the licensee.

c. Assess the prospects for upgrading the plant design to higher SSE values by plastic analysis and/or structural modifications and testing.

3. Concurrently, form a task force to review the current status in an attempt to determine if a probabilistic basis can be established to license Unit 1 for an interim period of operation while the other reviews are being conducted.

4. Concurrently, inform the licensee of the course of action we are pursuing and require him to pursue similar and/or alternative courses so that our final decisions may be made on the basis of our evaluation of his efforts supplemented by our independent assessments.

IMMEDIATE ACTIONS

We are planning to take immediate actions to initiate some of the approaches indicated above. Specifically we plan to:

1. Meet with NRR management to obtain approval of the general approach or to obtain an approved revised program.

2. Meet tomorrow (at Chicago, Illinois) with Dr. Newmark to begin to formulate the team of consultants discussed in item 2 above, and the task force discussed in item 3 above. At the same meeting Dr. Newmark will make a presentation to us so that we may clearly understand the bases and limitations of his recent paper on seismic design margins and probabilities of structural and mechanical failures.

3. Meet here, later this week, with the licensee to advise him of the current status of review and of the program we intend to pursue to establish a basis for a decision.

In view of the seriousness of the problem, it is essential that strong Regulatory management be imposed immediately to "manage" the team of consultants and the probability task force. These managers should be the highest level managers that we can practically assign to the tasks.

ASSOCIATED CONSIDERATIONS

In developing a program to follow to resolve the Diablo Canyon problem, consideration should be given to:

1. The impact of our decisions on the nation's energy problems and programs. The impact of potential denial for operation of a plant approved for construction cannot be underestimated, especially where the basis for denial is in controversy.

2. The impact of our decisions on the moratorium before the California voters.

3. The impact of our decisions on the viability of continued operation of plants at other sites with altered seismological bases, such as San Onofre, Pilgrim, etc.

4. The impact of our decisions on the viability of continued operation of plants where it is uncertain that the capability exists to withstand altered design bases in areas other than seismic design, such as containment structural design, pipe whip inside containment, spurious valve failures, etc.

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Existence of Hosgri Fault reported in scientific literature--Hoskin and Griffith's article. January 1971

Regulatory staff to counter intervenor's contention that seismic hazard should be reviewed, advises Hearing Board at NEPA prehearing conference for Diablo Canyon that there is no new information on earthquake hazard. June 1973

Regulatory staff receives reference to Hoskin's and Griffith's article and requests additional information from PG&E. August 1973

Application for Operating License docketed - Units 1 & 2. October 1973

USGS begins offshore surveys. December 1973

PG&E begins additional investigations at staff request. December 1973

ASLB considers and rejects request to issue stop-work order. Staff opposes order. April 1974

USGS publishes a preliminary report concluding the Hosgri to be an active fault at least 90 miles long, therefore capable of sustaining an event greater than the SSE for Diablo Canyon. **August 1974**

ASLB considers and rejects intervenor's second request to issue stop-work order. Staff opposes order. November 1974

Regulatory staff receives USGS conclusions:

1. 1927 earthquake may have occurred on Hosgri fault - magnitude 7.0-7.5 (Richter).
2. Hosgri fault more than 90 miles long.
3. Standard methods for calculating peak accelerations for fault this large and close to site are likely to lead to underdesigned plant.

December 1974

Upper level management at NRC reports to be unconvinced of merits of USGS findings. **January 1975**

Staff Supplement #1 to Safety Evaluation Report issued revising upward the Safe Shutdown Earthquake for Diablo Canyon. Staff further concludes that although plant designed to an earthquake resulting in 0.4g at the site, the "as built" facility.

could withstand the highest acceleration--0.5g--associated with the larger Safe Shutdown Earthquake. January 1975

Staff meets with USGS who have revised initial estimates upward and are advocating an SSE value of 0.7g. February 1975

Staff recognizes that USGS position will require design reanalysis, taking up to two years and perhaps more. Staff further concludes "[S]ome increases in capability is possible from design changes that might be undertaken, but changes sufficient to bring the design up to a 0.6g-0.7g capability are impracticable. February 1975

ACRS Subcommittee meeting on Diablo Canyon operating license. Meeting explores problems of seismic design and the Hosgri fault. February 1975

From position taken at ACRS meeting, the upper level management recognizes that "unless specific guidance is provided to the USGS geologists and seismologists, they will proceed with their review basing it upon their standard methods and arrive at a site SSE "g" value well in excess of the 0.4g value approved for the CP and used for the design of the almost

completed plant." Further, the same manager concludes that "unless specific guidance, support and direction is provided promptly by the upper management levels at NPC and USGS to the "working" levels in the two organizations, positions that do not necessarily reflect the judgment of upper-level management will be formulated and documented to the extent that later modification will be difficult. February 1975

Construction on Units 1 and 2 have continued unabated. Unit 1 due to be ready for fuel loading within 6 months; Unit 2, about 1 year from then. February 1975

ACRS subcommittee meeting on Diablo Canyon which considers Diablo Canyon seismic problems. May 1975

Regulatory staff puts together a team of consultants to demonstrate that, assuming occurence on the Hosgri fault of an earthquake as large as the USGS review implys (7.5), the energy transfer to the site would be limited to within the design capabilities of the nuclear plant. Concurrently, the staff initiates a review to determine if a probabilistic basis can be established to license Unit 1 for an interim period of

operation while the reviews are being conducted. Additionally the Staff informs PG&E to conduct a similar analysis. In developing this program the Staff considers the following:

1. "The impact of our decisions on the nation's energy problems and programs. The impact of potential denial for operation of a plant approved for construction cannot be underestimated, especially where the basis for denial is in controversy."
2. "The impact of our decisions on the moratorium before the California voters."
3. "The impact of our decisions on the viability of continued operation of plants at other sites with altered seismological bases, such as San Onofre, Pilgrim, etc."
4. "The impact of our decisions on the viability of continued operation of plants where it is uncertain that the capability exists to withstand altered design bases in areas other than seismic design, such as containment structural design, pipe whip inside containment, spurious valve failures, etc."

January 1976

ACRS subcommittee meeting. Staff and PG&E begin presentation of views on adequacy of seismic design of Diablo Canyon. May 21, 1976

ACRS subcommittee meeting. Staff and PG&E continue presentation of views on adequacy of seismic design of Diablo Canyon. June 1976

ACRS subcommittee meeting. ACRS consultants present critique of staff and PG&E presentation. Generally the consultants conclude:

1) The design response spectre adopted by the Regulatory Staff falls short by as much as 50% in depicting the 7.5 magnitude earthquake selected by USGS as the Safe Shutdown Earthquake.
2) The conclusions are based on poorly justified modifications. The process "makes a mockery of the seismic analyses and sets a dangerous precedent." October 1976

PG&E begins reanalysis of plant design consistent with new criteria set by Staff. January 1977

Staff invites PG&E to make application for an interim operating license based on

	demonstrating (1) the low probability of an earthquake resulting in radioactive release at Diablo Canyon; (2) a commitment to make necessary changes; (3) an evaluation of the practicality of making needed changes to a plant that has gone critical.	March 1977
Unit 1 estimated to be physically complete by April or May; Unit 2, by December 1977	March 1977	
ACRS meeting scheduled	June 1977	