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SUBJECT: Forwards comments on RF Reedy Inc,820308 mept documenting review of util pre-1978 QA program.

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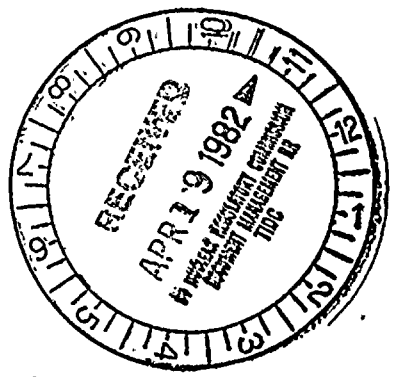
April 15, 1982



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Re: Docket No. 50-275
License No. DPR-76
Diablo Canyon Unit 1

Dear Sirs:

On March 8, 1982, R. F. Reedy, Inc. transmitted to the NRC a report documenting a review of PGandE's pre-1978 quality assurance (QA) program. At a meeting on April 1, 1982 between the NRC Staff, PGandE, and its consultants, PGandE agreed to provide to the NRC comments on the March 8 Reedy report by April 15, 1982. PGandE's comments on the subject report are enclosed.

Very truly yours,

for Philip A. Crane, Jr.

Enclosure

cc: W. E. Cooper,
Teledyne Engineering Services

R. F. Reedy,
R. F. Reedy, Inc.

Service List

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COMMENTS ON THE R. F. REEDY, INC., QUALITY ASSURANCE AUDIT REPORT ON SAFETY-RELATED ACTIVITIES PERFORMED BY PG&E PRIOR TO JUNE 1978

I. INTRODUCTION

At the April 1, 1982 meeting with the NRC, Pacific Gas and Electric Company (PG&E) committed to submit a formal response to the R. F. Reedy, Inc., Quality Assurance Audit Report (Report) within two weeks. At this meeting it was confirmed the audit was based on a 1982 interpretation of 10CFR50 Appendix B, as well as guidance from ANSI N45.2.11 (Design Control), and applied to the work performed prior to June 1978. For this reason we believe that comments on the Report are appropriate to place the findings in proper perspective, to correct certain inaccuracies or omissions, to describe the historical development and refinement of the PG&E Quality Assurance Program, and to present some different conclusions.

Important factors regarding our quality programs were presented in the November 19, 1981 statement of our Mr. G. A. Maneatis to the Subcommittee on Interior and Insular Affairs of the U.S. House of Representatives (Attachment 1). In that statement, evidence was provided as to the dedication of PG&E to formulating and implementing an effective quality assurance program. We believe this presents a much more quality-conscious image than that obtained from the Report. PG&E did provide controls for the work performed, consistent with our commitments to regulatory requirements and their interpretations in existence at the time the work was accomplished; however, our engineering activities were not documented by 1982 Quality Assurance standards. It is also important that the past work is being further confirmed by comprehensive design verification activities being performed by independent consultants, by PG&E, and by certain design contractors.

The key to understanding our position is to recognize that Diablo Canyon is a project mostly designed and built to quality standards of the late 1960s and early 1970s. It is now 16 years since the first major project commitments were made. During this time, the NRC (AEC) regulations requiring quality assurance programs were first issued, interpretative standards were developed, and enforcement practices evolved.

PG&E's Quality Assurance effort evolved from the preliminary proposed statement of the 18 Criteria in early 1969 to the comprehensive regulatory scheme of 1982. During this period, the NRC inspection effort has also evolved from an inspector's individual inspection plan in the early 1970s to a sophisticated computer-controlled inspection program in 1982. The Report spans almost this entire period; however, no acknowledgment is made of the many interpretations and changes implemented by Regulatory Guides, Appendices to existing regulations, or experience gained as a result of evaluation of the construction and operation of nuclear power plants. This evolutionary process should be kept in mind in reviewing the following brief outline of significant milestones of the design and construction of Diablo Canyon as referenced to the development of NRC Quality Assurance guidance.

We recognize the dilemma faced by R. F. Reedy, Inc., in attempting to go back and remember what the interpretation of Appendix B was in the 1972 era before issuance of the subsequent interpretative ANSI Standards and Regulatory Guides. We agree with Mr. Reedy that to do so would be impractical, if not impossible. (Tr. p 14)* As a result, it is extremely difficult to achieve meaningful results from this type of audit, where the history is so extensive and quality assurance requirements were evolving as project work proceeded.

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*Refers to Transcript of April 1, 1982, NRC "Meeting With Pacific Gas and Electric Company to Discuss Seismic Design Review, Diablo Canyon Unit 1."

II. HISTORY

The Diablo Canyon project study started in 1964 and resulted in the issuance of a contract for the Nuclear Steam Supply System (NSSS) in November 1966 - approximately 2 1/2 years before the proposed Appendix B to 10CFR50 was issued for comment. The Unit 1 PSAR was submitted in January 1967, prior to the identification of formal quality assurance requirements, and thus the requirements were not specifically addressed. Supplement 5 to the Unit 1 PSAR was submitted in November 1967 and described a quality program for the primary system. The Construction Permit for Unit 1 was issued in April 1968 (one year prior to publication of the proposed Appendix B to 10CFR50), and construction of the major buildings commenced in June 1969. At this time the seismic design for Unit 1 was essentially complete. Two months prior to the start of major construction on Unit 1, the proposed 10CFR50 Appendix B was published for comment.

Formal quality assurance requirements were first addressed in Appendix G to the Unit 2 PSAR which was submitted in July 1969. That appendix addressed 10CFR50 Appendix B requirements as follows:

QUALITY ASSURANCE

> A comprehensive Quality Assurance Program for the design and construction of Unit 2 at Diablo Canyon will be established by Pacific Gas and Electric Company in the discharge of its responsibility to build a safe and reliable nuclear power plant. The program will be an extension of the quality assurance program developed for Unit 1, and will benefit from the experience gained from the earlier program. . . .
>
> This Appendix discusses the scope of the program, its organization and management, and the implementation of the technical and systems aspects of the program. The organization of the material in this Appendix is based on the divisions used in the proposed "Appendix B - Quality Assurance Criteria for Nuclear Power Plants", issued for comment by the Atomic Energy Commission on April 17, 1969. Since there is substantial overlap in the material covered in the various headings, the subject matter of an individual division should not be considered separately but in relation to the entire Appendix.

PG&E established a Quality Engineering Department in November 1969 to implement this commitment to a Quality Assurance Program, and two months later the Company issued a Quality Assurance Manual for Design and Construction. This manual was developed utilizing the proposed criteria (April 1969) since 10CFR50 Appendix B was not formally published until June 1970. Since that time PG&E has continually reviewed and modified, as necessary, its Quality Assurance Program and organizational structure in order to be responsive to the evolving regulatory guidance and industry standards.

Erection of major piping systems for Unit 1 started in November 1970, approximately six months after Appendix B was issued and four months before 10CFR50 Appendix A was issued. It has been estimated that design at that time was about half complete. The NSSS installation began in September 1972, and Unit 1 construction was completed by November 1975 and a "Hot Functional Test" was conducted. One month later, Unit 1 was licensed to receive and store fuel in preparation for fuel loading.

During this period, there were several concurrent industry and NRC actions that had a significant impact on the evolution of quality assurance requirements. Appendix B to 10CFR50 was issued with a minimum of definition as to the detail required for implementation. In 1970, industry began to form technical groups to define Appendix B requirements. This effort resulted in the development of the N45.2 series of standards. Even though these standards did much to interpret and provide guidance on the application of the Appendix B requirements, the NRC found it necessary to conduct a series of meetings in the mid-1970s and to issue clarifications (Rainbow Books) to provide guidance in the establishment of industry quality assurance programs. An example of the difficulty encountered in developing a meaningful interpretation of Quality Assurance requirements was illustrated by the development of ANSI N45.2.13. The work on this standard began in September 1971 and it was not completed until 1976 when the standard was issued - a period of approximately five years. The NRC endorsed this standard in July 1977 - about six years after work on the standard was started. By that time Diablo Canyon had completed construction, hot functional testing, and was ready to load fuel. Since that time, PG&E has been involved in the Hosgri investigation, redesign for the postulated Hosgri event, and the TMI-related backfits.

In addition to the WASH documents (Rainbow Books), the NRC has issued Regulatory Guides which affect the interpretation of 10CFR50 Appendix B. For example, the Standard Review Plan references 17 Quality Assurance Programmatic Regulatory Guides which are applicable to present day design and construction of nuclear power plants. Many of these Regulatory Guides were issued after Unit 1 construction was complete but have had a significant effect on the current interpretation of 10CFR50 Appendix B.

In order to place the significant events involving Diablo Canyon in perspective, we are attaching a chronology of significant milestones of Unit 1 design and construction referenced to NRC regulations, industry standards, and Regulatory Guides. (Attachment 2)

III. APPLICATION OF AUDIT CRITERIA

A principal concern which was discussed and acknowledged at the April 1, 1982 meeting is that the Report was compiled utilizing "today's" understanding of the 10CFR50 Appendix B criteria for evaluating the adequacy of the PG&E quality assurance program during the pre-June 1978 period. In our view, the use of current interpretations of requirements as criteria for a historical audit of a quality assurance program over the past four to twelve years has created an erroneous and misleading perspective regarding the relative effectiveness of the PG&E quality assurance program.

In our meeting on April 1, 1982, Mr. Reedy stated that the Report did not consider the PG&E quality assurance program as committed to in the PSAR. (Tr. p 12) We strongly believe that the PSAR information would have been the proper base for the development of audit criteria.

The fact that the Report used current interpretations of 10CFR50 Appendix B criteria was made quite evident several times during said meeting. (Tr. pp 13 & 14)

It is important to note that the use of "today's" interpretation of Appendix B arose from the R. F. Reedy, Inc., interpretation of the Order, and further, that Mr. Reedy was not in agreement with that approach, but felt it was the only avenue available. (Tr. p 14)

Even more important, Mr. Reedy apparently agrees with our position when in response to a question from the NRC Staff regarding his feeling about the strictness of the criteria used to make the statements made in the Report, Mr. Reedy stated:

> "I have to agree with you that the strict interpretation that we use was completely unfair. The order to me did not seem to be fair to begin with, and I made a comment at the time that the evaluation should be done to the criteria that was in use at the time this program was accepted by the NRC and audited by the NRC, but we did not go back and say we will accept what the NRC audited and what they accepted. We will use the criteria in the order. Now I don't think that is fair, but that is what we did." (Tr. pp 32 & 33)

When 10CFR50 Appendix B was issued in 1970, there immediately arose many questions of interpretation. The industry, through the American National Standards Institute (ANSI) and the NRC (AEC) recognized the need for further "guidance" on the interpretation of Appendix B. Beginning in August 1970 with establishment of the ANSI N45 subcommittee, N45-3 and through the present time,

there has been an evolving set of Standards and Regulatory Guides that continue to refine, define, and in some cases redefine, the requirements of Appendix B. Mr. Reedy succinctly covered this issue when he stated that:

> "I think it is important to understand that the QA as written in the original 1970 Appendix B has had a lot of interpretations that were put out in safety guides and then in regulatory guides and then in adapting or adopting various - the rainbow books, for example, the N45.2 series as an educational progression of changing standards in QA, and this occurred starting about 1970 and went on to the present time so you have a knowledge increase as to what is required in QA as interpreted by the NRC, but we were not taking that into account because the criteria established in the order was take 10 CFR 50, Appendix B, and I think that is the comment that John Hoch brought out earlier, that this is a strict criteria when you use the end result to compare to the learning curves that goes on over a period of twelve years." (Tr. pp 12-13)

The NRC Staff appeared to be in general agreement with this opinion. (Tr. p 41)

An example of the impact of the use of today's strict interpretation of Appendix B is evidenced by the general issue of documentation. The Report implies that procedures did not exist or reviews were not held. The Report goes on to admit that many procedures and documents were in fact reviewed but that many of the documents were not "controlled" in accordance with today's standards, and hence no credit was given.

In response to a staff question regarding the general philosophy given to audit team members, Mr. Reedy replied:

> "The primary consideration was, we will consider the document if it's a controlled document. In other words, we felt that our work could be audited by anybody and the only way you could audit what we did and conclusions that we drew was on the basis of controlled documented evidence. A piece of paper pulled out of someone's file that shows a certain bit of information to me is not a controlled document, and we based our conclusions and things in the report on those documents that were officially controlled." (Tr. pp 29 & 30)

In our view, these observations should have been noted in the Report to ensure that credit was given for these quality assurance type controls that in fact existed. This would enable any reviewer of the Report to obtain a more comprehensive understanding of the overall quality of the product rather than the more restrictive view given in the Report.

In summary, it is significant to note that the Staff expressed appreciation for the interpretive insight into the Report received at the meeting, because it altered the impressions received from initial reading of the Report. (Tr. pp 36, 43, 102) We certainly agree with the Staff's response that when you take these observations into account you certainly get a different impression regarding the PG&E Quality Assurance Program during the pre-1978 period.

With the foregoing thoughts in mind, we now turn to our specific comments on the Report's conclusions.

IV. REVIEW OF REPORT CONCLUSIONS

The Report draws three conclusions, presumably developed from a review of the findings, to which we have the following response:

Conclusion 1: "The PG&E Quality Assurance program for design work was not adequate in areas of policy, procedures and implementation. The Quality Assurance organization had insufficient program responsibility."

Comment:

The Report appears to view the PG&E Quality Assurance Department as synonymous to the Quality Assurance Program. This viewpoint disregards the wording in 10CFR50 Appendix B that states: "Quality Assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component or system which provides a means to control the quality of the material, structure, component or system to predetermined requirements."

PG&E's present Quality Assurance Program includes not only the Quality Assurance Department but also the Quality Control groups located in each department associated with nuclear activities. The Quality Assurance Department and the Quality Control groups collectively monitor implementation of the Quality Assurance Program with the Quality Assurance Department performing an overview function.

While the PG&E Quality Assurance Program is structured so that the audit function of the Quality Assurance Department is highly visible, the Quality Assurance Department has always had, and executed, the responsibility for Quality Assurance Program definition and for assuring that an appropriate program is established. This is discussed further under Programmatic Finding 1.

Conclusion 2: "A general weakness existed in internal and external interface and document controls. This questions whether appropriate design information was being exchanged and utilized by design groups and consultants. One concern is if the latest Hosgri seismic data was inputted for design analysis."

Comment:

On page 3 of the Report it is stated, "Where procedural coverage was not in place, the design documentation was used for determining if positive though informal controls were practiced." There is no discussion in the Report which indicates what conclusions were reached when design documentation was reviewed. The Report does not clarify that many documents were reviewed such as memos, instructions, and interdiscipline letters which were issued to further implement and supplement Quality Assurance Manual procedures. These documents provide evidence that PG&E did indeed exercise controls for internal design documents. This is discussed further under Programmatic Finding 3.

Conclusion 3: "The design verification program was not formalized and was inconsistently implemented and documented. This included major gaps in design overviews of the design approach for mechanical and other equipment."

Comment:

Contrary to the conclusion, PG&E's design verification program was formalized in Quality Assurance Procedure PRE-6 issued in 1970. The Report concludes that there were major gaps in the design verification based on a "three element" definition which we believe goes beyond even present standards in some respects. We submit that this definition is not appropriate criteria for this audit. The Report on page 2 clearly states under Evaluation Criteria that selected parts of ANSI N45.2.11 were considered for guidance in the quality assurance program review. The application of these criteria was inappropriate and apparently resulted from a misinterpretation of Attachment 1 to the November 19, 1981 order, paragraph 1(a)(4) which intended that the criteria for the design verification program consider the relevant guidance in ANSI N45.2.11. This is discussed further under Programmatic Finding 4.

V. FINDINGS

Programmatic Finding 1: "Quality Assurance as defined in the QA Manual was essentially an audit role. The Quality Assurance group was not assigned a primary role in determining QA requirements."

Comment:

The Quality Assurance Department, including its predecessor, Quality Engineering Department, has been responsible for the development and issuance of corporate policies and procedures since the first issuance of the Quality Assurance Manual in 1970. Implementation authority and responsibility for the Quality Assurance Program is assigned to the Manager, Quality Assurance (previously Director, Quality Assurance). Revisions to the Policy Sections of the Quality Assurance Manual have always been reviewed and approved by senior management of PG&E and by the Manager, Quality Assurance. These revisions have always been developed by the Quality Assurance Department with due consideration to comments received from other affected departments.

The Checklist on page 37 states: "Until March 1972 Quality Engineering, which had responsibility for total quality program . . . ." This statement supports our comment that the Quality Assurance Department is responsible for developing, issuing, and auditing implementation of the program.

If we interpret these Checklist comments as "deficiencies" against Appendix B requirements for independence of Quality Assurance, we are confident in asserting that for the 1970-72 period such an organizational arrangement was not unusual, but was probably typical and in conformity with accepted practice in the industry.

Programmatic Finding 2: "PG&E had no procedure for assuring the completeness of the QA program to address the requirements of 10CFR50, Appendix B."

Comment:

We disagree that a procedure is required to demonstrate a one-to-one correlation of the Quality Assurance Program with the elements of Appendix B. On page 47 of the transcript, Mr. Reedy stated when asked if PG&E had any procedure which was intended to accomplish this activity:

> "No. There was no procedure and I don't know that a procedure is really required."

The finding implies that PG&E's Quality Assurance Program did not completely address NRC requirements. PG&E committed to develop a program consistent with the proposed requirements of 10CFR50 Appendix B in the Unit 2 PSAR Appendix G in 1970:

> "The organization of the material in this Appendix is based on the divisions used in the proposed "Appendix B - Quality Assurance Criteria for Nuclear Power Plants", issued for comment by the Atomic Energy Commission on April 17, 1969. Since there is substantial overlap in the material covered in the various headings, the subject matter of an individual division should not be considered separately but in relation to the entire Appendix."

This commitment is further emphasized in the Letter of Authorization for the Quality Assurance Manual signed by J. F. Bonner in 1970:

> ". . . the PG&E . . . Diablo Canyon Site, will be designed and constructed in full compliance with the Quality Assurance Program developed from the plan described in Appendix G of the Preliminary Safety Analysis Report . . . ."

From the foregoing and a review of the manual, it can be seen that the Revision 0 Quality Assurance Manual was based on the best available guidance from the NRC (AEC) at the time; e.g., the then draft version of 10CFR50, Appendix B. The Policy Section of the Quality Assurance Manual in Section 2.1.2 states: "The Director, Quality Assurance . . . . His responsibility is to review continually the Quality Assurance Program and to report on its adequacy and the extent to which it is being carried out." This Policy Section was issued in 1970.

Programmatic
Finding 3: "There were no provisions for document control of correspondence and design documents."

Comment:

There were programmatic requirement provisions in the Quality Assurance Manual for document control of correspondence and design documents. There were controls which described internal design interfaces and responsibilities for document control; however, these controls were contained in the work procedures and the implementation assigned to the Responsible Engineer. (Examples are given in Attachment 3.) A specific procedure concerning these items only was not issued at that time. The Checklist, page 27, refers to Quality Assurance Manual, Revision 0, Section 3.2.3, Information Control, which states:

> "Written procedures are required to control correspondence, drawings, specifications, manufacturers' information, etc., in order to assure that the engineers and designers involved in the design (1) receive the necessary information to develop the design, and (2) are kept informed of the design being developed by other interfacing design organizations. These procedures provide for the review, approval, release, distribution, and revision of design documents."

Also, during the exit interview it was stated that problems found with consultants had not been found to exist with equipment suppliers.

This finding on document control is discussed again in the Report as Finding 5 under "Implementation Deficiencies."

Implementation Finding 5: "There was no effective document control system established."

Comment:

These controls were implemented in project instructions, Engineering discipline memos, and departmental procedures and were not part of a formal system of procedure control such as we have today.

Page 39 of the Checklist states that coordination activities were controlled by memoranda, but the memoranda were not part of a formally controlled system. Page 24 of the Checklist notes that drawing control procedures were acceptable for PG&E drawings. Page 66 of the Checklist states that "evidence exists to verify that correspondence was reviewed but no formal procedures were used." These statements all support our comment that controls did exist.

The Report implies that the overall drawing control system was inadequate. This conclusion is apparently based upon reviewing five or six pipe support drawings (see page 87 of the Checklist). It is not appropriate to attempt a conclusion based on only a review of the pipe support drawings. PG&E recognized the control of pipe support drawings involved problems due to the number of supports and the number of revisions required. This was documented in a 1978 Nonconformance Report in which special procedures were written to control support drawings and changes.

Programmatic
Finding 4: "During Phase I, there were no controlled procedures for design control, design interfaces and design responsibilities. PRE-9 and PRE-10 on these subjects were released in 1979 and are to be audited during Phase II."

Comment:

There were existing controlled procedures in the Quality Assurance Manual covering these program elements. The Checklist, particularly on pages 17 through 24, indicates these were reviewed and in many cases found to be acceptable. These requirements were addressed in Section III of the Quality Assurance Manual Policy and the following procedures:

PRE 2 - Design Development
PRE 3 - Drawing Preparation, Review and Approval
PRE 4 - Specifications
PRE 6 - Comprehensive Design Reviews

In addition to these, there were "uncontrolled" implementing procedures (Attachment 3) as noted by Mr. Reedy. (Tr. p 54)

It should be noted that during this period, PG&E's use of consultants for engineering services was limited since a very significant amount of Phase I design work was done in-house and was completed prior to June 1970 when 10CFR50 Appendix B was issued.

As we stated at the November 3, 1981 meeting, the NRC and PG&E, in 1977, recognized that comprehensive design reviews needed to be completed on all licensee designated Class I structures, systems, and components prior to fuel loading. PG&E agreed to perform the design reviews. Also in report No. 50-275/77-12 issued in 1977, the NRC stated that PG&E Procedure PRE-6 provided adequate guidance for the conduct and approval of comprehensive design reviews.

This finding on design controls is directly related to Finding 4 discussed in the Report under "Implementation Deficiencies."

Implementation
Finding 4: "PG&E design verification on in-house activities and suppliers was unstructured and applied inconsistently. We consider that design verification consists of the following three elements:

"1) Design overview for design approach, methods, design input selection, and assumptions.

"2) Detailed checking of design steps and completed design documents.

"3) Verification of approved "As Built" condition against approved design.

"Activities for element 3 were not initiated until 1979 and are to be reviewed during Phase II. Documentation showed detailed checks to be performed on PG&E work with design overviews being performed on a selective basis. Most of what PG&E refers to as Design Reviews consists of element 2."

Comment:

As stated above, PG&E's design verification process was structured in Quality Assurance Procedure PRE-6 and was reviewed and found acceptable by the NRC in report No. 50-275/77-12.

Further, the three elements together are not appropriate because:

- Elements 1 and 2 can be acceptable methods for design verification even when used individually.
- They are not consistent with the Commission order dated November 19, 1981 even for applying today's criteria.
- Element 3 is not required for design verification by applicable quality assurance requirements.

The Report draws the conclusion that most of PG&E's design reviews consisted of element 2 which in itself is consistent with N45.2.11. While listed as an implementation deficiency, it appears to draw the conclusion that this is a programmatic deficiency also. PG&E submits that in the 1970-74 time frame, element 2 was generally accepted industrywide (until N45.2.11 and Regulatory Guide 1.64 were issued for additional supplemental guidance).

Regarding element 3, it clearly has merit for some situations, but it is neither required nor implied by current Regulatory Guides, ANSI Standards, or 10CFR50. PG&E has always maintained and has always had procedures and requirements for as-builting, and has never considered as-builting as an aspect of design verification. Simply stated, a design requirement is considered "as-built" when the construction or installation is verified as being within the tolerance, configuration, etc., of the design document. PG&E has always maintained a construction inspection engineering staff to assure that the plant is built as designed; and when deviations are encountered, they are as-built and returned to the Engineering Department for approval.

Programmatic
Finding 5: "PG&E did not require design consultants to implement Quality Assurance requirements."

Comment:

PG&E concedes that during the Phase I period, the program did not formally require design consultants to implement Quality Assurance program requirements. Guidance on control of procurement of items and services was widely interpreted, and we submit that it was neither uniformly understood nor typical industry practice to impose such requirements specifically on design consultants during essentially all of the Phase I period. Evolution of the PG&E Quality Assurance program as previously discussed in Section II was consistent with the rest of the industry.

This finding on quality assurance requirements for design consultants is also discussed in the Report as Finding 3 under "Implementation Deficiencies."

Implementation
Finding 3: "Design consultants were not required to implement Quality Assurance Programs."

Comment:

This finding does not clarify that PG&E began reviewing the quality assurance programs of seismic consultants in 1977 and that all consultants were required to submit a Quality Assurance Program starting in mid-to-late 1977 and were reviewed and qualified by mid-1978. As indicated on page 46 of the Checklist, two consultants implemented a Quality Assurance Program prior to mid-1978 - one in 1974 and the other in 1977.

In addition, PG&E utilized a Responsible Engineer in residence for seismic testing. (Tr. p 89)

Programmatic
Finding 6: "Corrective action provisions were not addressed except with respect to audit deficiencies and deficiencies at the site."

Comment:

The Transcript clarifies that the Report only applies to safety-related seismic design activities. Looking at this finding with that viewpoint, this finding is correct. However, the Report does not clarify that this programmatic deficiency was corrected in late 1975.

The Quality Assurance Manual for Operating Nuclear Power Plants issued for trial use in March 1975 contained a preliminary version of Quality Assurance Procedure (QAP) No. 8.1, "Nonconformances." Page 52 of the Checklist states under Audit Instruction, "Prior to issuance of PRM-3 (2/1/78), what measures were established to identify and control conditions adverse to quality and obtain corrective action to prevent recurrence?" The implication here is that PRM-3 was a satisfactory procedure. It should be noted here that PRM-3 was developed for the Design and Construction Quality Assurance Manual from QAP 8.1. The Report did not identify the existence of QAP 8.1, presumably because it was contained in the Quality Assurance Manual for Operating Nuclear Power Plants.

Although contained in the Operating Quality Assurance Manual, QAP 8.1 was applicable to Diablo Canyon Power Plant work at the time it was issued as evidenced by the following statements from the September 26, 1975 cover letter issuing the manual:

> "With this letter the revised Manual is being distributed. The new version has been approved and signed by the President and the Senior Vice President. It is important that any aspects of the quality assurance program which may not yet be fully in effect be implemented without delay."
>
> "Inspectors from Region V, Nuclear Regulatory Commission, have been reviewing the Manual and have begun inspections to evaluate our implementation of the program. By the early part of November we will need to demonstrate to the NRC inspectors a fully implemented quality assurance program at Diablo Canyon or run a risk of delaying the operating license."
>
> "The Quality Assurance Department will be conducting audits in the near future to evaluate the effectiveness of the program."

QAP 8.1 contained the following paragraph under Section 2.0, APPLICATION:

> "2.1 The Plant Superintendent, Manager, Station Construction, and Project Engineer are responsible for seeing that nonconformances occurring in work under their control are promptly disposed of in accordance with this Procedure."

This paragraph clearly describes the Project Engineer's responsibility to disposition deficiencies found in design activities in accordance with QAP 8.1. QAP 8.1 was developed during the review of the corporate program which took place for the Operating Quality Assurance Manual in anticipation of Unit 1 going into operation in late 1975 or early 1976.

This finding on corrective action provisions for design deficiencies is directly related to Finding 2 discussed in the Report under "Implementation Deficiencies."

Implementation Finding 2: "The PG&E audit system and corrective action system were not effective."

Comment:

It is inaccurate to imply that the overall audit and corrective action systems were not effective. All of the substatements made for this finding apply to the pre-1976 period. As discussed above, QAP 8.1 was issued in September 1975 to correct this programmatic deficiency.

Page 53 of the Checklist shows aspects of the PG&E audit program that were found acceptable. Page 31 of the Checklist shows the portions of the Quality Assurance Program covering corrective action for suppliers, contractors, on-site discrepancies, and audit results, all of which were found acceptable.

In the audits conducted in the Engineering Department between 1969 and 1978, deficiencies were identified and corrective actions were specified. All audit reports were distributed to senior management.

We would also note that Mr. Reedy clarified that he did not intend to imply that corrective action was not taken; rather, he did not see a corrective action document that he was accustomed to seeing. (Tr. p 84)

The third subparagraph of this finding, which states: "Corrective action verification was by re-audit only" apparently finds verification by reaudit to be a deficiency. This practice was an acceptable technique recognized by the NRC (AEC) guidance document WASH 1283 (Revision 1, May 24, 1974), which contains Draft 3, Revision 4, of ANSI N45.2.12. Section 4.5.2 thereof states (for the auditing organization):

> "Followup action may be accomplished through written communication, reaudit, or other appropriate means." [Underline added.]

Programmatic
Finding 7: "Indoctrination and training were not addressed in the QA Manual or procedures."

Comment:

The 1970 Quality Assurance Manual, Revision 0, contains Appendices which are bound into and made a part of the manual. Appendix B thereto, page B-6 states:

> "Personnel involved in the Quality Assurance Program will be trained and qualified in their respective fields. Personnel performing non-destructive examinations must meet the qualification requirements of appropriate Codes and Standards. Proficiencies will be monitored and training activity taken when necessary."

This topic is discussed in the Transcript on pages 47 and 48:

> MR. REEDY: ". . . There was a statement in the program that there would be training and indoctrination but nothing as to how it would be done. That you will do this. Each manager will do that, et cetera. We put down this as a programmatic deficiency in the respect that no detail -- just addressing it as an overall thing -- it wasn't provided, but other people could make a different interpretation of that. The fact that it did address it could be interpreted differently."
>
> MR. BISHOP: "So you concluded there was no indoctrination or training?"
>
> MR. REEDY: "It wasn't formalized and documented to the extent that you had controlled documents showing who received what training when, on what subject."

Programmatic
Finding 8: "The QA Manual contained no provisions for PG&E management review of the QA program for status and adequacy."

Comment:

The requirement in Appendix B is:

> "The applicant shall regularly review the status and adequacy of the quality assurance program. Management of other organizations participating in the quality assurance program shall regularly review the status and adequacy of that part of the quality assurance program which they are executing."

We believe the process described below constitutes a review by management and satisfies the intent of the Appendix B requirement.

As noted in our comments on Programmatic Finding 1, all program policy changes have been reviewed and approved by senior management for authorization. This review compared the revisions with Appendix B requirements. We have always considered that a revision to a procedure constitutes a review of that procedure. Between 1970 and 1978, there were at least five revisions made to each individual section in the Policy Section of the Quality Assurance Manual. Further, audit reports have been distributed to senior management as verified on page 35 of the Checklist. NRC I&E Reports received the same distribution as PG&E Quality Assurance audit reports.

This topic is discussed on page 47 of the Transcript:

> MR. REEDY: "For example, there has been an awful lot of discussion about Item 8 which is management review of the QA program; and there was management review of all the changes at the program. There was management review of all the audits, but the verification of that was extremely difficult to find. It wasn't documented that we could pull out as a controlled thing that yes, this occurred. It occurred because you might see a signature on someone's revision to the program but . . ."

Further, on page 65:

> MR. REEDY: "Now, there was QA or review on the part of management of audits. There was certainly review of program changes, so there was a management involvement in that, but we were trying to hone in specifically on the activity to verify the effectiveness of the program, and to me a review of audits doesn't tell you how effective the auditors are doing their work. It tells you what they found but not were they really effective auditors, and that is the intent of my statement."
>
> MR. BISHOP: "What do you expect to see to have a positive finding on that type?"
>
> MR. REEDY: "I would expect that someone would go in on a periodic basis to see if they are arriving at similar conclusions to what the auditors would be finding, the internal PG&E auditors, finding out if they are effective. In other words, do you concur with the type of findings that they are coming up with?"
>
> MR. BISHOP: "The third party?"
>
> MR. REEDY: "Third party, accompanying people, but just doing the same function again."

We observe that only in recent experience has the NRC encouraged use of third party auditors, or has the industry regarded them as useful.

In addition, page 68:

> MR. HAASS: "Was there implementation deficiencies tied in with any use of stricter QA requirements than one would read in Appendix B?"
>
> MR. REEDY: "I think it would be easy for people going back to 1970 to say our management involvement in assessing our program and having discussions with QA managers and looking at audit reports and talking to people was adequate to fulfill that requirement in 1970. That type of activity in my mind was the type of activity that was carried on in 1970. It was certainly carried on there, but now when you are looking for how is that documented as to what occurred? Where are the minutes? They weren't there. Again this is a very strict interpretation of today's requirement. What you would look for today. You would look for some kind of minutes of the meeting of what occurred. So I'm not saying management was not involved. That is not the intent of that statement."

This finding on management review is discussed again in the Report as Finding 1 under "Implementation Deficiencies."

Implementation Finding 1: "PG&E management did not review and assess the effectiveness of the Quality Assurance Program."

Comment:

PG&E's senior management has always received and reviewed copies of audit reports. By this process the overall Quality Assurance Program has been continually assessed using both Quality Assurance Department and NRC reports as input. As discussed above, changes to the Policy Section of the Quality Assurance Manual required the review and approval of senior management. Further, oral reports regarding the status of the Quality Assurance Program were given by the Quality Assurance Director to the Executive Vice President.

The Report mentions a program review by Energy Inc. (December 22, 1975). We submit that the Energy Inc. review is an important example of where senior management review and assessment were functioning. The Energy Inc. review was commissioned by PG&E management and results acted upon. Indeed, major changes in the PG&E Quality Assurance/Quality Control Program occurred following the Energy Inc. report. For example, the Engineering Quality Control Department was established in 1976 and charged with the responsibility of developing and issuing a manual controlling Engineering Department activities. Additionally, a new Director of Quality Assurance was hired from outside the Company to provide aggressive and experienced leadership in the Quality Assurance Program.

This documented evidence refutes a finding that there was no management review and assessment of the program. While they may not have been documented, they, in fact, did take place and along with the other evidence noted above support a conclusion that management was indeed assessing the effectiveness of the Quality Assurance Program activities.

VI. CONCLUSION

In conclusion PG&E submits that:

- Standing alone, the Report gives an erroneous impression of the pre-1978 PG&E Quality Assurance Program.

- The use of 1982 interpretation of 10CFR50 Appendix B for a historical audit of pre-1978 activities is inappropriate; however, PG&E recognizes the impracticality, if not the impossibility, of attempting to reconstruct acceptable interpretations of Appendix B during that time frame.

- The April 1, 1982 meeting did much to clarify these issues of concern to PG&E regarding the Report.

- The foregoing comments provide further clarification of our concerns.

- Finally, we believe that the Report, supplemented by these comments and the Transcript, provides an adequate basis for Teledyne Engineering Services to assess adequacy of the work performed by R. F. Reedy, Inc., and the implications of his work as they may impact upon the remainder of the Independent Verification Program.

ATTACHMENT 1

STATEMENT

by

George A. Maneatis

Senior Vice President - Facilities Development

Pacific Gas and Electric Company

before the

Subcommittee on Energy and Environment

Committee on Interior and Insular Affairs

U.S. House of Representatives

November 19, 1981

Good morning. My name is George A. Maneatis and I am the Senior Vice President - Facilities Development for Pacific Gas and Electric Company. I am here today to discuss our Quality Assurance Program in the context of the recently identified errors in the seismic design for our Diablo Canyon Nuclear Power Plant and to give our views on the implications of these errors relative to quality assurance for reactors under construction.

First, let me state that PGandE is committed to construct and operate the Diablo Canyon Nuclear Power Plant in a manner that will assure the public health and safety. Paramount to this commitment is the development and implementation of a Quality Assurance Program. The purpose of PGandE's Quality Assurance Program is to provide policies, procedures, controls, and

mechanisms to meet the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Such a program in addition to other practices provides confidence that the designed and constructed Diablo Canyon Nuclear Power Plant will operate safely and perform satisfactorily. Quality Assurance is a management and administrative tool which prescribes controls to detect and correct errors in the design, construction, and operation of nuclear facilities and, hence, should minimize the probability of undetected errors. However, Quality Assurance cannot, in all cases, prevent errors from being made nor can it guarantee that all errors will be detected. It should be emphasized that Quality Assurance is only one of many factors which contribute to the overall safety of a nuclear power plant. Conservative design and the redundancy and diversity of equipment and systems important to safety are other factors which contribute to safety.

PGandE QUALITY ASSURANCE

To put Quality Assurance at PGandE in historical perspective, a construction permit for the Diablo Canyon Nuclear Unit 1 was issued by the Atomic Energy Commission (AEC) on April 23, 1968. During the initial design and construction stages of the plant, Quality Assurance criteria were being formulated by the AEC and were formally adopted and issued as Appendix B to 10 CFR 50

in June 1970. These Quality Assurance criteria became requirements for both Diablo Canyon units.

In anticipation of these requirements, PGandE organized a Quality Engineering Section (now called Quality Assurance Department) in November 1969 and assigned it responsibilities for assuring that the design and construction of nuclear power plants complied with applicable policies and procedures. In January 1970, PGandE developed and issued a Quality Assurance Manual to govern audits of construction and engineering activities. Since that time, PGandE has continually reviewed and modified, as necessary, its Quality Assurance Program and organizational structure in order to be responsive to evolving regulatory guidance and industry standards.

When the Quality Engineering Section was first established it consisted of three engineers. Currently we have a total of 47 Quality Assurance/Quality Control engineers to assure implementation of the Quality Assurance Program. At the peak of construction activity at the Diablo Canyon Power Plant, the Quality Assurance/Quality Control personnel involved on the project (including contractor personnel) numbered 298 or about one Quality Assurance/Quality Control person for every ten craftsmen.

A further step in the evolution and improvement of PGandE's Quality Assurance Program was the consolidation and updating of the Engineering Department procedures into an Engineering Manual.

Since 1969, over 1400 internal Quality Assurance audits have been conducted of which about 230 were of Engineering Department activities. Deficiencies identified during these audits were reported to senior management and corrective actions were specified. These actions have either been or will be implemented and verified in accordance with Quality Assurance requirements. Additionally, throughout plant design and construction, the NRC has continually made reviews of the audits conducted by our Quality Assurance Department and performed independent inspections of various design, construction, and operating activities.

As an example of the NRC review process, the NRC and PGandE determined in June 1977 that the existing design control activities needed stronger controls. At that time, PGandE agreed to complete comprehensive design reviews on licensee-designed Class I components, structures, and systems to verify correctness of design. At this same time, the NRC reviewed PGandE's Procedure PRE-6, "Comprehensive Design Reviews," and found that it provided adequate guidance for the conduct and approval of comprehensive design reviews (NRC Report 50-275/77-12). Subsequent NRC inspections and PGandE Quality

Assurance audits of these comprehensive design reviews confirmed that the reviews were completed in accordance with the requirements of this procedure. The NRC affirmed the overall adequacy of the PGandE program in testimony before the ASLB in October 1977.

IDENTIFICATION AND REPORT OF ERROR

On September 27, 1981, we determined that an error had occurred which potentially affected the plant's seismic design. As a result, we immediately suspended scheduled fuel loading operations and informed the NRC.

We immediately assembled a team of engineers to analyze the matter thoroughly and hired an independent consultant to conduct a separate and independent review and analysis. The Quality Assurance Department also immediately initiated an investigation of the error to determine its cause and extent and cooperated fully in the NRC's independent investigation. We presented our findings to the NRC Staff in formal public briefings held on October 9, 1981 and November 3, 1981. Additionally we met with the staff and intervenors in lengthy public work sessions during the week of October 12, 1981. The staff has proposed, and PGandE has agreed in principle, to a far-ranging reverification program to review and confirm the adequacy and accuracy of work performed for PGandE by its service-related contractors.

Our findings indicate that although PGandE's Quality Assurance Program has been in overall compliance with NRC requirements, a deficiency in its implementation occurred in 1977 which involved the informal exchange of design information between PGandE and one of our seismic consultants during the seismic reanalysis for the Hosgri event. In this particular case, inaccurate weights for equipment and piping in a limited area of the containment structure were prepared and furnished the consultant on an incorrectly oriented diagram. This informal information exchange did not conform to Company practices and Quality Assurance procedures which required the checking of design calculations. Had these procedures been followed, we believe that the errors would have been detected at that time.

As it turned out, the error was not identified until a piping design engineer in PGandE's Department of Mechanical and Nuclear Engineering who was reviewing Unit 2 piping systems raised questions about the correctness of the diagram.

During our investigation we also identified a failure of Company personnel to use revised 1977 seismic data for checking the adequacy of the design of conduit and cable tray supports.

This error involved a failure to follow established Quality Assurance procedures which require formal distribution of design data. Again, had these procedures been followed, we believe that this error would also have been detected at that time.

To avoid such errors in the future and to assure that past errors have not affected plant design margins, the Company is embarking on a two-phase program. The first phase involves establishment of a retraining program for engineering personnel which emphasizes the adherence to quality procedures. The second phase involves the retention of a consultant to carry out a reverification of the existing design and to report any deficiencies without restriction.

Notwithstanding the occurrences of these errors, as well as several other minor errors found during the investigation, we continue to believe that because of the original conservative design and the rather large margins of safety associated with the affected systems, there would have been no safety consequences even if the errors had not been detected and the plant had gone into operation.

IMPLICATIONS FOR PLANTS UNDER CONSTRUCTION

The errors which have been identified at Diablo Canyon resulted from a failure to follow the requirements of our Quality Assurance Program. However, a review of the numerous PGandE Quality Assurance and NRC audits shows that while deficiencies occur, they are generally detected and resolved in a timely manner. This incident vividly illustrates that no matter how embarrassing or costly an error may be, it will be reported and promptly corrected. We believe that existing NRC and industry quality assurance requirements when properly implemented are adequate to safeguard the public health and safety. Also, the industry record of identifying, reporting, and correcting problems exemplifies a strong commitment to adhere to Quality Assurance requirements.

We are confident that the errors identified at Diablo Canyon do not represent a generic weakness in the Quality Assurance regulations or in industry's responsibility to design plants that will operate safely. We believe the present program of inspections by industry and the NRC is adequate to assure a high degree of reliability in the detection and correction of deficiencies.

CLOSING REMARKS

In closing let me emphasize that:

- PGandE voluntarily suspended fuel loading when we discovered the error and we immediately took steps to notify the NRC and to correct the error.

- PGandE is firmly committed to design, construct, and operate Diablo Canyon in a safe manner. In carrying out this commitment, we have:
  - Assigned competent, experienced, and dedicated people to perform these functions;
  - Used and continue to use extreme conservatism in the design and construction of Diablo Canyon;
  - Contracted with one of the most qualified consultants in the country to carry out an independent reverification of the existing design and to report any deficiencies without restrictions.
  - Agreed to make any further changes that are identified as a result of the reverification program; and

- Conducted ourselves and reported the results professionally and forthrightly even though it has been embarrassing to the Company, to our engineers, and to the nuclear industry.

- I represent the highest level of PGandE management in assuring this Committee, the NRC, and the public that we are totally committed to the continued implementation of a sound and effective Quality Assurance Program and to building nuclear power plants that are safe in every respect.

ATTACHMENT 2

DESIGN AND CONSTRUCTION MILESTONES

DATE	DESIGN AND CONSTRUCTION STATUS	COMMENTS
NOVEMBER 1966	NSSS CONTRACT AWARDED	
JANUARY 1967	UNIT 1 PSAR SUBMITTED	
JULY 1967		PROPOSED GENERAL DESIGN CRITERIA ISSUED (10CFR50 APPENDIX A)
APRIL 1968	UNIT 1 CONSTRUCTION PERMIT	
AUGUST 1968	STARTED SITE PREP	
JUNE 1968	UNIT 2 PSAR SUBMITTED	
APRIL 1969		PROPOSED QA CRITERIA ISSUED FOR COMMENT (18 CRITERIA)
JUNE 1969	START CONSTRUCTION MAJOR BUILDINGS	SEISMIC DESIGN FOR BUILDINGS COMPLETE
JULY 1969	UNIT 2 PSAR APPENDIX G ADDED "PROGRAM WILL BE AN EXTENSION OF THE QAP DEVELOPED FOR UNIT 1 . . ."	QUALITY ASSURANCE PROGRAM DESCRIBED USING PROPOSED 10CFR50 APPENDIX B
NOVEMBER 1969	PG&E FORMED QUALITY ENGINEERING DEPARTMENT	
JANUARY 1970	PG&E ISSUED RED QA MANUAL FOR DESIGN AND CONSTRUCTION	
JUNE 1970		10CFR50, APPENDIX B ISSUED
NOVEMBER 1970	START ERECTION OF MAJOR PIPING	DESIGN ALMOST HALF COMPLETE
DECEMBER 1970	UNIT 2 CONSTRUCTION PERMIT ISSUED	

DATE	DESIGN AND CONSTRUCTION STATUS	COMMENTS
FEBRUARY 1971		10CFR50 APPENDIX A ISSUED
OCTOBER 1971		N45.3.11 SUBCOMMITTEE ESTABLISHED (LATER RENAMED N45.2.11)
MARCH 1972	PG&E FORMED QUALITY ASSURANCE DEPARTMENT	
JUNE 1972		SAFETY GUIDE 23 ISSUED (QAP DESIGN AND CONSTRUCTION) ENDORSES ANSI N45.2-1971
SEPTEMBER 1972	START INSTALLATION NSSS	
NOVEMBER 1972		SAFETY GUIDE 33 ISSUED (OPERATING QAP) ENDORSES ANSI N45.2-1971
JUNE 1973		GRAY BOOK ISSUED
MAY 1974		GREEN BOOK ISSUED
JUNE 1974		N45.2.11 ISSUED (QUALITY ASSURANCE REQUIREMENTS FOR THE DESIGN OF NUCLEAR POWER PLANTS)
FEBRUARY 1975		R.G. 1.64 ENDORSES ANSI N45.2.11-1974
AUGUST 1975	CONTAINMENT LEAK TEST	
SEPTEMBER 1975		SER #3 APPROVES FSAR
NOVEMBER 1975	HOT FUNCTIONAL TEST	DESIGN AND CONSTRUCTION COMPLETE FOR FUEL LOADING
DECEMBER 1975		NRC ISSUES LICENSE TO RECEIVE AND STORE FUEL
FEBRUARY 1976		N45.2.13 ISSUED (QUALITY ASSURANCE REQUIREMENTS FOR CONTROL OF PROCUREMENT . . .)
JULY 1977		R.G. 1.123 ENDORSES ANSI N45.2.13-1976

NOTE: SINCE DECEMBER 1975, DIABLO CANYON WORK HAS BEEN CONCERNED WITH HOSGRI INVESTIGATIONS, HOSGRI REDESIGN, TMI BACKFIT, AND REVERIFICATION OF DESIGN.

ATTACHMENT 3 a

DIABLO CANYON UNIT #1
File: 102

November 25, 1969

Mechanical System Design Responsibilities
For Class I Systems and Equipment
Units 1 & 2 - Diablo Canyon Site

MEMORANDUM TO FILE:

The purpose of this memorandum is to confirm, update and clarify the mechanical system design responsibilities.

Each Engineer (System Engineer) who has been assigned a system is responsible for the total system design including establishment of design criteria, overall design, piping size and instrumentation.

The Lead Engineer is responsible to see that the Engineer(s) assigned to the system carries out the foregoing function.

Generally, either the Lead Engineer or the Engineer is responsible for equipment procurement for this assigned system. Where the System Engineer does not procure the equipment, the equipment procurement responsibility is shown below. The System Engineer, however, is still responsible for the equipment design criteria.

In addition to system responsibility as given above, Mr. G. A. Abbott is responsible for the design of the instrument systems based on the performance criteria established by the System Engineer. Mr. Abbott is also responsible for all control valves.

In addition to system responsibility as given above, Mr. A. G. Walther is responsible for the design of the piping for the various systems (except drainage piping) including hanging, valves and insulation.

The System Engineer is also responsible for furnishing the Mechanical Design Drafting Section, Electrical Design Section and Civil Design Section the necessary criteria for the design of items done by the foregoing sections.

System or Major Equipment	Organization With Prime Responsibility	PG&E Organization	
		Lead Engineer	Engineer
Main Steam and Feedwater	PG&E	JBGegan	AGWalther
Steam Gen. Safety Valves	"		RPFawcett
Reactor Coolant	Westinghouse	JPFinney	JPFinney
Chemical Volume & Control	"	JPFinney	HJGormly
Liquid Holdup Tanks	PG&E		JPDuffy
Safety Injection	Westinghouse	JPFinney	JPFinney
Residual Heat Removal	"	JPFinney	NLZiomek
Sampling	Westinghouse	GAAbbott	GAAbbott

System or Major Equipment	Organization With Prime Responsibility	PG&E Organization Lead Engineer *	Engineer
Containment Spray	Westinghouse/ PG&E	JPFinney/ WJLindblad	RWWood
Component Cooling	PG&E	JPFinney	NLZiomek
Auxiliary Salt Water	"	JBGegan	DOBrand
Fire Protection	"	WJLindblad	RPFawcett
Diesel Fuel Oil	"	JPFinney	NLZiomek
Auxiliary Building Ventilation	"	WJLindblad	RWWood***
Emergency Air	"	GAAbbott	JJCarpenella
Instrumentation & Control	Westinghouse/ PG&E	GAAbbott	RWMiner
Control Boards & Panels	"		JVRocca
Containment Ventilation	PG&E	WJLindblad	RWWood***
Containment Isolation Valves	"	WJLindblad	
Main Steam & Feedwater	"		AGWalther
Containment Piping Penetration	"	WJLindblad	JPDuffy
Diesel Generator Units (Mech.)	"	JPFinney	NLZiomek
Auxiliary Feedwater	"	JBGegan	RPFawcett
Makeup Water	"	JBGegan	HJGormly**
Radioactive Waste Disposal	"	HJGormly	HJGormly
Reactor Coolant Drain Tank	"		JPDuffy
Equipment Drain Receiver Tanks	"		JPDuffy
Gas Decay Tanks	"		JPDuffy
Piping Systems	"	AGWalther	JPDuffy WCHam

J. O. Schuyler
J. O. SCHUYLER

JOS:pac

See attached distribution.

** Civil Engineering responsible for detail design of tanks.
*** Civil Engineering responsible for detail design of ventilation systems.

DISTRIBUTION

Engineering Services
A. T. Lomas
R. H. Spalding

Elec. Distribution Engineering
J. W. Colwell

Civil Engineering
R. V. Bettinger
E. J. Ross

Mechanical Engineering
D. V. Kelly
G. A. Abbott
D. O. Brand
J. J. Carpenella
J. P. Duffy
R. P. Fawcett
J. P. Finney
J. B. Gegan
H. J. Gormly
W. C. Ham
W. J. Lindblad
R. W. Miner
J. V. Rocca
A. G. Walther
R. W. Wood
N. L. Ziomek

PACIFIC GAS AND ELECTRIC COMPANY

62-6224

COPY

ATTACHMENT 3 d

MECHANICAL & NUCLEAR ENGINEERING
1.23

Drawing Questions
Units 1 and 2- Diablo Canyon Site

January 7, 1975

MESSRS. D. NIELSEN
E. P. WOLLAK

Please have Diablo Canyon ECO's or drawings requiring coordination sent to the following engineers:

1. Turbine Building	John Sale
2. Auxiliary Building	Richard Bacher
3. Containment	Jesse Ante
4. Intake Structure	Panos Antiochos

They will be responsible for our routing and returning them to you.

H. J. GORMLY

JWSale/jm

cc: JAAnte
PGAntiochos
REBacher
DLPolley
JBGegan
RMLaverty
WJStracke
AGWalther

62-6214 (REV. 8-70)

Pacific Gas and Electric

FOR INTRA—COMPANY USES

ATTACHMENT 3 e

RECEIVED
PROJECT ENGINEER
DIABLO CANYON
JAN 15 1974

JRH
EPW
SWN
HJG
DLP
DN

FILE 2.5 cc 18.25

DIVISION OR DEPARTMENT: ELECTRIC DISTRIBUTION ENGINEERING
FILE NO.: 18.25
RE LETTER OF
SUBJECT: Diablo Canyon Site Units 1 and 2
Preparation of Design Reviews
For Class I Electric Systems

January 11, 1974

MEMORANDUM:

This memorandum defines the Class I electrical systems which will have design review and also describes the general requirements for these reviews. The specific design reviews covered are those that are in the scope responsibility of the Electric Distribution Department. Systems and equipment by Westinghouse on the NSSS Contract are not included, and neither are those in the responsibility of the Mechanical, Civil and Architectural Departments.

The design reviews shall be prepared as described in Quality Assurance Procedure PRE-6 for Diablo Canyon Site and also shall comply with Part III, "Design Control", of 10CFR50, Appendix B. Procedure PRE-6 generally is limited to systems in our case.

Design reviews shall be made for the following:

1. Each of these Class I electric power systems:
   a. 4160 volt, 60 hertz, Buses F, G, and H.
   b. 480 volt, 60 hertz, Buses F, G, and H.
   c. 115 volt, 60 hertz, instrument a.c. power system.
   d. 125 volt d.c. electric power system.
   e. 125 volt d.c. emergency lighting system.
2. Class I electrical conductors for equipment interconnections, including electrical penetrations of the containment.
3. Class I electrical raceways.
4. Class I heat tracing system.
5. Class I ventilation control system.
6. Settings of electrical protective devices.
7. Miscellaneous, as directed by the Supervising Engineer.

The design criteria selected for the electrical systems shall include those given in the PSAR and FSAR, and the AEC "General Design Criteria" listed in Appendix A of 10CRF50 to the extent of our committment in the PSAR and FSARs, also included are the Westinghouse criteria, and those industry standards and Company practices in effect as the design progressed. Care should be taken to not include those criteria or standards which have appeared since the design was committed and were not adopted for the project.

Design review means the critical review of the design in order to provide further assurance that the actions leading to the design output such as drawings, calculations, analysis, and specifications have been satisfactorily performed and the information included in the design output is correct. Established procedures for design review shall be followed, results of the review documented, and measures taken to ensure that the findings are implemented. Whether the review is conducted by one individual or an organization there are a number of basic questions that should be addressed where applicable:

(1) Were the inputs correctly selected and incorporated into design?

(2) If assumptions were necessary to perform the design activity are the basis of the assumptions adequately described and reasonable?

(3) Are the correct quality requirements specified?

(4) Have the applicable codes, standards and regulatory requirements been met?

(5) Have the design interface requirements been satisfied?

(6) Was an appropriate design method used?

(7) Is the output reasonable compared to inputs?

(8) Are the specified parts, equipment, and processes suitable for the required application?

(9) Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?

(10) Has adequate accessibility been provided to perform needed maintenance and repair?

(11) Have adequate maintenance requirements been specified?

(12) Have acceptance criteria been delineated in the design documents, such as drawings, instructions or other supporting documents which are sufficient to assure that adequate standards are maintained and that the activities prescribed by the design documents have been satisfactorily accomplished?

The design review documentation shall be organized and completed to meet the requirements of PRE-6.

The review shall contain the following:

1. A description of the system covered.

2. A statement giving the objective and scope of the review.

3. A summary giving the results and conclusions reached, and any design deficiencies formed not in accordance with the criteria or standards.

4. Any explanations, comments and recommendations.

5. A list of the design criteria and the standards used in the review.

6. The signature of the review and the Supervising Engineer and the date of completion.

7. A set of attachments containing the material supporting the details developed by the results and conclusions of the review. Material should include the analyses and data developed by the reviewer and copies of documents pertinent to the review.

The complete review shall be assembled in a folder or set of folders, labelled with title of the review and then placed in the files of the design section.

The status of the design review at this time are as follows:

1. The electric power systems are partially complete, with much of the system analyses completed. The design review of the Class I motors has been completed.

2. Design review of the electrical conductors for the containment fan coolers have been completed. The remainder has not been begun.

3., 4., 5. Electrical raceways, heat tracing, ventilation control, and relay settings have not been design reviewed.

6. A design review has been completed for the hydrogen releases in the battery rooms.

Persons assigned to perform and complete these design reviews will have access to any records that are available, and are requested to make the review as independent as practical of the original design.

Donald Nielsen
DONALD NIELSEN

DN:YG

ATTACHMENT 3 i

July 28, 1972

Design Changes to and Approval
of Piping Schematics
File No. 146.10

MEMORANDUM TO ALL DIABLO CANYON MECHANICAL ENGINEERS:

As of now, essentially all piping schematics are issued "Approved for Construction." This memorandum will revise the control over changes to piping schematics and supersede the previous memo of July 29, 1972, on this subject.

Any system, responsible, instrument or piping engineer may initiate a design change or revision to piping schematics. Changes should be limited to only those absolutely necessary. This will be done by an intra-company memorandum form with or without sketches. The memorandum shall be addressed to I. F. Hall and shall be routed through:

1. Responsible Engineer
2. Piping Engineer
3. Instrument Engineer
4. J. V. Rocca

Each will initial and date his approval of the proposed change.

Copies will be kept as follows:

yellow - originator
pink - mechanical file
white - I. F. Hall

Anyone wishing copies for their own file will use the Xerox.

Another area that requires a more formalized control is the "Line Designation Table" (LDT). The LDT will be issued "Approved for Construction" after being reviewed and signed off by each system engineer. After that, any changes in line number, flow, pressure or temperature must be processed through A. G. Walther/J. R. del Mazo on the attached format addressed to I. F. Hall. Again, this should be routed through:

1. Responsible Engineer
2. Piping Engineer
3. A. G. Walther/J. R. del Mazo

Each will initial and date his approval of the proposed change. Copies will be the responsibility of each individual.

H. J. Gormly

JVRocca/ja
Attachment

cc: IFHall

ATTACHMENT 3 j

LDT CHANGE REQUEST

Line No._____ Date_____

Change Description

Signed by:

System Engineer_____

Countersigned by:_____