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I, Charles C. Stokes, am providing this statement of my own volition in response to various Pacific Gas and Electric (PG&E) submittals to the NRC. This statement is primarily to follow up on the issues which I have raised in prior statements to the Commission and which I feel must still be addressed in detail by PG&E/BECHTEL Diablo Project management before Unit 1 is allowed to go beyond 5% power. In some cases, my comments suggest necessary methodological steps to obtain adequate correction action on my allegations, largely confirmed by Mr. Yin. In other cases, my comments expose false or misleading statements by PG&E in their response to Mr. Yin's findings.

In response to PG&E letter NO.: DCL-84-131 (PG&E's April 4, 1984 rebuttal to Mr. Yin's findings):

1. The second paragraph on page four (4) states, "Supervisors may have relied on the administrative system too much, to assure training, and did not, in some cases, track the satisfactory completion of training. Supervisors also were not required to document how employees were informed of procedure revisions. This situation is being corrected."

In my opinion, to support that conclusion several questions must be addressed: 1) How are the employees to be instructed, verbal transmission by group leaders (which can vary), verbal transmission by section lead, or by individual distributed written memorandum? 2) Will there be a signature slip requirement for verbal and written instruction? 3) How will people who are absent from

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oral session be followed up on to insure that they are informed upon return? 4) Concerning the signing of signature slips, who will be required to sign indicating that an employee has been trained. Will it be the person trained or his supervisor? 5) If questions are raised during training which can not be answered during the session, how will these be tracked and responded to so that all trained employees are aware of the question and answers? 6) How will questions be addressed which concern the validity of the practices being taught? 7) Will employees who raise serious questions be part of team reviewing the procedure or technical issue to which he addressed?

These types of questions should be addressed for the following reasons: 1) They are necessary to ensure that all members of work force receive the required information. 2) That isn't the way it was done in the past, which helps to explain the breakdown in design control I exposed. The NRC should evaluate PG&E's implementation of corrective action in light of these criteria, to assure that similar errors do not recur.

2. The bottom of page five (5) includes the following claim. "Since the sampling of small bore analyses performed by OPEG engineers did not indicate any correlation between training and frequency of these minor errors there is no basis to expect a correlation in any other engineering area, especially large bore where the frequency of detected errors has been very low (2-4%)."

This statement is in my opinion a prime example of con-

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tinuing to ignore the cause of a problem. My reasons for this statement are. 1) I have alleged in several past statements that an additional possible reason for many of the so-called errors was that they were the results of group leaders instructions. Group leaders are part of the same overall management leadership, which forms a link between responsibility for both small bore and large bore problems. 2) I have also alleged that training was non-existent or one on one (group leader to engineer). The lack of group instruction was the missing factor which allowed the group leaders to get away with instructing individuals differently. At present, these faulty instructions are included in the categories of technical errors or engineering judgment, rather than credited as the training problems they represent. 3) The breakdown in training was generic. Everyone was on their own, and in all areas of the job. As a result, there was no control group (well-trained employees) which could be used to assess the performance of poorly trained employees. In my opinion, PG&E's self-exoneration is impossible.

3. On the bottom of page six (6) and the top of page seven (7) PG&E states, "We share the inspector's opinion that audit findings should receive proper evaluation and be resolved in a timely manner. These observations have no significance for piping design activities or for low power testing or commercial operations."

The lack of timely solution of many problems, some for years, permitted similar problems which developed to go undetected and uncorrected. These have never been documented. They still are

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not fixed. They have been institutionalized on-site as "old work" which has been defined out of the quality assurance system on a generic basis. They are significant in that they bear on the plant's ability to operate safely. The last line quoted above is a false statement before the plant goes commercial, there should be a full review of all work missed by the Audit program. Until such corrective action occurs, the quality of what we're left with in relevant safety systems will be indeterminate.

4. On page thirteen (13) paragraph no. 1 PG&E states, "ANSI N45.2.12-1977 (Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants) states that the audited organization shall respond as requested by the audit report but does not require 'documented justification' for delays."

In response to the above statement, I would like to quote from 10 CFR 50 Appendix B, XVI. "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected." (Emphasis added) In my opinion the word promptly requires that if a delay occurs in a scheduled audit there should be documented justification.

5. On page nineteen (19) PG&E states, "The Project acknowledges that out-of-date procedures were in some controlled manuals at OPEG."

This statement is misleading, because it is incomplete.

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What about uncontrolled copies of the manuals? While I was in OPEG, the group leaders at times copied various sections of controlled manuals and gave them to us to use. At times, we discovered that a document existed which was relevant to the work which we were performing and we made our own copy. Have the uncontrolled documents have been removed from use? I know that in light of the heavy production drive which we were required to live up to, that we needed our own controlled documents in order to avoid spending unnecessary time searching out a document in someone else's possession. I would like to quote a line from 10 CFR 50 Appendix B, II. QUALITY ASSURANCE PROGRAM. "Activities affecting quality shall be accomplished under a suitably controlled conditions." I believe that the practices above are not in compliance with 10 CFR 50 Appendix B, II.

6. On page twenty (20) PG&E's statements raise serious questions. "Apparently the inspector believes that each OPEG engineer required his own controlled documents. Project documentation shows that, depending on the size of the group, there were never less than three and as many as eleven sets of controlled piping procedures assigned to the OPEG Stress Group. This constituted a sufficient number of controlled procedures for use by OPEG engineers."

From personal experience and discussion with OPEG engineers, I can testify that PG&E's conclusion is absurd. Under the conditions on-site--20 to 30 engineers trying to use three sets under a very demanding schedule. As a result, they made do without control documents. They used uncontrolled documents instead.

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PG&E's assertion violates industry accepted engineering procedures. It is industry practice to assign each engineer his own controlled documents. - At Bechtel's Gaithersburg office, I was given controlled documents within two weeks of my beginning work on the DAVIS-BESSEE project. When I went to work for Nuclear Services Corporation on the Zimmer project, we all received sets of control documents within two weeks of starting. I believe this is done for two reasons--1) to be in compliance with 10 CFR 50 Appendix B Criterion VI. DOCUMENT CONTROL; and 2) because production is very important to meet scheduled completion dates and time wasted looking for information should be avoided by providing each engineer with his own project documents.

7. PG&E contends on page twenty-nine (29), "The need to specifically address thermal gap-limiting conditions in design procedures is obviated if an acceptable alternate method is used." They also state that "it is neither necessary nor consistent with normal engineering practice to specify in the design procedures the limiting conditions for the use of thermal gaps."

In response to these statements, I would like to quote from 10 CFR 50 Appendix B, III. DESIGN CONTROL. "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in §50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. These measures shall in-

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clude provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled." (Emphasis added)

Further, the contention that it is not normal engineering practice to specify in the design procedures the limiting conditions for the use of thermal gaps empirically is false. It is my experience that the engineering firms in which I have worked have had procedures directing the use of thermal gaps.

Unlike Diablo Canyon, industry practice is that a seismic restraint is not modeled with a thermal gap. Nor are the construction and radial gaps which provided for the pipe diameter growth used as thermal gaps as such, as they are at Diablo Canyon. The use of these small gaps, 1/16 to 3/16 of an inch, is not a normal practice and does require procedures to limit their use to ensure that deviations from such standards are controlled.

8. On the bottom of page twenty-nine (29), PG&E states "The affected analyses have been rerun without gaps in these locations. The results indicate that all piping, supports and equipment remain qualified in accordance with licensing criteria."

I have a serious reservation about this statement. Before I state my reservation, I would like to state the standard industry practice in the use and application of thermal gaps based on my knowledge as a pipe stress engineer. First, it is standard practice to design a pipe system without thermal gaps if possible through good support location. Second when a thermal gap is used, it is because

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system (pipe, supports and connections to equipment) is over-stressed at some point, and without the use of the gap, design criteria (stresses) can not be met. I therefore believe the statement made by PG&E to be false.

9. On page thirty (30) PG&E asserts, "A specific design procedure to describe the methods or limitations for modeling pin joints (joint releases) is not required. The use of joint releases is a well-accepted engineering practice that is standard in engineering evaluations of frame structures." This is followed in the next paragraph by "It can be pointed out that this well-accepted engineering technique was used very infrequently in the course of the small bore analysis."

It is false to imply that joint releases have been commonly applied in the industry in the context defended by PG&E at Diablo Canyon. Joint releases are used in structural steel design to represent specific bolted connections as pin-joints. They are almost never used in pipe support design, because typically all joints are welded all-around or on all accessible sides. Most pipe support engineers have never worked as structural steel designers and are not familiar with the use of joint releases. The use of joint releases should be spelled out in a procedure or instruction to ensure "that deviations from such standards are controlled." 10 CFR 50 Appendix B, III. It was not at Diablo Canyon.

10. On page thirty-two (32), PG&E states "The walkdowns for the 79-14

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requirement were performed in 1980 and 1981. The NRC Staff signed off ^{off} CCS on this effort in 1981."

I question the validity of these sign-offs based on what has been learned since 1981. During that period, there have been many changes to the systems due to the reverification program. During this work, the as-builts did not reflect the installed hardware. These drawings in many cases had been as-built up to five (5) times and they still were not accurate. The Quick Fix Program exacerbated further, how much of the actual design is correctly as-built. No one can truthfully say that the drawings reflect what is installed at Diablo Canyon, even Mr. Yin found discrepancies in the as-built drawings.

Several lines from 79-14 demonstrate the significance of this issue. "The staff has determined, where design specifications and drawings are used to obtain input information for seismic analysis of safety-related piping systems, that it is essential for these documents to reflect as-built configurations. **Where subsequent use, damage or modifications affect the condition or configuration of safety-related piping systems as described in documents from which seismic analysis input information was obtained, the licensee must consider the need to re-evaluate the seismic analyses to consider the as-built configuration.**" (third para.) PG&E has conceded that 63% of the plant has been modified since the earlier walkdowns. '79-14 requirements should be reperformed.

11. In a discussion of the Quick-Fix Program in the second paragraph

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on page thirty-eight (38), PG&E states "Field construction problems were referred to PSTDC team engineers who, based on their engineering judgment and knowledge of DCM M-9, would, on a case-by-case basis, determine whether use of expanded tolerance limits could be authorized to resolve the construction problem while maintaining an acceptable support design."

This is a false and misleading statement. I know one engineer was hired and assigned to the PSTDC group who had no previous knowledge of M-9, nor did he have a copy of M-9 to consult in the field. I also know other engineers who had only worked in the San Francisco design office for several weeks prior to their assignment to the PSTDC group. They had very little knowledge of M-9. They were not assigned copies of M-9 to use in the field. Without knowledge of the design requirements contained in M-9, there was no way for these engineers to determine whether an expanded tolerance could be authorized to resolve a construction problem while maintaining an acceptable support design, other than through their engineering judgement alone. This is not enough. In this instance, the breakdown in training and the continued lack of necessary design information in the field means that, in an unknown number of cases, the Quick Fixes were just hunches. The review of all Quick Fixes is required to ensure that important design information shown on them is checked in the as-built review program.

12. Still under the PSTDC discussion on page thirty-eight (38) but in paragraph no. four, PG&E would like all parties concerned in the

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safety of Diablo to believe that I don't know what I am talking about. "Notwithstanding Mr. Stokes' apparent lack of knowledge, all the PSTDC group's modifications received final engineering review and approval as part of the as-built acceptance."

In reply to this, I would like to inform all interested parties that PG&E has never asked me to explain or clarify any statement I have made. Had they, I would have informed them that I was in touch with fellow Unit 1 engineers while I was in the PSTDC group. They told me that in performing the as-built reviews; PSTDC's were not part of the as-built review package. They were only given the as-built drawing to review and accept.

This is the same practice which was followed prior to March 1983 when I was part of the Unit 1 group. During this time, we were asked to approve as-builts which were not like the design drawings which we had issued to the field for construction. I was not aware that the PSTDC group was formed in January 1983.

I should also say that before March 1983 the engineer who designed a support also did the as-built acceptance of that support. This was changed in March because the Unit 1 group was split into two (2) groups. The engineers who were questioning management about the changes were assigned to Unit 2. This included myself.

13. On page thirty-nine (39) in the third paragraph, discussing the PSTDC program PG&E states "In August 1983 an audit was conducted by the PG&E QA Department which resulted in the overall conclusion that the control of design changes by OPEG appeared to be effectively imple-

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mented. One finding was identified with respect to use of the PSTDC forms. In response to this finding, special training sessions were held in October 1983 for all PSTDC engineers to emphasize the limitations on the use of PSTDC forms and **to assure that Design Change Notices would be initiated when required by the procedures.** (Emphasis added.) Then in the fourth paragraph in explaining "the June 16, 1983 memo, referred to by Mr. Stokes," PG&E says, "Summarized, the memo states that the PSTDC program is not a corrective action program and may not be used in lieu of construction discrepancy reports (DRS and DCNs). This memo was not applicable to the PSTDC engineers and as such did not receive distribution to them." (Emphasis added.)

It appears to me based only on the above two PG&E quotations that the last line of the second quotation is a false statement. This is supported by PG&E's QA Audit finding. (See emphasized comments) I would like to quote item 1 from the June 16, 1983 memorandum. "If an item on the process sheet has been accepted by Quality Control and then it is determined that a PSTDC is necessary to authorize this change, Pullman will generate a DCN prior to requesting the PSTDC. **PSTDC will monitor to assure that this is complied with.**" (Emphasis added.) Clearly, the document should have been given to the PSTDC engineers; if PSTDC was to monitor the generation of DCN's as stated in this memo.

To my knowledge, I was the only PSTDC engineer who had a copy of this memo other than my group leader Jeff Von Klompenberg. As a result, I was the only PSTDC engineer who consistently saw that the applicable DCN or DR was generated by Pullman. Many times when I asked for the DCN or DR to be generated before I wrote a PSTDC, the

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Pullman Field Engineer, Pre-Inspect Engineer or Redliner would walk away not to return during my shift. I checked with the day shift PSTDC engineers the following day and found that they had issued the PSTDC without requiring the necessary DCN or DR. Had this memo been distributed to the PSTDC engineers in June 16, 1983, many DCN's and DR's would have been generated, forming a record of existing defects discovered at Diablo Canyon during the reverification program. This information could have been used to correct other generic safety related defects. This knowledge has been lost.

14. Witnesses still on-site have described how Quick Fixes are still being used to disposition DCN's and DR's. This means that DCN's and DR's have been and are being closed out on the promise of future engineering review. As seen above, often the engineering reviews never took place. All DCN's and DR's dispositioned with Quick Fixes should be reopened to receive correct engineering resolution prior to their being closed out.

15. On the top of page forty (40), PG&E goes further "The PSTDC engineer is not, however, required to monitor writing of discrepancy reports by construction."

The point is that the PSTDC engineers should have been, as seen by the discussion of No. 13 above and PG&E's comment on page forty-two (42) last paragraph. "The PSTDC program may have used used in situations where a Discrepancy Report (DR) or Design Change Notice (DCN) was necessary."

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The last statement should say was used, not "may have."
Based on my discussions with other witnesses, I believe that Quick Fixes have continued to serve as substitutes for quality reports well into 1984.

16. On the top of page seventy-seven (77) in PG&E's response on audits, PG&E states, "Program audits provide coverage of all QA Program elements as required by Regulatory Guide 1.33 and 1.144."

In my opinion, this is a false statement. This is based on reading Regulatory Guides 1.33 and 1.144 for myself. The first point which is relevant is that Guide 1.33 is titled "QUALITY ASSURANCE PROGRAM REQUIREMENTS (OPERATIONAL)." The audits discussed on page seventy-seven (77) are during the construction phase not operation. The second point which is important is taken from the third paragraph under B. DISCUSSION. "A separate regulatory guide addressing the quality assurance program for the preoperational phase will be issued." After reading Reg. Guide 1.33, I don't believe it should have been included in PG&E's comments.

Regulatory Guide 1.144 in Section B. DISCUSSION in the second paragraph, discusses two documents "WASH-1283, Revision 1, Guidance on Quality Assurance During Design and Procurement Phase of Nuclear Power Plants," dated May 24, 1974 (Gray Book, Revision 1), and WASH-1309, 'Guidance on Quality Assurance Requirements During the Construction Phase of Nuclear Power Plants,' dated May 10, 1974 (Green Book, Revision 0)." In the third paragraph, it is stated that "ANSI/ASME N45.2.12-1977, subject to the regulatory exceptions in

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Section C of this guide, will replace N45.2.12 (Draft 3, Revision 4) contained in WASH-1283 and WASH-1309 in the evaluation of proposed auditing procedures for the applicant's quality assurance program included in construction permit and operating license applications." (Emphasis added.) From the sections quoted above, it appears Reg. Guide 1.144 does apply to the discussion of PG&E's audit procedures. Looking to Section C, first paragraph, "The requirements that are included in ANSI/ASME N45.2.12-1977 for auditing quality assurance programs for nuclear power plants are acceptable to the NRC staff and provide an adequate basis for complying with the pertinent quality assurance requirements of Appendix B to 10 CFR Part 50, subject to the following." (Emphasis added.)

Continuing in Reg. Guide 1.144 Section C.3.

3. Section 3.5.2 of ANSI/ASME N45.2.12-1977 requires that audits of quality assurance activities be regularly scheduled to ensure that the quality assurance program is adequate and that activities are being performed in accordance with the quality assurance program. **The frequency of the scheduling of audits is dependent on the status and importance of the activities**, and the following is considered acceptable scheduling:

a. Internal Audits

(2) Design and Construction Phase Activities--Applicable elements of an organization's quality assurance program should be audited at least annually or **at least once within the life of the activity**, whichever is shorter. In determining the scope of the audit, an evaluation of the area being audited may be useful. The evaluation may include some or all of the following: **prior quality assurance program audits; results of audits from other sources; nature and frequency of identified deficiencies; and significant changes in personnel, organization, or quality assurance program.** (Emphasis added.)

I don't think PG&E's audits fully met the intent of the above

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Section, especially the emphasized portions. They didn't comply with the frequency requirements per C.3.a.(2) "at least once within the life of the activity." Neither did they consider the emphasized parts of C.3.a.(2) "prior quality assurance program audits" (examples: deficient SITE INVESTIGATION--HOSGRI FAULT ANALYSIS pre-1981-82--MIRROR IMAGE PROBLEM--REVERIFICATION PROGRAM); "results of audits from other sources" (example: NSC AUDIT 1977); "nature and frequency of identified deficiencies" (examples: ALL USED SO FAR); "and significant changes in personnel, organization, or quality assurance program." "Significant changes in personnel, organization, or quality assurance program" accrued almost weekly during the reverification program.

Continuing in Reg. Guide 1.144 Section C.3.b. External Audits

(2) For other procurement actions not listed in Item C.3.b.(1), audits should be conducted as follows:
Elements of a supplier's quality assurance program should (shall per C.4) be audited by the purchaser on a triennial basis with the audit implemented in accordance with Section 4, "Audit Implementation," of ANSI/ASME N45.-2.12-1977. (Skip several lines) When a subsequent contract or a contract modification that significantly enlarges the scope of activities performed by the same supplier is executed, an audit should (shall per C.4) be conducted of the increased requirements, thus starting a new triennial period.

PG&E would have had to perform an audit almost weekly to have complied with the requirements of Reg. Guide 1.144 for Internal and External Audits.

17. On page eighty-one (81) and other locations in many responses PG&E states "technical QA audits are not a requirement of 10 CFR 50

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Appendix B."

In response to PG&E's persistent statement, I would like to quote 10 CFR 50 Appendix B, Section XVIII. AUDITS dated June 17, 1970.

A comprehensive system of planned and periodic audits shall be carried out to verify compliance with **all aspects of the quality assurance program** and to determine the effectiveness of the program. The audits shall be performed in accordance with the written procedures or check lists by **appropriately trained personnel not having direct responsibilities in the areas being audited**. Audit results shall be documented and reviewed by management having responsibility in the area audited. Follow up action, including reaudit of deficient areas, shall be taken where indicated. (Emphasis added.)

I would also like to quote the last line of ANSI/ASME N45.2.12-1977 Section 4.2.2 Team Selection.

4.2.2 Team Selection. (Several lines omitted) In selecting personnel for auditing assignments, consideration shall be given to **special abilities, specialized technical training, prior pertinent experience, personal characteristics, and education**. (Emphasis added.)

It is true that 10 CFR 50 Appendix B, Section XVIII does not say "technical audits are required" but I believe the reason for including "appropriately trained personnel not having direct responsibilities in the areas being audited" was because it was and is intended that all seventeen Sections listed before Section XVIII. AUDITS were to be audited. (Emphasis added.) No one section was to be self-monitoring.

This is implied by the emphasized section of Section 4.2.2 of ANSI/ASME N45.2.12-1977 also. Why would the authors require personnel to have special abilities, specialized technical training, and prior pertinent experience if technical audits were not required?

In practice, this commitment is honored outside of Diablo

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Canyon within the industry. Many design firms for which I have worked have included technical QA audits of engineering to ensure their compliance with the required CODES, STANDARDS AND the PSAR requirements.

At a minimum, the examples above raise serious questions whether the problems at Diablo were the result of deliberate management policy. Even more significant, PG&E's April 4th submission demonstrates that management is still defending a program which represents possibly the lowest standards in the industry, and is still defending it with false and misleading statements. The implications for PG&E's character and competence to operate the plant as well as the lingering effects on design must be resolved before the plant goes commercial.

I have read the above -18- page statement and it is true, accurate and complete to the best of my knowledge and belief.

Charles C. Stokes
Charles C. Stokes, PE.

Subscribed and sworn to before me this 15 day of ~~May~~^{June}, 1984.



[Signature]
Notary Public in and for the County of San Luis Obispo, State of California

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