UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
PACIFIC GAS AND ELECTRIC COMPANY	)	Docket Nos. 50-275 OL
	)	50-323 OL
(Diablo Canyon Nuclear Power Plant, Units 1 and 2)	)	

AFFIDAVIT OF DR. MARK HARTZMAN
REGARDING THE JOINT INTERVENORS'
MOTION TO AUGMENT OR, IN THE
ALTERNATIVE, TO REOPEN THE RECORD

I, Mark Hartzman, being duly sworn, state as follows:

1. I am employed by the U. S. Nuclear Regulatory Commission as a Senior Mechanical Engineer in the Mechanical Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation. A copy of my professional qualifications is attached.

2. I have reviewed the Joint Intervenors Motion to Augment or, in the Alternative, to Reopen the Record, dated February 14, 1984, and the attached affidavit by Charles Stokes, Exhibit C, dated February 1984. I have also participated in the staff site visit of Jan. 4-10, 1984.

3. I will address allegations 1, 2, 5, 6, 7, and 11 of Section A, allegation 4 of Section B, Section C, and the technical and non-technical issues mentioned in Section D, of the Joint

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HARTZMAN EXHIBIT 1

Intervenors motion to reopen the record on Design Quality Assurance.

Stokes Affidavit of November 1983

A.1. Construction of New Pipe Supports to Avoid Sample Expansion
As characterized in the Motion, Mr. Stokes asserts:
(1) construction of new pipe supports near previously failing supports, in order to redo the calculations and "pass" the failed pipe supports, thereby avoiding the requirement to expand to sample due to an initially high failure rate.

During an audit performed at the site on Jan. 9, 1984 the staff selected a random sample of ten new piping supports, from different piping analyses, and determined that three existing old supports were in possible close proximity. The calculations for these supports were reviewed to determine if these had not been qualified before the addition of the new supports. No deficiencies were noted. In all cases the new supports were added at the request of the piping stress group and were properly documented. PG&E also provided information in a letter of Feb. 7, 1984 which lists reasons for adding new restraints such as meeting code break criteria and valve acceleration requirements. They also indicated that in some cases new supports were added near existing supports to reduce the loads on the existing supports. This is an acceptable procedure in accordance with current engineering practice. The staff has reviewed this information and concluded that there is no basis for this allegation.

However, due to the proximity of some of the new supports to older supports and/or anchoring supports and snubbers, the possibility exists

that due to physical gap tolerances permitted in the construction of rigid supports the actual load distribution among the supports may not correspond to that on which the piping and supports analyses were based. As a result the design criteria for some anchors or supports may be substantially exceeded (possibly including inelastic deformation and/or bolt pullout) and seismic loads increased (due to possibly significant changes in system natural frequencies). PG&E will therefore be required to verify that the load distribution in closely spaced supports for those piping systems where this condition exists corresponds to the as-built configuration of these supports.

A.2. Exaggerated Load Ratings - U-bolts

> As characterized in the Motion, Mr. Stokes asserts:
> (2) design drawings that exaggerated the load ratings, or strength, of hardware such as U-bolts by up to four times more than claimed by those who sold the bolts. The ratings were possible due to inaccurate assumptions about pipe size and room temperature conditions, as well as failure to mention that the bolts were forcibly bent in order to achieve the load ratings. Engineers were instructed to continue relying on the false load ratings, even after the inaccuracies had been exposed.

Motion at 5.

PG&E has submitted background information on U-bolt allowables for small bore pipe supports in letters of Dec. 28, 1983 and Feb. 7, 1984. A meeting with the DCP was held at the site on Jan. 6, 1984, in which PG&E discussed and provided the technical basis for the U-bolt allowables

specified in DCP design documents. This meeting was attended by personnel from PGE, Bechtel S.F. and Bechtel Gaithersburg.

The staff has reviewed the PG&E submittals and test data. The U-bolt allowables were determined in accordance with prescribed procedures specified in ASME Section III, Subsection NB-3260. A concern regarding the sample size used in the tests was satisfactorily resolved in that PG&E based the allowables on the lowest test load of all tests for a given bolt diameter and loading type and not on the average test loads. This is considered equivalent to the requirement in NF-3260 that test loads be derated by 10% if the test consists of a single specimen. PG&E also demonstrated satisfactorily that the interaction equation specified in the DCP design documents has a reasonably adequate technical basis.

The concern regarding inaccurate assumptions about pipe size is not clear. The load rating or load carrying capacity of U-bolts, or any other kind of pipe supports, is independent of the local deformation or thickness of the attached pipe. Mr. Stokes refers to pipe buckling on Motion 7. There are two kinds of buckling which a pipe may experience while restrained by a U-bolt: local (ring) buckling and column buckling. Presumably he is referring to local buckling. This type of buckling can occur only if the U-bolts are clamped extremely tight around the pipe during installation. Current installation practice, as noticed during a site walkdown indicates that pipes clamped with a small gap, similar to those in rigid box restraints. For the pipe to experience column

buckling while clamped by a U-bolt would require the pipe to be completely ruptured some distance away from the U-bolt. No circumstances leading to such type of buckling have been asserted nor have any been reported or noted during staff site visits. Unless additional and specific detailed clarification is provided the staff cannot determine the nature of this concern.

The concern regarding room temperature conditions at which the U-bolt tests were performed has no basis. PG&E has stated that the U-bolts are not used in seismic applications above 650°F. The load rating for these U-bolts is based on the ultimate strength of the bolt material which is invariant between room temperature and 650°F. Therefore test loads and the load ratings obtained at room temperature are valid throughout this range. Mr. Stokes has also stated that there are lines in the plant with temperatures up to nearly 1000'F. The highest pipe temperature in a pressurized water reactor system is 635°F, which occurs in the hot leg of the reactor coolant piping during faulted conditions. The basis for his statement is therefore technically incorrect.

The statement that bolts were forcibly bent in order to achieve the load ratings is also unclear, unless it refers to the deformations experienced by the U-bolts at the test loads during the tests, during which such deformations would be expected to occur. Other deformations may also occur during the installation process, which are, however considerably smaller than the deformation which U-bolts experience

during the manufacturing process. The DCP has also provided at a meeting on Jan. 9, 1984 the results of a study of 112 U-bolts which were randomly sampled from the small bore support design calculation packages on site. They indicated that roughly 75% of the sample U-bolts were loaded below the allowables specified by the manufacturer, and thus considerably lower than the DCP specified U-bolt allowables.

Based on the information above the staff has determined that there is no basis for this allegation.

A.5.7 Destruction of Calculations - Reanalysis of Failed Pipe Supports

> In addition, as characterized in the Motion, Mr. Stokes alleged: (5) destruction of engineering calculations that failed pipe supports, along with references in the calculations log to the engineering reviews that produced this "wrong" results. In Mr. Stoke case, the log only reflects his work for five out of more than 100 calculations which he prepared. "[T]he original calculations demonstrating system failures vanished";
>
> (6) complete reanalysis of the failed pipe supports described above by new engineers, although their official mission was merely to conduct routine reviews for the accuracy of previous completed work;
>
> (7) a stated policy that once an engineer signed off on calculations, "they were Bechtel property and Bechtel could do what they pleased, including destroying them and having someone else rewrite them".

Motion at 6 and 7.

The staff has reviewed design calculations provided by Mr. Stokes, the relevant DCP design calculations packages, and the site design calculations logs.

Mr. Stokes has provided ten alternate calculations, which are not included in the design packages of record. Of these, two pertain to supports which have been deleted (MP 416 and MP 285). One calculation (MP 345) pertains to a related allegation on altered documentation (see page 12 below). A review of the remaining calculations is summarized as follows:

	Calculation Package	Calculation provided by Stokes	Calculation of Record
1	MP-988 Hgr 100-132	Rev. 1 shows base plate failure	Rev. 1 shows baseplate and bolts acceptable. Contains errors. Different analyst.
2	MP-301 Hgr 2182-93	Rev. 1 shows rigid frequency requirement not satisfied	Rev. 1 refers calculation to Hgr 169-12. Different analyst.
3	MP-302 Hgr 2182-94	Rev. 1 shows rigid frequency requirement not satisfied	Rev. 1 refers calculation to Hgr 169-12. Different analyst.
4	MP-268 Hgr-98-82	Rev. 1 shows bolt failure by hand calculation	Rev. 1 shows bolt acceptable based on computer calculation. Different analyst
5	MF-357 Hgr 2182-91	Rev. 1 shows rigid frequency requirment not satisfied, based on hand calculation	Rev. 1 shows rigid frequency requirement satisfied, based on computer calculation. Different analyst
6	MP-303 Hgr 2182-64	Rev. 1 shows rigid frequency requirement not satisfied, based on hand calculation	Log indicates referral to calculation MP-997.
7	MP-277 Hgr 2182-66	Rev. 1 shows failure in torsion	Log indicates referral to calculation MP-174. Different analyst

The evidence provided by Mr. Stokes indicates that in all cases the initial calculations show that some design requirement was not satisfied, and which are not included in the design packages of record. However, the staff was not able to verify explicitly that on-site management has actually destroyed these calculations exclusively because failure was shown. The DCP has stated (letter of Feb. 7, 1984) that the only calculations required to be retained in accordance with ANSI Standard N45.2.9 (1979) are the final calculations which show the qualification of the design. The same letter also provided information for the fact that certain calculations were performed by more than one analyst.

The calculation logs have also been reviewed to determine that names and dates match those of the calculation packages. There appear to be two logs, one of which is older and appears to be a subset of the current log. For design package MP-988 these logs show two different Rev. 1 analysts, although both calculations are shown approved on the same date. A similar instance was found for a different design package, MP-994. The DCP has stated that the older log was an informal log, kept as an aid by the Assistant Onsite Project Engineer, and was never updated. The current log, also termed the record calculation or master index log, is the only log which according to PG&E is required to be kept up to date. The staff has found that the allegation that management has purposely destroyed documentation is not substantiated.

The allegation that new staffers were assigned to reperform the calculations, and that the master log does not reflect the initial calculations, has been verified. However, the circumstances which form the basis for the allegation need considerable clarification. The staff has recommended that the Office of Investigation should conduct an investigation regarding retention of documentation and certain personnel practices.

A.11 Angle Members Stress

As characterized in the Motion, Mr. Stokes asserts:

> (11) angle members, another form of pipe support, that were up to four times too long for allowable bending stress under the relevant professional code. In an hour walkdown, Mr. Stokes found over 200 violations, on approximately 100 out of 300 frames checked. Some unreliable supports have been repaired, while equivalent pieces remain untouched.

PG&E has provided detailed background information on unbraced length specifications and design criteria for angle beams in the letter of Feb. 7, 1984. PG&E also has provided two technical reports on investigations performed by Australian researchers on the structural analysis of angle beams. One report describes the theoretical investigation in the structural behavior of angle beams subjected to bending type loads, while the other provides data of an experimental investigation in angle beam behavior subjected to the same type of loading. Based on these tests and the theoretical evaluation, criteria were developed for specifying safe unbraced lengths of angle beams. These criteria were adopted by PG&E for the DCP evaluation of angle beams. The staff is

currently reviewing the PG&E submittal and the two technical reports which form the basis for the DCP angle beam unbraced length design criteria. The unbraced length criteria adopted by DCP from these reports exceed those specified by the American Institute of Steel Construction (AISC) Manual of Steel Construction (7th Ed). However, the AISC Manual does not provide guidance in the evaluation of angle beams greater than certain lengths and laterally unsupported, and indicates that special investigations are necessary for laterally unsupported angle beams subject to torsion. In this sense the reports provided by PG&E satisfy this requirement. In addition, the specification in the AISC Manual of Steel Construction for single angle beams and columns subjected to general loading is an ongoing area of industry investigation.

Based on the review performed to date, the basis for the DCP criteria regarding unbraced lengths of angle beams appears to be technically sound. However, the acceptability of these criteria will be determined when the staff completes its in depth review. These criteria may therefore not be acceptable for all loading conditions and combinations and may have to be revised by the DCP to satisfy staff concerns regarding the safety of pipe supports containing angle members.

According to Mr. Stokes at the time he wrote his allegation he was not aware of the existence of these reports nor the basis for the DCP unbraced length criteria. He stated that he requested the basis for

these criteria from the DCP management which apparently never provided it. (Transcript of the Jan. 25, 1984 meeting between the Staff and C. Stokes pages 125-132). Therefore, the assertion of the violation as stated in the allegation is based on a professional disagreement with DCP technical criteria, which may or may not have a basis. A copy of these reports were sent to Mr. Stokes, C/o GAP on February 16, 1984.

B. Stokes Affidavit of February 1984

B.4. Failure to Include Assumptions in Final Calculations

The Motion states Mr. Stokes' allegations that there has been a:

> (4) failure to include the assumptions in the final calculations in the seismic design review, thereby precluding effective tracking.

Motion at 10.

Mr. Stokes refers to assumption sheets which are supposed to be included in final calculations. The reference to these sheets is obscure; no calculation sheets specifically labeled "assumptions" have been found in the calculation packages available to the staff at any stage of the calculations, nor is it clear that such sheets were required. The calculation packages reviewed by the staff appear to contain all necessary assumptions to perform the final calculations and qualification of small bore supports.

C. Board Notification 84-022

On January 25, 1984 I participated as a member of the NRC staff in a meeting with Mr. Thomas Devine, GAP, and Mr. Charles Stokes, which

purpose was to expand and provide additional information regarding Mr. Stokes allegations. A copy of the transcript was provided to the Appeal Board thru the referenced Board Notification.

Additional allegations were stated at this meeting which have been examined by the staff to determine whether they had been previously addressed. The staff has determined that the additional allegations raised by Mr. Stokes and Mr. Devine concern issues that are included within the scope of those currently under review by the staff.

D. NRC Assessment

The Intervenors Motion refers to a number of specific technical and non-technical issues which were contained in the various allegations by Mr. Stokes and others, assigned to the NRR staff for review. Following is a description of these issues and their present state of resolution.

Non technical issues:

1. Altered current documentation

   The staff reviewed a total of fifteen small bore support design packages. No evidence of directly altered documentation has been found. Two instances were found in which a supervisor changed a fix proposed by the analyst, without supporting calculations. (Calculation MP-071, Hanger 2171-16 and calculation MP-345, Hanger 2182-74). In both instances the supervisor signed the modifications, which appear to have been made based on judgement. These supervisor initiated changes appear to be reasonable. In addition, PGE has also provided additional information in the

letter of February 7, 1984 regarding the circumstances under which these changes were made. The staff finds this information acceptable and considers this issue resolved.

2. Destroyed documentation

See A.5, page 6.

Technical Issues

1. Code break locations have been revised in order to reduce the number of safety related supports, and many of those that failed were omitted in the review program.

To address this issue the staff reviewed the piping design package 3-313 during a site audit on Jan. 10, 1984, and performed an inspection of the code break region. PG&E also submitted an extensive response to this issue in the letter of Feb. 7, 1984, which provided additional information and clarification on the DCP code break analysis methodology. Based on this information the staff has determined that there is a basis for the allegation, but also that the final specification of code break locations and the design of the related supports were reasonably determined based on proper engineering analysis. This issue is therefore resolved.

2. Different penetration stiffnesses in static and dynamic analysis. In certain small bore piping stress calculations, rigid foam

penetrations had been modeled with different stiffnesses under static and dynamic loading.

PG&E stated in a submittal dated December 28, 1983, that this modeling assumption was applied at three wall penetrations involving seven small bore piping systems. They also stated that these piping systems were reanalyzed under the assumption that there is no thermal or seismic restraint at the penetration locations. The results show that the piping and pipe supports remain qualified for thermal and seismic loading under this assumption. The staff checked two piping stress calculations, 8-301 and 8-307, and found that the rigid foam penetrations had been modeled with different stiffnesses. In addition, in calculation 8-307 the staff verified the DCP assertion that the stresses increased but still met the required allowables under the assumption of no thermal or seismic restraint. The staff considers this issue resolved.

3. Modeling of rigid support gaps in small bore piping thermal stress analysis.

This issue pertains to the inclusion and modeling of existing or non existing gaps in rigid restraints in piping stress analysis with the objective of reducing thermal loading in piping. These gaps may or may not exist. The staff has reviewed information regarding this issue provided by PGE in letters of Dec. 28, 1983 and Feb. 7, 1984. PG&E has stated that the DCP reviewed all small bore piping analyses and determined that this modeling technique

was used in 25 small bore piping analyses affecting a total of 64 supports. Sixteen of these analyses involved piping with service conditions below 200°F, where thermal movement is of relatively minor concern. For the other 9 analyses the temperature exceeds 200°F, and these analyses include 16 affected supports. The DCP stated that in 15 of these supports gaps were specified and modeled to reduce the effects caused by thermal anchor movement of attached large bore piping. For the remaining supports the gap was modeled to relieve thermal loads induced by two opposing supports restraining the pipe in the same direction. The DCP also stated that the thermal anchor movements due to large bore piping expansion are repeatable throughout the life of the plant.

Based on this information the staff concluded the following: Gaps were modeled in accordance with as-built conditions; there is no evidence that non-existing gaps have been assumed in thermal analyses; ignoring existing gaps in thermal analyses represents a conservative approach. In addition, Mr. Stokes has not provided specific information where instances of non-existing gaps have been assumed. There therefore appears to be no basis for this allegation. However, the practice of modeling gaps in piping thermal analyses is acceptable only if these gap configurations can be shown to be present and repeatable throughout the life of the plant. Otherwise, a more conservative approach is to ignore these gaps in thermal analyses. Previous plant experience has shown that

gaps in supports are not always repeatable. Therefore PG&E will be required to develop and institute a program of inservice inspection to verify and monitor the support gaps modeled in those thermal piping analyses where operating temperatures exceed 200°F.

4. Different stiffnesses for the same rigid supports in static and dynamic piping analysis.

The staff reviewed piping stress calculation 8-304 and has verified that for two rigid supports a finite stiffness was used in the static (thermal) analysis while the stiffness of the same supports was taken as infinite in the dynamic (seismic) analysis. PG&E has stated in the letter of Feb. 7, 1984, that this technique was used in four out of 129 computer based piping analyses to reduce the calculated thermal loads. To address this concern they stated that they have reperformed these four calculations with the same stiffness for both the static and dynamic analyses. The results of these analyses demonstrated that the stresses and supports meet the requisite licensing criteria and are therefore acceptable. The staff has determined however that current industry practice is to use the same support stiffness for both type of analyses. Therefore the use of different stiffnesses for the same support by the DCP is considered to be a modeling deficiency, and will require a commitment to modify the Design Criteria, specifying the same stiffness in all future piping analyses.

5. Calculational error and modeling deficiencies in support design packages.

Although no allegation has been made regarding errors in support calculations, this issue resulted from a review of small bore pipe supports design calculations to verify specific allegations. The staff reviewed a total of 12 small bore pipe support design packages, 9 of which showed either a design QA deficiency, design or modeling deficiency or calculational errors. Three of the calculations indicated calculational errors (such as incorrect computer program input), two of which are known to be significant. The DCP has corrected these errors and reperformed these calculations, showing that the allowable stresses and loads are satisfied.

PG&E has stated in the letter of Feb. 7, 1984 that the DCP has reviewed 110 support design calculations since the Dec. 15, 1983 meeting in Bethesda, MD. They have determined that 22% of these calculations had significant discrepancies, and that these support calculations were acceptable on the basis of detailed calculations. They have also indicated that 74% of all discrepancies consisted of modeling, input or calculational errors. They have also stated that all revised calculations met the design requirements and that no physical modifications of any of these re-analyzed supports were required.

The number of deficiencies found in the sample of support calculations reviewed by the staff and the sample re-examined by the DCP exceeds that which would have been expected at this stage of the re-verification effort. The staff therefore finds that this is a potentially significant safety issue and has recommended that the DCP should institute an independent in-house program to reverify in detail all small bore piping supports which were either qualified or requalified by the DCP based on computer analysis. This program should be completed before assention to full power operation. In addition the NRC staff will audit such a reverification effort on a sample basis until this issue is satisfactorily resolved. However, since no supports have been found to date which require physical modification there appears to be no immediate impact on low power operation.

6. New supports were added within six inches of unacceptable supports. The new supports contain inaccurate assumptions on restraining gaps, and did not have control or document numbers.

During an audit performed at the site on Jan. 9, 1984 the staff selected a random sample of ten new piping supports, from different piping analyses, and determined that three existing old supports were in possible close proximity. The calculations for these supports were reviewed to determine if these had not been qualified before the addition of the new supports. No deficiencies were noted. In all cases the new supports were added at the request of the piping stress group and were properly documented. PG&E also

provided information in the letter of Feb. 7, 1984 which lists reasons for adding new restraints such as meeting code break criteria and valve acceleration requirements. They also indicated that in some cases new supports were added near existing supports to reduce the loads on the existing supports. This is an acceptable procedure in accordance with current engineering practice. The staff has reviewed all this information and concluded that there is no basis for this allegation.

7. Snubbers located adjacent to rigid restraints, thus remaining inoperative under dynamic loading.

   The staff is presently reviewing the PG&E response to this issue. This issue is therefore unresolved.

8. Improper resolution of pipe interference.

   This issue is still under review.

9. Calculations were performed to determine maximum support load carrying capacity. The results were then sent to the stress group for line model change to meet piping stress allowables.

   PGE has provided information regarding this practice in its letter of Feb. 7, 1984, in which they state that the technique of determining the maximum load carrying capacities of supports, which are then used iteratively in piping stress analyses, is analogous to calculating the load rating of standard supports. The staff has reviewed this submittal and finds that this procedure is in

accordance with current engineering practice and is therefore acceptable. This issue is therefore considered resolved.

10. Joint releases have been assumed for rigid connections, without removing the welds.

    PGE has provided information regarding this issue in its letter of Feb. 7, 1984, describing the engineering basis and the application of this technique in pipe support analysis. Based on this information the staff has determined that the allegation is substantiated. However, the staff also finds the engineering basis and approach as described by the DCP acceptable and in accordance with current engineering practice. This issue is therefore considered resolved.

11. U-Bolt allowables used by DCP are incorrect. U-Bolt interaction equation is unconservative.

    See A.2, page 3.

12. Unbraced angle-section steel members exceed AISC bending stress allowables.

    See A.11, page 9.

13. Drain line support bracket bolted to the floor with only one anchor bolt in Unit 2.

    No basis for this allegation has been found.

14. Calculation of fundamental frequencies.

The staff has expressed a concern, based on the ongoing review of the small bore supports calculations, regarding the correct application of the method for calculating the fundamental frequency of the supports. This issue is currently under review, but does not appear to have an immediate safety impact.

I hereby certify that the answers are true and correct to the best of my knowledge.

Mark Hartzman Ph.D.

Mark Hartzman, Ph.D.

Subscribed and sworn to before me
this 15 day of March 1984.

Notary Public

My Commission Expires: 2/1/86

U.S. NUCLEAR REGULATORY COMMISSION
Office of Inspector and Auditor

Date of transcription July 27, 1984

Report of Interview

James P. Knight, Assistant Director for Components and Structures Engineering, Office of Nuclear Reactor Regulation (NRR), upon telephonic interview, concerning an allegation that a Governmental decision had been made outside official channels, provided the following supplemental information to that provided by Dr. Mark Hartzman on this date:

The allegation number 87 addressed by Dr. Mark Hartzman in SSER 22 was not referred to OI as recommended by him because it was determined that no suspected wrongdoing was present and, further, that the matter had no effect on health and safety, as finally reviewed. Although Knight made this decision he communicated it to his supervisor, Richard Vollmer, with the further advice that they (review group) would still keep their "eyes open" for any indication of matters of OI investigative interest.

Investigation on July 26, 1984 at Bethesda, Md. File # 84-26

by Ronald M. Smith, Investigator, OIA Date dictated July 26, 1984

(10-82)

HARTZMAN EXHIBIT 2

Moreover, our searching review of the motions reveals nothing that causes us to question the continuing validity of the conclusions we reached in ALAB-756 and ALAB-763 -- conclusions that followed extensive evidentiary explorations of construction and design quality assurance at Diablo Canyon. For these reasons, the motion to reopen on the issue of the applicant's design quality assurance program is denied and, with the reservation noted in the footnote below, the motion to reopen on the issue of the applicant's construction quality assurance program is also denied.[21]

(Footnote Continued)
the number of errors occurring in this type of calculation to be higher than expected (NRC Staff's Answer To Joint Intervenors' Motion To Augment Or In the Alternative, To Reopen The Record (March 15, 1984), Knight Affidavit at 14). A staff imposed license condition required the applicant to redo all computer-based small bore pipe support calculations -- including additional physical effects not addressed in the original analyses. Transcript of May 9, 1984 Meeting between NRC staff and applicant at 15-23, 247. We note that the result of this program, with the reanalysis of all but 15 of 357 supports completed, shows that all of the supports meet design criteria, and no modifications are necessary. Letter from J. Schuyler to D. Eisenhut (June 11, 1984) (DCL-84-223), attachment at 1-5. Thus, errors in the small bore pipe support computer calculations, though numerous, have had no effect on the design adequacy of the supports.

[21] We reserve ruling on one matter raised by the joint intervenors' reopening motion on the issue of construction quality assurance until we receive further information from the applicant. In its February 22, 1984 motion at page 12, the joint intervenors charge that the applicant improperly used, as studs for the containment liner, A307 hardware bolts with the heads removed. According to an affidavit accompanying the applicant's response, the use of such bolts was permissible. Pacific Gas And Electric Company's Answer
(Footnote Continued)

As previously indicated, the number of diverse allegations of purported deficiencies contained in the joint intervenors' motions is very large. Even discounting the substantial repetition in the two motions, the affidavits and other documentary materials proffered as new evidence in support of the movants' charges are extensive.[22] When the

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(Footnote Continued)
In Opposition To Joint Intervenors' Motion To Reopen The Record On The Issue of Construction Quality Assurance And Licensee Character And Competence, supra note 9, Attachment C at 12-13. As an exhibit to their June 12, 1984 reply, the joint intervenors have attached a May 31, 1984 Pullman Power Products "Interoffice Correspondence" memorandum dealing with this issue. That memorandum is addressed to "Distribution" from "H. Karner" and concerns the subject of "Acceptable Stud Materials For Carbon Steel Welding (Ref: DR 5891)." The memorandum states, inter alia, that "(A-307 bolts with the heads removed are NOT acceptable)," and is signed by Harold W. Karner, QA/QC Manager.

The applicant shall inform us by July 6, 1984 why, in the words of the Pullman memorandum, A-307 bolts with the heads removed are not acceptable. The applicant's explanation shall be accompanied by appropriate affidavits of qualified experts and shall address the movants' charge, the applicant's prior response to that charge, and the recent Pullman memorandum.

[22] Not only does some of the same material accompany both motions, there is substantial repetition within the supporting materials accompanying each of the joint intervenors' motions. Additionally, the material purportedly supporting each motion is lumped together in a manner that lacks essential organization. Further, some of this material consists of anonymous statements. See note 18, supra. The movants have also included in their filings considerable material that is irrelevant and immaterial to many of their claims. Thus, the unorganized nature of the supporting material, combined with the massive amount of irrelevant matter in movants' filings, has made our task of

(Footnote Continued)

(b) The alleger is correct in stating that the WPS documents do not adequately illustrate all joint types which are welded. WPS 7/8 is qualified in accordance with ASME Section IX requirements which indicates in QW 402.1 that a change in joint type is a non-essential variable. Lack of description of all types of joints utilized is contrary to Section IX rules and requires a revision to the WPS. However, this is an administrative change only and does not require requalification of the WPS.

(c) In response to the allegation regarding unapproved welded materials, the staff reviewed each type of material identified by the alleger. Certain of these materials such as A500 and A307 were not listed in the published code but were approved for use by a separate code case. The staff is satisfied that all the materials of concern in this allegation were properly approved for ASME or AWS usage.

2. Allegations 106, 107 and 108:

The alleger stated that Welding Technique Specification No. AWS 1-1 was not applied to AWS welding in that, (a) AWS 1-1 was not referenced on every Pipe Rupture Restraint Welding Process Sheet, (b) AWS 1-1 was written and approved by an unqualified individual, and (c) AWS 1-1 specified an unlisted AWS code material.

Staff Position

(a) The alleger is correct that in some cases QC failed to clearly identify on the weld process sheets when welding was to be conducted to the WPS plus the Welding Technique Sheets. However, the use of Welding Technique Sheets to amplify and clarify WPS documents is an accepted standard industry practice. At Diablo Canyon the significant clarification made by the Welding Technique Sheet is the introduction of tighter controls on preheat. Whether this information was directly tied to the WPS through the technique sheet is of little consequence since the same information is clearly stated in other relevant documents (EDS 223 and EDS 243). As the preheat is covered in all cases, the inclusion of the exact document, whether it is the WPS or Welding Technique Sheet identification, is considered to have no engineering or quality related significance.

(b) The alleger expressed concern that a Welding Technique Sheet was prepared by an unqualified individual. In so doing Pullman utilized a QA/QC person to perform a function out of his area of expertise and permitted this individual to audit his own work. The staff found that there are no codes and standards requirements that state that a WPS or Welding Technique Sheet must be prepared by a specific individual. The only requirement is that the document adequately address the codes and standards variable rules i.e., essential and non-essential variables. The WPS documents and Welding Technique Sheets met the rules (with the exception of the QW 402.1 non-essential variable as previously discussed) and were properly approved by the licensee. QA/QC personnel normally monitor

implementation of programs and procedures, the fact that they may have assisted in writing the implementing procedures does not support the conclusion that QA/QC is auditing its own work.

(c) The alleger is correct that ASTM A515 steel is not listed in AWS D1.1 as an approved welding material. The staff found that A515 is not listed in AWS D1.1 Structural Welding Code because A515 is normally considered as a pressure vessel material. However, A515 was properly qualified and is acceptable material for welding structures in compliance with AWS D1.1 rules.

3. Allegations 109 and 110:

The alleger states that structural steel pipe supports were not designed, fabricated and erected to the American Welding Society (AWS) code. He further states that the PG&E Contract Specification 8711 requires pipe supports to comply with the applicable standards of the ASTM, ANSI, ASME, MSS, AWS, and PFI. Additionally, he states there was no change to the PG&E contract specification to allow pipe support to be worked to a standard other the AWS.

Staff Position

The staff found that the pipe support work was properly done to the ASME code which is permitted by the AWS code. Supporting details of the staff's findings are as follows:

- The American Welding Society D1.1 permits the ENGINEER to "accept evidence of previous qualification." It is normal practice to interpret this as permitting ASME Section IX welding qualification in lieu of D1.1 qualification by testing. In addition, the 8711 Specification Section 3 (para 4.11 and 4.12) require performance and procedure qualification in accordance with Section IX. Based on staff reviews, the welding qualification methods utilized by Pullman meet ASME Section IX requirements.

- The materials for pipe support welding were: A36, A500, SA515, SA516, and bolting materials A307, and A108 (grades 1010-1020). The staff found that each of these materials is suitable and allowable for ASME pipe support welding.

The staff reviewed Pullman procedure qualification documentation for engineering justification for welding in accordance with current ASME Section IX and AWS D1.1 rules (through utilization of the ENGINEER'S prerogatives in paragraph 5.2). This review included the procedure qualifications for "as-welded" fabrications and the following types of welding: ASME P1 to P1 material using shielded metal arc welding (SMAW); AWS Group I to Group I, using SMAW; AWS Group II to Group I and II, using SMAW; Welding of SA500, A441, A588, using SMAW; welding ASME P1 to AWS Group I using gas tungsten are welding (GTAW), ASME P8 to P8 using SMAW; ASME P8 to P8 using GTAW; tack welding, using SMAW or GTAW. Various thickness ranges were included.