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 FACIL: 50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga 05000275  
 50-323 Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Ga 05000323  
 AUTH. NAME AUTHOR AFFILIATION  
 SCHUYLER, J.O. Pacific Gas & Electric Co.  
 CRANE, P.A. Pacific Gas & Electric Co.  
 RECIP. NAME RECIPIENT AFFILIATION  
 DENTON, H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards responses to Govt Accountability Project 840301  
 2.206 petition of allegations. Portions of allegations based  
 on affidavits not available to util, thus some responses not  
 specific.

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NOTES: J Hanchett 1cy PDR Documents. 05000275  
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*See "84 Reports*

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EXTERNAL:	LPDR 03	2 2	NRC PDR 02	1 1
	NSIC 05	1 1	NTIS	1 1
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*Extra Cys. To: H. Schierling*

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY  
5800 S. DICKINSON DRIVE  
CHICAGO, ILLINOIS 60637

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TO: DIRECTOR, NATIONAL BUREAU OF STANDARDS  
WASHINGTON, D.C.

FROM: DR. J. H. GOLDSTEIN  
UNIVERSITY OF CHICAGO

RE: NITROGEN-15 NMR SPECTROSCOPY OF AMIDES

Sample	Chemical Shift (ppm)		Reference	Chemical Shift (ppm)		Reference
	Observed	Calculated		Observed	Calculated	
1	1.2	1.2	1	1.2	1	
2	1.5	1.5	2	1.5	2	
3	1.8	1.8	3	1.8	3	
4	2.1	2.1	4	2.1	4	
5	2.4	2.4	5	2.4	5	
6	2.7	2.7	6	2.7	6	
7	3.0	3.0	7	3.0	7	
8	3.3	3.3	8	3.3	8	
9	3.6	3.6	9	3.6	9	
10	3.9	3.9	10	3.9	10	

Very truly yours,  
J. H. Goldstein

PACIFIC GAS AND ELECTRIC COMPANY

PG&E + 77 BEALE STREET • SAN FRANCISCO, CALIFORNIA 94106 • (415) 781-4211 • TWX 910-372-6587

J. O. SCHUYLER  
VICE PRESIDENT  
NUCLEAR POWER GENERATION

April 30, 1984

PGandE Letter No.: DCL-84-166

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-76  
Docket No. 50-323  
Diablo Canyon Units 1 and 2  
10 CFR 2.206 Petition by GAP Dated March 1, 1984

Dear Mr. Denton:

In a letter dated March 29, 1984, the NRC Staff requested Pacific Gas and Electric Company (PGandE) to respond by April 14, 1984, in writing, to the allegations in a petition dated March 1, 1984, filed by the Government Accountability Project. The time for PGandE's responses was subsequently extended to April 30, 1984.

These responses are enclosed. It should be noted that portions of the allegations are based on affidavits which were not available to PGandE. Therefore, some of the responses are not as specific as they could have been had the affidavits supporting them been made available.

The responses are true and correct to the best of my knowledge, information, and belief.

*YEDB  
1/40  
Extra Cys  
To: H. Schierling*

8405180261 840430  
PDR ADOCK 05000275  
P PDR

At the expense of

Mr. H. R. Denton  
April 30, 1984  
PGandE Letter No.: DCL-84-166  
Page Two

Kindly acknowledge receipt of this material on the enclosed copy of this letter and return it in the enclosed addressed envelope.

Subscribed to in San Francisco, California, this 30th day of April, 1984.

Respectfully submitted,  
Pacific Gas and Electric Company

By J. O. Schuyler  
J. O. Schuyler  
Vice President,  
Nuclear Power Generation

Robert Ohlbach  
Philip A. Crane Jr.  
Richard F. Locke  
Dan G. Lubbock  
Attorneys for Pacific  
Gas and Electric Company

By Philip A. Crane, Jr.  
Philip A. Crane, Jr.

Subscribed and sworn to before me  
this 30th day of April, 1984

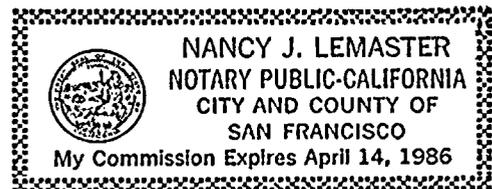
Nancy J. Lemaster  
Nancy J. Lemaster, Notary Public in  
and for the City and County of  
San Francisco, State of California



My commission expires April 14, 1986.

Enclosures

cc: Service List





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PACIFIC GAS AND ELECTRIC COMPANY

PG&E + 77 BEALE STREET, SAN FRANCISCO, CALIFORNIA 94106 TELEPHONE (415) 781-4211

April 30, 1984

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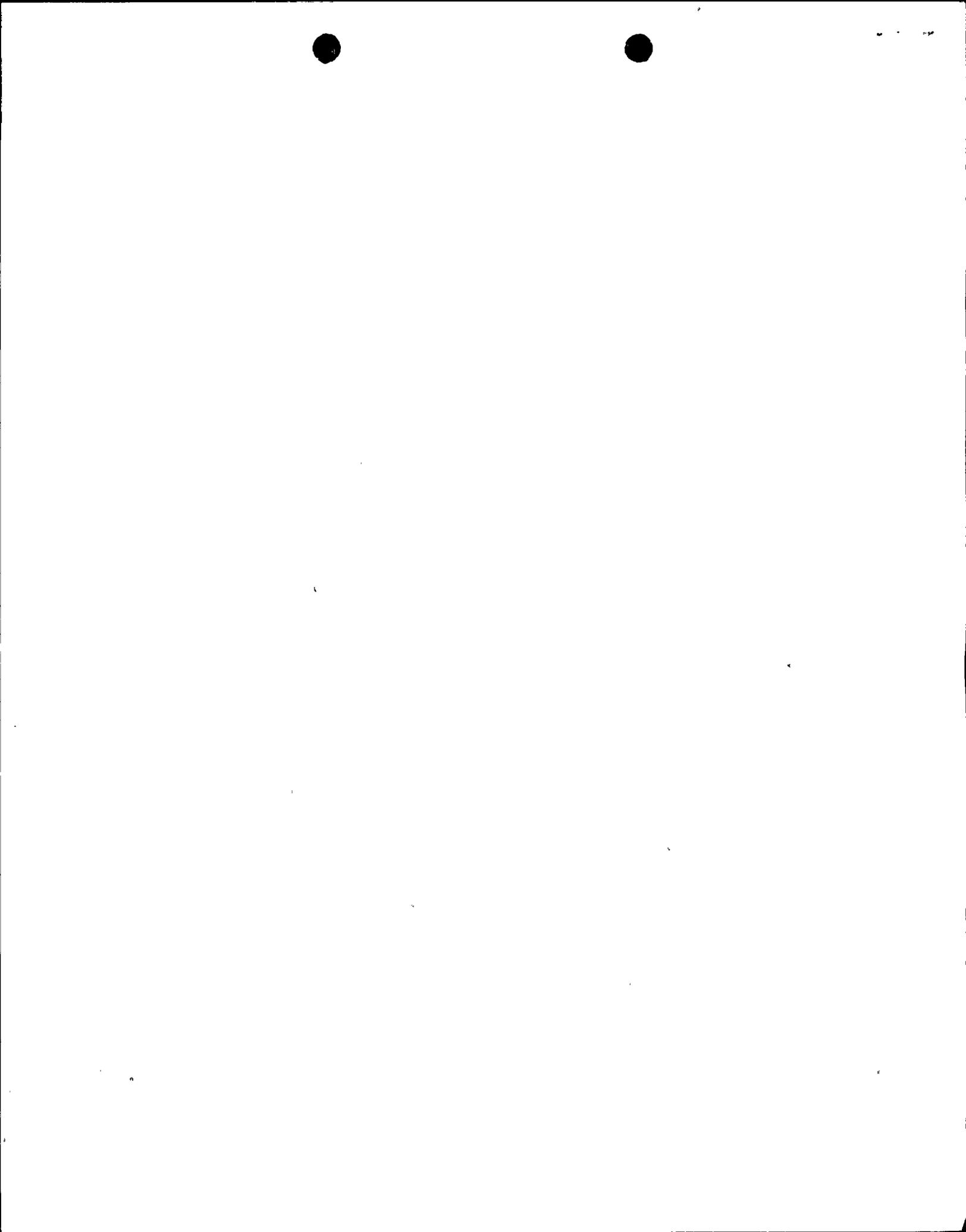
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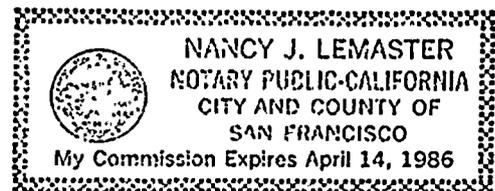
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Nancy J. Lemaster, Notary Public in  
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San Francisco, State of California

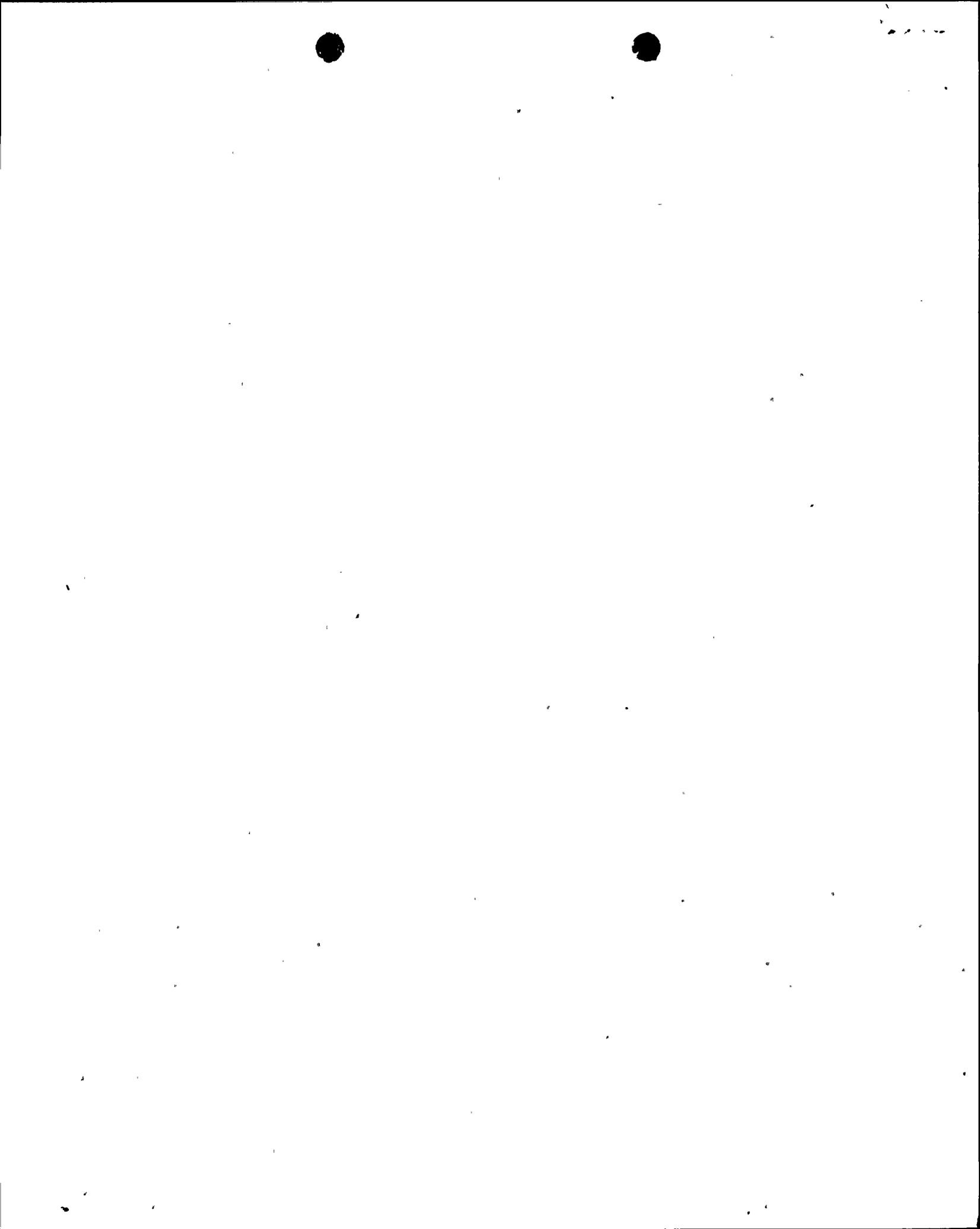
SEAL

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GAP #174 and #295, Petition at 5 and 40, respectively.

It is alleged that:

A February 21, 1984 PG&E memorandum institutionalized the above violation by stripping Pullman QC inspectors of the organizational freedom to apply corrective action for weld symbol deficiencies on previously accepted work. That authority was reserved for PG&E construction department preinspection field engineers. (citing 2/26/84 Anon. Aff. at 11.)

Until February 15, 1984, PG&E preinspection field engineers did not have the organizational freedom to look at any work already accepted, regardless of deficiencies. To illustrate, they were instructed not to look at any existing welds already accepted by Pullman. One current engineer explained what they had to ignore: "The paperwork was so sloppy, however, that I could not tell when a weld had been accepted, or under what revision of the installation procedure, or under what acceptance criteria." (citing 2/27/84 Anon. Aff. at 6.)

1. The above two allegations relate to a February 15, 1984 memorandum (there was no February 21 memorandum) signed by D. A. Rockwell, which reallocated responsibilities relating to, among other things, the examination of previously accepted work in conjunction with the implementation of design changes. Procedures covering the reinspection of such work were in place at all times.
2. When a pipe support design modification is received, a pre-inspection is performed to determine the constructibility of the change. Prior to February 15, 1984, each pre-inspection activity was performed by a pre-inspection field engineer and a QC inspector. The primary assignment of the pre-inspection field engineer was to check the constructibility of the design modification, i.e., could it be installed



as shown and where shown, and to recommend solutions if construction problems existed. He could also note the differences between the drawing and the existing installation. To perform the constructibility review, the pre-inspection field engineer was issued only the latest revision of the hanger drawing. The pre-inspection engineer was not responsible for conducting final quality control inspections of previously accepted work, and pre-inspection was not used as a substitute for the required QC inspections.

3. Prior to rework or modification, the QC inspector was assigned to inspect all existing welds on the supports to be modified against the revised design drawing and to identify any discrepancies between the existing welds and/or symbols and ESD-223 acceptance criteria.
4. After all work was completed and the new as-built drawings prepared, the QC inspector inspected the newly modified support to ensure that it complied with acceptance criteria and the new as-built drawing. After acceptance by QC, the as-built drawing was transmitted to PGandE Project Engineering for final review and acceptance of the as-built design.
5. The pre-inspection program and associated responsibilities were revised by the February 15, 1984 memorandum to more efficiently utilize available manpower without adversely impacting plant quality. The revised program eliminated QC participation in the pre-inspection process and clarified all pre-inspection responsibilities of the



pre-inspection field engineer, including the "red-lining" of existing welds and/or symbols which may not have been accurately depicted on the revised design drawing.

6. The QC inspection, including review of all new work, all rework, and all items "red-lined" by the pre-inspection field engineer, now takes place in a single step after the completion of the modification. All of the necessary design and quality functions continue to be performed, including transmittal of as-built drawings to Project Engineering for review and acceptance.
  
7. Documentation and traceability of inspection records for supports that have had modifications are the responsibility of Pullman's QA/QC Department. The pre-inspection field engineer is neither required nor expected to track through these documents during the normal course of his work, nor is there any reason for him to do so. That a specific engineer could not follow the necessary paperwork in an area for which he did not have responsibility is of little consequence as long as the documentation is acceptable and understandable to those who do have the responsibility. A history for any given hanger is maintained in either the Pullman QA vault or the PGandE QC vault.



It is alleged that:

On December 28, 1983, Pullman modified installation procedure ESD-223 -- which also provides the acceptance criteria for QC inspectors -- by adding the following provision: "D. For existing installations, welding which was performed but was not required as part of the design is acceptable . . ." (citing ESD-223, "Installation and Inspection of Pipe Supports, "at I, V and 46.) This practice can create unaccounted residual stress on the corresponding pipe support. (citing 2/27/84 Anon. Aff. at 4.)

On December 28, 1983, Pullman also amended ESD-223 with the following provision: "E. For existing installations, welding which was not performed but was required as part of the design is acceptable." (citing ESD-223 at I, V, and 46.) This waiver suggests that faulty welds also would be acceptable (sic), since they could be sacrificed entirely. In other words, anything that does (or does not) exist is acceptable. This procedure revision suggests that quality assurance standards are not just deteriorating; they have collapsed. ESD-223 governs safety-related pipe hangers throughout the plant.

Both amendments were made with the full knowledge of PG&E, pursuant to a December 9, 1983 meeting between Pullman and PG&E. (citing ESD-223 at 11.) The excuse offered for accepting these deviations from design was that through "as-built" drawings, further engineering analysis could determine whether the original design requirements were necessary. (citing ESD-223 at 46.) The excuse cannot wash. Valid QC inspection criteria are one mandatory step among many required for a minimum quality assurance program. They should not be sacrificed because of another independently-required safeguard. Second, the as-built reviews themselves are of questionable reliability. (citing GAP 3/1/84 Petition at 19, Item 216.)

8. These three allegations arise out of a misunderstanding of a December 1983 revision to Pullman procedure ESD-223. The revision resulted from a series of minor variations in welds that had been discovered during pre-inspection of existing pipe supports prior to their release for modifications which were required by the Corrective Action Program.



Undersized fillet welds, incomplete fillet welds, and minor weld defects were observed on existing pipe supports. PGandE Engineering reviewed the effect of such variations on the safety of existing supports and, consistent with design and licensing requirements, provided disposition for the existing welds referenced in the Minor Variation Reports.

9. Contrary to the implication of the allegations, the quality review of existing welds was not sacrificed by the procedural change but remained a requirement of the program. In its approval of the proposed procedure, PGandE specifically required that:

"1. Undersize, oversize, or incomplete fillet welds shall be as-built, provided that weld quality meets the requirements of ESD-223, paragraph 6.8.2.4 B, C, and D."  
(Emphasis added).

Paragraph 6.8.2.4 B requires that:

"B. The final surface of all welds shall be substantially free of sharp surface irregularities, excess surface slag, slag inclusions, and shall have a good workmanship appearance. Excessive surface irregularities may be removed by chipping or grinding provided the weld size specified on the support is maintained."

10. Contrary to GAP #181, the quality assurance program remains in effect for all welds. As discussed in the response to GAP #174 and 295, the February 15, 1984 revision to the pre-inspection program does not eliminate weld quality inspection, but merely shifts the time of inspection of existing welds from pre-inspection to after installation of the modification. At such time, all new and existing welds that



have been "red-lined" by the pre-inspection engineer or reworked are subject to quality control inspection for acceptability according to the same criteria.

11. In GAP #180 and 181, reference to the as-built process as part of the existing weld review program has been conveniently omitted by the allegor. Where welding which was not required by the existing design drawing has been performed on existing supports, or where required welding was not performed, the field engineer identifies the items for rework or indicates such discrepancies on the as-built drawings to ensure that each pre-existing discrepancy will be individually evaluated and accepted. After completion of the construction, QC confirms the accuracy of the as-built drawing by inspecting the completed support against the drawing.

12. All as-built drawings are transmitted to Project Engineering for review. Engineering reviews the as-builts and verifies compatibility with existing calculations or performs new calculations, as required. If compliance to design criteria is not demonstrated by calculation, appropriate corrective action, including the issuance of a modified support design or rewelding, is taken. Therefore, the design/construction process continues to ensure that the as-built configuration is accurately depicted on drawings, qualified by calculation, and acceptable. This entire process is controlled by procedure and documented.



13. With regard to residual stress in pipe supports, as alleged in GAP #180, such stresses that may be caused by overwelding are not a significant factor. Residual stresses are generally local and self-relieving, and exist in all welded construction and in many steel-based materials. The piping supports are constructed, primarily, of light and medium thickness plain carbon steel, such as ASTM A-36, steel plates and shapes. The supports are generally not highly restrained. ASTM A-36 is a ductile material with excellent weldability characteristics and is not subject to failure from residual welding stresses as much as are high-strength steels when subject to high restraint. The design codes take residual stresses into consideration in the specifications of load combinations and allowable stresses.

Gap #187, Petition at 8.

It is alleged that:

Mr. Karner prohibited QC personnel from researching the carbon content in A-490 bolts, which was necessary to evaluate whether the field practice of tack-welding those bolts was proper. Mr. Karner's position was that checking specifications was not part of an inspector's job, and that, in effect, inspectors should stay where they belong. (citing 2/25/84 Anon. Aff. at 13.)

14. Contrary to the allegation, there is no existing procedure or field practice for tack-welding A-490 bolts.



15. In the incident referenced in this allegation, Mr. Karner did tell the QC inspector not to research the carbon content in A-490 bolts or in A-354 bolts, which are larger but are made from the same material. There was no need to make such an investigation because Mr. Karner knew that, under the existing approved weld procedures, the material should not be tack-welded.
  
16. Welding of A-490 bolts has occurred, but only in isolated instances, and the occurrences have been documented in a DR and an NCR. In 1981, there was one instance where a design drawing had specified that A-490 bolts be welded. Four A-490 bolts in one rupture restraint in the plant had been welded in accordance with the Engineering direction. Pullman's field engineers notified PGandE that the A-490 bolts should not have been welded since Pullman had no qualified welding procedure for welding such material. PGandE changed its design requirements. A Pullman DR (DR 4447) was issued, and the welds on the bolts were removed.
  
17. Recent investigations of Unit 1 and Unit 2 drawings and Pullman Power Products weld process sheets has revealed that seven hinge pins in Unit 1 and six hinge pins in Unit 2 were welded with a 1/4" fillet weld all around at the ends. Such welds cannot be considered structural; their purpose is only to hold the hinge pins in place, and they are subject to no design loads or stresses. These welds were performed on A-490 and A-193 B7 material without a qualified welding procedure, and a PGandE Nonconformance Report has been initiated.



It is alleged that:

In November 1981, PG&E's General Construction Department "borrowed" three Class One steel plates, meant to be used by Pullman, for pipe supports, and instead used them improperly to cover a trench so that equipment could be driven over them. (citing 2/25/84 Anon. Aff. at 6.)

18. In November 1981, PGandE's Station Construction Department erroneously removed six Class I steel plates from surplus material laydown areas and used them to cover an open trench. The plates in question had not been purchased for any specific plant use, and, as surplus material, were stored in Class I surplus storage areas.
19. This allegation involving the use of this Class I material is neither new nor of safety significance. The six plates were identified as nonconforming on Pullman Power Products DR-4436, dated December 2, 1981, and H. P. Foley's NCR 5422-59, dated December 2, 1981.
20. The disposition of both the DR and the NCR was to officially transfer the plates to PGandE for use by Station Construction as non-safety-related material, thus ensuring that the plates would not be used for a safety function. The storage areas in question were reposted and clearly identified to ensure that similar incidents would not occur in the future.



21. This situation was also addressed by the NRC and was identified as an open item in its January 20, 1982, Routine Monthly Inspection Report. This open item was later closed by the NRC inspectors in their Routine Monthly Inspection Report dated March 1, 1982. This isolated instance of an unauthorized removal of Class I material does not establish or represent a generic problem. To the contrary, it demonstrates the proper dispositioning of a discrepancy and the proper functioning of involved QA organizations.

GAP #196, Petition at 11.

It is alleged that:

After an inspector rejected these plates for Class One use because of their improper use as a temporary "road", Pullman QA/QC Manager Karner convinced him to accept them anyway on grounds that the plates "were probably not injured." (citing 2/25/84 Anon. Aff. at 7.) That standard of quality is not sufficiently reliable for protection of materials with the highest safety classification on-site.

22. As discussed above, the six plates were improperly removed from surplus storage areas for non-safety-related use. Pullman Power Products' Discrepancy Report 4436 was initiated on December 2, 1982, to document the use of the safety-related plates for use as temporary trench covers. Because this use had not been extreme, Mr. Karner was of the opinion that the plates, with the appropriate evaluation and inspection, could be returned to Class I use. Mr. Karner's recommendation was a technically valid disposition for plates which had



not sustained permanent deformation. For nontechnical reasons, however, the recommendation was not accepted by PGandE, and the eventual disposition of the DR was to reclassify the plates as non-safety related, thus ensuring that the plates would not be used as safety-related material.

GAP #199, Petition at 12.

In the summer of 1982, the same inspector raised but never received a response to a memorandum asking Mr. Karner about a potentially widespread problem with baseplates that are mounted over concrete voids. The inspector believed that the voids could affect the strength of the bearing surface for the baseplates. (citing 2/25/84 Anon. Aff. at 12 and related Exhibit 22.)

23. The Project is unaware of problems with baseplates mounted over concrete voids, and Pullman has not been able to find, or even recall, any memorandum about this allegation.
24. The concrete placement program requires an inspector to be present during all concrete pours. When the forms are stripped, the concrete is inspected for voids. If voids are found, they are documented and repaired in accordance with approved contractor procedures.
25. Pullman is also responsible for inspecting holes for concrete anchors prior to attachment of the base plate. Any voids are required to be documented in accordance with approved procedures. Based upon review of the documentation, no problems with base plates mounted over concrete voids have been discovered.



26. The anonymous allegor claims to have documented this problem on an informal memorandum to Mr. Harold Karner. Had he documented it on a DR or DCN in accordance with established procedures, the problem, if indeed there was one, would have been properly addressed.

GAP #200, Petition at 12.

It is alleged that:

Mr. Karner completely rewrote a Discrepancy Report that a QC inspector submitted on studs made from unqualified materials that were welded on the containment liner and elsewhere. Mr. Karner censored the DR to remove all references to two of the three unqualified materials Pullman had used -- A-108 and A-307 material. In effect, two-thirds of the proposed DR improperly was verbally dispositioned. (citing 2/25/84 Anon. Aff. at 7.)

27. The allegation appears to arise out of the allegor's lack of understanding of Mr. Karner's procedural responsibilities as QA/QC Manager.
28. Under Pullman's ESD-240, "Field Procedure For Non-Conformance Reporting," the QA/QC Manager is responsible for the review and approval of all Discrepancy Reports (DRs) prior to submittal to PGandE. This review ensures that the alleged discrepant items do actually represent departures from procedures, specifications, or applicable codes and that the recommended disposition of the discrepant items complies with the requirements of Pullman's Quality Assurance Program. The DR is considered "proposed" until Mr. Karner has completed his review.



29. The proposed DR referenced in the allegation declared, inter alia, that the use of ASTM A-108 and A-307 Grade B materials as welding studs was a nonconformance because they allegedly were not P-1 materials as defined in ASME Section IX.
30. During his review of the proposed DR, Mr. Karner determined that A-108 and A-307 Grade B bolts, though not specifically listed in Section IX, do qualify as P-1 materials and that no deviation from approved procedures had occurred in welding them. ASTM A-108 is defined as a P-1 material in ASME code case N71-10. A-307 Grade B, as used at Diablo Canyon, also qualifies as a P-1 material. (See PGandE response, dated March 19, 1984, to Joint Intervenors' Motion to Reopen on CQA, Breismeister, et al., Aff. at 12-13.) The inspector who had prepared the proposed DR was informed of Mr. Karner's findings, and a corrected version of the DR was submitted to PGandE as DR 5739.
31. The implication of this allegation is that Mr. Karner has no right to edit DRs prepared by his subordinates. The facts are that Mr. Karner, under approved QA procedures, has the right, responsibility, and obligation to ensure the accuracy of such reports. Mr. Karner discharged this responsibility appropriately.



It is alleged that:

When some QC inspectors were tests (sic) to be certified, for weld inspections, the answers to the tests were lying on the table. In theory, the test was closed-book. (citing 1/23/84 Anon. Aff. at 9.)

32. The majority of the weld inspection tests for QC inspectors were, and are, closed-book tests administered in a controlled manner. Two examinations (pipe supports and rupture restraints) are open-book tests. Rather than testing knowledge of the substantive content of the procedures, these two examinations test the ability of an inspector to implement the procedures. Qualifying tests are administered on an individual basis.
33. Because up to 12 persons are in training at the same time, and because each is trained on an individual basis, it is possible that some individuals were taking their written qualifying tests in the same room with others who were taking an open-book test, or who were reviewing their previously completed tests. (See PGandE response, dated March 19, 1984, to Joint Intervenors' Motion to Reopen on CQA, Geske et al. Aff. at 3.) Although it is possible that already completed tests may have been lying on a table, tests were monitored, and Pullman is aware of no instances where cheating took place.



It is alleged that:

At least since 1976 PG&E has actively attempted to minimize accountability by establishing a policy of document destruction, and creation of sanitized records. This policy is reflected in a January 27, 1976 memoranda (sic) which advises PG&E employees that they should not attribute comments to specific people, that they should minimize files, minimize minutes of meetings, and minimize copy distribution, and that they should cull files regularly. The memo states that "nothing should be put in writing which could later prove to be detrimental or embarrassing to the Company." (citing 1/27/76 PGandE Memorandum.) Since disclosure of regulatory violations is at least embarrassing (sic), the policy itself represents an illegal gag order.

34. The document referred to in the allegation is not reflective of a company-wide policy but rather contains only suggestions for a policy within a single department of PGandE. That department, Planning and Research, has no responsibility for records management or for the design and/or construction of Diablo Canyon Nuclear Power Plant. The document in question reflects a suggested departmental management policy by which paperwork would be limited, and only those records deemed appropriate and necessary would be maintained. The suggested policy could not have been considered a gag order of any variety, but rather a prudent management prerogative in light of the tendency of individuals to misinterpret or misuse available documents after the passage of long periods of time (as is evidenced by this very allegation). It was definitely not an effort by that department to "minimize accountability," and it had absolutely nothing to do with the design and construction of Diablo Canyon.



GAP #249, Petition at 27.

It is alleged that:

In 1983, PG&E management responded to MVR's on weld symbols through repairs, without recognizing the quality report as the catalyst for the modifications. This means that, at best, individual examples of a generic deficiency were corrected, while management refused to recognize the report on the basic problem. (citing 2/27/84 Anon. Aff. at 8-9).

35. Without the referenced anonymous affidavit, a complete response is difficult. However, PGandE has reviewed its Minor Variation Report (MVR) records for the years 1982 and 1983, and there is no indication of any MVR having been filed regarding weld symbols. As discussed in response to GAP #244, a draft MVR was discovered, but the concerns raised in the draft had been resolved individually. The potential generic concerns were recognized and addressed, in part, through training programs and, in part, through the correspondence documented in PGandE letter No. DCL-84-40.



It is alleged that:

There was also a significant impact on weld quality from Pullman's failure to properly qualify a welding procedure as required by AWS, when contrary to code provisions copper backing strips were inserted behind certain welds. Another witness described how the deficiency led to lack of fusion and cracked welds, due to "intergranular" copper contamination. (citing 2/25/84 Anon. Aff. at 5.)

Although an inspector described the above problem and suggested that Pullman should properly qualify the procedure to make these welds, Pullman management took no corrective action. (citing 2/25/84 Anon. Aff. at 5.)

Harold Karner reprimanded the inspector and threatened him with "disciplinary action" when he continued to press his concern by mentioning it to Pullman's internal auditor who considered the matter legitimate, and serious enough to include in his Internal Audit #32. At the time, the inspector concluded that "Karner didn't want to know about any problems that might be serious." (citing 2/25/84 Anon. Aff. at 5.) (citing also, February 2 petition, Attachment 2, pp. 3-13, for a description of management's refusal to respond to Internal Audit #32.)

Two weeks later, Karner fired the inspector who had pressed the issue. (citing 2/25/84 Anon. Aff. at 5.)

36. Although the anonymous affidavit is not available, this does not appear to be a new incident, but one previously identified and documented on Internal Audit Report No. 32. (See Attachment 2 to Exhibit 1 of Attachment 2 to GAP February 2, 1984 Petition.) This subject was also reviewed with the NRC Staff on site during the week of January 9, 1984. Contrary to the allegation, copper backing is not prohibited in the AWS D1.1 code. Contrary to the implication of these allegations, the inspector was not fired for raising a potential quality issue.



37. The welds referenced in the allegation are FW 60 and 61 on Rupture Restraint 251 RR, which were weld repairs to existing holes drilled in base material. The process sheets specified the use of non-fusing copper backing bars and were reviewed and approved by PGandE. The process sheets also included steps for removing the backing bar, back grinding, back welding, and grinding flush with the base metal followed by Magnetic Particle (MT) examination. This is consistent with AWS D1.1 Code, paragraph 3.3 which, although not mentioning copper, recognizes that non-fused backing is permitted, and paragraph 4.6.9 which requires that full penetration welds made without steel backing shall have the root gouged to sound metal before welding from the second side.
38. The use of copper backing bars for this type of weld is a common practice. The copper backing bars serve as a retainer for the weld material and are used because they are easily removed. It was never intended for the copper to be fused during the welding operation, nor for it to become part of the final installation.
39. The required MT examination showed indications in the welds which were identified by the technician as lack of fusion, both on the top and bottom of one weld and the bottom of the other weld. The allegation is misleading in stating that the copper backing led to lack of fusion. The required examinations revealed lack of fusion on the weld face and root. Such lack of fusion, especially on the weld face, is attributable only to the welding technique and not the backing technique. In any



event, the defects, lack of fusion (face and root) and cracks, were properly identified and documented by Pullman and successfully repaired by the same welder using copper backing. Additionally, the acceptability of non-fusing copper backing is reinforced by the fact that AWS D1.1, in various places, specifically recognizes copper backing as prequalified for full penetration welds without backgouging.

40. Another inspector etched the welds with 10 to 20% ammonium persulfate solution and identified cracking in the weld metal and the fusion zone. On the attachment to the process sheet he indicated, "It was noted that a copper backing strip was used which is the likely cause of cracking, due to Cu contamination." However, it appears his assumption was in error since any copper contamination would have been confined to the bottom of the welds.
41. The inspector's initial conclusion that the defects were cracks and his conclusion of the cause thereof were not confirmed, but were initially accepted because the weld was to be repaired in any event. The following discussion indicates that the inspector's analysis and conclusion of the defects and their cause were most likely incorrect.
42. The conclusion that the indications were, in fact, cracks is not sustained by evaluation. Nor is the conclusion that the alleged cracks were attributable to copper supportable, because the surfaces upon which



the indications were found had not been in contact with the copper. The root surfaces, which were the only surfaces that had contact with copper, had been removed by backgrinding and replaced by new weld metal during the back welding.

43. As a result of the MT indications, the welds were completely removed and rewelded, again using copper as backing. The MT examinations on the new welds revealed no rejectable indications similar to the first welds, but some possible slag was indicated on one weld. This weld was repaired and accepted.
44. The use of the copper backing is not an essential variable of the AWS Code and does not require a separate procedure qualification as suggested by the allegation.
45. Although the inspector correctly rejected the welds during the in-process inspection, there is no documented evidence that the inspector contacted his leadman or the QA/QC Manager regarding his concerns about the use of copper backing. The inspector also did not write a Deficient Condition Notice (DCN), which is the approved method of identifying the concern. The inspector also ignored both the normal chain of command for reporting his concerns and the established



reporting mechanisms within the QA program, allegedly choosing to deal directly with the Internal Auditor instead.

46. The inspector in question had a history of avoiding normal channels and dealing directly with the Internal Auditor. It was this repeated conduct which was a source of concern to management and caused the initiation of discussions of potential disciplinary action. Such potential action was not related in any way to the inspector raising a potential quality concern. The inspector in question, who is believed to be Mr. J. L. McDermott, was not terminated for pressing the copper backing issue but for his habitual erratic job attendance and tardiness, as documented in his personnel file.

47. The inspector's conclusion that "Karner didn't want to know about any problems that might be serious" is not supported by the facts. When problems have been identified at Diablo Canyon, Mr. Karner has responded appropriately. In this particular case, no problem existed.

GAP #188, Petition at 9.

It is alleged that:

In 1982 Mr. Karner fired an inspector (citing 2/25/84 Anon. Aff. at 5.) who had protested that certain welds were not adequately prepared for magnetic particle testing. To illustrate the problem, despite claims on the paperwork, paint covering the welds was not fully removed. (citing 2/25/84 Anon. Aff. at 13-14, and related Exhibits



23 and 24.) When the inspector noted that the deficiency would hinder his ability to inspect properly he was confronted by his own leadman, the other inspectors' leadman, a QC supervisor, and Karner himself. Within two weeks Mr. Karner fired the inspector (citing 2/25/84 Anon. Aff. at 14.)

48. Contrary to the allegation, no inspector has ever been fired for protesting that welds were inadequately prepared for MT testing.
49. The specific welds in question cannot be positively identified due to the lack of information provided. Any inspector, upon finding welds and adjacent base material inadequately cleaned or prepared for examination, simply needs to identify the condition to the craft personnel to get the problem resolved.
50. PGandE is aware of one incident which required Mr. Karner's involvement and which may have been the one referred to in the allegation. The incident in question did not involve paint on the welds themselves, but did involve paint on the base metal adjacent to the welds. The incident was resolved by instructing the inspector to identify the condition, together with the requirements of the procedure, to all parties, including craft personnel and visual inspectors. The areas in question were then to be cleaned, if necessary, so inspections could be conducted. This was accomplished and all inspections were satisfactorily completed.



51. The inspector in question, Mr. J. L. McDermott, was indeed terminated on August 26, 1982, not for any quality problems he may have identified, but for habitual erratic job attendance and tardiness, as is documented in his personnel file.

GAP #189, Petition at 9.

It is alleged that:

Harassment of this individual did not stop after he was fired as a QC inspector, but continued in 1983 when he attempted to obtain a job as a welder. During the welding test, someone twice tampered with his welding machine by increasing the amperage. This made it more difficult to weld. After the witness obtained a QC inspector to watch the welding machine until he finished the root pass, the welder passed the test. (citing 2/25/84 Anon. Aff. at 14.)

52. There was no harassment of Mr. McDermott when he took his welder qualification tests. To the contrary, Mr. McDermott was given the maximum amount of time necessary to finish his test, which he passed.

53. During the period of May 13-16, 1983, 30 welders took the qualification test administered by Pullman. The welding test was administered in a common area with welding machines located together in two banks. All welders who were tested were instructed by both the foreman of the test facility and the QC welding inspector that they should only adjust the amperage on their own machine. During the second day of the test, Mr. McDermott complained that someone was "messing" with his machine. In response, all welders were again instructed that they should adjust only their own machine and were also told that anyone observed adjusting someone else's machine would be immediately disqualified.



54. While misadjustment of Mr. McDermott's welding machine could have occurred, the effect would have been immediately recognized and should have been rectified by Mr. McDermott. The Pullman inspector administering the test saw no person loitering by the bank which contained Mr. McDermott's welding machine and saw no person adjusting any machine other than his own. In any event, Mr. McDermott passed the test and was hired as a welder.

GAP #190, Petition at 9.

It is alleged that:

After passing the test and coming to work as a welder, the same individual was transferred, on the same day as Harold Hudson, a pipe fitter who formerly was Pullman's Internal Auditor, to a fabrication shop where the decision to transfer workers is usually made by the Foreman or General Foreman. This decision was not made by either, and presumably came from management officials. (citing 2/25/84 Anon. Aff. at 14.)

55. The decision to transfer personnel is not the responsibility of the foreman or general foreman but that of Pullman management, specifically the Construction Superintendents. The decision to transfer craft personnel, however, is often done with the knowledge of, and in consultation with, the foreman and general foreman. Transfer of personnel and reorganization of crews are continuing routine functions as work requirements change.



GAP #202, Petition at 13.

It is alleged that:

On December 12, 1983, PG&E's Mr. C. Braf (sic) rebuked Pullman's QC representative in strong language, asserting that QC was "wasting time" in noting that shop-drilled holes did not match the design drawing, because the vendors "have their own QA/QC program and accepted the material for shipment [sic] to Diablo Canyon." This rebuke was instead of a reply on the merits to the legitimate question raised. (See December 9, 1983 Memoranda, (sic) and December 12, 1983 Reply, enclosed as Attachment 6.) The brush-off also is suspect, because Pullman inspectors have been reporting QC violations since 1979 on purchases from the same vendors, Bostrom-Bergen and American Bridge, including welds so "pathetic" that they rip the inspectors' clothes. (See February 2 Petition, at 24-26.)

56. The December 9, 1983, memorandum, which was written by a Pullman rupture restraint field engineer, not by a "Q.C. representative" as alleged, asked a legitimate question about the acceptance of oversized bolt holes, but did not make reference to a specific problem or example. The question could not be answered without identification of a specific instance. Mr. Braff's answer should have stated his inability to respond without such identification, and that acceptance or rejection of oversized bolt holes would be accomplished only on a case-by-case basis. To the best of our knowledge, this established process of resolving each instance of an oversized bolt hole on a case-by-case basis has resulted in the resolution of all concerns involving oversized bolt holes, either by engineering evaluation and acceptance, by repair, or by member replacement.



57. Mr. Braff's response to the question in the December 9, 1983 memorandum was not a rebuke but was, rather, a question and an expression of concern about the appropriateness and the necessity of Pullman's inspection of another vendor's work.

58. The reference to the quality of the welds is discussed in PGandE response dated March 19, 1984, to the Joint Intervenors' Motion to Reopen on CQA, Breismeister et al. Aff. at 39 to 43.

GAP #211, Petition at 16.

It is alleged that:

In 1982, a QC inspector was told by his own leadman that he would no longer be allowed to occasionally act as a temporary leadman, because he was not sufficiently "production oriented." (citing 2/25/84 Anon. Aff. at 7.) Such criterion is improper, since a QC inspector's mission is to be quality-oriented. Indeed, 10 CFR 50, Appendix B, Criterion I guarantees QA personnel will have freedom from cost and scheduling pressures that could compromise quality. At Diablo Canyon, the priorities are reversed.

59. As stated in the FSAR and the PGandE and Pullman Quality Assurance Manuals, the number one priority for quality control personnel at Diablo Canyon is quality, not production. However, a QC leadman is responsible for the coordination of activities between quality control and production and must have some "production orientation."



60. This "production orientation" is one of the ingredients necessary for a quality control leadman to perform his job in a proper manner. The position requires an individual who has an understanding of both quality control and production and the ability to ensure that required quality control activities are performed in a time frame which is as compatible as possible with production schedules. Individuals who have exhibited an inability to accomplish the required quality activities in a timely manner or those who perform the quality activities too quickly at the expense of quality are not qualified to be leadmen.
61. A leadman must also have "production orientation" in the sense of being able to manage his inspectors. He must have a sense of where to assign inspectors and how to optimize the use of his manpower. He must be able to keep his inspectors usefully employed when there are no major demands on their time and properly allocate his inspectors when the demands for inspections are great.
62. In each instance, the qualifications of an individual are reviewed to determine if he has the necessary capabilities to be a leadman. The performance of an individual given the position of temporary leadman is reviewed and evaluated. An inspector who is habitually late for work, takes unauthorized breaks, does not complete his own work in a timely manner, or has other personal habits that cause welders and fitters to sit around unnecessarily waiting for the late completion of inspections is obviously not qualified to be a leadman. The inspector in the



allegation was given the opportunity to perform as a temporary leadman and found to lack one or more of the characteristics necessary to competently perform this job. If the allegation does, in fact, correctly recount a specific discussion, it is probable that lack of one or more of these ancillary traits was the reason for such a statement.

63. The fact that some production orientation is required to effectively perform the duties of a leadman in no way compromises the individual's priorities or conflicts with 10 CFR 50, Appendix B requirements.

GAP #212, Motion at 16.

It is alleged that:

In 1983, Mr. Karner tore up a DCN that a QC inspector had written to protest harassment by Superintendent Rich Babineau. Mr. Karner also threw away a supporting statement signed by another inspector. Further, a production foreman told a pipefitter and welder who witnessed the original harassment that if they signed a supporting statement they would be fired. (citing 1/23/84 Anon. Aff. at 10 and NRC Interview Transcript at 47.)

64. Contrary to the allegation, Mr. Karner did not tear up or discard a Deficient Condition Notice (DCN) that had been written to protest harassment. The DCN referred to in the allegation is DCN 1245-025 and was written by Mr. Roger Fisher on August 13, 1983. This DCN and related attachments still exist in their original form and are part of the DCN file. The related attachments include a letter to file by H. W.



Karner dated August 15, 1983, which explains the discussion with Mr. Fisher at the time of the incident, as well as the discussion with Mr. Richard Babineau, the Construction Superintendent involved in the incident.

65. As was indicated in PGandE's response to JI allegation #134 submitted March 19, 1984,:

"After the DCN was submitted on August 13, 1983, Mr. Karner discussed the DCN extensively with Mr. Fisher. Mr. Karner did not consider the contention a valid issue nor did he feel that the subject of the alleged intimidation was substantiated. This latter issue was investigated in depth by Mr Karner with Mr. Fisher's supervisor and the craft superintendent, Mr. Richard Babineau. The matter was documented in an office memo dated August 15, 1983. Mr. Karner's investigation disclosed that there had, in fact, been a loud discussion between Mr. Fisher and Mr. Babineau. After this discussion Mr. Babineau became upset and stormed off to see the QC Supervisor, almost falling in a construction hole in the process. Mr. Karner advised Mr. Babineau that such displays of anger were not acceptable and that any action which might even be perceived as intimidation would not be tolerated. Mr. Karner's actions demonstrate that Pullman management did take timely corrective action about alleged threats of intimidation, and that the termination of Mr. Fisher was unrelated to any activities on his part related to the DCN or to claims of harassment."

66. In further refutation of the allegation, the supporting statement referred to in the allegation (and which was supposedly destroyed) is a handwritten memo by Mr. Keith Achtenberg, dated August 15, 1983. The original of this document has been retained and is on file.



67. As to the alleged remarks of "a Production Foreman," PGandE has no knowledge of such remarks being made. A single page handwritten note was received from Mr. James Keeling, a pipe fitter, who observed the confrontation between Mr. Babineau and Mr. Fisher. The note makes no mention of any harassment from a "Production Foreman" and no retribution of any kind occurred against Mr. Keeling or anyone else.

GAP #243, Petition at 26.

It is alleged that:

PG&E's management's response during 1983 to various initiatives taken by field engineers to correct weld symbol deficiencies include demotion; transfers; orders to stop working on the problem; and advice that nothing would change, because "we've always done it that way." (citing 2/27/84 Anon. Aff. at 5.)

68. PGandE has not demoted (i.e., a reduction in job classification) any individual for initiatives taken to correct weld symbols. If the individual alleged considers a change in the scope of an individual's responsibilities as a demotion, PGandE takes exception to that interpretation. Any attempt to demote an individual within PGandE can only be accomplished by a formalized process that is documented and open for review and appeal to various governmental agencies. It is PGandE's responsibility to assign the most qualified individuals to lead any effort. While it is sometimes necessary to change the scope of an individual's assignments for a variety of reasons, such a change does not constitute a demotion. Some of the reasons for change in job scope



include changes in the amount of work assigned to a group, adding or reducing the number of individuals to perform the work, and evaluation of an individual's abilities to handle the assigned work.

69. PGandE has not transferred any individual for initiatives taken to correct weld symbols. PGandE has always maintained a policy of transferring people within groups and between groups as work loads demand. Transfers are based upon personnel qualifications and abilities, and on work loads and work priorities.
70. PGandE is not aware of any individual being ordered to stop working on weld symbol problems. The quality program emphasizes the formal reporting and resolution of problems. Based on the information contained in the petition, it appears that the allegation was from an individual who was or is assigned to the pipe hanger pre-inspection group. The supervisors of this group have been interviewed and are not aware of any such orders being given.
71. The individual's interpretation of being advised "that nothing would change, because we've always done it that way" is apparently a misinterpretation of the requirements for Diablo Canyon. In the area of weld symbols, some requests for clarification have been made by individuals who had previously worked on nuclear plants of later licensing vintage. These requests were based on their interpretation of newer codes which may not be applicable to Diablo Canyon. In cases where the request for interpretation was written, a formal response was made to the individual making the request.



It is alleged that:

In 1983, management failed to process in writing Minor Variation Reports (MVR) on welding. Reports did not receive MVR numbers and, in general, the official problem-resolving system did not operate. At most, management answered formal quality reports with "heart-to-heart talks and memos." (citing 2/27/84 Anon. Aff. at 5, 6.)

72. PGandE records indicate that Minor Variation Reports (MVRs), when actually submitted, have been processed in accordance with established procedures. MVRs require identification of the potential discrepancy, disposition, review by Quality Control and management, and verification that the disposition was accomplished. MVRs are logged and tracked to completion by Quality Control. It is the responsibility of the individual who identifies the potential problem to initiate the MVR and take it to Quality Control for logging and numbering. Once an MVR is entered into the system, management cannot stop its processing. The process of clarification of the problem and resolution may indeed involve discussions and "memos" between the interested parties.
73. In researching this allegation, an apparent draft of an MVR concerning weld symbols was discovered. This draft MVR had never been signed by the initiator or entered into the system. By interviewing the involved personnel and reviewing pertinent correspondence, it was determined that the concerns raised in the draft MVR had been resolved. Apparently,



after receiving several memos concerning weld symbols, a supervisor requested an individual to prepare an MVR based on the memos. These memos had been passed on to Engineering for clarification. By the time the MVR was drafted, Engineering had responded to all the memos. The individual who had drafted the MVR and his supervisor agreed that it was not necessary to formalize the MVR since a quality problem was not involved.

GAP #294, Petition at 40.

It is alleged that:

Management schedule pressure deprives preinspection engineers of adequate time to find and correct problems on the hangers. While the minimum time needed to properly inspect and document a hanger is 9-12 hours, they only had 4.5 hours per hanger. Complex hangers with significant deficiencies could take 30-35 hours. These time limits were enforced by verbal threats from the lead to let go any engineers who could not maintain that pace. (citing 2/27/84 Anon. Aff. at 17.)

74. The purpose of the pre-inspection program is to verify that a component can be constructed in accordance with the "design" drawings and to identify differences between the drawings and the existing configuration. The QC responsibilities are separate from the pre-inspection program and are assigned to the QC inspectors in accordance with the approved ESDs.



75. The specific issue raised by the allegation was addressed in an internal PGandE memo to Mr. Paul Werts from Mr. Jim Phillips and Mr. E. Henton, dated February 15, 1984. This memo was responded to by Mr. Werts on March 6, 1984. The job duties and responsibilities of the pre-inspection engineer were also discussed in an interoffice memo (IOM) from Mr. Werts to Mr. Jim Bratton of PGandE QC dated March 21, 1984.

76. The allegation that the minimum time needed to inspect and document a hanger is 9 to 12 hours is not correct. However, the time is subject to wide variation. Based on prior industry experience, a 4.5 hour pre-inspection time per hanger was considered to be attainable. However, at Diablo Canyon, 8 to 9 hours has proven to be the average time required to perform this function. It is recognized that complex hangers can take well in excess of even this longer time frame. The weekly hanger production report shows the number of hours actually required to pre-inspect hangers. This report is used as a management tool for staffing requirements and hours to be worked per week for pre-inspection engineers to meet schedule requirements.

77. No individual has been disciplined for not pre-inspecting hangers in 4.5 hours (or, for that matter, 8 to 9 hours) as alleged. The leadman, Mr. Werts, has no recollection of any threats, implicit or explicit, made to any individuals in the group. Statements were made to the group that individuals who could constantly perform this function in an acceptable



manner in less than the average time would be so recognized in their performance reviews. However, inasmuch as pre-inspection is not a QC function, ability to perform the work faster would not have any potential adverse impact on construction quality, because the existing work had previously been inspected and accepted by QC inspectors and all new or reworked items must subsequently be reviewed and accepted by QC.

GAP #297, Petition at 41.

It is alleged that:

A new Bechtel management practice fundamentally compromises the licensee's record on quality assurance. Counsel has received two reports since February 1984 that Bechtel personnel who resign are told by the Personnel Department to sign a printed form endorsing the following conclusions: To the best of the employee's knowledge, there were -- 1) no code violations; 2) no design deficiencies; and 3) no quality assurance/quality control inadequacies. As one whistleblower explained, "Because almost anyone with eyes who has worked at Diablo Canyon knows this statement is false, it puts employees in an impossible situation. If questioned later by the NRC about these topics, employees must choose between making false statements to the government, or repudiating a signed statement they gave to Bechtel. The former choice would be a criminal violation; the latter could lead to industry blacklisting." (citing, e.g., 2/27/84 Anon. Aff. at 17-18.) When necessary, construction management officials intervened to help persuade the employee(s) to sign the form. (citing 2/27/84 Anon. Aff. at 17-18.)



78. Requesting information regarding employee knowledge of possible QA deficiencies does not compromise the QA program at Diablo. The "practice" referred to in the allegation is simply a routine voluntary exit interview conducted with Bechtel non-manual and Bechtel contract non-manual personnel leaving the Project. The practice is not unique to Diablo Canyon. It has been used on at least five other nuclear projects over longer time frames.

79. Its purpose is to provide the departing employees with a further opportunity to communicate any quality concerns they may have and to provide the Project with an opportunity to understand and act on these concerns, where appropriate.

80. Contrary to the allegation, construction management officials do not "intervene" to help persuade a departing employee to sign the form. The interview is conducted by the Bechtel Personnel Department as part of the standard checkout process for departing Bechtel non-manual and Bechtel contract non-manual personnel. The employees are specifically notified by Personnel that the interview is voluntary and that the employee need not answer the questions on the exit interview form. The purpose of the interview is explained and a copy of the form is given to the employee to be completed.



81. If the employee is reluctant to sign the form, additional discussions with Personnel are conducted to assure that the purpose of the interview has been correctly understood. In these discussions employees have also been reminded, where appropriate, of the "Quality Hotline" which provides another (more anonymous) mechanism for communicating quality concerns. If the employee chooses not to fill out or sign the form, no further action is taken.

82. When the employee chooses to identify a concern, a further interview between a construction management representative (not the individual's current supervisor) and the employee is held to clarify the nature of the concern and enable the follow-up effort by the Project to begin.

83. As can be seen by a review of the Exit Interview form (Attachment 1), the questions asked are simple inquiries. There is no intent or practice of intimidation. The forms, if filled out, are not included in an individual's personnel file, are maintained separately, and are not, and cannot, be made available to potential, future employers or reference checkers. Thus, allegations regarding "industry blacklisting" are unwarranted.



GAP #203 and 204, Petition at 13.

It is alleged that:

Faulty quality-control for paint and other protective coverings can affect the safety of the plant. The use of improper paint or the correct paint under improper conditions can defeat the original purpose of the covering, such as rust protection of carbon steel components. (citing 2/6/84 Interview at 2.)

QA violations for paint also have spillover effects on other safety-related work. For example, in a radioactive area, if the wrong paint is used, or if the proper paint is improperly applied, it may chip off. This can interfere with the proper working of other safety systems. Nuclear reactors require a clean environment to run. Further, paint chips from a radioactive area can help spread radioactivity to other equipment and to people. (citing 2/6/84 Interview at 2.)

84. These paragraphs are not allegations but are rather simple statements of fact that if paint is improperly used or applied, a potential exists for adverse impact on installations and personnel. PGandE agrees and has provided controls to ensure that proper paint is applied appropriately and consistent with corrosion protection, plant design, and operational requirements.

GAP #205, Petition at 14.

It is alleged that:

Until December 1983, Pacific Gas and Electric (PG&E) had no quality control (QC) program of any kind for at least the previous five years to insure the quality of paint and other protective coating at Diablo Canyon. Diablo Canyon may, in fact, be the only plant in the nation with no QC for paint. An NRC inspector informed PG&E officials in December of 1983 that Diablo Canyon was the only such



plant. This problem was discovered late in December of 1983 when NRC inspectors inspected the General Construction (GC) paint department which inspects the painting and insulation work of contractors, originally the H.P. Foley Company and now Bechtel, and which should have had a QC program. (citing 2/6/84 Interview at 1.)

85. PGandE has had a controlled program for painting and special coatings in effect since the start of painting activities at Diablo Canyon in 1972. About 90% of the current Class-A coatings have been in place since early 1977.

86. This program, which is similar to programs maintained by plants of similar licensing vintage, has always provided the following controls:

- (1) The specification, which is a part of the painting contract, incorporates the requirements of ANSI N 101.2 and ANSI N 5.12. These ANSI documents establish the standards for painting and the use of protective coatings in the nuclear industry.
- (2) Safety-related equipment and building areas potentially subjected to relatively large quantities of radioactive materials, high radiation fields, high probability of contamination by radionuclides, spills, splash, fumes from acids and alkalies, frequent exposure to high humidity and temperature, exposure to decontamination reagents (acids, alkalies) and steam cleaning, and/or constant immersion in de-ionized water were identified as



requiring Class-A coatings. All Class-A coating purchase orders required manufacturers' certification of compliance with specifications. In addition, all Class-A coatings were batch sampled, tested, and accepted by the PGandE Department of Engineering Research before they were released for use.

- (3) Painting activities conducted by the painting contractor were monitored and sample tested by PGandE as directed by written instructions. Civil Resident Engineer Instruction No. C-15 was in effect before painting was started on May 1, 1972, and was used until completion of the contract in December 1977. Instruction C-15 requirements are to:

- (a) Maintain a daily log of painting activities.
- (b) Prepare and submit to the Field Engineer daily inspection reports which detail activities and any problems found. These reports address the material painted, paint materials, temperature, moisture content, method of application, condition of substrate, surface preparation, dry film thickness of previous coat, wet film thickness, work force, and other work details.



(c) Perform weekly inspections of paint in storage and provide written reports of these audits to the field engineer.

(d) Report deviations from specification requirements on an exception report form to the Field Engineer.

(e) Document equipment and buildings as ready for painting and release for painting in a written format.

(4) Painting performed by PGandE personnel or personnel provided by the cleanup contractor were directed by the PGandE paint foreman and inspected by inspectors who reported to the paint foreman. The forms originally required by Instruction C-15 were not used. However, a log of painting activities was maintained. (See response to GAP #208.)

(5) All inspectors performing paint inspections were qualified by the PGandE resident civil engineer or paint foreman based on a review of the inspector's experience. Guidance for qualification of these inspectors was provided by PGandE's coatings specialist.

87. The controls described in paragraphs (1) through (5) have provided and ensured the appropriate quality of protective coatings. The quality of



the protective coatings is evident by the absence of chipping, flaking, holidays, bubbling, or other signs of defective materials or application on the existing installations. Many of these applications have been in place about ten years and have been subjected to the conditions encountered during the three plant hot functional tests. In addition, the plant layup environment is more severe in some respects than an operating environment due to the condensation that occurs at lower temperatures.

GAP #206, Petition at 14.

It is alleged that:

The discovery was also made in December of 1983 that the plant specifications used by the paint foreman did not conform to the specifications maintained by the records department of GC. When an NRC inspector reviewed the specifications that the foreman said he had relied on, the inspector discovered that they conflicted with what the inspector had been told by the records department. (citing 2/6/84 Interview at 1.)

88. In December 1983, an NRC inspector found differences between the paint specification used by the paint foreman and the specification on file in the PGandE GC records section. The primary difference between the specifications was that the paint foreman's specification required application of Carboline products while the file copies required the use of Devoe products. However, the correct specification was maintained by the PGandE coatings specialist and the supervisor responsible for coatings application prior to performance of the work, thus providing assurance that the work was done properly.



89. The Carboline products are the appropriate materials based on PGandE Engineering review and test results. Carboline products were applied as required by specification and in accordance with the manufacturers' requirements. Investigation by the resident civil engineer has verified that the paint foreman has always possessed the specification which requires the use of Carboline products.

90. The specification was changed by communication between the PGandE coatings specialist and supervisory personnel responsible for applying coatings before the start of painting activities. These changes were also provided to the Contractor and PGandE civil construction engineering and inspection staff. Since all parties associated with material procurement, testing, application, and inspection had the appropriate specifications before work started and the proper coatings were applied, no impact adverse to quality exists.

GAP #207, Petition at 14.

It is alleged that:

Corrective action for the paint QC violations had been prospective only. In the wake of the NRC discovery, management has belatedly begun to use a Daily Paint Report to record various data that can affect the ability of protective coatings to perform their safety-related functions, including the temperature and wetness of the surface that was coated, the preparation of the surface, the type of protective coating applied, the manufacturer, the method of application, the thickness of the coating, etc. This program should be applied retroactively to all safety-related painting. (citing 2/6/84 Interview at 1.)



91. Contrary to the allegation, daily paint reports have been a procedural requirement for all work performed by painting contractors since the start of painting work at Diablo Canyon in 1972 to 1977. All aspects of surface preparation, materials, and application are addressed as appropriate. Further details are included in the response to GAP #205.

92. Since completion of the main paint contract in December 1977, only maintenance and modification painting has been required on Class-A surfaces. This work is performed and documented in the foreman's daily paint log books and, more recently, in daily paint reports.

GAP #208, Petition at 14.

It is alleged that:

Because of the failure to record critical information or to adequately control the variables described above, the quality of an unknown percentage of the paint and other protective coatings at Diablo Canyon is indeterminate. (citing 2/6/84 Interview at 2.)

93. It is erroneous to assume that the quality of coatings at Diablo Canyon is indeterminate. This information was required to be recorded for the initial paint contractor which covered about 90 percent of the work.

94. The remaining maintenance work was done after the initial completion of the plant in 1977. Since this time, parameters such as humidity and temperature in Class-A areas would not have varied sufficiently to



adversely affect application of coating. Process variables, although not recorded, were controlled since application was performed by experienced maintenance contract personnel and monitored by PGandE. During this time, the paint testing and inspection of stock was maintained. The foreman's daily paint logs record the type of coating applied and the location. The allegation is, therefore, without safety significance.

GAP #209, Petition at 15.

It is alleged that:

The witness saw no evidence of any efforts by PG&E or any of its contractors to assess the safety significance of the non-existence of any quality control for paint. (citing 2/6/84 Interview at 2.)

95. Contrary to the allegation, PGandE has assessed the safety significance of the painting process as evidenced by the control maintained over paint procurement, testing, and application. Further evidence is provided by PGandE's establishment of Class-A areas and equipment. The paint specification has always contained the requirements of ANSI N 101.2 and ANSI N 5.12.

GAP #210, Petition at 15.

It is alleged that:

Paint inspectors have not been instructed that they can write a Non-Conformance Report (NCR) or any similar



report. The only method to record problems is on the newly-instituted Daily Paint Record, or in the log book maintained by the paint foremen. Neither approach is designed to provide resolutions for quality-control problems. (citing 2/6/84 Interview at 2.)

96. The paint program does not fall under the formal quality program; however, paint inspectors have used paint acceptance reports, paint foreman daily logs and, more recently, daily paint records.
  
97. These reports have always been reviewed by supervisory personnel responsible for protective coating applications. The supervisors have ensured that corrective action has been taken when problems with coatings were noted on these reports. While paint inspectors do not use Non-Conformance Reports (NCRs) or Minor Variation Reports (MVRs) to document paint-related discrepancies, the program that has been used at Diablo Canyon ensures that protective coatings have been applied in accordance with Specification requirements.



## WELDING OVERVIEW

### WELD SYMBOLS

The following twenty-two allegations are based upon weld symbols: 171, 173, 174, 234 through 246, 248, 249, 252, 253, 254, and 263. These allegations represent 16% of the allegations in GAP II. The allegations come from only two sources: first, Stokes, and these were previously addressed; and second, GAP II anonymous affidavit attachments, which have not been made available. The allegations all fail for either a lack of substance, lack of context, technical errors, false or misleading statements, or a combination of these reasons. The subject of weld symbols was discussed with the NRC and documented in PGandE's letter DCL-84-40, dated February 7, 1984. It is recommended that the February 7th letter be reviewed to assist in understanding the response.

This overview is provided to keep the significance of the allegations in perspective. The total program with regard to weld symbols has worked effectively from design calculations to as-built structures.

American Welding Society symbols for welding have been used at Diablo Canyon since its inception. Symbol usage has been incorporated into the project by numerous references to contract specifications and other documents. AWS symbols have been used as the common basis for communication within the United States welding industry, regardless of the fabrication code specified or



product constructed. As stated in AWS A2.4, the intent of symbols is to facilitate communication. The AWS symbols have been used by common consent even where not specifically referenced, just as the English language has been used at Diablo Canyon. Symbols may have occasionally been used imperfectly, but the required meaning was conveyed and understood, and the use of any non-standard symbols has not resulted in unacceptable welds. The parallel between weld symbols and the written and spoken language exists in that grammatically imperfect language can effectively convey meaning and requirements.

Engineering and inspection personnel have acquired knowledge of welding symbols through their experience, education, training, and use of references. Pullman has included questions regarding weld symbols in the QC inspectors' qualifications tests since 1974, and has included AWS A2.4 in the reading list for QC inspectors. Welding symbols are not difficult to master, in fact, approximately six symbols account for almost all field welds.

Due to the rapid expansion of the Diablo Canyon plant staff, specific training programs were conducted regarding AWS A2.4 weld symbols. Three hundred and fifty engineers and QC inspectors were trained during May, June, and July of 1983. Additional pre-certification training was conducted for the AWS Certified Welding Inspectors Program in June-July and November-December, 1983.



PGandE letter DCL-84-40 provided an overview of the weld symbols issue.

Examples of symbol concerns and unclear symbols were intentionally included. Notations were made on example drawings contained in DCL-84-40 to show how the Project addressed the specific concern, and how the Project compensated for lack of specific or clear weld size information.

Previous correspondence was included with letter DCL-84-40 showing examples of how some imprecise weld symbols on previously issued drawings were to be interpreted. Additional correspondence displaying examples of preferred symbols, labeled DO, and non-preferred symbols, labeled DONT, were also included. The DOs and DONTs were identified as applicable to new drawings.

In a few cases, specific narrow scope exceptions to the standard symbols have been documented. These documented exceptions to A2.4 symbols use are permissible and correct in the context of the Diablo Canyon Project.

Weld symbols are not used in a vacuum but are part of a program of communication between design engineering and construction in the field. There have been, and will continue to be, additional verbal and documented communications between engineering and construction clarifying design requirements. These communications are a necessary and proper method to assure that the welds required by the design are installed in the plant.



WELDING OVERVIEW

FLARE BEVEL WELDS

TUBE STEEL RADII

Eight allegations (225, 226, 227, 228, 229, 231, 233, and 255) are directly related to corner radii on rectangular structural tube steel, and to the effective throat of flare bevel welds made along the corners in the groove which results when such tubes are placed against flat surfaces. In response to concerns expressed by the NRC Staff, structural steel tubes were sampled by Pullman QC, and worst case examples were selected for specific detailed measurement and weld testing. The results were reported to the NRC (See PGandE letter DCL-84-141, dated April 11, 1984). The individual responses will be more understandable if DCL-84-141 is reviewed prior to reading these specific responses.

Referring to DCL-84-141, the curved portion of the tube corner is not fabricated to be exactly one quarter of a circle, as indicated by the dotted line in Figure A. In fact, it is actually less than a quarter of a circle as indicated by the solid line in the same figure. Therefore, different radii can be inferred for the tube corner dependent upon the measurement method used.



If a straight ruler or mechanic's square is used, as shown in Figure B of DCL-84-141, a corner dimension,  $D$ , is measured. We have termed this the flat side intersection method ( $D$  dimension). Based on this  $D$  dimension, an apparent corner radius of  $R_D$  is implied. As shown in Figure B, this may not be the actual radius of curvature. Alternatively, if a concave radius gauge is used, the measured radius is  $R_A$ , as shown in Figure C.  $R_A$  is the appropriate measurement of the actual radius of curvature. Only when the tube corner is an exact quarter circle will the two measurement methods yield the same radius. Examples of tubes with the smallest corner dimension,  $D$ , were selected by the Pullman QC for further measurement. The resulting measurements are summarized in Tables 1A and 1B of DCL-84-141. The difference between  $R_D$  and  $R_A$  is clearly shown in these tables. For the 3 x 3 x 1/4 tubes, the apparent radius,  $R_D$ , is approximately 1.25  $t$  to 1.5  $t$  and the  $R_A$  is always 2.0  $t$  or slightly larger. For the 3 x 3 x 1/2 tubes,  $R_D$  is approximately 1.0  $t$  and  $R_A$  is again 2.0  $t$ .

The tubes selected by Pullman for detailed measurement (the "D" dimension was 1.0 $t$  to 1.5 $t$ ) were also used for weld tests. The weld tests were performed using both 3/32" and 1/8" diameter electrodes in four welding positions. The test coupons were cross sectioned and the flare bevel weld effective throats were measured. The effective throat was measured as flush with the side of the tube. No credit was taken for weld reinforcement. The actual weld effective throat, as shown in Tables 2A and 2B of DCL-84-141, is, in all cases, at least equal to or greater than the dimension required by the design calculations.



The use of tube steel with corner dimensions  $D$  of  $1.0t$ ,  $1.25t$  or  $1.5t$ , measured by the flat side intersection method, has no effect on the adequacy of pipe supports or their flare bevel welds. As demonstrated by weld tests, corner dimensions with  $R_D$  less than  $2.0t$  have no adverse effect on the weld effective throat. The effective throat used in the design calculation is always equalled or exceeded. Regardless of how the tube corners are measured, the flare bevel welds are more than adequate.



It is alleged that:

Pullman does not comply with AWS conventions for the use of symbols in engineering drawings that refer to weld grinding. For example, in 1982 Pullman's QA/QC Manager Harold Karner told one of his QC inspectors to ignore the AWS "break in arrow" convention that indicates which side of a weld fit-up is supposed to be "chamfered", or ground down, before being welded. (citing 2/25/84 Anon. Aff. at 3 and related Exhibit 2.)

98. This allegation contains two conclusions, both of which are very misleading. Engineering does not generally require that welds be ground and therefore rarely uses the grinding symbols. The cases where a grinding requirement has been shown on drawings have related to joints which require flush finish surfaces. Completed weld surfaces may be ground to facilitate nondestructive examination (NDE), but such grinding is not an engineering requirement and need not be symbolized by engineering on the drawings. Finally, directions for grinding are not normally contained on weld symbols. Weld symbols, specifically, do not indicate grinding or the method to produce a weld groove or chamfer.
99. The second part of the allegation has not been supported because the cited anonymous affidavit has not been made available; however, Mr. Karner specifically recalls an incident similar to the one identified in the allegation. The allegation is misleading and taken out of context. The incident recalled by Mr. Karner concerned a discussion of weld symbols referred to on field layout drawings (field sketches) used to assign weld identification numbers. These sketches are not used to determine which member is beveled, chamfered, or ground before



welding. These sketches are only a construction aid. The weld symbol arrow break on these sketches has no technical significance and may properly be ignored in the context of its limited use. This fact was explained to the QC inspector who brought up this concern and, at the time, the explanation appeared to satisfy the inspector.

GAP #172, Petition at 4.

It is alleged that:

Pullman management instructed inspectors to violate contract specifications for traceability of welds. For example, in a July 15, 1982 memorandum, Pullman QA/QC Manager Harold Karner states that a practice is acceptable if it isn't specifically prohibited by Pullman's ESD engineering specifications, the installation procedures. As a result, since the relevant ESD does not reflect the PG&E specifications prohibiting identification stamping on the weld itself, Karner concluded that it was acceptable. (citing 2/25/84 Anon. Aff. at 4 and related Exhibit 3.) This practice can introduce residual stresses on the welding and lead to cracks.

100. The allegation is totally false. The full text of the memo to which Mr. Karner responded is as follows:

"During a routine QC walkdown, our crew noticed a field weld with the stamping on the weld volume. We, in the past, have assumed this to be an unacceptable practice, but ESD 243 Sec. 9.9 makes no mention of stamping on top or adjacent to the weld. ESD 203/204 Sec. 1.8 states ... shall be stamped adjacent to the weld ... but ESD 203/204 is derived from PG&E Spec. 8711 and we are working to PG&E Spec. 8833XR. What is your resolution?"



101. As can be seen from the memo and Mr. Karner's response (Attachment 2), this memo addressed rupture restraints constructed to PGandE specification 8833XR, which does not prohibit stamping on welds. Therefore, Mr. Karner's response was proper, and the allegation regarding violation of contract specification traceability requirements is false.
102. Stamping identification on the weld or adjacent base metal is performed to provide traceability of the welder and weld. As long as the stamping does not interfere with any required NDE of the weld, it is technically acceptable.
103. Identification stamping of welds is common practice and normally performed adjacent to welds so that the stamp indentations will not show up during radiography or other NDE of the welds, not because of any concern associated with residual stresses in the weld. The residual stresses from stamping on welds are inconsequential and not different from stresses that exist when the adjacent base metal is stamped. Identification stamping does not cause cracks. It is innocuous and is an industry-wide practice. The allegation appears to arise from a sentence in the AWS D1.1 non-mandatory Commentary, which recommended against stamping on welds. In contrast to the AWS D1.1 Commentary recommendation, the ASME code requires stamping for identification.
104. This issue of stamping on the weld has no implications with regard to safety or procedural violation.



In November 1981 PG&E also accepted out-of-code practices when PG&E official Robert Torstrom overruled an inspector who found that engineering drawings specified a weld not recognized by AWS. The drawing called for a fillet weld. Due to the fitup angle for the weld, however, AWS does not credit it as a fillet weld. Instead, contrary to the design, the weld can only be considered as a partial penetration groove weld. In this instance, Karner backed the inspector, but Mr. Torstrom blocked corrective action with the unexplained conclusion that there was "no need" for it. (citing 2/25/84 Anon. Aff. at 5 and related Exhibit 4.)

105. While the cited anonymous affidavit has not been made available and the precise situation cannot be determined, this issue is not technically significant. Regardless of the adopted symbol, the important issue is that the designers use symbols and dimensions that are consistent with their calculations. If a designer used a fillet symbol, it need not be changed to a partial penetration groove weld symbol. Quibbling over which is the proper or preferred symbol is irrelevant since there is no single correct answer. The weld symbols used have resulted in the constructed plant meeting its design requirements.
106. Mr. Karner and Mr. Torstrom both recall that this issue refers to an area of interpretation in American Welding Society (AWS) definitions about when a fillet weld should be considered a partial penetration groove weld, and which is the best symbol for such welds. The allegation is false in stating that the weld can only be considered as a partial penetration weld since it may also be correctly considered a fillet weld because the base materials have not been chamfered or beveled to produce a welding groove.



107. It is important to recall that the purpose of weld symbols is to facilitate communication between the designer and constructor. It is frequently possible to convey design requirements with more than one symbol as long as both parties know and understand the design intent. This is such a case. Structural members intersecting at acute angles and welded within the acute angle are correctly referred to as fillet welds. The AWS D1.1 Code, paragraph 2.7 relating to prequalified fillet welds, indicates that smaller acute angles are permitted but that when the angle is less than 60 degrees, the joint should be considered as a partial penetration weld. The designers have considered the incomplete root penetration/fusion and the effective throat for joints in acute angles less than 60 degrees. Appropriate reductions for non-fused root portions have been taken from the apparent throat to develop the weld effective throat. The same reduction is taken whether the weld joint is called a fillet weld or partial penetration weld. The correct symbol for the acute angle case described above (fillet or partial penetration) is not addressed in AWS D1.1. The symbol dimensions for fillet welds and partial penetration welds have different meanings, appropriate to each weld type. The designer may correctly symbolize and dimension the weld in at least two ways: as a fillet or a partial penetration. This nomenclature issue has no technical significance.



It is alleged that:

The effects of not following AWS instructions can be illustrated through undersized welds for important safety-related stud welding on the containment liner. Contrary to the AWS requirements in design commitments, a field engineer observed that the welds did not have the full throat filled in. ASME weld criteria had been substituted for that AWS requirement, without evidence of destructive testing to prove that these welds were still acceptable. (citing 2/27/84 Anon. Aff. at 4.)

108. Since the cited anonymous affidavit has not been made available, the specific allegation cannot be addressed. We have no record of stud weld throat deficiencies being identified by a field engineer. There is voluminous Pullman process sheet documentation of visual inspections and torque test data showing that the welds meet design requirements. The allegation is false and misleading by implying that AWS requirements apply to containment liner attachment welds because the ASME Code is the governing code for containment liner plate. The ASME criteria were not "substituted" since the ASME Code is the requirement, not AWS.

109. The welding of liner studs has been qualified by testing in accordance with ASME requirements. This allegation is similar to, but slightly different from, allegations related to the welding of studs to containment liners, as addressed in PGandE response dated March 19, 1984, to Joint Intervenors' Motion to Reopen on CQA, Breismeister et al. Aff. at 11-12.



It is alleged that:

In 1981 PG&E neutralized a corrective action program by accepting welds that failed an MT (magnetic particle) test, based on results from previously-discredited tests that had accepted the same welds. The current selector switch on a testing machine had erroneously been installed backwards, to run at alternating current (AC) rather than on direct current (DC). AC, unlike DC, cannot detect subsurface cracks. Pullman and PG&E both require the use of DC for this reason. After 80 welds had been approved with the machine in an AC mode, the problem was discovered. When a sample of eight erroneously approved welds were retested, three failed because of subsurface flaws. Nonetheless, PG&E directed Pullman to accept these three welds, based on the earlier inadequate approvals with AC. (citing 2/25/84 Anon. Aff. at 9-10 and related Exhibits 15-19.) One such weld had "linear indications", suggesting possible cracks, as long as 3 inches. (citing 2/25/84 Anon. Aff. at 9-10 and related Exhibits 17 and 19.)

In the same case, PG&E directed Pullman to accept welds that had never been properly tested. Rather than retesting the remainder of the 80 welds that had been erroneously accepted using an improper testing method, PG&E directed Pullman to accept all of them without retesting, based on the AC tests. The reason PG&E gave for this was the cryptic statement that "the ability of DC to detect subsurface defects is limited in our configurations." (citing 2/25/84 Anon. Aff. at 9-10 and related Exhibit 18.) As described above, PG&E offered this excuse in spite of the fact that a retest with DC had failed more than a third of the sample, a result that PG&E's Torstrom called "inconclusive" (citing 2/25/84 Anon. Aff. at 10 and related Exhibit 18.)

110. The allegations are correct only insofar as they relate to the erroneous installation of the current selector switch on a testing machine. The remainder of the allegations are misleading because each assumes that the DC mode testing was required for the purpose of subsurface examination. This assumption is incorrect. Rupture restraints were



examined for potential subsurface defects pursuant to Contract Specification 8833XR by volumetric ultrasonic (UT) examination. The magnetic particle testing (MT) examination "DC mode" was never intended to be used for the purpose of volumetric examination, but was intended solely for surface examination. Since both AC and DC are adequate for surface examination, acceptance of the AC test results is of absolutely no significance with respect to subsurface indications.

111. The allegation is also misleading in that it attributes significant subsurface capability to the DC mode of MT. The fact is that the subsurface capability of DC mode MT is minimal and not relied on for subsurface examination.
112. The alleged subsurface "linear indications" are commonly attributable to non-relevant concerns, such as residual magnetism from welding or surface contour. There is nothing to confirm that the AC-powered examination was inadequate or that subsurface defects did in fact exist. Color photographs of the most severe indications indicate that spurious non-relevant conditions such as surface contour caused greater retention of magnetic powders with DC-powered examination. These full penetration welds were subject to UT examination for subsurface defects and accepted. The UT examination confirmed that the magnetic powders retained during DC mode MT were spurious indications. Both AC- and/or DC-powered magnetic particle examinations are acceptable to the Codes of construction.



113. The incorrect installation of the selector switch was reported on Pullman DR 4350 and 4352 and dispositioned according to accepted QA procedures.

GAP #225, Petition at 22.

It is alleged that:

Because of deficient design drawings for welding, the various departments made drastically inconsistent assumptions about weld penetration. Mr. Stokes explained, "The San Francisco office assumes one set of criteria, site design engineering another, and QC a third." (citing 2/8/84 Stokes Aff. at 6.) Similarly, the skewed fillet weld table on-site and the San Francisco office did not use the same effective leg length. (citing 2/8/84 Stokes Aff. at 8.) As a result, the weld is smaller than assumed in design calculations and as specified by drawings.

114. The allegation is misleading and false. The GAP attachment makes clear that the first part of the allegation relates to flare bevel groove welds. This subject was addressed in PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 46-49.

115. The second part of the allegation, comparing San Francisco Project office use of leg-size fillet dimensions and Pullman ESD direction to use working dimension "W", was previously addressed in PGandE's response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA,



Breismeister, et al., Aff. at 53-54. In direct contradiction to the conclusion of this allegation, the weld size assumed by engineering is consistent with the as-built condition. The as-built hanger drawing indicates the size of the existing skewed fillet weld. Engineering likewise uses this dimension in the engineering calculation. There is no inconsistency between the installed conditions and the engineering calculation.

GAP #226, Petition at 22.

It is alleged that:

Assumptions used by the San Francisco office to design bevel and flare bevel welds for tube steel were inaccurate and compromise claims that the design is conservative. The San Francisco office assumed that the tube steel had radii twice the size observed by engineers in the field. A conservative analysis should not be based on assumptions more favorable than exist empirically. (citing Transcript of January 25, 1984, meeting between Charles Stokes and NRC staff at 6.) Drawings illustrating the difference between reality and assumptions are enclosed in Attachment 7, Exhibit 2. (citing 2/8/84 Stokes Aff. and related Ex. 2.)

116. These allegations are false and misleading. The cited attachment and exhibit do not accurately illustrate the corner radius condition as it actually exists. This allegation was addressed in PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 46-49, and additional data was provided in PGandE letter DCL-84-141. There is no technical merit in these allegations.



GAP #227, Petition at 23.

It is alleged that:

Weld procedures and techniques failed to compensate for inaccurate design drawings, as asserted by PG&E in response to the NRC staff. It is possible to partially neutralize the impact of inaccurate assumptions on weld penetration of bevel and flare bevel welds by using 3/32" or smaller weld rod. Weld procedures and techniques, however, did not require the use of a rod that size. A QC inspector told Mr. Stokes that "welders often used 1/8" rods instead, and that the procedure allowed even more variation." (citing 2/8/84 Stokes Aff. at 6-7.)

117. This allegation was previously addressed in PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 49, and this previous response is supplemented by additional test data which have been submitted to the NRC (refer to PGandE letter DCL-84-141). The test data demonstrate that this allegation has no technical merit.

GAP #229, Petition at 23.

It is alleged that:

Contrary to staff conclusions in SSER 21, Mr. Stokes and other witnesses have observed bevel and flare bevel welds that were not flush, which means that design drawings overestimate the effective throat for these welds. (citing, e.g., 2/8/84 Stokes Aff. at 7; and 2/27/84 Anon. Aff. at 8.)

118. The NRC Staff's conclusions in SSER 21, based on a sample of 100 welds, were justified. The Project sampled 233 welds and found only five welds less than absolutely flush. The Project criterion for flushness was very conservative since it included lack of flushness in the area of



weld outside of the area where weld strength is affected. The minor imperfections did not adversely affect the acceptability of the five welds since the effective throat was not reduced. Additionally, the data provided by PGandE to the NRC on this subject (see PGandE letter DCL-84-141, dated April 11, 1984), clearly demonstrate a significant margin on the flare bevel effective throat in comparison to design calculations. Therefore, there is no technical significance to this allegation.

GAP #230, Petition at 23.

It is alleged that:

The angles specified in Pullman weld procedures and techniques did not match the relevant code requirements in design commitments. Mr. Stokes explained that

for skewed fillet welds, ESD-223 permits an angle down to 15 degrees, which is not permissible under any code. For groove welds, until June 23, 1983, the procedures required a 37 1/2 degree angle, which is permissible under the American Welding Society (AWS) code for piping. But it does not satisfy the requirements for prequalified structural steel or tube steel covered under our design commitments to specific American Institute of Steel Construction (AISC) or AWS code provisions identified to us by management. The 15 degree angle is so far off that the AWS code does not even list a way to compensate for such an error. (citing 2/8/84 Stokes Aff. at 7-8; citing also 2/27/84 Anon. Aff. at 7.)



119. The subject matter of this allegation was addressed in PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 51-52.

GAP #232, Petition at 24.

It is alleged that:

The current QC corrective action program for weld design deficiencies does not compensate for past mistakes. Pullman QC inspectors have told the NRC staff that in the absence of formal directions, they compensated by conservatively assuming a 45-60 degree angle if the information was not included on the drawings or relevant procedures to guide their inspections. Unfortunately, this practice did not begin until issuance of a June 23, 1983, Pullman memorandum. (citing 2/8/84 Stokes Aff. at 9.) Mr. Stokes described the impact: "In other words, the facts as described by the NRC only are accurate for new work by Pullman during the past seven months." (citing 2/8/84 Stokes Aff. at 9.)

120. This allegation is misleading and is a reiteration of previously answered allegations with a few minor changes. (See PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 46-50, 52, 53 ad 57-59.) There have been no weld design deficiencies identified which require compensation by QC corrective action. The Stokes affidavit makes clear that the concern is for the effective throat of partial penetration welds made with a 37-1/2 degree bevel prior to the Project's standardization of the 45 degree bevel. Pullman has welded test coupons and has demonstrated that the required effective throat was achieved with the 37-1/2 degree bevel.



Additionally, an as-constructed example was identified, sectioned, examined, and measured. The cross-sections confirmed that the required effective throat was achieved. These test coupons and as-constructed example established that the 1/8 inch deduction from weld effective throat as used for 45 degree bevels was also valid for 37-1/2 degree bevels. There is no technical basis for the concern. There are no design deficiencies.

GAP #235, Petition at 24.

It is alleged that:

Until February, 1984, there was no welding symbol standard for welders at Diablo Canyon to translate what the engineers meant in the drawings. Neither the design engineers, construction nor the contractor used a uniform system of weld symbols. For example, AWS symbols are supposed to be used in the design, while the American Society of Mechanical Engineers (ASME) code is used for welder qualifications. Unfortunately, the ASME does not have any weld symbols. (citing 2/27/84 Anon. Aff. at 2.)

121. The allegation approaches technical absurdity in comparing ASME Code welder qualifications to AWS symbols and bemoaning the lack of ASME weld symbols. The AWS standard weld symbols are used throughout the United States welding industry, regardless of code or the product being fabricated. AWS symbols are also used at Diablo Canyon.
122. The use of welding symbols on drawings was described in PGandE letter DCL-84-40, dated February 7, 1984, to the NRC. This letter explains the



use of weld symbols, which is to facilitate communications as stated in AWS 2.4, Symbols for Welding and Nondestructive Testing. Other programmatic means to communicate and clarify requirements were also discussed. The historic use of weld symbols at Diablo Canyon, while not completely specified, has been adequate to assure implementation of design requirements. To assure better communications for the large influx of new construction, engineering, and inspection personnel, the Project conducted two training sessions for 350 personnel during May, June, and July of 1983 to further assist in obtaining uniform interpretation of welding symbols.

GAP #236, Petition at 25.

It is alleged that:

In some cases, there were not any symbols for welding required by the drawings. As a result, in an unknown number of instances, there was no design guidance for welding in the field. (citing 2/27/84 Anon. Aff. at 2.)

123. This allegation, which is based upon an anonymous affidavit which has not been provided, does not contain sufficient details for PGandE to respond. It is PGandE's belief that sufficient design guidance exists for any welding performed in the field.



It is alleged that:

Field engineering personnel are consistently untrained and are not consistently knowledgeable about weld symbols. This problem extends to the supervisory level. Overall, one pre-inspection engineer concluded, "From personal observation and discussions, I would estimate that 75-80% could not pass a surprise test on weld symbols." (citing 2/27/84 Anon. Aff. at 2-3.)

124. Although it is impossible to accurately determine the specific details of this allegation since the cited anonymous affidavit has not been made available, it appears to be essentially the same issue as is addressed in PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 54.

125. The allegation is misleading in the implication that weld symbols need to be memorized. Field engineering personnel are not required to memorize weld symbols, and this is not necessary for them to adequately perform their job. In fact, the vast majority of all field welds associated with pipe supports and rupture restraints are covered by about six basic weld symbols. The symbols are commonly available in reference documents which can be referred to in the course of an individual's work. Specific uncertainties regarding interpretation of weld symbols are easily resolved by using these ready references. Specific training in weld symbols was conducted for over 350 personnel during the periods of May 10-12, 1983, and June 20-July 1, 1983. The allegation is also false regarding untrained personnel.



GAP #238, Petition at 25.

It is alleged that:

Inconsistent interpretation of weld symbols in part was due to reliance on an oral tradition, instead of documented instructions. It was difficult to even get a written answer for a question. Numerous written inquiries during the spring of 1983 from field engineering personnel mostly to verbal responses (sic). (citing 2/27/84 Anon. Aff. at 3.)

126. The lack of the cited anonymous affidavit prevents a detailed response. However, the allegation of inconsistent interpretation of weld symbols is refuted by the experience documented in the as-built program. The interpretation of weld symbols and the other channels of communication to resolve questions regarding symbols have been adequate to result in acceptable construction, as is discussed in PGandE letter DCL-84-40, dated February 7, 1984. The assertion of "reliance on an oral tradition" is misleading. The welding symbols used have been well documented in reference material, training aids, training sessions and through specifications. Some oral communications are an essential part of every program and have been used effectively as demonstrated by the final documented acceptance of the as-built configurations.

GAP #239, Petition at 25.

It is alleged that:

The routine on-site was to falsely assume that safety-related welding was done properly, even when the weld symbols did not provide the right instructions. As a field engineer explained, "That is a fairy tale assumption if you don't have a program to do the work right, you can expect a significant portion to be defective. To



illustrate, from personal inspection, I saw generic problems at code breaks with type 12 small bore anchor and pipe attachment fillet welds." (citing 2/27/84 Anon. Aff. at 3.)

127. The cited anonymous affidavit is not available, thus precluding a detailed response at this time. All safety related welding was subjected to QC inspection and acceptance. The welds were documented on as-builts that were subsequently reviewed by design engineering to assure, among other things, that final welds meet calculated requirements.

GAP #240, Petition at 25.

It is alleged that:

There was a generic misuse at Diablo Canyon of the term "typical." To illustrate, if the same meaning for "typical" in the example above were applied to all other interpretations of the term on-site, everything at the plant would be welded all the way around. (citing 2/27/84 Anon. Aff. at 3.)

128. Once again, it is impossible to address this allegation without the availability of the specific details which are, supposedly, contained in the anonymous affidavit. The use of the word "typical" on drawings is common industry practice and is understood, at Diablo Canyon and elsewhere, by those having the appropriate experience and a willingness to look at and understand a drawing. Additional guidance on the use of the word "typical" has been given by Engineering, as referenced in PGandE letter DCL-84-40, Attachment 4, Example 8, Sheet 2 of 4. If any specific question or concern arises, the as-built design review cycle



and open communication policy result in the resolution of such a question or concern. The use of the word "typical", as it specifically applies to the Type 12 anchor, is readily understandable. It is also readily understood that, unless specifically stated, the use of the word "typical" is only applied to the specific drawing and is not generically applied to every drawing for the plant.

GAP #241, Petition at 26.

It is alleged that:

The weld symbol breakdown resulted in oversized welds that can also compromise safety. Contrary to PG&E's position, the harm from overwelding is not merely economic due to waste. It can have an effect analogous to hitting metal with a hammer, and lead to metal distortions due to unexpected residual stress. Specific effects can include excessive shrinking, especially in stainless steel; cracks; warps; early fatigue; and premature aging of pipes and plates that could lead to their early failure. Some baseplates on-site are so warped from overwelding that they no longer can be fitted properly without grout. (citing 2/27/84 Anon. Aff. at 4.)

129. While the cited anonymous affidavit is not available, this allegation does not appear to have any technical merit. Welding symbol knowledge has little, if anything, to do with overwelding. Weld symbols show minimum sizes, not maximum sizes. Because the materials of construction were selected for weldability and ductility, there is little technical concern regarding overwelding. Significant overwelding, in excess of design, has not been found to be a problem at Diablo Canyon, and Pullman ESDs have limits for oversized welds.



130. The comparison between hitting metal with a hammer (or cold working) and welding (a hot process) is not metallurgically valid. Distortion is not a technical concern, provided the design configuration, with tolerances, is maintained. Contrary to the allegation, residual stress from welding is expected and considered in design and construction. Excessive warp and shrinkage are not a valid technical concern, provided design dimensional requirements are met.

131. There is no Project data linking welding symbol interpretation to overwelding or to weld cracks. There is no technical basis for the assertion that overwelding would contribute to early fatigue or premature aging for the applications at Diablo Canyon. Some baseplate warpage is anticipated and is one reason for grouting and shimming. Grouting baseplates simply represents engineering and construction considerations in recognizing and compensating for warpage. The requirements for grouting and shimming are specified in ESD 223.

GAP #242 and 250, Petition at 26 and 27.

It is alleged that:

Another effect of the weld symbol breakdown has been drawings that make impossible claims about the welds, which means that the as-built condition is indeterminate. Examples include weld symbols indicating 1" long fillet welds performed by the Shielded Metal Arc Welding (SMAW) process, and bevel welds that supposedly have 1/16" effective throats. A current field engineer assessed the impact of the inaccuracies: "Perhaps there is no safety significance, but I can say with confidence that conclusion is premature until we look." (citing 2/27/84 Anon. Aff. at 4-5.)



PG&E management's rationalization to the NRC staff, that defective welds are unnecessary, has untenable generic implications. To illustrate, management's response to an identified case of a bevel weld with a 1/16" effective throat was that the weld is unnecessary. But contrary to management assertions, a witness still at the plant reports that the condition of the weld represents a generic problem. It is hard to accept that all such undersized bevel welds are unnecessary. The assumption should be independently verified. If it is correct, there has been a huge waste of consumer money on unnecessary welding and welding preparation at Diablo Canyon. In some cases, the welding and prep represented 60% of the labor cost for the hanger. (citing 2/27/84 Anon. Aff. at 9.)

132. Since the cited anonymous affidavit has not been provided and no specifics are supplied, a detailed response is not possible. The examples cited do not appear to have any significance. There is no support for the claim that the as-built condition is indeterminate.

GAP #245, Petition at 27.

It is alleged that:

The contents of 1983 PG&E reform commitments on weld symbols were inaccurate in fact, and demonstrated a lack of understanding about the problem. The memoranda supposedly demonstrated a pledge to use AWS weld symbols, but the authors used symbols and terms that are meaningless in the AWS system. This indicates that the problems may be getting reinforced, rather than corrected. (citing 2/27/84 Anon. Aff. at 5-6.)

133. The specific details, if indeed there are any, of the issue addressed in the allegation cannot be determined without the anonymous affidavit, which has not been provided.



GAP #246, Petition at 27.

It is alleged that:

Even if appropriate, PG&E's reform commitments have only existed on paper. They have not been applied to the field through an on-site training program for the engineers. (citing 2/27/84 Anon. Aff. at 6.)

134. The allegation is false in that at least four training programs were conducted during 1983 for on-site engineers and inspectors. Two weld symbols training programs based on AWS A2.4 "Symbols for Welding and Nondestructive Testing," for 350 engineering and inspection personnel were conducted during May, June, and July, 1983.

GAP #247, Petition at 27.

It is alleged that:

The design QA breakdown for welding may include preheating. During 1983, PG&E still had not issued instructions that defined when preheating was required. Preheat treatment reduces the metal shock from welding, and therefore strengthens the bonding. Failure to preheat when necessary can lead to metal brittleness and underbead cracking on the weld. (citing 2/27/84 Anon. Aff. at 6-7.)

135. This allegation is false and demonstrates the allegor's confusion and misunderstanding about the roles of engineers in design and of contractors in construction. PGandE specifications have always contained references to control the use of preheating. For example, specification 8711 (for piping and pipe supports) requires that all fabrication be



conducted to the B31.7 and B31.1 codes. These two codes contain detailed rules for the use of preheating. These rules have been implemented in the contractor's welding procedures.

136. Engineers do not generally provide detailed instructions for preheat, but instead specify code requirements which address preheating, if required. Preheat recommendations and requirements are contained in the ASME Codes and ANSI B31 Codes. Prequalified preheat procedures are also contained in the AWS D1.1 Code where applicable. PGandE design engineers, by specification, require these codes to be implemented. The construction contractors, in turn, must use qualified or prequalified welding procedures specifications (WPS) for their work, as appropriate. Preheat is part of the contractors' WPS and defined in installation procedures. In short, preheat instructions are a construction concern and not a design or a design QA concern, as alleged. The major welding contractors at Diablo Canyon, Pullman and Foley, have appropriately addressed preheating in their weld procedure specifications. Also, contrary to the allegation, preheating does not strengthen bonding of welds.

GAP #251, Petition at 28.

It is alleged that:

The NRC should independently verify the calculations behind management answers that the plant can do without suspect work, even for isolated welds. In one case, the weld management would sacrifice is holding up an entire pipe.



In another instance, an engineer reports that sacrificing the weld could cause the hanger to buckle under certain stresses, although PG&E claims it is unnecessary. As a result, individual calculations should be verified, as well as the generic consequences. (citing 2/27/84 Anon. Aff. at 9.)

137. The cited anonymous affidavit has not been provided, and the concern is too vague to permit specific comment. Generically, however, the Diablo Canyon Project has always shown a readiness to review with the NRC any type of design calculation. The issue raised in this allegation shows a consistent lack of understanding of nuclear design work. All safety related work is performed, reviewed, and accepted, including an as-built review, according to approved quality programs which are established to meet NRC requirements.

GAP #252, Petition at 28.

It is alleged that:

A current engineer at Diablo Canyon characterized PG&E's February 7, 1984, response (DCL-84-040) to a January 19, 1984, NRC audit exit interview on weld symbols as an "obvious . . . false statement that is digging PG&E further into a hole . . . For example, on page one PG&E asserted, 'To date, no situation has been identified in which misinterpretation of weld symbols has resulted in the installation of unacceptable welds. Consequently, there is no safety significance to this issue.' Based on personal observation, I believe that statement is wrong." (citing 2/27/84 Anon. Aff. at 10.)



138. Since the referenced anonymous affidavit has not been provided, a detailed response to this allegation is not possible. The allegation simply states that an unnamed, "current engineer" disagrees with a statement made by PGandE.

GAP #253, Petition at 28-29.

It is alleged that:

In its February 7, response to the NRC staff, PG&E may have submitted knowingly false statements on weld symbols. To illustrate, an October 10, 1983, construction memorandum (to be "implemented immediately" for Unit II) conceded:

THE DO'S AND DONT'S LISTING IS PROVIDED AS A GUIDE FOR PIPE SUPPORT WELDING DESIGN. THE USE OF DON'TS IN THE PAST HAS CAUSED CONFUSION AND INCREASE IN WELDING COST. QUALITY OF THE WELDED CONNECTIONS ALSO MAY BE AFFECTED ADVERSELY. IT IS STRONGLY RECOMMENDED THAT THE DO'S BE USED IN ALL PIPE SUPPORT DESIGN FROM NOW ON. (Capitals in original.)  
(citing 2/27/84 Anon. Aff. at 10 and related Exhibit 1.)

139. Contrary to the allegation, there were no false statements in PGandE letter DCL-84-40. The statement of concern in the February 7 letter apparently is "To date, no situation has been identified in which misinterpretation of weld symbols has resulted in the installation of unacceptable welds". The referenced October 10, 1983 memorandum does not dispute this statement. In fact, the October 10, 1983 memorandum containing the DOs and DONTs was attached to letter DCL-84-40. As pointed out in letter DCL-84-40, symbols are only one means of communicating requirements and there are many supplementary methods of



resolving any weld symbol confusion to ensure that the installed condition is acceptable. The thrust of letter DCL-84-40 is that even though some confusion regarding weld symbols may have existed, there were adequate alternative references and communication channels such that the installation of unacceptable welds did not result.

The October 10, 1983 memo was authored by a Diablo Canyon Project engineer in a conservative move to promote conformity with the preferred "D0" symbols for future use.

GAP #254, Petition at 29.

It is alleged that:

On February 21, field engineers received a PG&E management memorandum, effective February 15, that preinspectors could change weld symbols to assure compliance with AWS A 2.4. This development vindicated the concerns of whistleblowers on-site. Unfortunately, for all practical purpose, the solution again was prospective only, because preinspectors have not yet been trained to implement the AWS symbols. This means that even if they learned instantaneously, the welding would only be done accurately for the last three weeks of construction. (citing 2/27/84 Anon. Aff. at 10 and related Exhibit 2.)

140. This allegation is false and misleading. The purpose of the pre-inspection program has been stated in response to GAP #174 and #295.



141. The change in responsibilities promulgated by the February 15, 1984 memo did not "vindicate the concern of whistleblowers onsite" but was merely implemented as a part of a reorganization process to improve utilization of personnel without a sacrifice in quality. This program is consistent with PGandE's intent to assure the accuracy of drawings, including weld symbols, as early in the design process as possible.
142. The implication that with this change and "even if they learned instantaneously, the welding would only be done accurately for the last three weeks of construction" is also untrue. As is discussed in the overview of weld symbols, the system of weld symbols that was used resulted in acceptable welding and quality control of welding as discussed in DCL 84-40. Even before the February 15, 1984 change, the welds and the applicable symbols were inspected and discrepancies identified by the Quality Control inspectors in accordance with the ESD's.
143. The allegation is also false regarding lack of training. Weld symbol training was conducted for 350 personnel during May, June and July, 1983. This program was implemented to ensure that all personnel were using the same system and were aware of the symbols in use. In addition, pre-certification Certified Welding Inspector Training Courses were given to engineers and inspectors at the Diablo Canyon site in June-July, 1983, and November-December, 1983. Those individuals involved with welding at Diablo Canyon are assumed to have an adequate working knowledge of weld



symbols due to previous education, experience and/or training and weld symbols are commonly available in reference documents. Because of the previous knowledge of all personnel involved in welding and related engineering and QA/QC activities, and the ready availability of applicable information, there is adequate confidence that the as-built drawings transmitted to Project Engineering both prior to and after February 15, 1984 are accurate.

GAP #255, Petition at 29.

It is alleged that:

There has not yet been effective corrective action to verify the size of skewed fillet and groove welds. One technique would be "to drill into the weld, insert a hooked wire and measure how far it extended, with appropriate deductions for interior conditions such as slag." Another solution for groove welds "would be to recalculate, assuming that the welds were butt welds with an effective throat of 1/8". Another approach would be destructive examinations. In a February 3, interview with Mr. Stokes, an NRC staff representative conceded that none of these solutions has been implemented. (citing 2/8/84 Stokes Aff. at 10.)

144. This allegation is an example of intervenors' counsel misstating and/or misrepresenting the facts in his own alleged's affidavit.

145. Contrary to the allegation, Mr. Stokes' affidavit at page 10 does not state that "an NRC staff representative conceded that none of these



solutions has been implemented." Rather, Mr. Stokes, in his affidavit, only claims that he (Mr. Stokes) did not have personal knowledge that any of the solutions have been implemented.

146. There are clear instructions in Pullman ESD-223 regarding measurement of skewed fillet welds. Through the repeated inspections, reinspections, and the as-built program, skewed fillet weld sizes have been adequately verified. These QA/QC and engineering activities have been effective actions.

147. Test programs have been conducted which substantiate the effective throat assumption for flare bevel welds and partial penetration groove welds. (See PGandE response dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 46-51.)

148. In addition to this previously referenced data, additional test data has been developed by the Diablo Canyon Project to confirm that the effective throat of flare bevel joints exceeds the values used in the design calculations, even for worst case tube steel with minimal corner dimensions. (See letter DCL-84-141 dated April 11, 1984).

149. Proposals to drill holes for measurement purposes are unnecessary and technically unjustified. Proposals to arbitrarily treat groove joints as having only a 1/8-inch effective throat have no technical basis.



It is alleged that:

Bechtel management displayed an arrogant disregard for professional codes, to the extent of announcing that it would get the codes changed rather than comply with them. For example, Bechtel's Materials Department chief offered that response at a training session in June 1983, when engineers protested that they were being trained to violate AWS skewed T joint requirements for such factors as the amount of weld material and weld callout. (citing 2/27/84 Anon. Aff. at 17.)

150. This allegation is misleading. While it is true that Bechtel personnel serve on various professional code committees and correspond with others in an attempt to address industry concerns, any announcement similar to that alleged would clearly be out of place in any training program. Training regarding weld symbols was provided for approximately 350 personnel during May, June, and July, 1983, and training for the AWS Certified Welding Inspector program was conducted during June-July, 1983 and in November-December, 1983. These sessions were standard corporate training programs. The text of these training programs and the training handouts are on file and do not reflect such an alleged arrogant attitude. Contrary to the allegation, all training material and management direction indicates that the codes should be complied with.
151. These training programs were conducted by Bechtel's Materials and Quality Services Department training supervisor and a department engineer. The Department "Chief" Manager never attended these training sessions and has never been on the Diablo Canyon jobsite.



GAP #215, Petition at 19.

It is alleged that:

The most basic characteristic of the design QA breakdown at Diablo Canyon is that the plant is being designed and built through memoranda, rather than under controlled procedures. (citing 2/27/84 Anon. Aff. at 11.) The normal industry design and review process did not exist for these ad hoc changes. They largely occurred beyond the scope of the formal program.

152. Without access to the supporting anonymous affidavit, it is not possible to respond to any specifics, since the allegation provides none. However, the design and construction of Diablo Canyon have been conducted in accordance with well-established procedures which clearly describe and define authorities, responsibilities, and procedural methods, and include provisions for appropriate review processes, where necessary. Memoranda were used, appropriately, to clarify detailed points of day-to-day implementation. Memoranda were not used in lieu of established procedures. This subject matter was also discussed in the PGandE response, dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Anderson et al. Aff., Exhibit 1 at 44.

GAP #216, Petition at 19.

It is alleged that:

In at least one case, management instructed a design engineer to approve pipe support revisions marked on as-built drawings without the benefit of any analysis. The revisions had been marked in the field to denote design deviations. (citing GAP 3/1/84 Petition at 7, Item 182.) Engineers in the design trailers just "eyeballed" the



changes. In at least one case when an engineer refused to approve modifications without analysis, management promised him that it would be forthcoming but instead recruited another engineer who immediately signed and approved the drawing. (citing 2/13/84 Anon. Aff. at 3.)

153. This allegation points to two events as indicating a design quality breakdown at OPEG. A complete understanding of these two examples demonstrates that such was not the case. In the first example, a design engineer was alleged to have been instructed to approve pipe support revisions marked on as-built drawings without any analysis. This would occur when an approved pipe support was removed for construction purposes and was then reinstalled in essentially its original configuration. Some of the supports so removed had been previously qualified without a unique calculation based on the reverification program sample. Where the as-built drawing of such reinstalled supports was shown to be essentially identical to the original support installation, Engineering could accept the reinstalled support without generation of a unique calculation. If the support deviated from the original qualified design configuration, the pipe support engineers were directed to evaluate the significance of the deviations. Design of a new pipe support or of a significant modification to the original support design was required to be supported by unique calculations.

154. The second example cites a situation where one pipe support engineer refused to approve a modification to a pipe support without necessary supporting calculations. It is difficult to respond to the specifics of



this allegation since the example in the referenced affidavit is not available and, therefore, there are no details of the specific case given to allow its identification. However, reassignment of a pipe support design review to another pipe support engineer who is professionally capable of completing evaluations necessary for design acceptance is proper and does not show a design quality breakdown. (See PGandE response, dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Shusterman Aff. at 2-3.)

GAP 224, Petition at 21.

It is alleged that:

Management officials arbitrarily limited the scope of the Quick Fix program when preinspection "engineers tried to use it as a solution to quality deficiencies." Management representatives asserted that if there was a possibility of the drawing being interpreted accurately, according to design, the Quick Fix program was unavailable. One current engineer put this rationalization in perspective: "Usually it would have been possible to do the job right in spite of confusing or misleading weld symbols, but frequently, and understandably, the work was not done properly. That is a sorry statement about management's standard for corrective action. I fear that it may apply to the whole facility." (citing 2/27/84 Anon. Aff. at 8.)

155. Without the supporting anonymous affidavit, specific response to this allegation cannot be made.
  
156. Responsibilities of pre-inspection engineers and QC inspectors under the pre-inspection program are discussed in PGandE's response to GAP #174



and #295. The PSDTC program ("Quick Fix") was described in the PGandE response, dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 39-43. Contrary to the implication of the allegation, a policy requiring reasonable interpretation of existing drawings without requiring the assistance of the PSDTC program is appropriate and consistent with good engineering practice.

GAP #233, Petition at 24.

It is alleged that:

Corrective action has been inadequate to date for inaccurate design drawings on bevel and flare bevel welds. The design groups could recalculate, assuming that all tubing has a radius of 1.5T instead of 1.3T, or that each joint is a butt weld with a 1/8" effective throat instead of 1/4" as assumed by San Francisco. As of Mr. Stokes' October 15, 1983 departure, neither action had occurred. (citing 2/8/84 Stokes Aff. at 9-10.)

157. No corrective action is necessary for bevel and flare bevel welds on tube steel used for pipe supports because such welds have been demonstrated to be entirely adequate. (See PGandE letter DCL-84-141, dated April 11, 1984.)

GAP #248, Petition at 27.

It is alleged that:

The quick fix program was used to thwart QC inspectors who raised problems with weld symbols, when QC inspectors



refused to sign for welds because they could not read the symbols. In some cases, the quick fix "solution" was to remove the symbols from the drawings without any calculations. (citing 2/25/84 Anon. Aff. at 8.)

158. The subject matter of this allegation was responded to in the PGandE response, dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 54-56 and PGandE letter DCL-84-40, dated February 7, 1984. (See also Overview - Weld Symbols supra at 56.)

GAP #257, Petition at 30.

It is alleged that:

PG&E's December 28, 1983 response to the NRC on small bore piping analysis does not contain enough information to support a conclusion. Mr. Stokes explained that data is missing or inaccurate for thermal anchor movements at relevant points; maximum design and operating temperatures; dimensions for the necessary length of pipe to verify expansion; gaps at the restraint location; and other examples." (citing 2/8/84 Stokes Aff. at 5.)

159. Mr. Stokes has misunderstood the purpose of PGandE's December 28, 1983, Small Bore Piping Response to the NRC Staff. The Staff had requested an elaboration of how PGandE considered gaps in its analyses and why the gaps that were considered were repeatable. The Staff did not request data such as size of thermal anchor movement, design and operating temperature, or dimensions of pipe and restraint gaps. To the satisfaction of the NRC Staff, the response provided a description of the methodology used and an analysis that demonstrated that the gaps were repeatable over numerous thermal cycles. This subject was also



discussed in PGandE letter DCL-84-131, dated April 4, 1984.

GAP #259, Petition at 31.

It is alleged that:

The reliability of the seismic design review is hampered by its reliance on deficient data from apparently unqualified personnel during the 1981 and 1982 walkdown of the plant. Based on language in their early reports, a field engineer estimated that "90% were not qualified. To illustrate, one weld had the following note: 'Heavy-weld all around.' It is impossible to do calculations, or even draw meaningful conclusions, from that type of description. The descriptions at most supported a guesstimate for necessary corrective action, but not a reliable estimate. Unfortunately, that type of analysis established the scope of the redesign program." (citing 2/27/84 Anon. Aff. at 3.)

160. A detailed response to this allegation is difficult because it is confusing and no details are available without the supporting anonymous affidavit. The allegation confuses the purpose of the walkdown program with that of the pipe support reverification program. The purpose of the 1982 walkdown of the plant, referenced in the allegation, was to verify piping geometry, including clearances to supports, and not to verify weld condition or seismic acceptability of existing pipe supports.

161. The personnel who performed the 1982 walkdown and incorporation of as-built information on piping drawings were qualified for that activity. All participants were engineers with experience in the piping



discipline. The work was performed in accordance with a detailed procedure, and training was provided to assure proper implementation. The results of the walkdown program were incorporated on as-built drawings, which were audited by the IDVP and found to be adequate.

162. During the Project's Corrective Action Program, certain pipe support as-built drawings were found to contain incomplete weld descriptions, such as the example "Heavy-weld all around." When an incomplete weld description was found, the support was analyzed assuming the weld did not exist; or, if it was necessary to include the weld in the analysis, a documented reinspection was performed to accurately describe the weld. This follow-up documentation was incorporated in the design calculations and as-built drawings. Contrary to the allegation, the analysis was proper.

GAP #260, Petition at 31.

It is alleged that:

Management further compromised the reliability of design verification results by stripping the drawings of essential information for review calculations, such as loads and movements. That data was on all the older pre-1983 drawings, but has (sic) been eliminated from newer revisions. This makes it easy to "create" whatever load or movement is necessary to "pass" a suspect hanger, and for PG&E to draw questionable conclusions that certain welds are unnecessary. The data to check those conclusions has been removed from the drawings. Most significantly, without those movements engineers cannot draw conclusions in field preinspection whether certain hangers will work as designed. (citing 2/27/84 Anon. Aff. at 12.) Before and



after examples of complete and stripped design drawings are enclosed. (citing 2/27/84 Anon. Aff. at 12 and related Exhibit 3.)

163. This allegation appears to stem from the anonymous alleger's lack of understanding of the various aspects of the design and design control systems in place at Diablo Canyon. Notation of loads and movements were eliminated from the face of piping seismic limiter drawings, and movements were eliminated from the face of other pipe support drawings during the Project's corrective action program review. This information was removed in order to reduce the number of necessary drawing revisions and to increase drawing legibility. This action in no way compromised the reliability of design or design verification.

164. Piping movements and loads continue to be identified for each support in the support calculation package. Each calculation shows qualification of that support for those loads and movements. Therefore, the statement made in the allegation, "This makes it easy to 'create' whatever load or movement is necessary to 'pass' a suspect hanger, and for PGandE to draw questionable conclusions that certain welds are unnecessary," is patently false.

165. The piping analyses which provide these loads and movements have frequently been reperformed due to small temperature and spectra input changes. These piping reanalyses oftentimes result in very small changes in loads and movement which do not affect the support design.



In such cases, the support calculation is updated but no change to the drawing is necessary since the design has not changed.

166. The allegation that preinspection engineers cannot perform design verification is partially correct. However, the purpose of field preinspection is to verify that the support can be installed as designed, not to verify structural design adequacy. The responsibilities of field pre-inspection engineers do not include design or verification of proper design of pipe supports. Responsibility for proper design rests with the design engineer. Verification of proper design is provided through checks by other people, including walkdowns of systems during the different modes of plant operation.

GAP #261, Petition at 32.

It is alleged that:

Engineers on-site have personally observed a generic problem with attachments and baseplates where there is no room for movement, which surely will occur. Even worse, they could not see any indication that the engineering calculations for thermal movement took this into account, because the data no longer is on the drawings. (citing 2/27/84 Anon. Aff. at 13.)

167. It is difficult to understand this allegation. The allegation does not give specific examples and the supporting anonymous affidavit was not provided. However, it is surmised that the allegation pertains to the potential for binding of struts and seismic limiters at their points of



attachment to the pipe and structures, which can be caused by pipe movement.

168. Design criteria (DCM M-9) and construction procedure ESD-223 provide direction and controls to minimize binding. This aspect of design and construction is controlled by special design details and as-built process requirements. Each support calculation provides for pipe movement. The IDVP reviewed this design consideration in its sample of pipe supports, and no deficiencies were reported.
169. The walkdown of systems during plant heat-up and different system operating modes has confirmed that adequate provision for thermal growth has been provided.

GAP #262, Petition at 32.

It is alleged that:

The seismic design review may have failed to take account of the extra residual stress from overwelding. An example involves containment spray pump discharge schedule 10 stainless steel piping, where there is a problem with overwelding on thin wall stainless pipe. The excess heat from excess welding causes the stainless steel to shrink and deform. Unfortunately, there was no available evidence that the resulting increased stress on the pipe wall and lugs were (sic) taken into account in the engineering calculations. As a witness explained, "The safety significance is clear. If that piping does not work when needed, the containment spray system may spill water at the bottom of the auxiliary building, instead of spraying it out at the top of the containment building where it is needed." (citing 2/27/84 Anon. Aff. at 13.)

170. Contrary to the allegation, the seismic design review of all systems,



including the containment spray system, was performed in accordance with appropriate codes which consider residual stresses in the formulation of the rules for piping design.

171. Residual stresses due to welding and other fabrication processes occur in virtually all piping and other steel components. The deformation of thin walled stainless steel piping due to welding is a phenomenon that is well understood by the ASME codes and the industry.
172. The development of the rules for piping analysis by the ASME and ANSI B31.1 codes considered the presence of residual stresses. These rules rely on data obtained from tests of actual fabricated piping components, and hence residual stresses were factored into the tests.
173. These stresses are not of concern, in and of themselves, since they are secondary in nature. Secondary stress is self-limiting and, as such, will self-relieve after the first operating cycle. Although not required by the code, there was a local stress analysis performed to assess the effects of loads applied to shear lugs and other weld attachments used to restrain the pipe. All stresses were shown to be acceptable for all operating conditions.

GAP #263, Petition at 32

It is alleged that:

The seismic design review may have failed to compensate for



the effects of the weld symbol breakdown, which further compromises its reliability by factoring those errors into the calculations that "verify" the design. To illustrate, one of the PG&E representatives conceded that bevel welds with less than a 30-degree dihedral angle should not be calculated or considered for carrying a load. But due to the time and money spent on weld repairs and modifications for that work, it appears that the welds are being included in the calculations. (citing 2/27/84 Anon. Aff. at 13-14.)

174. The allegation that "... the welds are being included in the calculation" is impossible to respond to absent any specific examples. The anonymous affidavit has not been provided. However, written instructions provided to support designers specifically exclude the use of less than 30-degree dihedral angle welds in calculations. (See PGandE letter DCL-84-083, dated February 29, 1984 at 6.) Welds of less than 30-degree dihedral angle are considered to be cosmetic only. In addition to providing a quality appearance, welds are repaired to provide surfaces suitable for painting and to ensure a complete weather-tight seal.

GAP #268, Petition at 34.

It is alleged that:

Contrary to management assertions at a December 15, 1983 meeting with the NRC staff, another base for the seismic design review -- analysis ME-101 -- does not represent conservative engineering standards "in many cases". By contrast, Mr. Stokes described ME-101 as "erroneous, full of errors, defects and flaws". (citing 2/8/84 Stokes Aff. at 13-14.)

175. Mr. Stokes' argument regarding ME101 is incorrect. The Bechtel analysis



ME101, referred to in the allegation, is a computer program used to perform time-history, response-spectra, and dynamic analyses on piping systems. ME101 has been bench marked and verified in accordance with established procedures.

176. ME101 has also been extensively tested and bench marked against the NRC test problems and the ASME bench-mark problems and several other industry accepted computer programs. In all cases, the ME101 program has met all acceptance criteria.

GAP #279, Petition at 36.

It is alleged that:

Mr. Leo Mangoba, the Bechtel official who supervised engineers in the pipe support group, approved the seismic review calculations en masse over several days without studying and properly reviewing the work. Mr. Mangoba did not even get to the calculations until a few days before the end of the program. Supposedly Mr. Mangoba's approval was one of the checks and balances on the quality of the calculations, but it was pro forma. (citing January 25 transcript at 52.) Abuse of the process was crude and well-known on-site. Field engineers joked that responsible checkers "autographed the drawings instead of seriously reviewing and approving them. This happened because the tight time schedule make it impossible for them to study everything they were approving." (citing 2/27/84 Anon. Aff. at 14.)

177. As discussed in the response to GAP #276, procedures were in place which defined the methods to be used in checking calculations, and experienced, responsible engineers were employed to originate and check



pipe support calculations. Mr. Mangoba's approval of the pipe support calculations was based on a detailed technical review by five senior experienced engineers. His approval thus indicated that the calculations received the appropriate level of review in accordance with established procedures. (See PGandE response, dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff. at 73.) Contrary to the allegation, adequate time was provided for support design and checking. (Id. at 76.)

GAP #285, Petition at 37.

It is alleged that:

There was no system or procedure to verify the accuracy of design information received on the telephone from the San Francisco offices. In the absence of any such procedures, the data was unfalsifiable despite engineers' doubts about its accuracy in some cases. (citing January 25 transcript at 111-12; 2/27/84 Anon. Aff. at 13.) The unfalsifiable responses, combined with the long delays in transmitting the information, gave management an opportunity to tamper with the answers to sensitive inquiries.

178. Procedures were in place and were used for control of design information transmitted by telephone. (See PGandE response, dated March 6, 1984, to Joint Intervenors' Motion to Reopen on DQA, Breismeister, et al., Aff., at 82; Anderson et al. Aff., Ex. 1, at 45.) Pertinent design information which was rarely transmitted by telephone was subsequently confirmed in writing. The suggestion that delays in receiving written confirmations created the opportunity for management to tamper with answers to sensitive inquiries is unsupported and false. Under



written procedure, calculations containing verbally transmitted data are required to be marked "Preliminary" until formal written confirmation is received. Such receipt allows the calculation to be verified and finalized.

GAP # 301, Petition at 43.

It is alleged that:

In some instances the design does not realistically account for the full effect from temperature variations. Combined with design control problems, this is asking for trouble. For example, one engineer observed cases where the drawings allow for 1/4" movement on lines that will heat to 450-500 degrees. The temperature shifts can result in movements of four to six inches. "The consensus among field engineers is that we could lose much of the plant if it goes to low-power testing in its current condition. Hilti-bolts, studs and hangers may well rip out of the wall." (citing 2/27/84 Anon. Aff. at 16.)

179. The anonymous allegor obviously is not familiar with design of piping systems. Contrary to the allegation, piping design criteria and procedures are in place which require the effects of temperature variations to be considered both in piping and pipe support design. These procedures and criteria have been implemented and provide assurance that design for temperature variations is proper. The IDVP reviewed piping design for thermal conditions and found no deficiencies. The design has been verified further by walkdowns of systems during plant heat-up and different system operating modes.



180. Without knowing the details of the affidavit, it is difficult to completely respond to its specifics. The fact that an engineer observed cases where the drawing allows for a 1/4" of movement on lines that will heat to 450-500°F is not significant. All lines have been analyzed to accommodate the movement which will occur under operation. The fact that some lines may move 4-6" does not mean that the specific line observed will do so.

181. The statement that "we could lose much of the plant" at low power testing of the plant has no factual basis. Most of the plant already has been heated up to maximum operating temperature or close to maximum operating temperature, and inspection has verified that none of the plant has been "lost" and no Hilti-bolts, studs, or hangers have "ripped out" of a wall or other structure.



It is alleged that:

Inaccurate drawings mean that operators may rely on information which conflicts with the approved design. The Nuclear Plant Operators (sic) (NPO) department uses drawings known as Operational Valve Identification Diagram (OVID) to run and assess the condition of the plant. A whistleblower reports, however, that these drawings do not match the approved design drawings, known as Piping and Instrumentation Diagrams (sic) (P and ID) (sic). For example, "the flow sequence was so far off that the two versions of drawings had valves on different sides of the check valves. This discrepancy could lead to false readings for the operators about the flow of liquid in the system." (citing 2/27/84 Anon. Aff. at 14.)

In some cases, the OVIDs that will be relied on by operators are incomplete. The missing information includes such significant data as valve numbers, which are used to obtain line clearance angles required for plant equipment status. (citing 2/27/84 Anon. Aff. at 15.)

PG&E management's verbal 1983 policy was that field engineers should ignore all problems with OVIDs. (citing 2/27/84 Anon. Aff. at 15.) As a result, management made an intentional decision for plant operations to rely on incomplete and/or inaccurate information.

183. At Diablo Canyon, like other power plants, the design engineering organization provides a series of diagrams, called Piping and Instrument Schematics (P&Is), which include schematic piping layouts for each plant system. The P&Is schematically show the various system components and piping, identify the major components, and provide miscellaneous design information, such as line sizes and applicable piping codes.
184. Although P&Is contain much useful information for the operators, they are not tailored specifically toward operational needs. In general, the P&Is do not assign unique valve numbers to any manual valves. Also,



instruments, vents, drains, and piping interconnections are shown in a very schematic manner on the P&Is, and not in their exact physical layout.

185. As a result of the above considerations, the plant operations staff has prepared Operational Valve Identification Diagrams (OVIDs). The principle purpose of this effort was to assign a unique identification number to every valve in the plant, thereby assuring that operating procedures were unambiguous in their references to valves. Also, while the OVIDs are laid out in the same manner as the P&Is, with a one-to-one correspondence between the two types of diagrams, the OVIDs were "cleaned up" (in relation to the P&Is) by removing extraneous design information and showing additional detail where it would enhance operator effectiveness.

186. The OVIDs are prepared and maintained by the plant operations staff in accordance with approved administrative procedures (see Administrative Procedure E-9 and Supplement 1 to Administrative Procedure E-9). These procedures provide for initial and periodic review of OVIDs to assure their accuracy, incorporation of design changes, and approval and signoff.



187. In summary, OVIDs are considered as descriptive appendices to the plant operating procedures, are specifically designed to be used by operators for system line-ups and for reference in clearing equipment, and are carefully controlled to assure accuracy. They contain more operational information, not, as alleged, less than do the P&Is.

188. The OVIDs, unlike the P&Is, are maintained by the Operations Department instead of the Engineering Department. This, of course, explains any instructions to personnel in other departments that they were not responsible for updating OVIDs.

GAP #286, Petition at 37.

It is alleged that:

At the time of Mr. Stokes' departure, plant operators did not have access to a centralized document center with all information necessary to respond to conditions in the plant. This could compromise operators' ability to make all decisions from the control room in an emergency. (citing January 25 transcript at 115-16.)

189. This allegation is simply false and beyond the area of expertise and knowledge of the alleger. Plant operators have, for many years, had access to accurate, up-to-date information necessary to operate the plant. This includes access to central files, records management computer terminals, and hard copies in the control room for high-use documents. Similarly, the Technical Support Center and Emergency Operations Facility are provided with appropriate documents for use during emergencies.



Attachment 1

BECHTEL POWER CORPORATION

DIABLO CANYON PROJECT

JOB #15320

EXIT INTERVIEW

EMPLOYEE NAME \_\_\_\_\_

Do you know or are you aware of any problems with the quality of workmanship or the engineering design of this project?

YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, explain.

Do you know or are you aware of any possible code of violations that are or have been committed at this project?

YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, explain.

Did you attempt to bring these to the attention of your supervisor?

YES \_\_\_\_\_ NO \_\_\_\_\_

What were the results?

REVIEWER \_\_\_\_\_

DATE \_\_\_\_\_

EMPLOYEE SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_



ATTACHMENT 2

**PULLMAN POWER PRODUCTS**

**JOB # 7177 • AVILA BEACH, CALIFORNIA 93424 • PHONE (805) 595-2356**

TO **H. KARNER**  
**QA/QC MANAGER**  
**D.C.P.P.**

DATE **7-15-82**

SUBJECT: **ESD 243 SEC. 9.9 "WELD STAMPING"**

DURING A ROUTINE QC WALKDOWN OUR CREW NOTICED  
A FIELD WELD WITH THE STAMPING ON THE WELD  
VOLUME. WE, IN THE PAST, HAVE ASSUMED THIS TO BE  
AN UNACCEPTABLE PRACTICE, BUT ESD 243 SEC 9.9 MAKES  
NO MENTION OF STAMPING ON TOP OR ADJACENT TO THE  
WELD ESD <sup>203</sup>204 SEC 1.8 STATES.... SHALL BE STAMP-  
ED ADJACENT TO THE WELD.... BUT ESD <sup>203</sup>204 IS  
DERIVED FROM PG&E SPEC. 8711 AND WE ARE  
WORKING TO PG&E SPEC 8833X R. WHAT IS YOUR RESOLUTION?

BY **JH McDermott** QC 1/777

DATE **7/19/82**

If the E.S.D. does not say that it cannot be done it is acceptable.

SIGNED **JH Karner** 7/19/82

INSTRUCTIONS TO SENDER:

1. KEEP YELLOW COPY. 2. SEND WHITE AND PINK COPIES WITH CARBON IN TACT

INSTRUCTIONS TO RECEIVER:

WRITE REPLY. 2. DETACH STUB, KEEP PINK COPY, RETURN WHITE COPY TO SENDER

