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

In response to PG&E letters on the subject of **Tube Steel Radius** and **Flare-Bevel Welds** as addressed in the April 7, 1984 and April 11, 1984 to the members of the Appeal Board, and PG&E letter No.: DCL-84-083, DCL-84-164, DCL-84-166, and DCL-84-190.

In PG&E letter: DCL-84-164 Enclosure 7 on page 10, PG&E states "The adequacy of the DCP criterion was addressed in PG&E letters DCL-84-083, DCL-84-141, and DCL-84-153. As described in these letters, **site inspections confirmed** that the **tube steel corner radii are**, in fact, **2.0 t** (or slightly larger)."

In PG&E letter: DCL-84-166 on page 47 under the subject "WELDING OVERVIEW WELD SYMBOLS, "PG&E states "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."

I hope to put an end to the verbal debate about the existence and safety significance of out-of-specification tube steel which is and has been used in constructing faulty safety-related pipe supports and other safety structures at Diablo Canyon. This problem is not limited to isolated occurrences, as claimed by PG&E. Until recently, I had only seen tube steel with radius less than 2 t at Diablo Canyon site before I was terminated last October 1983. However, that has changed in the last few days. A currently-employed Diablo worker who

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was aware of my ongoing debate with PG&E, provided my counsel Thomas Devine a piece of 3 x 3 x 1/4 tube steel which was cut from a piece of tubing being used to construct a Unit 2 class 1 pipe support. The worker informed me that tubing similar to this example was used during 1983 to construct Unit 1 class 1 pipe supports. The tube steel was given to Mr. Devine for my analysis to forward to the appropriate government authorities. I know that it was intended for use on safety-related work, because I examined the relevant support drawing. It indicated that the support was code class 1 and design class 1.

In PG&E letter no. DCL-84-166 on page fifty under topic "WELDING OVERVIEW FLARE BEVEL WELDS TUBE STEEL RADII" PG&E states that "different radii can be inferred for the tube corner dependent upon the measurement method used."

On page 51, PG&E states, "We have termed this the flat side intersection method (D dimension). Based on this D dimension, an apparent corner radius of RD is implied. (...) For the 3 x 3 x 1/4 tubes, the apparent radius, RD, is approximately 1.25 t to 1.5 t and the RA is always 2.0 t or slightly larger. For the 3 x 3 x 1/2 tubes, RD is approximately 1.0 t and RA is again 2.0 t."

This tubing (Attachment 1 sketches) not only has a corner radius less than 2t but has only one (1) corner which is 2t. Three corners are less than 2t, of which two (2) are only 1t as I and others have confirmed. It measures 1t using the Straight Ruler Method (per PG&E) and using the Concave Radius Gage Method. An additional flaw exists, which before seeing this piece, not even I was aware of. The tube wall has what appears to me to be a lamination crack running all the way around its' perimeter. This lamination crack is almost exactly at the center line of the tube wall.

On the 24th of May, I was in a meeting with the NRC staff in which I was asked how I felt the radius of tube steel should be verified? Should the Straight Ruler Method, the Concave Radius Gage

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Method or some other method be used? I am not going to propose a novel method. What is and has been my only concern is that the calculations which PG&E/BECHTEL perform are done with good engineering judgement based on obtaining conservative results. After measuring the sample tube steel referenced above, I recognized that no simple accurate method exists for measuring the radii, because this steel is so badly made that the radii changes noticeably along its' length. Depending on how you decide to measure the radii you can obtain three (3) possible results at each corner.

As an engineer and in accordance with the established guidelines of relevant professional CODES, I feel the above data should be factored into the methodology. In the case of pipe support steel design, I will and would like to see applied at Diablo Canyon the definition of tube steel radius as defined by either the (AISC) or the (AWS) CODES. Based on my knowledge, and after review of pages 4-131 to 4- 149 and Section 1.17 "WELDS" on page 5-44 of the AISC manual, I decided that the answer must be within the AWS document. Both documents govern the construction of pipe support steel, but on page 4-149 and 5-44 the AISC references the reader to the AWS code for this issue.

Looking at AWS A2.4-79, the AWS document on SYMBOLS FOR WELDING AND NONDESTRUCTIVE TESTING Section 9.2.9.

> "Flare-groove welds. The dimension S of flare-groove welds is considered as extending only to the tangent points indicated below by dimension lines. (See Fig. 32)" (See Attachment 2, 2 pages)

Based on my own measurements of the sample tube radii and the section 9.2.9, the only conservative method of measurement is the Straight Line Method per PG&E. By using a combination square with a

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Bevel Protractor Head with a blade graduated in 64ths in conjunction with a flashlight, a QC inspector or engineer can measure the radius to within 1/64 inch. I feel that it is important to state that two (2) values per corner typically can be measured, and it is good engineering practice to use the minimum value in the effective throat calculations to ensure a conservative design. The reason for the Bevel Protractor Head is that the tube steel walls are not necessarily 90° to each other, and the protractor will allow flush contact with the wall of the tube.

I can't provide PG&E or the NRC with an easy way to resolve the lamination problem. There is one question that should be addressed before any other. Should this defective steel be allowed to remain in the plant, or should a through search be made and all defective materials be removed from the plant? To accept this condition "as is" without compromising public safety, several questions must be satisfactorily addressed. First, Welding-What joint configuration, effective throat, or wall thickness will govern the failure mode which is the most critical? Second, member stresses-What section properly will be used in the analysis of member stresses? Third, how will confidence be established that this is the only defective material in the plant?

There is increasing empirical evidence that the answers will confirm a problem. Another Diablo employee told me that some NPS Struts and Snubbers which were for class 1 systems have spherical bearings which are cracked from what appears to be the swageing process when they were installed. Swageing is a process by which material is welded by pressure or hammering. My friend recalled that

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the spherical bearings are marked "made in Japan." I gave the NRC in December 1983 a large spring-can structural steel attachment which also had lamination cracks from cold rolling. I told them that I was aware that three (3) were defective of a random sample of four (4). Since December 1983, I have heard from workers at the plant that 25 defective spring-can attachments had been found in the plant. I should note that the NRC was not concerned with the defective spring-can attachment - it was not installed on a class 1 pipe system (just Main Steam!).

The problem has been confirmed on a sufficient scale that to adequately protect the public safety we still must obtain answers before Unit 1 begins power ascension. Results from PG&E and the NRC's "samples" are sharply in conflict with hardware reports from workers in the field. Only a comprehensive review can resolve this dispute of fact.

In PG&E letter No. DCL-83-166 on page 48 in the last paragraph, PG&E states "**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 (**350**) 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." (Emphasis added.).

When you read PG&E's responses to valid problems such as this, their answers are humorous like material for comics performing a night club act. For anyone who has additional facts to fill in around the flakes of truth, they provide a good laugh. Maybe 350 people sounds like a lot. Let me put the number in perspective. How does **350** compare to **7000** relevant employees at the site? Mathematically the ratio is 1 in 20. When you consider that 350 were typically in management, the number left in the field to spread the knowledge

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around brings the ratio to more like 1 in 50. When this fact is combined with the time frame, everyone should get a good laugh. As of March 1983, according to PG&E Unit 1 modifications were complete. What good does it do to train the help after the job is finished?

In response to PG&E letters on **Licensing Condition # 1 (Small and Large bore review with technical subjects)** per: DCL-84-164, DCL-84-166 and Transcript between PG&E and NRC Staff in Bethesda, Maryland on Wed., May 9, 1984.

1. **AS-BUILD HANGER DRAWINGS** - In summary there are many aspects of the as-builts which do not supply adequate information, it is PG&E's intention to get any information which is incomplete and required for the review. This appears to be acceptable to the staff. It impossible for the engineer in an office to know if the drawing with which he has been provided is an accurate representation of what exists in the field. There are details which can tip him off to problems. The first place to look is at the concrete pour details showing embeds, conduit, ground cable, and drain lines. These items could be the reason the bolt pattern is as shown on the drawing and in the case of drain lines may lower allowable bolt loads. The drawing usually shows the type and size of anchor bolt. When large bolts (1" and 1¼" or larger) are shown or the bolt embedment length is shown and the embedment requested to be installed is 6" or more. It is important to check the slab thickness because as a guide it should be twice the bolt embedment depth. The concrete drawings are necessary to determine the thickness of the slab or wall. Thin slabs and walls (those not twice the maximum bolt embedment used) may require calculations under the pipe support loads to determine if they are safe. Three bolt problems exist which have not been addressed in the calculations. 1) No review has been made checking the embedment

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length to slab or wall thickness for effects on bolt interaction on the opposite face of the slab or wall. 2) No review has been made of the effects to the concrete member subjected to a large load which is indicated by the use of the larger bolts and thru-bolts from a single support. 3) Similarly, no review has been made of the effects to the concrete member from multiple support loads.

Members shown intersecting other members at angles other than what appear on the drawing to be square should be a clue that fillet weld may not have full effective throat. This depends on whether the member intersects another at an angle less that 60°. Dimensions or and included angle should be requested from the field in any case where the drawing appears to show members intersecting at other than 90°.

Another item which should be included, was admitted by Mr. Tressler on page 215 of the May 9 transcript. "I guess another case is I remember seeing a DP where the field asked the engineer of three threads of nut engagement was acceptable on this support. I don't know for sure what the answer was, but if the answer was yes, we don't as-built thread engagement." This problem requires that each support be checked for a full nut thread engagement. The engineers performing the review can not verify the adequacy of the bolted connection with out knowing the thread engagement. Will the staff require that thread engagement be as-built knowing that some bolts exist with only three (3) thread engagement?

Other things to watch for are in accurate or insufficient detail. At times items will be shown but not in enough detail for an engineer to perform an analysis or evaluate the effects through the

use of good engineering judgement. I have seen supports which looked to be quite strong on the drawing but upon a closer examination in the field were found to be completely free to slide in the direction of pipe thermal movement. Another example that comes to mind was a plate attachment near the edge of a wall. The original drawing indicated that the plate was supported under its' full length by concrete but after a field trip, it was found to be cantilevered out over the edge so that a large bending stress was placed in the plate. I should note that the anchor bolts were over stressed when considering the cantilever.

One form of information, which is available and could be used to provide the missing kinds of information on problems which must be reviewed can be provided by including the PSTDC forms or Quick Fix sheets with the As-Built Drawings. Hard to find information relevant to the design review process is frequently shown on the PSTDC form as the reason for a modification. It is true that the information was obtained thru "trial and error," but that process of finding necessary information for review might prove more efficient than trying to locate the applicable concrete pour drawing which would only provide approximate information. Construction drawings are not very accurate in many ways. For example, the slab dimensions are usually to a quarter inch, but the location of reinforcing steel at best is only good for a rough spacing requirement. Accuracy for the location of items like drain lines and ground wire is none existent. Typically drains lines are supposed to be placed near the center of a slab but while in the PSTDC group, I had to write a Quick Fix when a construction crew drilled through a drain line when installing anchor

bolts. The location and depth can be determined with more accuracy when checking the anchor bolts for reduced allowable load reductions from the Quick Fix form than from any concrete drawing. Other important information might be that the slab or wall is only 10" when it was supposed to be 12".

Beyond the fact that the Quick Fix sheets show critical information which should be reviewed, there is the necessity to have engineering review these documents and give their approval of the installed change as is the standard procedure when a design change request is made. The only difference here is the issuer didn't perform any calculations. Thus requiring both the origination of some calculation or other basis for acceptance from the applicable engineering department. Without this act, we will uproot the foundation which has been laid for a good QA program.

The review of the PSTDC's and the DP's has no formal procedure by which to work. PG&E doesn't appear to be committed to reviewing either of these two critical programs. In the May 9 transcript on page 204 Tressler states that 2,120 DP's were reviewed, we found 429 related to piping or pipe supports and out of these 55 were found to contain design information which applied to pipe or pipe supports. What were all the rest written against structural steel, concrete or what? If there was were 55 DP's which contained design information, why are't the others being reviewed by the appropriate design departments? In the case of PSTDC's , out of approximately 15,000 only 1100 have been reviewed of which only 20 small and 20 large bore were selected as having extensive modifications made by the PSTDC group. Here the staff was insistent that all be reviewed. The

detail of this review is not clear nor is there a clear purpose behind it.

All of the examples used are hardware problems that have been confirmed in the field. Our engineering calculations did not take them into account because they weren't on the drawing. The effect on public safety is unknown, but could be devastating. Problems also loom over the NEW staff corrective action programs to verify the calculations but not the hardware. The drawings are still incomplete, so significant problems won't be considered. The conditions of the hardware must first be confirmed, before we can produce reliable engineering conclusions.

2. **LOAD DETERMINATION** - PG&E's response to the staff has been incomplete.

To adequately protect public safety through conservative analysis, the following factors must be considered. In order to begin any calculation or review process the first step should be to decide how we will determine the loads to be used. This is important to provide uniformity in load determination and consistency of application to the structure which is relevant for both small and large bore. Due to the fact that less than all possible combinations of loads were actually run in the analysis, I feel that some procedure is required to be followed to ensure that the maximum possible load combination has been analyzed. This problem was one which existed during our review work, which I felt was far too vague and thus allowed failing structures to pass. (See Attachment 3a,b,c)

Attachment 3a is the form supplied by management for the pipe support engineers to compute the loads for their calculations.

I have added what I believe to be clarification letters to this form which were not part of the original, or were used by only a few other engineers. I added the (A) or (B) letters to the load cases on form 3a. Though it may not be obvious the difference between 1A and 1B, 2A and 2B, etc. is quite simple. All cases with an (A) are the most positive value that can be determined using the formulas and notes on the bottom of the form and all cases with a (B) are the most negative values, also based on the formulas and notes on the bottom of the form. Most of the time I only used this form for the most simple support, ie. one (1) pipe, 2 directional restraint. For this type support and using this form, four (4) combinations are possible for Load case 1, not just the two (2) which are on the sheet by the 1A or 1B, but also the diagonal cases.

Not all OPEG engineers were aware that pipe loads are dynamic and each direction should be assumed to be independent of the others unless a very detailed analysis has been performed demonstrating otherwise. At Diablo the practice was to also allow each engineer to perform his analysis with whatever he was able to get a checker to also accept. In sum, the new review must have procedures directing analysis from all relevant directions. The current methodology does not guarantee this necessary analysis.

Forms 3b and 3c have been included in Attachment 3 along with a discussion of their development. They are intended to be used as an example of the kinds of detail which should be included in any procedures on load determination, as well as examples of changes to the forms which should be made so that all engineers are consistent in the load calculations. The types of supports addressed in this

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discussion are the most difficult and are the ones which are performed using STRUDL. These are being reviewed because of errors which were found by the staff.

When performing an analysis requiring the use of STRUDL on a simple support as described above, I usually ran four load cases to guarantee that I obtained the maximum stresses. For a gang (a number of individually numbered supports welded together at one or more points) support, it was not possible to run all possible combinations. Gang supports are the most difficult supports to analyze. They require the best analysis and the most experienced engineers are assigned to them.

For these suppports, I developed two (2) forms which caused me to spend a little more time in determining the load case I would analyze but reduced the number of combinations from each pipe to only one (1). Actually if anchor bolts were involved, there would be two (2). However two individual runs could be made, one to check stresses for frame members, welds, component hardware etc., and one to perform the base plate and anchor bolt calculations. I also wrote (on my own time) and had a co-engineer check a program for an HP41C to perform the combinations required in the flow chart on the top of Attachment 3b. This program provided the same results for load cases (A) or (B) as explained earlier. The reason for my doing all this was to keep up with the production requirements since I was usually given gang supports and multi-pipe supports (support restraining multiple lines but only assigned one support number) to analyze. Production credit was based on support numbers not number of pipe restrained. When I was laid off, I was and had been working on extremely large gang and

multi-support structures since approximately the 1st of March 1983 except while in the PSTDC group. Two which I had worked on just before going to the PSTDC group in June were reassigned to me. The structural steel loads had been sent to the city for approval and had come back rejected. **The pipe support loads were causing too much torsional load on some fairly large** W14's **(structural steel)** which were desigred as pined end beams attached with angle clips.

I am not proposing that my forms be used, but I hope the NRC will see the necessity for procedures to ensure that all engineers can consistently obtain the same load values to be used in the calculations. That control still does not exist in the PG&E/STAFF program. The loophole means that the same deficiencies could repeat themselves, which would disqualify the results of the current corrective action.

3. **STRUDL MODEL** - Several details should be addressed which are critical to obtaining consistent results by all engineers performing the review. To date, they have not been covered by the PG&E/STAFF responses.

Guidelines should be defined for accuracy of dimensions, both of members and eccentric connections. The use of the word significant as a standard by which to build a nuclear plant has no reasonable basis, nor can a definition be given to the word such that all the engineers could apply it consistently - one to another. A standard value of (+ or -) ½ inch would ensure that a consistent level of accuracy is maintained. On other projects which I worked, the standard was (+ or -) ¼ inch. Procedures should be more specific and beyond misinterpretation.

Second, project specific instructions should be supplied on the determination of Beta angles. There were many non-controlled documents on how to determine the Beta angles from all over the country within OPEG. This was not any different from the San Francisco office, as employees there confirmed to me. Due to the number of angle members in the small bore supports, I feel it imperative that tables be given to the engineers which have been approved by management indicating the correct Beta angle depending on position of the member.

Third, instructions should be given the engineers on when to use joint releases. This should include sketches of the detail and how it should be modeled. There should be a free atmosphere within which questions may be asked both for clarification and to question the validity of the proposed instruction or any technical aspect of the review program.

Finally, guidance on modeling members which have had a part of the cross section cutout for any number of reasons should be provided as examples of good modeling practice. These could range from a hole through the web of a wide flange (WF) to the hole member having been cutout and displaced in one direction or another. This problem with notches and cutouts are stress related. Typically, details are not paid very much attention. When a member has had its' cross section reduced, stresses are intensified in the reduced zone and unless an engineer considers the transferral of stresses from one side to the other - an overstress can exist.

On balance the failure to provide methodological controls such as described above, means that there is no guarantee that the

PG&E/staff corrective action program will catch all significant problems. These factors must be considered.

4. **STRUDL STRESS SUMMARIES** - These represent another problem not adequately covered in the current corrective action plan. At Diablo, each engineer was allowed to check as little as his checker would agree to accept. Even the work at Zimmer was better in this respect. Enclosed is a copy of the CHECKLIST FOR STRUDL FRAME ANALYSIS (Attachment 4a) which was used at Diablo by OPEG. Also attached is a copy of a form which was used at Quadrex Corporation for checking the stress combinations of members which were analyzed by Strudl. (See Attachment 4b) I adapted the basic form to the Diablo Title for my use at Diablo, but was not allowed to use it. This form was included as an example of how to properly combine the torsional shear stresses (see line 18) and also how to combine the warping normal bending stresses with the axial and bending stresses (see line 21). For the record, I would like to state that this form was part of the calculation package for all small bore supports which were performed by Quadrex on Zimmer Nuclear Plant. I would also like to say that a fortran program based on the same technical literature as the Bethlehem Steel design guide on TORSION ANALYSIS of Rolled Steel Sections was used to compute the warping shear and warping normal stresses (lines 7 and 8 of attachment 4b) If there is any remaining question whether my challenge to the loophole is reasonable, in 1980 at the Gaithersburg, MD office of Bechtel, we used this same program. It was on Bechtel's own system. The subject of warping stresses is not new either to the engineers at Bechtel or PG&E.

Another point should be raised in discussing Strudl stress

summaries, the use of Strudl input forms at OPEG. These forms had all load combinations already written out. When I reviewed the combinations in detail to make sure all load cases were being combined which effected stresses in the Load Combination statements, I found that the of the structure was not being included in the stress results. "Self-weight" is the load of the structure itself. In some cases, the stresses on members from "self-weight" load alone will be sufficient to fail the support, and in all cases this component of load is important in evaluating the acceptance or failure of that support.

This was not obvious since in load case five (5) or so there were three (3) load cases written to provide the self weight in the X, Y, and Z directions. These were being run and combined with the tributary load (also effective weight of pipe system in each of the respective directions) for output as the displacement by which we were to check the stiffness of the structure. Apparently, the writer of this form failed to add the necessary load cases in the load combination statements which are combined for stress output. After this discovery, I wrote my own input forms.

I would suggest that the NRC have an in depth look at this form if it is being used in the review work. The public record does not demonstrate that this problem has been corrected. If there is any question about the significance of this error, some supports will fail under their self-weight without any pipe load being applied.

Another point on this subject must be addressed, but is not clear from the public record. Why wasn't the deflection required to be checked? On all other plants with which I am familiar, a displacement limit was imposed at the point of the pipe attachment.

This was a secondary check beyond the stiffness requirement. It is important to verify the displacement under load for if the support moves in some cases too far the pipe may be overstressed. It is possible to have a support which meets the stiffness requirements and still will have large amounts of displacement.

5. **TORSIONAL WARPING NORMAL AND WARPING SHEAR STRESS** - In PG&E's letter: DCL-84-164 Enclosure 7 on page 2 PG&E states "There are three considerations in the pipe support design at Diablo Canyon that tend to minimize the significance of the warping phenomena:

o The **predominant use of wide flange** sections rather than "I" sections or other sectional shapes having a lesser capacity to restrain torsional loads.

o The pipe supports are designed to use standard size members and a **stiffness criteria that**, in most cases, **assure** that the **member stresses will not be the critical factor** in the strength of the support.

o Small bore supports typically use **angle** or **square tube** section **material that are not subject to warping."** (Emphasis added.)

The statements by PG&E are ridiculous. Wide flange sections may be used predominantly in large bore, but even if they are that does not preclude many from being overstressed when torsional warping normal and warping shear stresses are added to the existing bending and shear stresses. This is especially true in large bore supports where very large loads are possible. The end connections are very important in how much torsion a member can safely carry. It is true that wide flanges have more torsional stiffness than an "I" beam, but it is equally true that a square, rectangular or circular tube has far more torsional stiffness than a wide flange.

The second PG&E statement concerning the stiffness criteria may be somewhat relevant for the most simple support, i.e., a simple cantilever, but even here a counteracting force is at work. As mentioned in the paragraph above, the end condition has a lot to do

with how much torsional loading a member can take. A beam which is Fixed-Fixed will carry more torsional loading than one which is Fixed-Pined, Pined-Pined, or Fixed-Free, providing only end conditions vary. Again the failure to consider all possible forces could be the difference between passing and failing the support.

The last statement has to be a misprint. I can't believe that PG&E would allow such an obvious falsehood. I believe almost any competent engineer can tell you that any material or shape will warp if loaded. In reply to the angle and tube shape comments of PG&E, I would like to quote several lines from a book published by the Lincoln Arc Welding Foundation "Design of Welded Structures." I selected this document because many engineers have one and use it regularly.

From Section 2.10-3 "Designing for Torsional Loading"

> "**The solid or tubular round closed section is best** for torsional loading since the shear stresses are uniform around the circumference of the member.
>
> **Next** to a tubular section, the best section for resisting torsion **is a closed square** or **rectangular tubular section.**
>
> (Skip a paragraph)
>
> The **poorest sections** for torsional loading **are open sections, flat plates, angle sections, channel sections, Z-bar sections, T-bar sections, I-beam sections, and tubular sections which have a slot."** (Emphasis added.)

The truth of PG&E's amazing assertion should be tested fully, both for the validity of this theory and its effect on the design. I feel that when the evidence is laid out on the table that PG&E will have to admit their incompetence.

6. ANGLE MEMBERS - In PG&E letter No: DCL-84-164 Enclosure 7 on page 3 paragraph (b), Differences Between AISC Code and Project Criteria, PG&E state "The so called 'differences' between AISC and the Project criteria using the Australian data, references 1,2, and 3, with respect to allowable stresses of angle sections in bending do not really exist."

While I have not had very much time to fully analysis the

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Australian papers, I have studied them sufficiently to conclude that they are not applicable for type of loading to which they are being applied by PG&E. I would like to quote several lines from the Australian paper "Laterally Unsupported Angles With Equal and Unequal Legs" Section 4. LOADING CASES. "Note that the location of the moment on the cross-section is not critical. However point loadings which are not applied through the shear centre will cause additional twisting (Section 12)." In Section 12. LOADS NOT THROUGH THE SHEAR CENTRE, additional formulas are given for the additional twist and the additional stresses due to twisting. On the bottom of Section 12, "A more exact and comprehensive solution to this problem can be found in (21)." Reference 21 is to an article entitled "Deformations of Geometrically Imperfect Beams" written by N. S. Trahair which was printed in Proc. ASCE, 95 (ST7) JULY 1969, PP.1475-1496.

I am sure that the Australian study was not intended to be used by the author in application to the types of end connections which we find in nuclear power plants. In Section 1. INTRODUCTION second paragraph, a discussion is provided as to the use of angles in structures such as transmission towers. The last line of this paragraph says "Even here, however, the underlying research has frequently been highly empirical with strut load capacities given for each member size under practical field conditions." From the qualifiers in the text, these studies were made strictly for expansion of knowledge in the area of transmission tower design.

I don't believe the Australian papers should be used in the design of nuclear power plants or the construction of any structure which would place the lives of people in danger for the

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following reasons: 1) The design of Class 1 nuclear pipe supports requires a much more conservative analysis than do transmission towers. 2) The joint details which exist in constructing a transmission tower are easier to control than they are in pipe supports. Thus through a good joint design it is possible to apply loads to the shear centre avoiding the additional twisting stresses inherent to a nuclear plant, discussed in the first paragraph. 3) The Bending moments to which the angles in the Australian papers are subjected are limited to those caused by wind combined with a small amount of axial load, neither of which require the same degree of evaluation as do the safety-related systems in a nuclear power plant.

On page 33 of PG&E letter: DCL-84-164 Enclosure 7 PG&E states "It should also be pointed out that the **18 pipe supports identified** in the **DR 83-042-S** as discrepant have been reviewed. All of the angle beam spans are found within the Project Design Criteria."

This statement is false and misleading. This is not the DR which I signed and submitted to Leo Mangoba on 10/5/83. That document did not contain any pipe support numbers which I felt were discrepant. It did contain seven (7) pages which I had copied out of the AISC. The pages which I included were marked up to show the sections which detailed the problem. I did give a list of supports to Jeff Van Klompenburg several days after I first submitted the DR in preliminary form back in 8/83. This was after I submitted the DR and it was returned with a note that I should provide a support number which was not within criteria as an example. In stead of one support, I submitted a list in rough form which contained approximately 100 Unit 1 supports which were not in compliance the AISC code section 1.5.1.4.6b or more specifically 76.0 $b_f/\sqrt{F_y}$ which for 2" angles = 25.3", and for 3" angles = 38", and for 4" angles = 50.68". I have no

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knowledge as to who added the 18 supports to the DR which I submitted to management on 10/5/83.

7. **BASE PLATE II** - There are several points which should not be over looked in the Base plate calculations beyond those discussed by Mr. Hartzman and Mr. Manoly. Base Plate II must as a finite element program, in order to give accurate results have certain criteria met. These are: 1) The elements must be within a certain aspect ratio, i.e., height, length, width. Most finite element programs specify that the aspect ratio be not more than 1 to 4. This requirement if applied to a ½ inch thick plate, would require that the length and width dimensions not exceed 2 inches. I have been informed, that the analyses which were performed were not within the aspect ratio which is required for accurate results. 2) Some plates are not one piece of steel and have been welded together with partial penetration welds. The model should account for the reduced thickness where welded, so that the plate stress calculations will be accurate. Also, in the case of shell type anchor bolts the hole diameter should be used per the manufacturers requirements in determining the 10D distance. In the past, this was done incorrectly as the hole diameter was not supplied by management. This information is now supplied to the engineers in the ESD 223 and the calculation should be corrected during the present review. Failure to correct this could result in a safety-related support failing.

On balance the above methodological holes and flaws each must be answered because they independently identify conditions any which if left uncorrected could significantly threaten public safety during full power operation. Even if the plant could operate without

CCS

analysis of some of these issues, the combined effect of the missing factors is decisive. To date the staff has not required these questions to be satisfactorily answered. Until that occurs, the current corrective action may just amount to another way to endorse portions of the status quo that would be indefensible if publicly scrutinized.

I have read the above ~~-23-~~ 22 CCS page statement and it is true and accurate and complete to the best of my knowledge and belief.

Charles C. Stokes

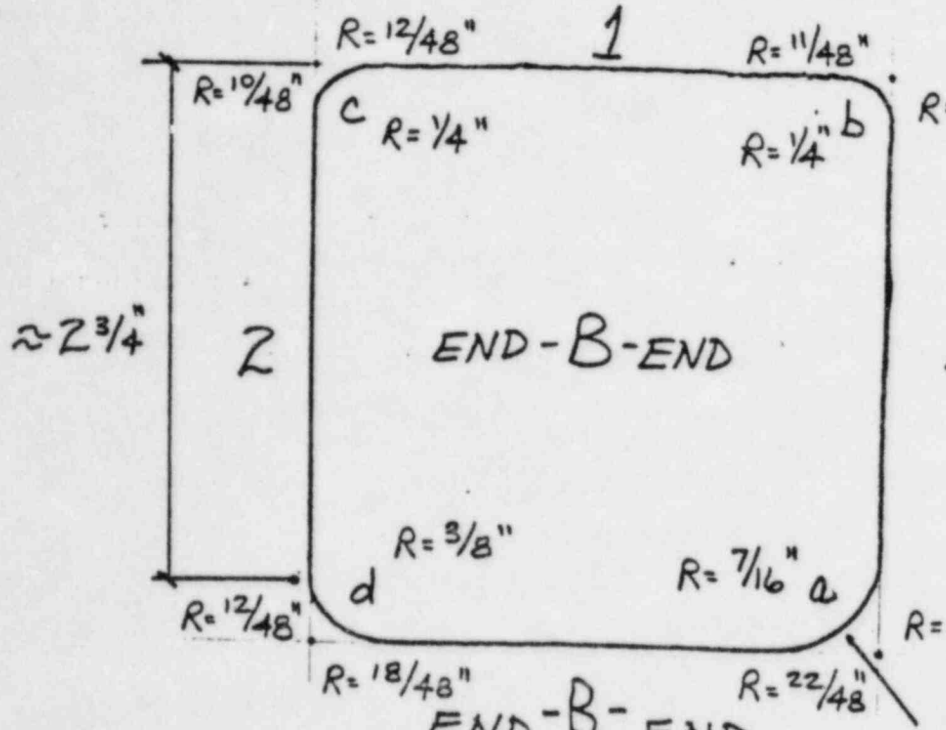
Charles C. Stokes PE.

Subscribed and sworn to before me this 1st day of June, 1984.

OFFICIAL SEAL
LISA R. WENTER
NOTARY PUBLIC - CALIFORNIA
SAN LUIS OBISPO COUNTY
My Comm. Expires May 9, 1986

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

ATTACHMENT 1



VISUAL CRACK ON SIDES 1, 4 AND 2 3/4" ON 2 ENDS IN RADIUS 3 to 4

END-B-END

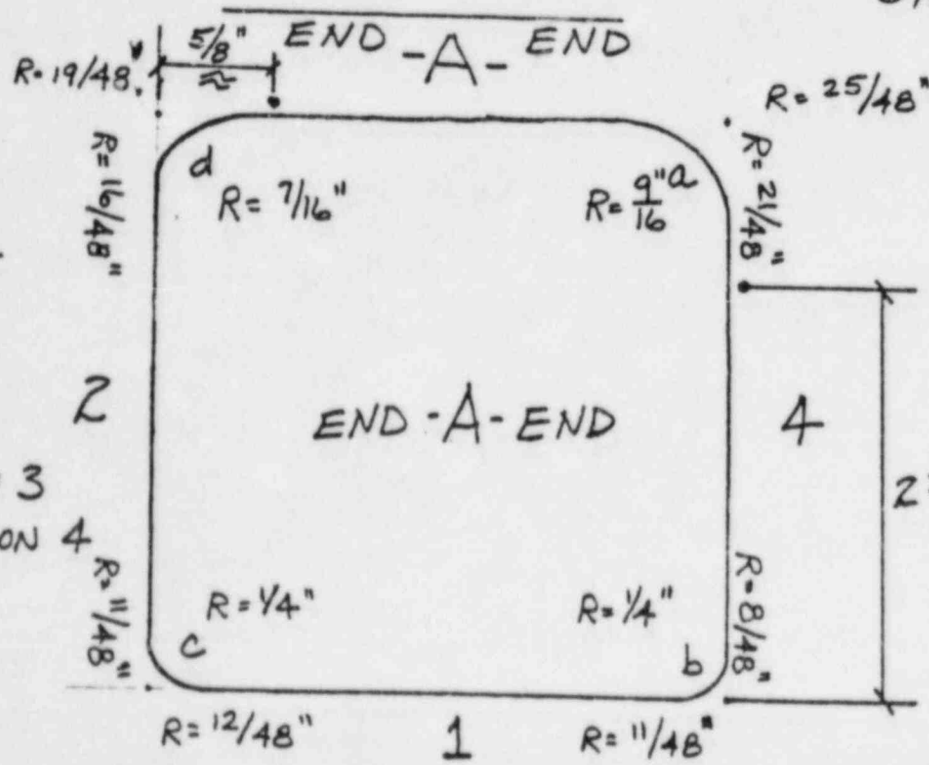
R - INSIDE MEASURED W/FILLET GAUGES

IF R = 2t = 2(1/4) = 1/2" = 24/48"

NO. PO 14817 ON TS 3"X3"X1/4"

SIDE 3

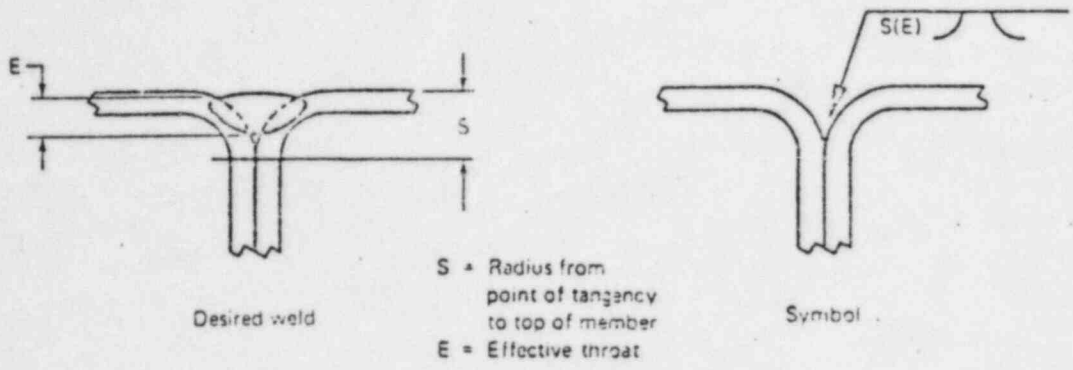
OUTSIDE OF TUBE SHOWN



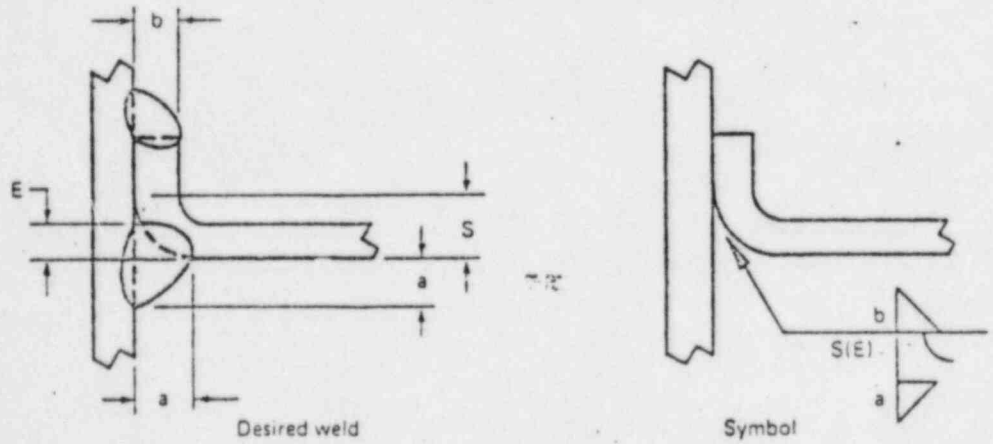
VISUAL CRACK ON SIDES 1, 2 5/8" ON 3 + 2 3/16" ON 4

BY: DCSTOKES 5/24 & 5/25 1984

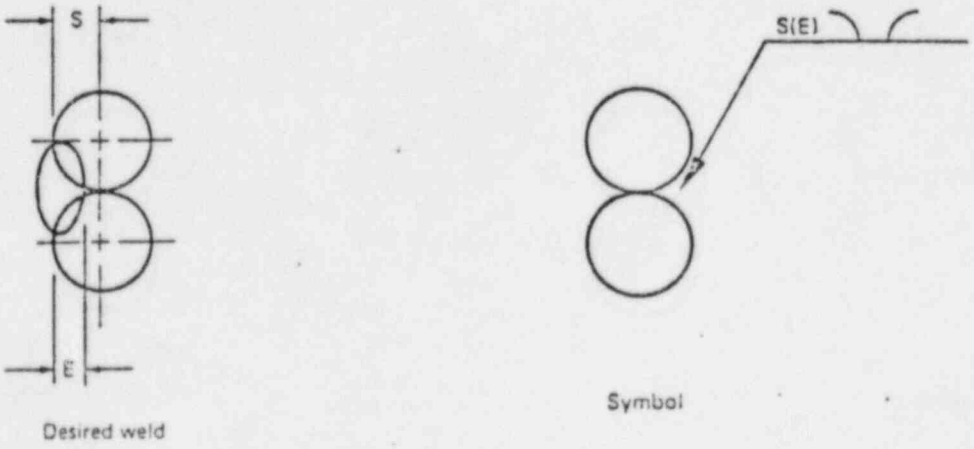
ATTACHMENT 2.a



(A) Flare-V-groove weld with specified partial joint penetration



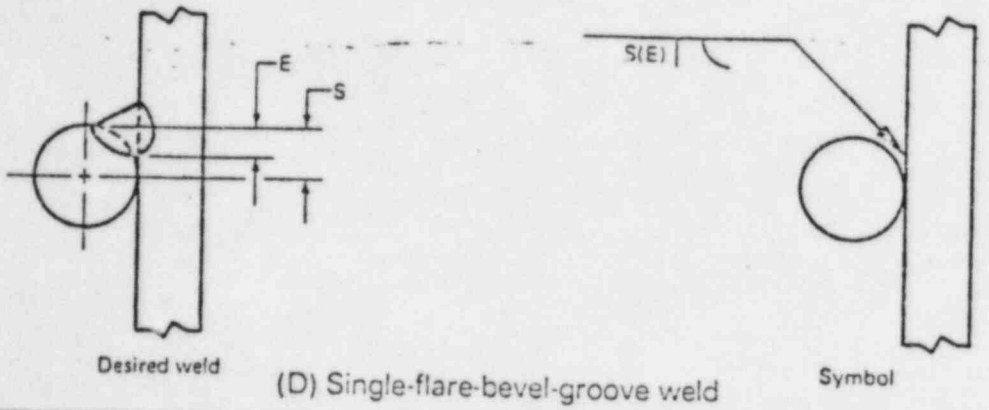
(B) Flare-bevel-groove weld with specified partial joint penetration and fillet weld



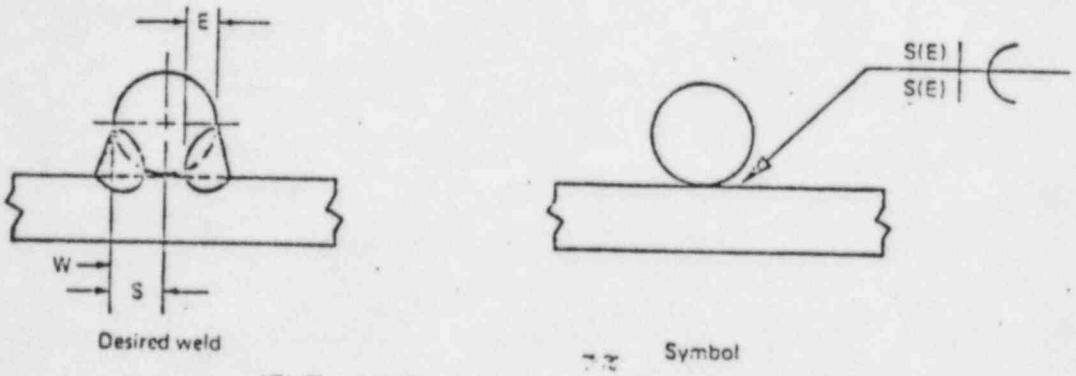
(C) Single-flare-V-groove weld

Fig. 32—Application of flare-bevel- and flare-V-groove weld symbols

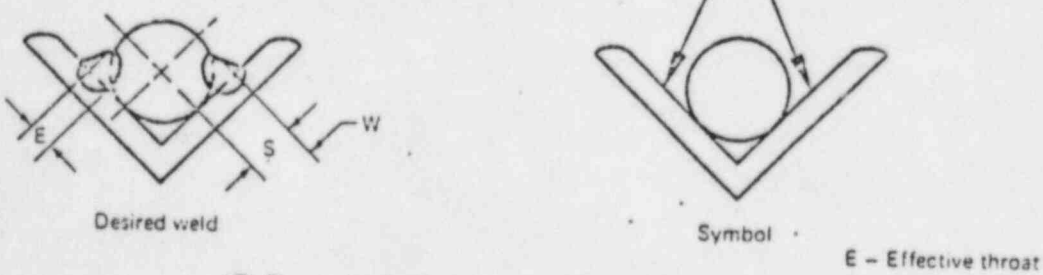
ATTACHMENT 2,b



(D) Single-flare-bevel-groove weld

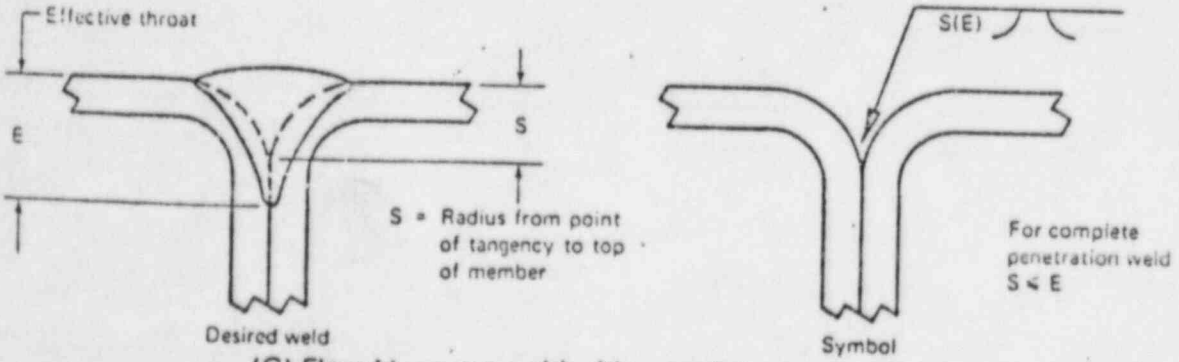


(E) Double-flare-bevel-groove weld



E – Effective throat
S – Radius of bar

(F) Two single-flare-bevel-groove welds



(G) Flare-V-groove weld with complete penetration

ATTACHMENT 3A

PACIFIC GAS AND ELECTRIC COMPANY

SHEET NO. ____ OF ____ SHEETS

GENERAL COMPUTATION SHEET

JOB FILE ____ NO. ____

LOCATION ____

SUBJECT LOADING CASES FOR HGR. No.
DIABLO CANYON UNIT

MADE BY ____ DATE ____ CHECKED BY ____ APPROVED BY ____

HANGER No. ____ REV. ____

LINE No. ____

ANALYSIS No. ____ REV. ____

DATA POINT ____

SEQ	SHT
SH	OF

LOAD CASES	FX (lb.)	FY (lb.)	FZ (lb)	MX (IN-lb.)	MY (IN-lb.)	MZ (IN-lb.)
1 A						
1 B						
2 A						
2 B						
3 A						
3 B						
4 A						
4 B						
5 A						
5 B						

CASE LOADING

1. A & B ; $\overline{TH} + DL + FL$
2. A ; $TH + DL + FV + RVOT + (DE^2 + SAM^2)^{1/2}$
2. B ; $TH + DL + FV + RVOT - (DE^2 + SAM^2)^{1/2}$
3. A ; $TH + DL + FV + RVOT + (DDE^2 + SAM^2)^{1/2}$
3. B ; $TH + DL + FV + RVOT - (DDE^2 + SAM^2)^{1/2}$
4. A ; $DL + (HOS^2 + SAM^2)^{1/2}$
4. B ; $DL - (HOS^2 + SAM^2)^{1/2}$
5. A ; $TH + DL + (HOS^2 + SAM^2)^{1/2}$
5. B ; $TH - DL - (HOS^2 + SAM^2)^{1/2}$

NOTE

1. FRICTION LOADS REF DCM-M9 (4.2H)
2. THE DIRECTION OF THE THERMAL FORCE SHALL NOT BE USED TO REDUCE THE MAGNITUDE OF THE COMBINED LOADS.
3. FOR LOAD CASES 3 AND 5 USE THE GREATER OF TH OR THA.
4. CASE 5 FOR ANCHOR BOLTS ONLY.

62-4713 3/66

PACIFIC GAS AND ELECTRIC COMPAN

GENERAL COMPUTATION 36

SHEET NO. ____ OF ____ SHEETS

JOB FILE NO. ____

LOCATION AREA: ____

SUBJECT HGR. No. - Iso. No. - ELEV.:

DIABLO CANION UNIT NO.

MADE BY ____ DATE 1/83 CHECKED BY ____ APPROVED BY ____

LOAD CASE DETERMINATION PER M-9

LOADS ☐ Global ☐ Local

SEQ ____ REV ____

SH ____ OF ____

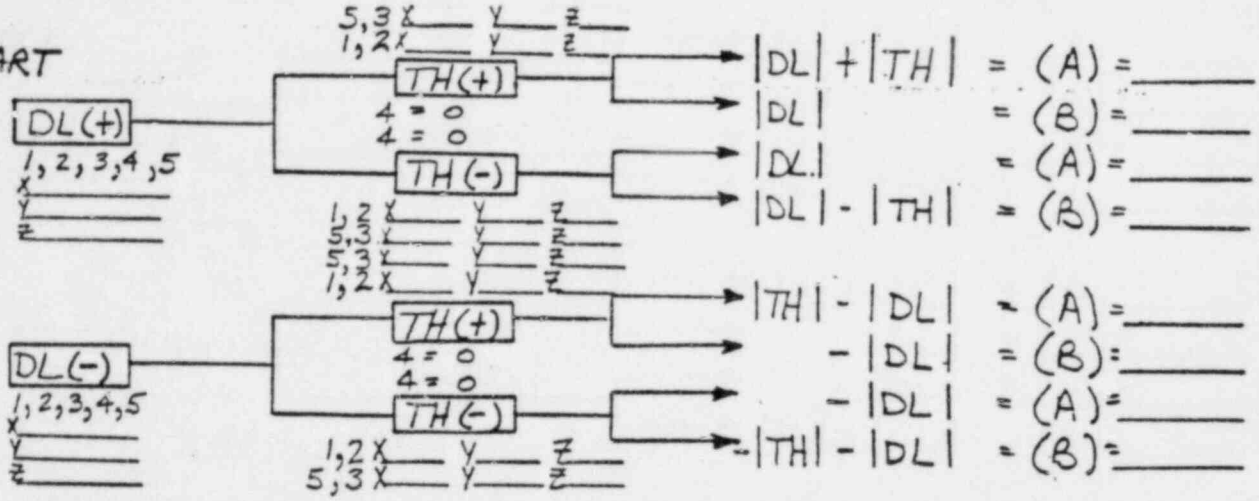
LINE NO. ____

ANALYSIS NO. ____ DATA POINT ____ REV. ____ DATE / /

ACCELERATION VALUES ☐ PEAK ☐ 15 Hz ☐ ME 101 ☐ M-40 CALC

UNITS – FORCE ____ MOMENT ____

FLOW CHART FOR HANDLING DL + TH LOADS



LOAD CASES	Fx	FY	Fz	Mx	MY	MZ
1.a. (A) + |FL|						
1.b. (B) - |FL|						
2a. (A) + |Fv| + |RvoT| + (DE)						
2b. (B) - |Fv| - |RvoT| - (DE)						
* 3.a. (A) + |FV| + |RvoT| + (DDE)						
* 3.b. (B) - |FV| - |RvoT| - (DDE)						
** 4.a. (A) + (HOS)						
** 4.b. (B) - (HOS)						
* 5.a. (A) + (HOS)						
* 5.b. (B) - (HOS)						

$(DE) = (DE^2 + SAM_{DE}^2)^{1/2}$

$(DDE) = (DDE^2 + SAM_{DE}^2)^{1/2}$

$(HOS) = (HOS^2 + SAM_{HOS}^2)^{1/2}$

FL = ((A) OR (B)) MAX ({ .3 STEEL / .07 TEFLON }) IF MOVEMENT > .0625 IN.

* USE (TH OR THA) MAX IN FLOW CHART TO OBTAIN (A), (B)

** USE TH = 0 ZERO THIS CASE ONLY

62-4713 1/66

PACIFIC GAS AND ELECTRIC COMPA

SHEET NO. ____ OF ____ SHEETS

GENERAL COMPUTATION 3C

JOB FILE NO. ____

LOCATION AREA: ____

ELEV. : ____

SUBJECT HGR. NO. -
DIABLO CANYON UNIT NO.

MADE BY ____ DATE / / CHECKED BY ____ APPROVED BY ____

MAX. LOAD COMBINATION CALC. PER M-9 ☐ GLOBAL LDS. ☐ LOCAL LDS.

SEQ ____ REV ____
SH ____ OF ____

LINE NO. ____

ANALYSIS NO. ____ DATA POINT ____ REV. ____ DATE / /

ACCELERATION VALUES ☐ PEAK ☐ 15HZ ☐ ME 101... ☐ M-40 CALC.

UNIT FORCE ____ MOMENT ____

LOAD COMBINATION		FX	FY	FZ	MX	MY	MZ
1. TH+DL+FL	A						
	B						
2. TH+DL+FV+Rvot $+(DE^2 + SAMDE^2)^{\frac{1}{2}}$	A						
	B						
3. TH or THA +DL+FV+Rvot $+(DDE^2 + SAMDDE^2)^{\frac{1}{2}}$	A						
	B						
4. DL+$(HOS^2 + SAMHOS^2)^{\frac{1}{2}}$	A						
	B						
5. ANCHOR BOLT CALC.	A						
TH or THA + CASE 4	B						
6. ADJ. FACTOR K= COMB 3 or 4 (LAR.) / COMB 1 or 2 (LAR.)	K=						
IF K > 1.33 ADJ.LOAD=(3 or 4)	A						
IF K < 1.33 ADJ.LOAD= 1 or 1.33/2	K=						
	B						
7. STRUCT. WT.							
8. ADJ. FACTOR L=ACC.DDE or HOS (LAR) / ACC. DE	L=		L=	L=	X-ACC:	Y-ACC:	Z-ACC:
IF L > 1.33 ADJ.ACC.=(DDE or HOS) / 1.33	ADJ. ACC:		ADJ. ACC:	ADJ. ACC:	DE	DE	DE
IF L < 1.33 ADJ.ACC.= DE					DDE	DDE	DDE
					HOS	HOS	HOS
9. STRUCT. WT. x ADJ. ACC. (8)							
10. TRIB. or EFF. WT.							
11. FRAME DESIGN	A						
LOAD = 6 + 9 + 7-Y ONLY	B						
12. FREQ. DESIGN	A						
LOAD = 7 + 10	B						
13. ANCHOR BOLT DESIGN	A						
LOAD =(5 OR 6) MAX. + 9 + 7-Y ONLY	B						

FL = FRICTION FRIC. COEFF. = .3 STEEL ; .07 TEFLON

USE ALLOW. STRESS FOR CASE 1 or 2 Fb 1-DIR. PL. = 23.9 ksi

AISC STEEL - Fa, Fb, Fb 2-DIR. PL = 19.1 ksi Fv = 12.8 ksi WELD = 18.0 ksi

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON NUCLEAR POWER PLANT UNIT _____ HANGER NO. _____

MADE BY: _____ DATE _____ CALC. SEQ. NO. _____ REV. _____

CHECKED BY: _____ DATE _____

APPROVED BY: _____ DATE _____

ATTACHMENT 4A

CHECKLIST FOR STRUDL FRAME ANALYSIS

1. MEMBERS

	YES	NO	N/A	PAGE
DOES THIS FRAME INCLUDE ANGLES	☐	☐		
ANGLE PROPERTIES INCORPORATE PRINCIPAL AXES	☐	☐		
ANGLE PROPERTIES INCORPORATE ORTHOGONAL AXES	☐	☐		
L/t FOR ANGLES HAS BEEN REVIEWED	☐	☐		___
SLENDERNESS RATIOS HAVE BEEN REVIEWED	☐	☐		___
LENGTHS MODIFIED FOR COMPRESSION MEMBERS WITH INTERMEDIATE JOINTS	☐	☐		
TORSION MEBERS ARE ACCEPTABLE BY ENGINEERING JUDGEMENT, OR FOR CALCULATIONS SEE	☐	☐	☐	___

2. NATURAL FREQUENCY

DIRECTION	f_n	ALLOWABLE	RESTRAINED	UNRESTRAINED
X	= _____ cps	_____ cps	☐	☐
Y	= _____ cps	_____ cps	☐	☐
Z	= _____ cps	_____ cps	☐	☐

ATTACHMENT 4B

PACIFIC GAS AND ELECTRIC COMPANY

GENERAL COMPUTATION SHEET

HGR. NO. _____ SEQ. NO.- _____ Rev.

DIABLO CANYON UNIT NO. _____ ISO. NO.- _____

DATE 1 / 1 CHECKED BY _____ APPROVED _____

Check combined stress and deflection

Units: Lbs., In.

☐ Installed support
☐ Not installed support

Support Loading Condition
☐ A/B ☐ C/D ☐ T ☐ C/D .33 ☐ T .33

Ref.	Description	Line No.	Span No. / Joint No.				
	Stress bending MY/SM	(1)					
	Stress bending MZ/SM	(2)					
	Stress axial P/A	(3)					
	Force local FY	(4)					
	Force local FZ	(5)					
	Span length L	(6)					
Shear 1	Stress Tors. & warp. shear	(7)					
	Warping normal stress	(8)					
AISC	Column ratio K	(9)					
	Radius of gyr. r	(10)					
	Shear area. Local Ay	(11)					
	Shear area. Local Az	(12)					
	$\frac{(9)x(6)}{(10)}$	(13)					
	Allow. compr. stress Fa	(14)					
	Allow bend. stress Fby	(15)					
	Allow bend. stress Fbz	(16)					
	Allow shear stress Fv	(17)					
Shear	$\frac{(4)}{(11)} + \frac{(5)}{(12)} + (7)$	(18)					
Compr. Ratio	$\frac{(3)}{(14)}$	(19)					
Enter O.K. if	18 + 17 < .6	(20)					
Axial & Bending	$\frac{(1)}{(15)} + \frac{(2)}{(16)} + \frac{(8)}{(16)} + (19)$	(21)					
Enter O.K. if	ϕ Allow * (21) ≤ ϕ Allow						
Max.	Max. deflection at joint _____ in the restrained direction is _____ ≤ _____ ∴ ok.						

If (19)> .15 resolve on separate calc. sheet using AISC formulas 1.6-1a & b.
If (20)> .6, prorate (15) and (16) per AISC section 1.10.7

To: Rep. Morris Udall, Chairman
House Interior and Insular Affairs Committee
Washington, D.C. 20515

Attn: Dr. Henry Myers

From: Harold Hudson

Date: 6-9-84

Subject: Deficiencies in the Nuclear Regulatory Commission Inspection to determine the extent to which Pullman and PG&E had implemented an adequate audit program during startup phase of Pullman work at Diablo Canyon (Report Nos. 50-275/84-16 and 50-323/84-06).

The special, unannounced NRC inspection on April 2-4, 1984, to examine audit records of Pullman Power welding activities, performed during the period of August 1971 through December 1973, does not provide an accurate assessment of the PG&E and Pullman audit programs. There are a number of deficiencies in the report based mainly on the apparent omission of information. The NRC report concluded: "Based upon a review of PG&E and Pullman audits it appears that audits of Pullman welding activities were thorough and conducted in accordance with the Pullman QA Program during the period of August 1971 through December 1973. Based upon the above reviews the inspector condludes that:

a. the Pullman audit program met the intent of Safety Guide 28 (June 1972) and ANSI N45.2-1971, in effect during that time period, and, therefore, the intent of Appendix B,

b. the audits appeared to be of reasonable competence and quality, and

c. based upon a sampling of corrective actions it appears that findings were followed up and resolved ina responsible fashion."

There is documented evidence which I believe will show that the NRC conclusions are not an accurate assessment of the Pullman and PG&E Audit Programs during the 1971 to 1973 period.

1. The NRC Report states: "The inspector read through and surveyed the above audits to develop a sense of the audit competency and quality. The audits were performed by Pullman and PG&E to determine compliance with the Pullman Quality Assurance Program (KFP's). The inspector noted that applicable procedures of the QA program related to welding activities were audited: KFP-8 "Process Planning and Control", KFP-I2 "Control of Filler Metal", KFP-13 "Postweld Heat Treatment", and KFP-15 "Welding Qualification". Further,

the above audits deomonstrated that Field Process Sheets (travelers) were audited for compliance to KFP-8 (for each field weld the process sheet lists operations such as fit up, weld completion, NDE, and designated holdpoints for QC and the Authorized Nuclear Inspector's inspection and approval)."

What the NRC Inspector apparently failed to recognize was that the Pullman QA program related to welding activities, which were audited by Pullman and PG&E, and surveyed by the NRC Inspector for a sense of audit competency and quality, was not applicable to Pipe Hangers (Supports) and Pipe Rupture Restraints.

a. The NRC Inspector references a PG&E Audit #73-15 (11-29 and 12-19, 1973) but failed to recognize the significance of its findings in relation to the scope of his work. PG&E Audit #73-15 disclosed that in regard to Pipe Hangers (Supports) and Pipe Rupture Restraints, M.W. Kellogg and PG&E's General Construction Dept. departed significantly from the requirements of the Specification and PG&E's QA Manual. "MWK's Quality Assurance Program does not comply with Section 4 of Specification 8711 and (PG&E) Procedure PRP-4. The (PG&E) Mechanical Dept's surveillance program does not comply with Procedure PRC-7". PG&E Audit #73-15 reviewed MWK's Q.A. Manual, with respect to Pipe hangers and restraints, for adequacy and compliance to Spec 8711 and PG&E QA Procedure PRP-4. Audit #73-15 concluded that MWK's approved QA Manual "does not specifically address itself to, nor is it completely applicable to, the control of pipe hangers and restraints." Thus MWK wrote an "Engineering Specification," ESD 223. The intent of ESD 223 was to set forth procedures and instructions to the field QA inspectors, engineers and foremen implementing the policy stated in the QA Manual. Audit #73-15 concluded ESD 223 established QA policy instead of providing instructions on how to implement the policy stated in the Manual. Audit #73-15 also concluded that "the program set forth in ESD 223 does not meet all of the requirements of Section 4 of the Spec. Deficiencies were noted in the areas of document review and control, qualification of special processes and personnel, work procurement control, receipt inspection of material, identification control and status of material, nonconforming material control, inspection and test records and inspection and test plans. Consequently the hanger and restrain QA program is in violation of Procedure PRP-4.

   Audit #73-15 would review the receipt, storage and installation of pipe hangers and rupture restraints - and identify numerous major discrepancies (see attached PG&E Audit #73-15).

Audit #73-15 audited PG&E's Resident Mechanical Engineer's surveillance system of the fabricating, furnishing and installing of pipe hangers and rupture restraints, which was performed by the Power Plant Piping Group. PG&E Procedure MFI-2 set forth the Resident's written instructions to personnel in this Group. The audit concluded that "MFI-2 Instructions do not specifically address themselves to the surveillance of pipe hangers and restraints and are not applicable to the inspection of pipe hangers and restraints. The inspection is performing other inspections, however, these inspections are not documented or described in the MFI. HOH

The bottom line is that sudits performed by Pullman based on its QA Manual (KFP's) and audits by PG&E's Mechanical Department were not applicable to Pipe Hangers and Pipe Rupture Restraints during the August 1971 to December 1973 period. The NRC Report conclusion that "it appears that audits of Pullman welding activities were thorough and conducted in accordance with the Pullman QA Program" is not an accurate assessment in regard to Pullman's Pipe Hanger and Pipe Rupture Restraint Programs. The NRC Report conclusion that "audits appear to be of reasonable competence and quality" is not accurate in regard to Pipe Hangers and Pipe Rupture Restraints.

b. A major fallacy in the PG&E audit program in the 1971 to 1973 period was that Pipe Rupture Restraints were audited against PG&E Contract Spec. 8711. PG&E's C.S #8833XR specified the fabrication, erection and Quality Assurance requirements for Pipe Rupture Restraints. Yet PG&E's Audit #73-15 of Rupture Restraints would be against the requirements of C.S. #8711 not C.S. #8833XR. All PG&E audits performed prior to Audit #73-15 were also against C.S. #8711. This leaves the PG&E audit program for Pipe Rupture Restraints indeterminate during this time period. Again the NRC Inspector has not recognized this deficiency in the audit program.

HOH *See Post Script.

c. The NRC Report does not reference a 10-24-73 Pullman Internal Audit, which was the first documented Internal Audit performed specifically on Pipe Rupture Restraints. Per C.S. #8833XR Pullman was scheduled to begin erection of Pipe Rupture Restraints in Unit I on 7-8-73. Yet it would be 16 months before an Internal Audit would be performed on the program. This audit would note discrepancies with weld rod requisition and that some restraints did not have any rod requisitions. Again this audit would reveal

that C.S. #8711 was being used in conjunction with C.S. #8833XR for the installation of restraints.

Yet the most significant aspect of this audit was that it revealed there was no Quality Assurance Manual available for the control of installation of restraints. Installation was controlled by a "letter approved by A. G. Walters on October 19, 1972."

The omission of this audit from the NRC Report and the finding revealed by the Audit cast doubts on the NRC conclusion "that audits of Pullmans welding activities were thorough and conducted in accordance with the Pullman QA Program."

d. The first documented Pullman Internal Audit of Pipe Hangers (Supports) was performed on 9-18-73 and is referenced in the NRC Report. The audit report states that the scope of the Audit was "adherence to the Engineering Specifications and Quality Assurance Manual." It would be identified in PG&E Audit #73-15 that Pullman QA Manual (KFP's) did not specifically address or was applicable to Pipe Hangers. The PG&E Audit would also identify that ESD 223 established QA policy instead of providing instructions for the installation of hangers, in essence, on "alternate QA program, which was not submitted to the PG&E Quality Assurance Dept. for review and approval prior to use.

   The NRC Report does not address these discrepancies but concludes that "the audits appeared to be of reasonable competence and quality."

e. The NRC Report states "the above audits demonstrated that Field Process Sheets (travelers) were audited for compliance to KFP 8". The NRC Report is misleading in regard to Pipe Hangers (Supports) and Pipe Rupture Restraints. It has already been established that the Pullman QA Manual (KFP's) was not applicable to Pipe Hangers and Pipe Rupture Restraints.

   PG&E Audit #73-15, dated 11-29 and 12-19, 1973, identified:

   1. Hangers for pipe 2-1/2" and greater:

      a. Subcontractor supplied hanger assemblies were not inspected by QA personnel.

      b. Hanger assemblies fabricated on site do not receive any in process or final inspection.

      c. The installation of hangers received a final inspection, but no inprocess inspections.

d. Inspectors are using inspection forms which they consider necessary but are not controlled by the QA Program.

e. The conditions of field welds were generally rough and irregular. Some welds specified on the drawings were not made. No discrepancy reports or other documentation authorizing the acceptance of these discrepancies were available.

f. Inspectors could not furnish any explicit acceptance criteria.

2. Field run hangers for pipe less than 2-12":

a. All field run pipe hangers are fabricated on site. These hangers do not receive any inprocess or final inspections.

b. The installation of hangers receive a final inspection but no inprocess inspections.

c. The auditor noted rough and irregular welds, undersize and incomplete welds, hangers not in the location specified by the drawings, hangers not fabricated in accordance with approved drawings.

3. Pipe Rupture Restraints:

a. The method of recording inspections and acceptance criteria are not set forth in an instruction. All inprocess inspections of workmanship and technique required by the AWS Code are not being performed.

b. Some welders were welding materials of greater thickness than they were qualified for.

c. Welding was not in complete accordance with the assigned weld procedures.

The Pullman and PG&E Audits of KFP 8 were obviously not applied to Pipe Supports and Pipe Rupture Restraints. Yet the NRC Inspector does not reveal this even after he had reviewed the PG&E Audit #73-15. For the time period being discussed, Pullman would not identify any of the Hanger and Restraint discrepancies listed above. PG&E's onsite General Construction QC group would not identify any of the discrepancies. Not until October/November 1973 (the very end of the time frame

being discussed), when the PG&E Corporate QA Department performed Audit #73-15, would the discrepancies be identified. The NRC Report conclusion that "audits of Pullman welding activities were thorough and conducted in accordance with the Pullman QA program during the period of August 1971 through December 1973" is not an accurate assessment regarding Pipe Hangers and Rupture Restraints.

2. The NRC Report concludes: "The Pullman audit program met the intent of Safety Guide 28 (June 1972) and ANSI N45.2-1971, in effect during that time period, and therefore, the intent of Appendix B." There is documented evidence which apparently was not reviewed by the NRC Inspector, which suggest the NRC conclusion about the Pullman Audit Program may not be completely accurate for the August 1971 to December 1973 time period for Piping, Pipe Supports and Pipe Rupture Restraints.

   a. A Pullman Corporate Interoffice Correspondence, dated 11-13-78, from the Senior QA Engineer, concerning Corporate Management Audits, states that "The Diablo Canyon project has been audited extensively only in hardware areas. The entire program has not been evaluated." The same IOC states "In the past, Pullman Power Products did not conduct audits or practices to ASME (Pullman's QA Manual is based on ASME Code Section III, 1971 edition) or 10 CFR 50, but I feel it s very essential to do so now".

   b. A PG&E Corporate Management Audit #80422, dated 6-13-78, indicates that the ANSI standards are not applicable to Pullmans QA Program. Audit #80422 states "ANSI N45.2 states in its forward that it is not applicable to work performed in accordance with the Code (ASME Section III).

   c. PG&E's C.S. #8711 and C.S. #8833XR to Pullman makes no reference to or commitment to Safety Guide 28, ANSI N45.2-1971 or 10 CFR 50 Appendix B.

   d. PG&E Audit #80422 identified that the Pullman Quality Assurance Program is not adequately defined. The ASME Code Section III, 1971, requires that the Quality Assurance Program be documented in detail in a manual consisting of written policies, procedures, and instructions. Pullman Corporate Procedure No. XVIII-I, is presently being used for the performance of management audits of field activities. This procedure implemented QA requirements of the contract but were not identified as part of the program and revisions were not controlled by the program.

   e. PG&E Audit #80422 indicated that PG&E C.S.#8711 and the 1971 ASME Code required a comprehensive system

of planned and periodic audits to be carried out to assure compliance with all aspects of the QA Program. Audit #80422 identified:

> "Procedure KFP-18 states in its scope that it establishes such a system. However, two types of audits, management audits and internal audits, are described. The procedure does not establish the scope of either type of audit and no detailed schedule has been developed to show that all aspects of the program are being audited. Furthermore, audit records at the site do not indicate that all aspects of the program are being audited. Records do not indicate that management audits have been performed on pipe support work (and pipe rupture restraints)." An unofficial, unapproved NON internal audit schedule exists, but it has not been followed consistently and for ESD's appear on th schedule".

In light of the above listed evidence, which would have been in effect during the 1971 to 1973 time frame, the NRC Report conclusion about the Pullman audit program during the 1971 to 1973 period becomes suspect.

The NRC Report reveals that a number of Pullman Internal and Corporate audits were performed as well as PG&E audits, on QA Manual (KFP) procedures related to welding activities. But the QA Manual was applicable to Piping only, not to Pipe Hangers (Supports) or Pipe Rupture Restraints. Therefore the conclusion reached by the NRC Inspection are not applicable to Pipe Hangers and Rupture Restraints. In addition, there is evidence documenting serious deficiencies in the Pullman Corporate and Internal audit program which would suggest noncompliance to 10 CFR 50 Appendix B during the 1971 to 1973 time period.

This letter has presented evidence which indicates that Pullman and PG&E did not implement an adequate audit program for all three major areas of construction, Piping, Pipe Hangers (Supports) and Pipe Rupture Restraints, during the startup phase of Pullman work at Diablo Canyon. Many areas have since been corrected as a result of the Audit Program but only after a repeated history of discrepancies. Areas of inadequate corrective action include:

1. The QA Program Description for Pipe Hangers (Supports) and Pipe Rupture Restraints. See PG&E Audit #73-15 and #80422 and Pullman Internal Audit of 10-24-73. The Current QA Program Description still does not make a commitment to 10 CFR 50 Appendix B, ANSI N45.2 series or ASME Section III. Per the QA Program Description certain sections of the Piping QA Manual apply to Pipe Supports and Rupture Restraints but it does not specify which section for which type of work. The Piping QA Manual is based on ASME Section III, 1971 edition.

2. Preheating of welds. The Pipe Rupture Restraint Crack Repair Program was the result of inadequate corrective action to poor preheating practices.

3. The Pullman Audit Program. See PG&E letter dated 9-19-73, Quality Assurance Audits (Failure to follow existing and and upgrade Quality Assurance procedures). See PG&E Audit #75-2 and PG&E letter dated 3-25-75 concerning the need for a more comprehensive and extensive internal audit system. See PG&E Audit #80422.

4. QA Documentation for Pipe Support and Pipe Rupture Restraint work. See PG&E Audit #73-15, PG&E NCR # DC1-79-RM-003, PG&E NCR # DC1-78-RM-009

There are other areas of inadequate corrective action which would require more research and time to write about.

I hope this information will be of use during your hearings with the NRC.

Sincerely,

Harold O. Hudson

Harold O. Hudson
Former Pullman, QA/QC Inspector,
QA Program Internal Auditor,
Lead Auditor and Pipefitter

Post Script:
The problem of PG+E auditing Pipe Rupture Restraints to C.S#8711 extended to 1975. See PG+E Audit # 75-2 and PG+E letter dated 3-25-75. Pipe Rupture Restraints should have been audited to C.S #8933R,
The problem of which Contract Spec to work to was not limited to Pullman. PG+E would direct Bartom-Bergen Metal Products to establish QA requirements to the wrong contract Specification. See PG+E Memorandum, 9-24-74, and PG+E letter dated 10-24-74, PG+E letter dated 12-23-74, and PG+E Letter dated 1-7-75.

HOH

List of Attachments

1. U. S. Nuclear Regulatory Commission, Region V, Report Nos. 50-275/84-16 and 50-323/84-06.
2. PG&E Audit #73-15, Oct. and Nov. 1973.
3. M.W. Kellogg Interoffice Correspondence, 9-18-73, Subject: M.W. Kellogg Internal Audit of Hanger Dept.
4. M.W. Kellogg Interoffice Correspondence, 10-24-73, Subject: Follow up Audit of Hanger Dept. and Audit of Rupture Restraints QA Program.
5. Interoffice Correspondence, 11-13-78. Subject: Upcoming Audit of Diablo Canyon in December.
6. PG&E Audit #80422, 6-13-78. Pullman Power Products QA Program
7. PG&E Letter, 9-19-73, Quality Assurance Audits.
8. PG&E Letter, 3-25-75, Quality Assurance Audits.
9. PG&E Audit #75-2, 2-20,21 and 25, 1975.
10. PG&E NCR # DC1-79-RM-003, 1-24-79
11. PG&E NCR # DC1-78-RM-009, 10-26-78
12. PG&E Memorandum, 9.24.74, To Bostrom-Bergen Metal Products.
13. PG&E letter, 10-24-74, to Bostrom-Bergen Metal Products.
14. PG&E letter, 12-23-74, to Bostrom-Bergen Metal Products
15. PG&E letter, 1-7-75, to Bostrom. Bergen Metal Products.

2 copies
Copy & Return to Sandy

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-275/84-16 and 50-323/84-06

Docket Nos. 50-275 and 50-323

License No. DPR-76

Construction Permit No. CPPR-60

Licensee: Pacific Gas and Electric Company
77 Beale Street
Room 1435
San Francisco, California 94106

Facility Name: Diablo Canyon Units 1 and 2

Inspection at: Diablo Canyon Site, San Luis Obispo County, California

Inspection conducted: April 2-4, 1984

Inspectors: W. J. Wagner — 5/30/84
W. J. Wagner, Reactor Inspector — Date Signed

Approved by: D. F. Kirsch — 5/30/84
D. F. Kirsch, Chief — Date Signed
Reactor Projects Branch

Summary:

Inspection during the period of April 2-4, 1984 (NRC Inspection Report Nos. 50-275/84-16 and 50-323/84-06)

Areas Inspected: A special, unannounced inspection by a regional-based inspector to examine audit records of Pullman Power welding activities, performed during the period of August 1971 through December 1973.

The inspection involved 20 inspection-hours by one NRC inspector.

Results: No items of noncompliance or deviations were identified.

DETAILS

1. Individuals Contacted

   a. Pacific Gas and Electric Company (PG&E)

      D. A. Rockwell, Project Field Engineer
      J. Arnold, Resident Mechanical Engineer

   b. Pullman Power Products (Pullman)

      J. Guyler, Internal Auditor

2. Purpose

   The purpose of the inspection was to determine the extent to which Pullman and PG&E had implemented an adequate audit program during the startup phase of Pullman work at Diablo Canyon.

3. Inspection Approach

   The inspectors approach was to locate and review the documentation of Pullman self-audits and PG&E audits conducted between August 1971 and December 1973. The inspector then reviewed these audits to determine whether:

   a. the appropriate criteria of Appendix B were being audited,

   b. the audits conducted were of reasonable competence and quality, and

   c. followup action in response to audit findings was reasonable and appropriate.

4. Inspection Results

   The inspector reviewed reports of audits conducted by PG&E and Pullman for evidence that Pullman welding activities were being audited during the period of August 1971 through December 1973. Pullman audits include internal (site organization) and corporate organization audits. The following audits were conducted of Pullman's welding activities:

   a. Pullman Self Audits

Audit Date(s)	Welding Areas Audited
Dec. 8, 1970 ✓	Corporate Management Audit - Review of QA Manual ✓
Sept. 10, 1971	Weld Filler Material Control (WFMC), Welder Qualifications

March 28, 1972	Field Process Sheets (Travelers), Field Weld Records (RT, MT, Heat Chart, Weld Rod Requisition), WFMC
July 18, 1972	Field Process Sheets, Examination (visual) of completed welds, in-process (production) field welding
Sept. 29, 1972	Corporate Management Audit - QA Engineering and Administration, purchasing, receiving, material marking, in-process and final welding, material traceability, handling, storage, special processes, liquid penetrant/magnetic particle/ radiography NDE, welding controls, cleaning, heat treatment, records.
Dec. 15, 1972	WFMC
Jan. 9-10, 1973	WFMC
March 5, 1973	Process Sheets, WFMC In-Process welding
March 26, 1973	Corporate Management Audit - WFMC, Ferrite Control, Fit-Up, In-Process welding, Process Sheets, Welding Equipment
May 1, 1973	Welder Stamp Depression
May 21, 1973	Followup of January 1973 Audit
Sept. 6, 1973	Welding Equipment Calibration
Sept. 18, 1973	Visual Inspection of Completed Hanger Welds, Welder Qualifications (weld gages, rod control bend test)
Sept. 19, 1973	Welder Performance Qualification and Testing Procedures
Sept. 28, 1973	Compliance to Welding Procedure Specifications, WFMC (Rod Slips)
October 5, 1973	Followup of Audit of Welder Qualification and Test Procedures performed September 1973
October 16, 1973	Followup of Audit on Kellogg Welder Audit of September 28, 1973
Nov. 7, 1973	Corporate Management Audit - design and document control, procurement control, fabrication process control, qualification of personnel and procedures, calibration of measuring and test equipment, nonconformance

reporting and corrective action, QA records, audits

b. PG&E QC Audits

Audit No.	Audit Date(s)	Welding Areas Audited
MA 71-16	Aug. 12, 1971	WFMC
MA 71-20	Sept. 15, 1971	WFMC, Welder Qualifications
MA 71-24	Oct. 20, 1971	Process Sheets, WFMC, Ferrite Control
MA 71-28	Dec. 30, 1971 Jan. 4, 1972	WFMC, Nondestructive Examination (NDE)
MA 72-2	Jan. 20, 1972	WFMC (Filler Metal Traceability), Welder's Symbols
MA 72-6	Feb. 25 & 28, 1972	Postweld Heat Treatment (PWHT)
MA 72-8	May 1, 1972	Radiographs (RT) of Class I Weldments, WFMC
MA 72-12 ✓	May 30, 1972	WFMC (Weld Rod Accountability), RT of Class I Weldments
MA 72-16	June 27, 1972	WFMC (Storage), In-Process Welding
MA 72-18 ✓	Aug. 31 - Sept. 1, 1972	(Field) Process Sheets, WFMC (Rod Control Ovens)
MA 72-23 ✓	Nov. 1, 2, 3 & 6, 1972	Rod Oven Control, Portable Rod Oven Control (WFMC)
MA 72-27	March 27-28, 1972	WFMC (Compliance to 4 hour weld rod issuance)
MA 73-5	Jan. 26, 29-31, 1973	WFMC (Follow-up to MA 72-27), Fit-Up and Alignment
MA 73-10	March 22-23 & April 2-3, 1973	QC Inspector's Qualifications to Inspect Welds
MA 73-11	April 9 & 12, 1973	WFMC
MA 73-12	May 1, 7, 8, 10, 1973	Follow-up on Ferrite Checks on Stainless Steel Welds
MA 73-21	Dec. 11, 1973	Ferrite Control, PWHT, Welding Qualifications

c. PG&E Corporate QA Audits

Audit No.	Audit Date(s)	Welding Area Audited
71-15	Aug. 23 - Sept. 4, 1971	WFMC (Receiving Storage, Field Use)
72-3	Feb. 4, 1972	Piping Installation to Process Sheets
72-13	June 8-13, 1972	Process Sheets, Welding Procedure Compliance, In-Process Welding, Welder Qualifications, WFMC, Welding Equipment (Amps), Calibration of Equipment (Rod Ovens) Welding Material Certifications
73-15	Nov. 29 & Dec. 19, 1973	Pipe Hangers & Rupture Restraints - In-Process Welding, Welder Qualifications, Welding Procedure Compliance

The inspector read through and surveyed the above audits to develop a sense of the audit competency and quality. The audits were performed by Pullman and PG&E to determine compliance with the Pullman Quality Assurance Program. The inspector noted that applicable procedures of the QA program related to welding activities were audited: KFP-8 "Process Planning and Control", KFP-12 "Control of Filler Metal", KFP-13 "Postweld Heat Treatment", and KFP-15 "Welding Qualifications". Further, the above audits demonstrated that Field Process Sheets (travelers) were audited for compliance to KFP-8 (for each field weld the process sheet lists operations such as fit-up, weld completion, NDE, and designated holdpoints for QC and the Authorized Nuclear Inspector's inspection and approval).

In addition, the inspector surveyed the findings and corrective actions generated as a result of the audits to assess the appropriateness of the identified corrective actions. The corrective actions taken, and follow-up audits to assure the corrective measures were effective, appeared satisfactory.

5. Conclusion

Based upon a review of PG&E and Pullman audits it appears that audits of Pullman welding activities were thorough and conducted in accordance with the Pullman QA program during the period of August 1971 through December 1973.

Based upon the above reviews the inspector concludes that:

a. the Pullman audit program met the intent of Safety Guide 28 (June 1972) and ANSI N45.2-1971, in effect during that time period, and, therefore, the intent of Appendix B,

b. the audits appeared to be of reasonable competence and quality, and

c. based upon a sampling of corrective actions it appears that findings were followed up and resolved in a responsible fashion.

PACIFIC GAS AND ELECTRIC COMPANY
QUALITY ASSURANCE DEPARTMENT
DIABLO CANYON PROJECT

PIPE HANGERS AND RUPTURE RESTRAINTS
(Specification 8711)

Performed by: D. C. Landes

Date: Oct. and Nov., 1973

Critiqued: Nov. 29 and Dec. 19, 1973

SCOPE

The audit was conducted to verify that the pipe hangers and rupture restraints are fabricated, furnished and erected in accordance with the Specification and the Pacific Gas and Electric Company and M. W. Kellogg Quality Assurance Manuals.

RESULTS AND CONCLUSIONS

The results of this audit were reviewed with the Project Superintendent and his staff in order to (1) discuss the results of this audit, (2) resolve any inadvertent misrepresentations, and (3) to establish a completion date for those items requiring corrective action.

The audit disclosed that M. W. Kellogg (MWK) and the General Construction Department departed significantly from the requirements of the Specification and P G and E's Quality Assurance Manual. MWK's Quality Assurance program does not comply with Section 4 of Specification 8711 and Procedure PRP-4. The Mechanical Department's surveillance program does not comply with Procedure PRC-7.

Accordingly, the Project Superintendent has stopped work on the installation of the pipe hangers and rupture restraints. He has directed his staff to initiate appropriate corrective actions to resolve all deficiencies and preclude recurrence. The Project Superintendent has agreed to formally respond to this audit by January 14, 1974.

Attachment D2

I. ITEM AUDITED

M. W. Kellogg Company Quality Assurance Manual.

Reviewed MWK's Quality Assurance Manual, with respect to the pipe hangers and restraints, for adequacy and compliance to Specification 8711 and QA Procedure PRP-4.

RESULTS

Section 4 of Specification 8711 sets forth the requirements of the standard "Supplementary Specification for Contractor's Quality Assurance Program" included in Procedure PRP-4.

MWK's approved QA Manual complies with Section 4 of the Specification. The Manual, however, does not specifically address itself to, nor is it completely applicable to, the control of pipe hangers and restraints.

Thus, MWK has written an "Engineering Specification," ESD-223, establishing the QA program applicable to the control of the hangers and restraints. As confirmed by R. G. Fink, MWK's Field Quality Assurance Manager, the intent of the "Engineering Specifications" is to set forth procedures and instructions to the field QA inspectors, engineers and foremen implementing the policy stated in the QA Manual. ESD-223 establishes QA policy instead of providing instructions on how to implement the policy stated in the Manual.

Additionally, the program set forth in ESD-223 does not meet all of the requirements of Section 4 of the Specification. Deficiencies were noted in the areas of document review and control, qualification of special processes and personnel, work procurement control, receipt inspection of material, identification control and status of material, nonconforming material control, inspection and test records and inspection and test plans. Consequently, the hanger and restraint QA program is in violation of Procedure PRP-4.

ESD-223 is, in essence, an "alternate QA program" approved by the Resident Mechanical Engineer. Procedure PRP-4, Paragraphs 3.14 and 3.15, requires that such an "alternate QA program" be submitted to the Director, Quality Assurance, for review and approval prior to use. ESD-223 was not submitted to the Quality Assurance Department for review and approval prior to use.

CORRECTIVE ACTION

Initiate a separate QA program, which is in accordance with Specification 8711 and Procedure PRP-4, covering the fabrication, receipt and installation of the pipe hangers and restraints.

Complete discrepancy reports identifying and dispositioning the discrepant items and conditions existing in the work completed to date and initiating steps to preclude recurrence.

Attachment D2

II. ITEM AUDITED

Altius Corporation and Grinnel Company Quality Assurance Manuals.

Altius and Grinnel, subcontractors to NWK, supply fabricated pipe hangers and components. Reviewed these Manuals for compliance to Specification 8711 and Procedure PRP-4.

RESULTS

Altius' QA Manual is in general compliance with Specification 8711 and Procedure PRP-4.

Grinnel's QA Manual was not available on site. Documentation regarding the status of its review and approval was also not available on site.

CORRECTIVE ACTION

Obtain a copy of Grinnel's Manual and determine that it is in accordance with the Specification and PRP-4. Obtain or provide objective evidence, documentation, of P G and E's review and approval.

III. ITEM AUDITED

Receipt, storage and installation of pipe hangers and rupture restraints.

Reviewed the receipt, storage and installation operations and documentation of various hangers.

RESULTS

Selected several hangers and restraints, determined their status, and reviewed the quality records documenting the fabrication, receipt, storage and installation.

Results of the review are:

1. Hangers for pipe 2-1/2" and greater:

   A. Subcontractor-supplied hanger assemblies are inspected by construction forces rather than QA personnel. These receipt inspections are not documented and filed in the QA vault.

   B. Hanger assemblies fabricated on site do not receive any in-process or final inspections.

   C. The installation of hangers receive a final inspection, but no in-process inspections.

   D. Inspectors are using inspection forms which they consider necessary but are not controlled by the QA program.

Attachment D2

E. Two hangers which had been inspected and accepted by MWK were re-inspected. The condition of the field welds were generally rough and irregular. Portions of the welds were less than the 1/4" fillet specified on the drawings; other sections were somewhat oversize and convex. The condition of the shop welds were uniform and smooth; however, the weld size was generally less than the 1/4" fillet specified on the drawings. Also, some welds specified on the drawings were not made; inaccessibility explained why some were omitted, but not others. No discrepancy reports or other documentation authorizing the acceptance of these discrepancies was available.

F. When requested, the inspectors could not furnish any explicit acceptance criteria. This data is not clearly stated in the ANSI Codes or in any P G and E or MWK document.

2. Field run hangers for pipe less than 2-1/2":

A. Receipt inspection and surveillance of raw stock materials is performed and documented by QA inspectors.

B. All field run pipe hangers are fabricated on site. These hangers do not receive any in-process or final inspections.

C. The installation of hangers receive a final inspection, but no in-process inspections.

D. No field run hangers had been inspected at the time of the audit. Various discrepancies were noted by the auditor. Discrepancies noted were: rough and irregular welds, undersize and incomplete welds, hangers not in the location specified by the drawings, hangers not fabricated in accordance with approved drawings and hangers and approved hanger drawings contrary to the P G and E standard design drawing. No discrepancy reports or other documentation authorizing the installation of hangers with these departures was available.

E. Measures providing for the appropriate and timely identification, review, and dispositioning of hangers when they cannot be installed in accordance with the approved drawings are not evident. Construction crews are not required to stop work and obtain appropriate approval when the hanger cannot be installed in accordance with the approved drawings. Instead they are allowed to proceed with the work and rely on the final inspection to detect and resolve any departures.

3. Pipe rupture restraints:

A. MWK's receipt inspection checks for road damage and completeness of material only. Surveillance inspections of stored assemblies is performed by MWK.

B. The P G and E Civil Department provides the inspection and documentation to assure that the procurement requirements have been met. The receiving inspection forms, Form C-35, were on file in the QA vault. Several forms, however, note contingencies where the inspection, verification that the procurement requirements have been met, has not been completed.

These supports are not placed on "hold" or withheld from installation. The Resident's Instructions do not require identification and segregation of non-conforming items. Additionally, the auditor could not locate receiving reports for all the restraints.

C. MWK has not determined, or received a written material release from P G and E stating that the procurement requirements have been met. Unless exempted in writing, Specification 8711 and Procedure PRP-4 require that the contractor inspect company-furnished material for conformance to the purchase documents, specification, drawings, etc.

D. Except for the ultrasonic inspection, MWK documents their inspections on "Marked-up" erection drawings. This documentation takes the form of sign-offs and color coding. The method of recording inspections and acceptance criteria are not set forth in an instruction and was not clear to the auditor. Upon explanation of the system by the inspector, it was still difficult to determine the inspection status. All in-process inspections of workmanship and technique required by the AWS Code are not being performed.

E. Some welders were welding materials of greater thickness than they were qualified.

F. Welding was not in complete accordance with the assigned weld procedures. Several of the non-essential variables had been altered or were not being complied with.

G. Provisions for the installation and inspection of high strength steel bolts are not in accordance with the AISC Code.

CORRECTIVE ACTION

Refer to the corrective actions for Audit Item No. I.

IV. ITEM AUDITED

The Resident Mechanical Engineer's surveillance system of the fabricating, furnishing and installing of the pipe hangers and rupture restraints.

Reviewed the Resident's written instructions and surveillance activities for adequacy and compliance to Procedure PRC-7, "Inspection of Materials and Components During Use and/or Installation."

RESULTS

Surveillance of the receipt and installation of the pipe hangers and rupture restraints is performed by the Power Plant Piping Group. MFI-2 sets forth the Resident's written instructions to personnel in this Group.

MFI-2 Instructions do not specifically address themselves to the surveillance of pipe hangers and restraints. The instructions define the inspector's responsibilities and require him to perform and record specific inspections.

However, the inspector is not performing any of these inspections; they are not applicable to the inspection of pipe hangers and restraints. The inspector is performing other inspections; however, these inspections are not documented or described in the MFI.

CORRECTIVE ACTION

Issue a written instruction describing the responsibilities and duties of, and the inspections and records required from, the hanger inspector.

V. ITEM AUDITED

Departures from approved drawings.

Reviewed the Contractor and P G and E system for handling discrepancies and departures from the approved drawings for the 2-1/2" and larger pipe hangers.

RESULTS

When a departure is discovered, MWK stops work on the support, completes a discrepancy report (DR), and submits the DR to P G and E for approval. Upon approval, they release the support for completion of work.

Upon receiving MWK's DR, General Construction analyzes the departure and writes its own DR to disposition the discrepancy or initiates a drawing revision to nullify the discrepancy. In the majority of the cases, a drawing revision is initiated. In most instances the concurrence of the Responsible Engineer is documented on a telecon sheet and work proceeds; a revised drawing or mechanical revision sheet is not obtained before proceeding with the work. In other instances, the mechanical revision sheet or revised drawing is received, but all of the signatures required by Procedure PRE-3, Responsible and Supervising Engineers, are not present.

CORRECTIVE ACTION

Document and disposition such departures on a discrepancy report or do not proceed with the work until a properly approved revised drawing or mechanical revision sheet is received on site.

D. C. Landes

D. C. LANDES

DCL:jc

cc: PLBussolini
RRFriedrichs
CMMaxfield
GVRichards
MRTresler
File

Attachment D2

File

30183

PACIFIC GAS AND ELECTRIC COMPANY

PG&E — 245 MARKET STREET • SAN FRANCISCO, CALIFORNIA 94106 • (415) 781-4211 • TWX 910-372-6587

P.O. Box 117
Avila Beach, California 93424

November 29, 1973

M.W. Kellogg Company
P.O. Box 367
Avila Beach, California 93424

Attention: Mr. J.W. Ryan
Project Manager

Diablo Canyon Project
Specification 8711
Class I Hangers

Gentlemen:

Effective immediately, installation of Class I hangers must be discontinued. This order is a result of a recent audit performed on installation of Class I hangers. The results of this audit indicate:

1. An approved Quality Assurance Manual for installation of Class I hangers does not exist.

2. A majority of those Class I hangers installed to date do not conform to drawing requirements.

Should you have any questions, contact the Mechanical Resident Engineer.

Sincerely,

C.K. Maxfield
Project Superintendent

PACIFIC GAS AND ELECTRIC COMPANY

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

M. H. CHANDLER
MANAGER
STATION CONSTRUCTION DEPARTMENT
GENERAL CONSTRUCTION

December 11, 1973

M. W. Kellogg Company
P. O. Box 1007
Williamsport, Pennsylvania 17701

Attention: Mr. J. E. Bowes
Manager of Construction

Diablo Canyon Project
Specification 8711

Gentlemen:

This will confer approval of the M. W. Kellogg Quality Assurance Manual for Pipe Support Field Procedures dated December 10, 1973 with the exception of rupture restraints. Per discussions with your on-site personnel, the section on rupture restraints will need further revisions before approval.

Please submit nineteen (19) copies of the revised pages to:

Mr. C. K. Maxfield
Pacific Gas and Electric Company
P. O. Box 117
Avila Beach, California 93424.

A copy of this letter is to be inserted into each copy of the Quality Assurance Manual.

Sincerely,

M. H. Chandler

INTEROFFICE CORRESPONDENCE

THE M. W. KELLOGG COMPANY

TO R. G. FINK

DATE SEPTEMBER 18, 1973

FROM J. R. MOSKWA AND DON TUTKO

SUBJECT M. W. KELLOGG INTERNAL AUDIT OF HANGER DEPARTMENT

SCOPE OF AUDIT

A complete audit was performed as to the adherence to the Engineering Specifications and Quality Assurance Manual.

BODY OF AUDIT

A. Two Hangers were picked at random in the Turbine Building for traceable tracking and correct installation.

NOTE: These Hangers have been tagged by Q.A. as:

1. Sys 02 K-503 4240 6-309
2. Sys 02 K-503 4242 6-311

1. Hanger (1.) 6-309 was found to have a loose cotter pin. The inspector in the area was notified and he immediately rectified the area in question.

2. For both Hanger (1. & 2.) 6-309 and 6-311 traceability was followed through the Area Inspector's Log Book to the Main Office. It was at the Hanger Department in that office where traceability stopped. I was unable to confirm from the office records that the two above mentioned Hangers had been checked.

3. The Engineer in charge of the Hanger Department was notified as to the problem. He has informed the Area Inspectors that they must bring their Log Books into the office, for a short period of time, in order to transfer all pertinent information into office records. A follow-up audit will be made to insure compliance.

B. The method of checking for correct Hanger location was discussed with the inspectors. The method which they now employ consists of measuring with a tape to the nearest coordinates indicated on the walls by P. G. & E. This appears to be a satisfactory method.

C. It was noted that some Hangers have welds which were questionable to the Auditor. The inspectors for the Hanger Department were shown

these welds and a discussion followed, the inspectors agreed that the welds were not of a quality which is compatible to good workmanship at this complex. All questionable welds will have a hold tag attached to the Hanger and a D.R. will be initiated for final disposition.

D. There were many discrepancies when comparing the P. G. & E. Drawing Log against the drawings used by the Hanger Department for fabrication. These descrepancies are:

Drawing	Log Revision	Copy on File	Sheet #
049294	2	1	---
049303	4	1	26
049279	13	12	1
"	12	9	2

NOTE: On 049279 Sheet 1, Change #13 is voided and 049279 Sheets #5 through #19 are not logged in the book. This is only a random sample of fifteen drawings. The Field Engineer and the Hanger Department must combine their information and bring their log and prints up to date. A future audit will be conducted to verify compliance.

E. Area Ten was examined for proper storage of Hanger material. There is not a definite separation between Class I and Class II material. However, any storage areas which have Class I material in it are designated with a Class I sign.

F. This section of the audit pertains to the Hanger Departments compliance with ESD-223 Sections 2 and 3:

1. M. W. Kellogg is writing the Purchase Orders and material requirements. P. G. & E. is not approving the design of any 2" and under Hangers. At this time M. W. Kellogg's Hanger Department has stopped designing 2" and under Hangers and are in the process of up dating Iso's to show location and design of installed Hangers for P. G. & E.'s approval. When design of 2" and under Hangers are resumed compliance to ESD-223 will be assured by a follow up audit.

2. Random support material is being ordered by the Hanger Engineer. The C.A. Manager is reviewing all Purchase Orders, this is in complete compliance with ESD-223 Para. 2.2.

TO: R. G. FINK

DATE SEPTEMBER 18, 1973

SUBJECT: M. W. KELLOGG INTERNAL AUDIT OF HANGER DEPARTMENT

PAGE NO. PAGE 3

3. Vendors which are supplying us with Pipesupports have been certified by P. G. & E. and M. W. Kellogg in the following manner:

MR. #4 Grinnell: P. G. & E. Engineering release signed by A. G. Walthers 8-25-71 and approved by W. Linbled 9-3-71.

MR. #5 Altius Corporation: Approved per P. G. & E. letter dated 3-6-72 with the provision that Altius add the latest revision of AWS D.1.0 to their Quality Assurance Manual. Altius revised their Q. A. Manual with Amendment #2 which added Sub-Section 13.5 on 4-3-72 according to the above P. G. & E. recommendation.

Bergen & Paterson: Have been approved by M. W. Kellogg and a letter has been sent to P. G. & E. stating this fact and requesting their approval.

4. The M. W. Kellogg Receiving Inspector is complying with all aspects of ESD-223 for the proper receiving of Class I Pipesupport.

CONCLUSION

A follow-up audit will be conducted during the month of October.

J. R. Moskwa
Q.A. Documentation Supervisor

Don Tutko
Q.A. Inspector

cc: J.W. Ryan
C. Lenzi
T. Novanec
A. MacAuley

JRM,DT:cc

INTEROFFICE CORRESPONDENCE

THE M.W. KELLOGG COMPANY

TO R. G. FINK DATE OCTOBER 24, 1973

FROM J. MOSKWA

SUBJECT FOLLOW-UP AUDIT OF HANGER DEPARTMENT AND AUDIT OF RUPTURE RESTRAINT'S QUALITY ASSURANCE PROGRAM

FOLLOW-UP AUDIT OF HANGER DEPARTMENT

Inspectors Daily Work Sheet

During the previous month it was determined that information was not being transferred from the field to the Hanger Department Office. They are now up dating their office logs on a weekly basis (every Friday). This apprears to be of a sufficient occurance to assure reliable records.

Drawing Revisions

M. W. Kellogg has completely revised its Drawing Log to agree with the Master Log kept by P. G. & E. The Hanger Department is now in the process of comparing their complete drawing inventory to the corrected Drawing Log to insure complete compliance to our Quality Assurance Program at this facility.

Bergen & Paterson

We still have not received word from P. G. & E. about our letter of approval on the above stated firm.

AUDIT OF RUPTURE RESTRAINT QUALITY ASSURANCE PROGRAM

Rupture Restraint Relcases

Rupture Restraints were released for Unit I with a manager's release. M.W. Kellogg has attempted to receive a material release from P. G. & E. for Unit II Rupture Restraints. As of this date, M.W. Kellogg has been informed by P. G. & E. (J. Holley) that a release was unnecessary due to the following information:

American Bridge is an approved on site contract vendor and they, (American Bridge), utilizes P. G. & E. approved drawings there is, therefore, no need for a material release for any Rupture Restraint.

Attachment C2

TO: R. G. FINK DATE OCTOBER 24, 1973

SUBJECT: FOLLOW-UP AUDIT OF HANGER DEPARTMENT AND AUDIT OF RUPTURE RESTRAINT's QUALITY ASSURANCE PROGRAM

PAGE NO. 2

Rupture Restraint Rod Requisitions

All Rod requisitions were arranged by Restraint Number and were checked to the actual work in the field by Restraint Number. A few descrepancies were noted, such as:

Rod requisitions which have been filled out improperly and are difficult to file. There are some Restraints in which I have been unable to trace any Rod requisitions. A further check insured the auditor that all present Rod requisitions are being filled out properly and this problem should be alleviated in a short time. A future audit will be performed in November to insure proper steps have been taken to file the remaining requisitions.

Adherence to Correct Installation Procedure

All aspects of installation were checked to insure compliance to the letter approved by A. G. Walters on October 19, 1972.

It appears that Spec 8833 XR and 8711 as stated in the body of the letter are being complied with completely but, it would seem to be beneficial if all the references stated in the letter were condensed into a single procedure to be used at this complex. This would save considerable time which is normally spent researching the various references.

Vendor's Drawings

The Vendor Drawing Log was correlated to the Master Log in the P. G. & E. office for Drawing # 663068 (Unit II) and # 663378 (Unit II). There were no discrepancies noted in our Log, the drawings were then checked to the latest copy on the stick in the office. All drawings were of the correct revision. The foreman in the field was audited for his copy of Drawings #663378 (Unit II) and all his revisions were found to be up to date.

Upon checking the Quality Assurance Documents which we use for weld documentation, I found that a few drawings were out dated. New revisions have been ordered and during a future audit next month all drawings will be checked for proper revisions.

J. R. Rosano
Q. A. Documentation Supervisor

cc: J.W. Ryan
C. Lenzi
T. Novanec
A. MacAuley

Attachment C2

INTEROFFICE CORRESPONDENCE

TO E. F. Gerwin DATE November 13, 1978

FROM E. J. Manning

SUBJECT Upcoming Audit of Diablo Canyon in December

This audit is very essential and should be conducted for the following reasons:

1. Pullman Power Products has committed itself to audit all areas of the facilities program annually. The Diablo Canyon project has been audited extensively only in hardware areas. The entire program has not been evaluated.

2. To be in compliance with our corporate requirements, an ASME Section III, Article NCA-4000, this audit is essential. In the past, Pullman Power Products did not conduct audits or practices to ASME or 10 CFR 50, but I feel it very essential to do so now. This type of thinking will satisfy the requirements of the NRC and ASME and hopefully, the results of the audit will be objective evidence t show the NRC and ASME of compliance of our program.

If any further questions dealing with this matter are necessary, please feel free to contact Central Staff Auditing.

E. J. Manning
Senior QA Engineer

EJM/kal
cc: J. E. Bowes
A. A. Eck
P. Runyan
J. Ryan
File

PROPRIETARY INFORMATION

Audit No. 80422
Issue Date: 6/13/78

PACIFIC GAS AND ELECTRIC COMPANY
QUALITY ASSURANCE DEPARTMENT

Title: Pullman Power Products Quality Assurance Program

Audited Organization/
Facility: Pullman Power Products at Diablo Canyon Power Plant

Auditors: M. E. Leppke (Lead Auditor)
C. L. Eldridge
R. W. Taylor

Dates Performed: April 2 - June 1, 1978

1.0 Scope

This audit was performed with three objectives in mind. They were:

(a) Verify that the Pullman Power Products Quality Assurance Program implemented at the site meets contract requirements and the requirements of applicable regulations, codes, and standards.

(b) Review objective evidence to determine the validity of the findings of an audit performed by Nuclear Services Corporation (NSC) in 1977 and determine if Pullman's responses were accurate and appropriate.

(c) Observe the as-installed condition of components and supports fabricated and installed by Pullman to verify adherence to applicable specifications, design drawings, and quality standards.

2.0 Conclusions and Exit Interviews

2.1 Conclusions

The Pullman Power Products Corporate QA Program and the implementation thereof were reviewed in light of the audit performed by Nuclear Services Corporation. Additional audit activities included a review of the installed hardware. The primary conclusions are given below with additional details set forth in Appendix A.

(a) Adequacy of the Pullman Power Products QA Program

The Quality Assurance Program implemented by Pullman Power Products essentially fulfills contract requirements and meets requirements of the ASME Boiler and Pressure Vessel Code, 1971 edition. However, three program deficiencies were identified and three deficiencies in the implementation of established procedural requirements were noted. Two Nonconformance Reports and four Minor Variation Reports were initiated by General Construction. Areas were also identified where it appears to be to Pacific Gas and Electric Company's advantage

(b) Evaluation of the Nuclear Services Audit of Pullman Power Products QA Program

Several apparently generic deficiencies in work performed by Pullman were previously identified by the General Construction Department. As a result, extensive reinspections were directed or performed by the General Construction Department. Additionally, Pullman was asked to perform an overall evaluation of the acceptability of the installed components and supports. An independent party, Nuclear Services Corporation (NSC) was contracted by Pullman to perform this evaluation. However, the resulting audit did not achieve its main objective in that NSC concentrated almost entirely on Pullman's Quality Assurance Program and inspected very little of the installed hardware to determine the quality of the work.

NSC's audit findings allege that major portions of Pullman's program are inadequate. It is essential to understand the requirements which NSC audited against to place the NSC audit findings in perspective. The audit checklist used by NSC states that requirements for the NSC audit were extracted from the following sources:

a) 18 Criteria (10CFR50 Appendix B)

b) Grey Book (WASH. 1283 "Guidance on Quality Assurance Requirements During Design and Procurement Phase of Nuclear Power Plants")

c) ANSI Standards

d) Nuclear Services Corporation (internal guidelines)

The 18 criteria of 10CFR50 Appendix B are applicable. Chapter 17.1 of the Diablo Canyon Final Safety Analysis Report commits to a quality assurance program meeting the intent of 10CFR50 Appendix B. Pullman's program also commits to the ASME Boiler and Pressure Vessel Code (CODE), 1971 edition for quality assurance requirements. The 1971 Code is consistent with the requirements of 10CFR50 Appendix B.

The WASH 1283 document (Grey Book) is not applicable. Chapter 17 of the Diablo Canyon Final Safety Analysis Report makes no commitment to WASH 1283 for the design and construction of Diablo Canyon. WASH 1283 endorses ANSI N45.2, 1971 and ANSI N45.2 series standards. ANSI N45.2 states in its foreword that it is not applicable to work performed in accordance with the Code. ANSI N45.2 series standards state under "Scope" that they are intended for use in conjunction with ANSI N45.2, 1971.

The ANSI Standards are not applicable for the same reasons expressed for WASH 1283.

Internal NSC corporate guidelines only represent the opinions of the auditors and are not interpreted by PGandE as requirements.

PROPRIETARY INFORMATION

Many NSC audit findings state that elements of Pullman's program are inadequate but specific deficiencies and references for requirements are not identified. Some actual deficiencies were identified by the NSC auditors but many of their findings appear to represent the auditor's opinions with no bases in applicable regulations, codes, or standards.

The audit performed by the PGandE QA Department essentially retraced the steps of the NSC auditors. Deficiencies identified are listed in Appendix A. Other alleged deficiencies stated by NSC do not appear to be supported by objective evidence or do not appear to be based on applicable codes, regulations standards.

Pullman's responses to the NSC audit findings in general appear to be correct. However, to place the NSC audit findings in proper perspective, Pullman should have assessed the applicability of requirements which NSC alleged that Pullman violated.

(c) Evaluation of the Pullman Power Products Corporate Audit of the Unit 2 Hardware Installed by Pullman Power Products Corporation

In February 1978 Pullman's corporate office performed an audit to verify that Unit 2 hardware items were installed in accordance with design drawings and specifications. One hundred twenty-two hangers, restraints, and snubbers and seventy-seven isometric drawing packages were inspected; no discrepancies were noted by the Pullman Power Products auditors.

Approximately half of the items inspected by the Pullman audit team were reinspected by PGandE during this audit; several discrepancies were noted. In light of the number of discrepancies noted, it is apparent that the Pullman audit did not effectively evaluate the quality of their work.

Most of the discrepancies noted appear to be minor in nature. Similar problems identified by reinspections in other areas have generally been "accepted as is" by the PGandE Engineering Department. However, an overall assessment of the situation still should be done to determine whether additional reinspections should be performed and the scope thereof. Pullman's management agreed, during a meeting held on May 25, 1978, to send additional qualified staff to the site to perform the required evaluation. General Construction plans to direct the performance of the Pullman evaluation.

MVR M-3725 and M-3726 were initiated by General Construction to document and provide for resolution of the noted discrepancies.

2.2 Exit Interviews

Two preliminary meetings and a final exit meeting were held to discuss the audit findings and to establish the recommended corrective actions.

(a) Preliminary Exit Meeting (May 10, 1978)

A meeting was held on May 10, 1978 to discuss the results and preliminary findings of the audit of the Pullman Quality Assurance Program and of the overall pipe and pipe support inspections. The following personnel attended:

General Construction	Quality Assurance	Engineering
C. K. Maxfield	R. P. Wischow	J. B. Hoch
M. R. Tresler	V. L. Killpack	
R. Etzler	M. E. Leppke	
G. Arnold	C. L. Eldridge	
	R. W. Taylor	

(b) Preliminary Exit Meeting (May 25, 1978)

A meeting was held on May 25, 1978 to discuss corrective actions with General Construction and Pullman Power Products. The General Construction Department directed Pullman Power Products to perform the required corrective actions. Those in attendance were:

Pullman Power Products	Quality Assurance	General Construction
M. Evans	V. L. Killpack	C. K. Maxfield
P. Runyan	M. E. Leppke	M. R. Tresler
J. Ryan		R. Etzler
A. Eck		

(c) Final Exit Meeting (June 1, 1978)

A final exit interview was held on June 1, 1978. Audit findings and agreed-upon corrective actions were summarized. All deficiencies identified during the audit had been documented prior to the exit interview by General Construction on Nonconformance Reports or Minor Variation Reports. Those in attendance were:

General Construction	Quality Assurance
C. K. Maxfield	R. P. Wischow
M. R. Tresler	V. L. Killpack
R. Etzler	M. E. Leppke
G. Arnold	C. L. Eldridge

PROPRIETARY INFORMATION

As a result of this audit the following Nonconformance Reports (NCRs) and Minor Variation Reports (MVRs) were written by the General Construction Department to resolve the problems identified:

NCR	Description
DC-78-RM-004	Documents the lack of program definition and lack of detailed audit schedule.
DC-78-RM-005	The relative responsibilities of QA and production are not clearly established.

MVR	Description
M-3723	Pullman Corporate Management audits were not performed at the scheduled frequency.
M-3724	Hold points were bypassed.
M-3725	Hardware discrepancies were noted.
M-3726	Discrepancies concerning isometric drawing packages were noted.

Corrective actions were agreed upon; the QA Department will verify the resolution of these nonconformances and deficiencies.

Prepared by: M E Leppke by V L Killpack
M. E. Leppke

C L Eldridge
C. L. Eldridge

R W Taylor by V L Killpack
R. W. Taylor

Approved by: V. L. Killpack
V. L. Killpack

B R Austin by J J Schuite

APPENDIX A

In this section, the deficiencies which were identified as a result of the audit are discussed. The problem in each instance is identified to a specific Nonconformance Report (NCR) or Minor Variation Report (MVR) that was initiated by the General Construction Department.

In addition, non-mandatory suggestions and recommendations of program improvements are given for consideration.

1.0 Program Deficiencies

Two Nonconformance Reports were initiated for the three identified deficiencies.

(a) Nonconformance Report No. DC-78-RM-004

This NCR is comprised of two parts as follows:

(1) The Pullman Power Products Quality Assurance Program is not adequately defined. The ASME Boiler and Pressure Vessel Code, Section III, paragraph NA4140 of the 1971 edition requires that the Quality Assurance Program be documented in detail in a manual consisting of written policies, procedures, and instructions. Corporate Procedure No. XVIII-1 is presently being used for the performance of management audits of field activities. Corporate Procedure No. VII-1 is being used for qualifying vendors for the Approved Vendors List. These procedures implement Quality Assurance requirements of the contract but are not identified as part of the program and revisions are not controlled by the program.

The program is required to be approved by the ASME, and changes to the manual are to be approved by the Authorized Inspection Agency. KFP-1, paragraph 1.13 states that Engineering Specifications (ESDs) shall be part of the program. Most ESDs appear to be implementing procedures, but some define actual program elements. For example, ESD-240 establishes the Noncompliance Report (NCR) system. No evidence could be found to indicate that ESD-240 has been reviewed and approved by the ASME or the Authorized Inspection Agency.

It is not clear which manuals and procedures are applicable to specific activities. The pipe support manual is considered by site personnel to be a supplement to the piping manual. The piping manual is approved by Pullman's Vice President but the support manual is only approved by the field QA Manager. However, the front page of each manual indicates that it establishes the quality requirements for work performed under that manual. The defined scope of each manual indicates that the two apply to

Engineering Specifications appear to supplement one or both manuals or independently establish quality assurance program requirements. Special QA instructions are written to supplement and clarify Engineering Specifications or procedures in one or both manuals.

Recommended Corrective Action

(a) Write a program description which clearly identifies the documents that are to be considered part of the total quality assurance program and establish the hierarchy of the documents (where necessary obtain approval by the proper authority).

(b) Define approval requirements for the above documents and for revisions and obtain approvals where necessary. (For example, approval requirements are not provided for special QA instructions).

(c) Clearly define the scope of work to which the above documents are applicable. (For example, do requirements of the piping manual apply to pipe support work?)

(d) Review the program to insure that supplementary procedures do not include requirements which conflict with requirements of the procedures they supplement. Several KFP procedures require the involvement of the AI. Corresponding KFPS procedures allow work to be done without AI involvement. KFPS procedures clearly cannot supplement KFP procedures without revising the KFP procedures to allow waiving AI involvement on non-Code work. (Example: KFP-7 and KFPS-6).

(2) PG and E Specification 8711 and the 1971 Code, Section III, paragraph NA4700 require a comprehensive system of planned and periodic audits to be carried out to assure compliance with all aspects of the Quality Assurance Program.

Procedure KFP-18 states in its scope that it establishes such a system. However, two types of audits, management audits and internal audits, are described. The procedure does not establish the scope of either type of audit and no detailed schedule has been developed to show that all aspects of the program are being audited. Furthermore, audit records at the site do not indicate that all aspects of the program are being audited. Records do not indicate that management audits have been performed on pipe support work. An unofficial, unapproved internal audit schedule exists, but it has not been followed consistently and few ESDs appear on the schedule. A March 1977 internal audit erroneously states that KFP-3, -5, -9, and -14 are not to be audited as they do not apply to Diablo Canyon. Internal audit schedules for October, November, and December 1977 and January 1978 were not met.

Recommended Corrective Action

Establish and implement a detailed audit schedule to assure compliance with Specification 8711 and the Code.

(b) Nonconformance Report No. DC-78-RM-005

PGandE Specification 8711, Section 4, paragraph 3.11 requires that Quality Control personnel perform only quality control functions and that they be free of scheduling and production pressures.

A review of procedures and work in progress indicates that Quality Control inspectors' independence from scheduling and production pressures is not assured by the program as written. Procedures do not clearly indicate that it is the Production Department's responsibility to read and use the process sheet insuring that steps are performed in the required sequence and hold points are observed.

During the course of this audit, it was noted that two hold points were bypassed on FW #362 (see Section 2.2 below). Discussions with individuals involved indicated that the Quality Control inspector was expected to follow the work and ensure that inspections were performed at hold points indicated on the traveler. The Foreman apparently had not read the traveler and was unaware that hold points existed. A QC inspector should not be responsible for directing the course of construction to ensure that hold points are observed, particularly if he also signs off these hold points.

Pullman's procedures identify the Field QA/QC Manager as responsible for ensuring that most Quality Assurance Program functions are performed. Field QA personnel had already determined that some procedures needed to be revised to clarify or redefine responsibilities to ensure that production responsibilities are not assigned to QA/QC personnel. The Assistant Field QA Manager has drafted revisions to three pipe support manual procedures and is reviewing others to determine whether revisions are needed.

Recommended Corrective Action

(a) Revise KFP-8 and KFPS-7 to clearly state that production is responsible for following the traveler and ensuring that hold points are observed. QC should only be <u>responsible</u> to inspect or audit.

(b) Review procedures and practices to verify that QC is neither procedurally nor functionally placed in situations where their independence may be compromised. Revise procedures as necessary.

(c) Perform the training necessary to ensure that production and QC personnel fully understand their relationship and the functions they are expected to perform.

2.0 Deficiencies in Implementation of Procedures

Four Minor Variation Reports (MVR) (M-3723; M-3724; M-3725, and M-3726) were initiated by General Construction for the identified deficiencies.

(a) Minor Variation Report No. M-3723

Records indicate that management audits have not been performed by Pullman Power Products Corporation at the specified frequency. Management audits are required by KFP-18 to be performed at least every six months. Since December 1975, audits have been performed at eight to ten month intervals.

Recommended Corrective Action

Conduct audits at required intervals or change the requirements.

(b) Minor Variation Report No. M-3724

On April 25, 1978, work in progress was inspected to verify that the Field Process Sheet was being used as required by procedure KFP-8. It was noted that the repair work on FW #362 had proceeded to step 4 on the Field Process Sheet. The Field Process Sheet was in the custody of the area QC Inspector. Inspection of the Field Process Sheet indicated that, contrary to KFP-8, paragraph 8.4, work had proceeded beyond two hold points and the designated inspections had not been performed.

Corrective Action

The Field QA/QC Manager issued Nonconformance Report #265 and agreed to write a procedure requiring the issuance of a Field Process Sheet to production. The procedure is to clearly define responsibilities for using and completing process sheets.

(c) Minor Variation Report No. M-3725

Minor Variation Report M-3725 was initiated to document the following hardware discrepancies, noted by the PGandE QA Department, to facilitate their resolution.

Support or Isometric	Description of Discrepancy
47-69R	Vertical clearance is 1/2" should be 1/16"
47-70R	Vertical clearance is 1/2" should be 1/16"
46-17R	Clearance is 3/16" should be 1/16"
	Weld Item 2 to 1 not all around
77-12SL	Snubber installed on wrong pipe
77-14SL	No torque seal
23-7V	Location Item 7 is 5/8" should be 4"
23-8V	Weld Item 9 to pipe not all around
23-5R	Clearance Item 12 is 1/4" should be 1/8"
23-12R	Missing anchor bolts
23-16R	Grinder Gouges 3/32" deep.
	Loose bolt
	Clearance is 1/8" should be 1/16"
23-66R	Clearance is 0" should be 1/16"
947-1R	Weld Item 1 is not all around
90-44R	Weld Item 9 is not all around
90-45R	As-built does not reflect added shim
90-47R	Weld Item 6 only tacked
90-48R	As-built does not reflect added weld
96-6V	5/8" rod used in lieu of 1/2" rod
90-46A	Weld Item 2 is 5/16" should be 3/8"
72-19SL	Weld Item 4 not both sides
6-4R	Weld on attachment is 1/4" should be 3/8"
6-28R	Fabrication of "t" shoe not to as-built
6-6V	Dimension is 3'-1 1/2" should be 2'-11 11/16"
6-8V	No load on support, not tightened
2730-61	No Clearance "t" shoe to clip
2730-63	Broken stud
2730-65	No clearance "t" shoe to clip
2730-66	No clearance "t" shoe to clip
2730-42	Clamp loose, wrong location
2730-21	No clearance "t" shoe to clip
935-23	Brace weld not all around
935-24	Brace is 45° should be 55°
935-25	Configuration opposite to DWG.
935-27	Brace weld not all around

PROPRIETARY INFORMATION

(d) Minor Variation Report No. M-3726

Minor Variation Report No. M-3726 was initiated to document the following discrepancies noted in isometric drawings to facilitate their resolution:

Support or Isometric	Description of Discrepancy
2-3-18	ISO shows check valve as Spec 8729 Item 17 (Velan). Installed valve is Spec 2550 (Weston Hyd.)
2-3-19	Same as 2-3-18
2-4-418	Line 1058; dimension shown as 2'-8" is 1'-8".
2-9-478	F.W. 858 is etched on two welds
2-12-5	F.W. 170 is stamped 176
2-14-14	Detail for PX263 refers to pump 2-1, should be 2-3.
2-3-418	F.W. 1390, 1391, & 1392 are shown by the process sheet to have been performed using stainless steel 309 rod. Joints are all carbon to carbon. Note: Documentation was determined to be incorrect. The correct rod was verified to have been used.

3.0 Recommendations

Several comments and recommendations for program requirements were presented for consideration to the General Construction Dept. during exit interviews and are summarized as follows:

(a) Schedule for Implementation of Commitments

A schedule for implementation of the following commitments should be established:

Training program - added to KFP-1, 12/23/77.

Use of internal audit checklists - made in draft responses to NSC audit.

Issue a procedure requiring a process sheet to be issued to production. Commitment of 4/25/78.

Implementation of corrective action resulting from this audit.

PROPRIETARY INFORMATION

(b) Pullman Problem Reporting Procedures

These procedures should be revised to facilitate determining and verifying corrective actions.

The following changes are recommended:

Issue internal audit findings as NCRs.

Expand the use of NCRs to cover all conditions adverse to quality which are not covered by DRs.

Require the cause as well as the corrective action to prevent recurrence to be documented.

Establish a management review system for DRs and NCRs to identify trends.

(c) Inspector's Certification

The Pullman inspector's certification card should be amended to eliminate the claim that inspectors are qualified to ANSI N45.2.6 or inspectors should be qualified in accordance with its requirements. A review of ESD-237 and qualification records indicates that some Pullman inspectors are not qualified to ANSI N45.2.6.

(d) Description of Supervisory Responsibilities

The KFPS (pipe support) manual assigns specific quality functions to the "Hanger Engineering Supervisor". The responsibilities and duties of this position should be defined in the program.

(e) Special QA Instruction Index

An index for special QA instructions should be prepared. This index should identify the procedures being amplified and the subject being addressed.

(f) Update Pipe Support Procedure KFPS-7

The process sheet shown in KFPS-7 is Revision 7 and the process sheet shown in ESD-223 is Revision 8. The latest revision of the process sheet should be placed in KFPS-7 or the process sheet should be removed from the procedure.

File

PACIFIC GAS AND ELECTRIC COMPANY

245 MARKET STREET • SAN FRANCISCO, CALIFORNIA 94106 • (415) 781-4211 • TWX 910-372-6587
P. O. Box 117
Avila Beach, California 93424

September 19, 1973

M. W. Kellogg Company
P. O. Box 367
Avila Beach, California 93424

Attention: Mr. J. W. Ryan
Project Manager

Diablo Canyon Project
Quality Assurance Audits

Gentlemen:

Past audits conducted both by the Atomic Energy Commission and our Quality Assurance Department have disclosed numerous Quality Assurance deficiencies. These deficiencies usually fall into two categories:

1. Failure to follow existing Quality Assurance procedures.

2. Failure to upgrade Quality Assurance procedures.

We request that you place more emphasis on your Quality Assurance audit program such that most of the deficiencies noted by the Atomic Energy Commission and our Quality Assurance Department will be eliminated before the time of their audits.

Our Quality Control engineers will call on you in the near future to assist you in the upgrading of Quality Assurance procedures. He will also audit you periodically to help you to uncover the areas that need improvement.

Your cooperation in the upgrading of Quality Assurance programs will be appreciated.

Sincerely,

C. K. Hanfield
Project Superintendent

Attachment B 2

PACIFIC GAS AND ELECTRIC COMPANY

245 MARKET STREET • SAN FRANCISCO, CALIFORNIA 94106 • (415) 781-4211 • TWX 910-372-6587

P. O. Box 117
Avila Beach, California 93424

March 25, 1975

M. W. Kellogg Company
P. O. Box 367
Avila Beach, California 93424

Attention: Mr. J. W. Ryan, Project Manager
Mr. J. P. Runyan, Field Quality Assurance Manager

Diablo Canyon Project
Specification 8711
Quality Assurance Audit

Gentlemen:

On February 20, 21 and 25, 1975, a Quality Assurance audit was performed on M. W. Kellogg Company. This audit reviewed piping support and rupture restraint installation procedures to verify compliance to the Pacific Gas and Electric Company and M. W. Kellogg Company Quality Assurance Manuals, Specification 8711 and the FSAR. The departures which are noted are not individually of major significance. However, when considered collectively as a trend, these departures reveal the need for a more comprehensive and extensive internal audit system.

Please correct the discrepancies noted in the attached audit and reply to the audit, in writing, no later than April 1, 1975. Indicate in the reply both corrective actions being taken and steps to prevent recurrence.

Sincerely,

C. K. Maxfield
Project Superintendent

Attachment

Attachment 3C

PACIFIC GAS AND ELECTRIC COMPANY
QUALITY ASSURANCE DEPARTMENT
DIABLO CANYON PROJECT

INSTALLATION OF PIPE SUPPORTS AND RUPTURE RESTRAINTS (Specification 8711 and 8833XR)

Performed by: W. J. Tomei

Date: February 20, 21 & 25, 1975

Critiqued: March 18, 1975

SCOPE

The audit was conducted to verify that piping supports and rupture restraints are installed in accordance with the Pacific Gas and Electric Company and M. W. Kellogg Company Quality Assurance Manuals, Specifications 8711 and 8833XR, and the FSAR.

CONCLUSION

The results of this audit were reviewed with the Resident Mechanical Engineer to (1) discuss the results of the audit, (2) resolve any inadvertant misrepresentation, and (3) establish a completion date for those items requiring corrective action.

The audit disclosed departures from prescribed quality procedures in the areas of drawing control, weld electrode control, ultrasonic equipment calibration, and P G and E surveillance inspection documentation. Individually, the departures were not of major significance; however, collectively the departures indicate the need for a more comprehensive internal audit system.

The Resident Mechanical Engineer has directed his staff to review the unresolved items, implement corrective actions, and provide a written response to this audit by April 4, 1975.

I. ITEM AUDITED

Ref: MWK Pipe Support QA Manual, Procedure KFPS-13

Reviewed MWK welder performance qualifications for rupture restraint welds to assure conformance to ASME, Section IX. Welder performance qualifications reviewed included MWK welder symbols KS, YP, HZ, and LV who were qualified to MWK weld procedure number 7/8.

DISCREPANCY

No discrepancies noted.

II. ITEM AUDITED

Ref: MWK Pipe Support QA Manual, Procedure KFPS-7

Reviewed MWK Field Process Sheets for hanger numbers 40/24R, 40/25R, 40/44R, and 40/21R for conformance to MWK QA requirements. These hangers were also physically examined in the field to assure conformance to the P G and E design drawings and MWK Engineering Specification ESD-223.

DISCREPANCY

No discrepancies noted.

III. ITEM AUDITED

Ref: MWK Pipe Support QA Manual, Procedure KFPS-6

Reviewed drawings in the field for pipe rupture restraints to assure they are current. Drawings reviewed included P G and E drawing numbers 438237, 439562, 439566, 439569, 439575, 443250, 447248, and 447255.

DISCREPANCY

The MWK QA inspector for the Unit I pipe rupture restraints was observed to have drawing number 447255, Revision 2, in his possession. Revision 4 is the current revision and was transmitted to MWK on August 16, 1974. Revision 2 of this same drawing was located in the QA office drawing rack. Further investigation revealed that rupture restraint drawings were not being distributed to the MWK QA office by the MWK Office Engineer.

CORRECTIVE ACTION

The MWK QA Manager stated that P G and E rupture restraint drawings will be added to their current drawing control system.

The Resident Mechanical Engineer stated that his personnel will audit drawings in this area to assure that only the latest revisions are used.

IV. ITEM AUDITED

Ref: MWK Engineering Specification ESD-223

Reviewed field fabrication of pipe supports in the hanger fabrication shop located in area "L", Unit 2 Auxiliary Building. Work was reviewed in process to determine conformance to Specification ESD-223.

DISCREPANCY

The following departures were noted:

Contrary to ESD-223, Paragraph 2.4, Welder symbol "LH" did not have a Weld Rod Requisition form for electrodes found at his work table.

Contrary to ESD-223, Paragraph 2.4, the Weld Rod Requisition form for welder symbol "VE" referenced the incorrect weld specification.

Contrary to ESD-223, Paragraph 2.16, the temperature of the electrode holding oven issued to welder symbol "VE" was noted to be 100°F. A minimum of 225°F is required for low hydrogen electrodes.

Some electrodes were observed which were not properly controlled; Rod Requisition forms were not attached and they were not stored in a rod oven.

CORRECTIVE ACTION

The MWK QA inspector agreed that this area needed immediate attention. MWK Nonconformance Report No. 204 was written to identify the problem areas and initiate corrective actions.

V. ITEM AUDITED

Ref: MWK Pipe Support QA Manual, Procedure KITS-6.

Reviewed the MWK storage area for Class I supports and support material for conformance to KFPS-6.

OBSERVATION

Procedure KFPS-6, Paragraph 6.1.7, requires that only color coded structural shapes and plates may be moved for fabrication purposes. It was observed that the color coding requirement for these items had been discontinued. Currently, this material is not released until certification is received at the site. This appears to be an acceptable method of controlling this material; however, methods which deviate from prescribed plans and procedures should not proceed until the alternate method has been approved.

CORRECTIVE ACTION

The MWK Pipe Support QA Manual is in the process of being revised to include the above change. In the future, procedures will not be altered until formal approval is received from P G and E.

VI. ITEM AUDITED

Ref: MWK Pipe Support QA Manual, Procedure KFPS-2

The ultrasonic inspection of rupture restraint full penetration welds was reviewed for conformance to MWK Procedure KFPS-2, MWK Engineering Specification ESD-234, and AWS D1.0-1969. UT examinations were reviewed in process and the following items were inspected for conformance to procedural requirements: equipment, transducer, weld preparation, technique, basic calibration blocks, calibration, and inspection documentation.

DISCREPANCY

UT inspection work appeared to be in compliance with AWS D1.0-1969 requirements. One departure was observed in the area of equipment calibration. There was no documented evidence that the equipment's gain control was checked for correct calibration as required by AWS D1.0-1969, Appendix C, Paragraph C106a.

CORRECTIVE ACTION

The MWK UT inspector stated that a method would be developed to cali-

(1) FILE (1) L. WERNER
(1) Q.A.

PG&E
Quality Assurance
76-286 REV. 4/78

NONCONFORMANCE REPORT

1 IDENTIFICATION: Plant/Site DC1 | Year 79 | Resp. Dept. RM | Number 003 Sheet 1 of 4

TO BE COMPLETED BY INITIATOR

2 Reference Requirement(s): Specification 8833XR. Nonconformance Report DC1-78-RM-009.

3 Item or Activity: Rupture Restraints.

4 NONCONFORMANCE
Description: See page 2.

Suggested Resolution (optional):

5 ORIGINATED | Department: GC Mechanical | Date: 1/24/79 | By: Robert Fortson | Distribute Information Copies - SEE 11 Below

TO BE COMPLETED BY TECHNICAL REVIEW GROUP

6 Cause of Nonconformance: Pullman Power Products' Rupture Restraint Program has had inadequate design change control, inspection performance, and control.

7 DISPOSITION
Resolution: See pages 2, 3, and 4.

Reported to NRC? ☐YES ☒NO BY _____ ☐Part 21 Review Group to Determine Reportability | Date / /

Corrective Action to Prevent Recurrence: Pullman Power Products has developed and implemented a program which assures adequate control of design changes. Training and indoctrination programs have been developed and implemented which assures adequate performance of inspection personnel.

APPROVED

Group Chairman	V. L. Kilpack	Date 1/24/79	Robert Fortson	Date	1/24/79
Quality Assurance	M E Staples	Date 1/24/79	[illegible]	Date	2/6/79
Other Representative	[illegible]	Date 1/24/79	[illegible]	Date	2/9/79

8 SCHEDULED COMPLETION | Resolution Date 3/30/79 | Corrective Action Date 2/9/79

TO BE COMPLETED BY IMPLEMENTING ORGANIZATION

9 IMPLEMENTATION

Resolution Completed		Approved By		Date	/ /
Inspection (if required)		By		Date	/ /
Corrective Action Completed		Approved By	V. L. Kilpack	Date	2/9/79
Inspection (if required)		Approved By	N/A	Date	/ /

Remarks:

TO BE COMPLETED BY QUALITY ASSURANCE

10 VERIFICATION: The Resolution and Corrective Action are complete. Date / /

11 DISTRIBUTION (Other Departments to receive information copy when originated - check below)

☐ Authorized Inspector (for ASME items) ☐ Plant Superintendent ☐ Security
☐ Steam Generation ☐ Engineering Research ☐ Materials

DC1 - 79 - RM - 003

NONCONFORMANCE 4

Description:

1) a. Documentation shows acceptable bolted connections. However, there are cases of out of tolerance gaps existing under baseplates, nuts not bearing against splice plates properly and nuts not engaged per requirements.

b. Documentation shows acceptable welded connections. However, there are cases of material and welds not conforming to the specification.

2) a. Welds exist which do not have documentation.

b. Modifications have been performed which were not required by the design drawings and have not been documented.

c. There are bolts that have "torque seal" which indicates tensioning and inspection, however, inspection records do not exist. This has led to some ASTM A-490 bolts being tensioned more than one time. Reuse of A-490 bolts is not permitted by the current revision of the "Specification for Structural Joints Using ASTM A-490 Bolts" (Revision dated Feb. 4, 1976). Previous editions did not prohibit the reuse of A-490 bolts.

DISPOSITION 7

Resolution:

Pullman Power Products shall perform a documented inspection of all bolted and welded connections and applicable documentation, required by the Specification, as set forth in approved contractor's ESD's, in order to:

1) identify connections which do not conform to Specification requirements, and

2) identify connections which do not have required documentation.

Deficient conditions shall be corrected as follows:

1-a) Out of tolerance gaps under baseplates have been inspected by the assigned engineer and will be allowed to remain in connections not requiring rework. In connections requiring rework the baseplate shall be shimmed tight. New bolts and nuts shall be installed as required by the Specification. A documented test will be performed to determine the minimum thread engagement required to develop full designed bolt strength. The test results will be submitted to the assigned engineer for his evaluation. Nuts not having full thread engagement shall be "As-Builted" and the As-Builts submitted to the assigned engineer for review and approval.

Resolution (continued)

1-b) Documented material and welds which do not conform to Specification requirements shall be removed and replaced with conforming material and welds.

2-a) Undocumented welds shall be inspected using existing final acceptance criteria as required by the Specification. In addition, all undocumented fillet welds shall be magnetic particle inspected. If a magnetic particle inspection is not possible, the contractor shall submit a discrepancy report to P G and E. Welds found acceptable through inspection may remain; welds found unacceptable shall be removed and replaced.

2-b) Modifications not required by the design drawings and not authorized, shall be "As-Builted" and the As-Builts submitted to the assigned engineer for review. Modifications approved by the assigned engineer need not be removed. Modifications not approved by the assigned engineer shall be removed.

2-c) All high strength ASTM A-325 and A-490 nuts and bolts, previously tensioned in steel to steel connections, shall be replaced with new bolts and nuts which conform to the original specifications. New bolts shall be tensioned to current requirements.*

All high strength ASTM A-325 and A-490 anchor bolts through concrete walls which have been previously tensioned shall have the threaded portion or portions examined using ultrasonic inspection or the nuts shall be removed and the exposed threads magnetic particle inspected. If the threaded portion of a bolt is inaccessible for magnetic particle inspection, a liquid penetrant inspection shall be performed. All examinations shall be documented and included in the Restraint Documentation Package.

All anchor bolts through concrete walls which have no rejectable indications, as defined by the specification, are acceptable and shall be tensioned to current requirements.*

Bolts which have rejectable indications shall be discarded and replaced with new bolts with new nuts. If bolts are grouted in wall the connection shall be "As-Builted" and the As-Built submitted to the assigned engineer for review and disposition.

All high strength ASTM A-325 and A-490 anchor bolts embedded in concrete which have been tensioned to 30% of F_t or less shall be retensioned to current requirements.*

Bolts which have been tensioned to more than 30% of F_t shall have the threaded portion examined using ultrasonic or magnetic particle inspection. If the threaded portion of a bolt is inaccessible for magnetic particle inspection, a liquid penetrant inspection shall be performed. All examinations shall be documented and included in the Restraint

Resolution (continued)

Documentation Package. All anchor bolts embedded in concrete which have no rejectable indications as defined by the specifications, are acceptable and shall be tensioned to current requirements.*

Bolts which have rejectable indications shall be "As-Builted" and the As-Built submitted to the assigned engineer for review and disposition.

"As-Builted" shall mean a complete description of location, condition, and test or inspection performed.

F_t shall mean specified minimum tensile strength of bolt.

ATTACHMENT 1

DCI - 79 - RM - 003

BOLTING REQUIREMENTS FOR RUPTURE RESTRAINTS

Minimum bolt tension per AISC Table 3 for ASTM A-325 and A-490 bolts:

.70 (min. f_t)

Rupture Restraint Steel to Steel Connections:

.70 (min. f_t)

Rupture Restraint Anchor Bolts through Concrete Walls (floors):

.55 (min. f_t)

Rupture Restraint Anchor Bolts cast in Concrete:

.25 (min. f_t)

Rupture Restraint Steel to Steel Connections which are periodically detensioned and reused:

.55 (min. f_t)

min. f_t = specified minimum tensile strengths of bolts

COPY

P. O. Box 117
Avila Beach, California 93424

February 22, 1979

Mr. J. W. Ryan
Project Manager
Pullman Power Products
P. O. Box 367
Avila Beach, California 93424

Diablo Canyon Project
Specification 8711
Clarification of NCR
DCl-79-R4-003, Pages
3 and 4, Item 2C,
Paragraphs 1, 3, 5,
and 6

Dear Mr. Ryan:

Where reference is made to re-tensioning of embedded bolts or anchor bolts through concrete walls to current requirements, it should be understood this is applicable only if it is necessary to remove nuts for N.D.E. of the bolt.

Sincerely,

(Signed) R. D. ETZLER

R. D. ETZLER
Project Superintendent

JAHolley:fr
bcc: VLKillpack
MELeppke
JArnold
RTorstrom
ISokoloff
SHanusiak
File

(1) GA (1) M WOLF (1) FILE

PG&E
Quality Assurance
76-286 REV. 4/78

NONCONFORMANCE REPORT

1 IDENTIFICATION: Plant/Site DC1 | Year 78 | Resp. Dept. RM | Number 009 | Sheet 1 of 2

TO BE COMPLETED BY INITIATOR

2 Reference Requirement(s): Rupture Restraints inside Containment erected per Spec. 8833XR

3 Item or Activity: Contractor's erection and inspection of Rupture Restraints documentation.

4 NONCONFORMANCE
Description: 1) Documentation shows work complete, correct and inspected. Work is not correct. 2) There is physical evidence of work but inspection records are incomplete or non-existant. (See page 2 for details).
Suggested Resolution (optional): Reinspect all Rupture Restraints inside containment. Correct all deficiencies.

5 ORIGINATED: Department: GC Mechanical | Date: 10/26/78 | By: Robert Forstrom | Distribute Information Copies - SEE 11 Below

TO BE COMPLETED BY TECHNICAL REVIEW GROUP

6 Cause of Nonconformance

7 DISPOSITION
Resolution: Cancelled. Refer to Nonconformance Report #DC1-79-RM-003.
Reported to NRC? ☐YES ☐NO BY _____ ☐Part 21 Review Group to Determine Reportability | Date / /
Corrective Action to Prevent Recurrence

INFORMATION COPY

APPROVED

Group Chairman	Date / /		Date / /
Quality Assurance	Date / /		Date / /
Other Representative	Date / /		Date / /

8 SCHEDULED COMPLETION | Resolution Date | Corrective Action Date

TO BE COMPLETED BY IMPLEMENTING ORGANIZATION

9 IMPLEMENTATION

Resolution Completed	Approved By	Date / /
Inspection (if required)	By	Date / /
Corrective Action Completed	Approved By	Date / /
Inspection (if required)	Approved By	Date / /
Remarks		

TO BE COMPLETED BY QUALITY ASSURANCE

10 VERIFICATION: The Resolution and Corrective Action are complete NCR 24132 [signature] Date 2/6/79

11 DISTRIBUTION (Other Departments to receive information copy when originated - check below)

- ☐ Authorized Inspector (for ASME items)
- ☐ Steam Generation
- ☐ Engineering
- ☒ Station Construction
- ☐ Plant Superintendent
- ☐ Engineering Research
- ☒ Quality Assurance
- ☐ Safety Health and Claims
- ☐ Security
- ☐ Materials
- ☒ Contractor PULLMAN POWER PROD.
- ☐ Other

NONCONFORMANCE 4

Description: (Details)

1) a. Documentation shows bolted connections are shimmed, tensioned and accepted but there are cases of gaps existing under baseplates, nuts not bearing against splice plates and nuts not having proper thread engagement.

b. Documentation shows weld process sheet signed off for material verification and fit up but there are cases of material without traceability having been installed, material installed in the wrong place and welds made in the wrong place.

2) a. Welds exist, which although correct, do not have process sheets.

b. Welds exist which are not required and have not been authorized.

c. Modifications have been performed which were not authorized.

d. There are bolts that have "torque seal" which indicates tensioning and inspection but inspection records do not exist.

File

Standard EC Moore Business Forms, Inc.

Rec'd 10-24-76

(1) I.S.
~~(2) EML~~
(3) SH
(4) I.S

G E
MORANDUM

Date 9-24-74

P. S. Baer. Location ______ Ext. ______

H. O. [illegible] Location ______ Ext. ______

SUBJECT Diablo Canyon - Pipe break outside cont. - File No. ______
NSC design - quality assurance requirements

This is to confirm that appropriate quality assurance requirements shall apply to the fabrication and installation of structures designed for use by NSC to mitigate the effects of high energy pipe ruptures outside the containment.

For structural steel (excluding impingement sleeves) applicable quality assurance requirements are those contained in [illegible] 8833XP with the exception that Charpy impact tests are required for information only on carbon steel only. No charpy tests are required on type 304 stainless steel (Ferrite content Schmidt [illegible]).

For impingement sleeves refer to D.V. Kelly's letter to R.P. Kelly dated 6/25/74 for applicable quality assurance requirements.

Date ______

CC: WJL
EPW
HJG
D.N.
AGW

IGOR SOKOLOFF

PACIFIC GAS AND ELECTRIC COMPANY

COPY

IGOR SOKOLOFF

October 24, 1974

Mr. E. J. Nicholini
Vice President
Bostrom-Bergen Metal Products
4700 Coliseum Way
Oakland, Ca. 94601

Diablo Canyon Project
GH 167027 - Spec. 8831R
Pipe Restraint Q.A. Material PC01223

Dear Mr. Nicholini:

The Quality Assurance requirements for the NSC designed structures which you are furnishing shall be as follows:

1. The general applicable requirements are those outlined in Specification 8831R and detailed in your Quality Assurance Manual prepared for that specification.

2. Charpy impact tests for carbon steel are required for information only. Tests shall be made at +20° F.

3. Charpy impact tests are not required for type 304 stainless steel. (Schmitt Steel should be so advised.)

Sincerely,

M. M. Chandler

JMWoodward:ls

bcc: PSBain
EPWolfak/VJChio/IScholoff (2)
APDematteI (GFA)
CWMarfield
CdSedas

COPY

IGOR SOKOLOFF

December 23, 1974

Mr. E. J. Michelini
Vice President
Bostrom-Bergen Metal Products
4700 Coliseum Way
Oakland, CA 94601

Diablo Canyon Project
GH 167027 - Spec. 8831R
Pipe Restraint Q.A. Material PCO 1223

Dear Mr. Michelini:

This letter confirms verbal instructions given you by Mr. Art Valente and Mr. T. Ewoldt on December 20, 1974.

All stainless steel rods must be in accordance with the applicable ASTM specification designation as shown on the design drawings. Any rod not falling within the limits of ASTM specification designation must be approved before proceeding. The rod in question is shown on your reference letter 56, page 4 of 4.

According to Mr. Valente you were not fully aware that you were to follow the general applicable Quality Assurance requirements as outlined in Specification 8831R rather than 8831R. This was the intent as mentioned previously in our October 24, 1974, letter.

Sincerely,

H. H. CHANDLER

TWEwoldt:sc

bcc: RSBain
AFDematteI (CFA)
CKMonfield
CHSedan
RFWollak/VJChio/ISokoloff (2)✓

PACIFIC GAS AND ELECTRIC COMPANY

COPY

Vikl Arrester

IGOR SOKOLOFF

January 7, 1975

Mr. E. J. Nichelini
Vice President
Bostrom-Bergen Metal Products
4700 Coliseum Way
Oakland, CA 94601

Diablo Canyon Project
GH 167027 - Spec. 8831R
Pipe Restraint Q.A. Material FCD1223

Dear Mr. Nichelini:

This letter will answer questions posed in your reference letter 60, dated December 27, 1974.

(1) Job direction sequence will be as follows:

Phase I	Pipe Wall
Phase II	Area CB/CH
Phase III	Pipeway
Phase IV	Turbine Building

You have already received marked up drawings for Phase I showing our proposed erection sequence. We will furnish erection sequences for each of the remaining phases, if our field personnel think it necessary.

(2) Final release dates for Nuclear Service Corporation design drawings remain the same as stated in their October 28, 1974 letter except for Phase I which we received December 26 and December 31, 1974, and the Component Cooling Water Heat Exchanger Jet Impingement Barrier which will be delayed. You will still need to add a minimum of two weeks to these dates for Pacific Gas and Electric Company coordination before you would receive them.

(3) Anticipated time required to approve your shop drawings will be approximately three weeks.

PACIFIC GAS AND ELECTRIC COMPANY

COPY

IGOR SOKOLOFF

Mr. E. J. Nichelini - 2 - January 7, 1975

On January 2, 1975, you again asked for a clarification as to which specification you were to follow for Quality Assurance, workmanship and material. As you stated, and we stand corrected, General Quality Assurance should be in accordance with Specification 8831R. Material and workmanship should be in accordance with Specification 8833XR. NSC design drawings already reflect this requirement.

Sincerely,

H. H. Chandler

TEwoldt:lv

bcc: RSBain
AMDonatti (GPA)
WRForbes/AWalents
CHMarxfield
CASedam
EPWollak/VJCilio/ISokoloff (2) ✓

17

GOVERNMENT ACCOUNTABILITY PROJECT
Institute for Policy Studies
1901 Que Street, N.W., Washington, D.C. 20009

(202) 234-9382

June 13, 1984

The Honorable Leon Panetta
U.S. House of Representatives
339 Cannon House Office Building
Washington, D.C. 20515

Dear Congressman Panetta:

My name is Thomas Devine. I am the legal director of the Government Accountability Project. I am writing on behalf of a Diablo Canyon whistleblower whom I represent. He is fed up after repeated efforts to work within the system at Diablo Canyon, as offered by Pacific Gas and Electric (PG&E), its contractor Pullman Power and the Nuclear Regulatory Commission (NRC) representatives of Region V. He is concerned that tne plant is being licensed on the basis of false statements, while potentially dangerous conditions remain uncorrected.

He has taken his evidence to the NRC, which has frustrated him by not responding at all, or by accepting PG&E/Pullman responses uncritically. He is angry that the NRC compromised his anonymity, which he believes has led to increased harassment.

He seeks the assistance of your office in persuading the government to respond honestly to legitimate concerns that could affect public health and safety. In order to avoid becoming any more of a public figure than the NRC has made him already, he asked me to submit to you the information summarized below.

I. MISLEADING OR MATERIAL FALSE STATEMENTS

Like many whistleblowers at Diablo Canyon, this employee submitted a sworn statement detailing his charges to the NRC, after the system at the plant did not respond. He believes that PG&E's answers to the allegations contain misleading or material false statements. That is no basis on which to officially bless Diablo Canyon for commercial operations. Illustrative examples are listed below:

1. One of the employee's charges was that Pullman's quality assurance (QA) manager did not respond to a 1982 inquiry over a potentially widespread problem with baseplates that are mounted over concrete voids. The employee was concerned that the voids could affect the baseplates' ability to bear heavy structural loads for which they are responsible. (See March 1 2.206 petition, GAP allegation #199, p. 12).

PG&E answered in part that the employee was at fault for raising the issue through an informal memorandum. In an April 30 letter to the NRC, the utility stated somewhat stuffily, "Had he documented it on a DR [Discrepancy Report] or DCN [Deficient Condition Notice] in accordance with established procedures, the problem, if indeed there were one, would have been properly addressed." (April 30 letter to the NRC, DCL-84-166, at p. 12).

PG&E's response is misleading. It fails to add that management had verbally instructed him not to write up such problems on formal reports. He was following orders by disclosing QA problems on informal notes. This policy is dangerous, because the reporting system insures that QA problems receive full engineering review by PG&E and are monitored by the NRC for their safety significance.

Unfortunately, the coverups are getting cruder. Other witnesses have described 1984 written instructions for inspectors not to write Discrepancy Reports.

This is one of the problems the NRC says is too insignificant or repetitive to interfere with operating the plant. Perhaps that explains why management is so arrogant that it is attempting to close down the reporting system just when it is most needed -- on the eve of operation. Perhaps that also explains why we still don't know the condition of Diablo Canyon on the eve of operation. Possible QC violations such as with the baseplates were reported on notes which management now claims it "has not been able to find, or even recall . . ." (PG&E April 30 letter, DCL-84-166, at p. 11). Luckily, the witness kept his copy of the "lost" note in this case.

2. The same witness was also concerned about the use of a copper backing bar for certain welding without first conducting qualification tests on the effects. Cracking occurred in welding done with the copper backing bar. (March 1 petition, GAP allegations #176-179, at pp. 6-7).

In partial response, PG&E claimed "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." (PG&E April 30 letter, DCL-84-166, at pp. 20-21).

That is a false statement, unless the documented evidence was destroyed. Even then it would be misleading. The whistleblower and another inspector co-authored written findings about the problem on a process sheet. The QA Manager certainly was not ignorant. He admonished the co-author for writing up the problem report that PG&E now says doesn't exist.

This is another one of those issues the NRC hasn't yet resolved. The agency has not contacted the witness to check the accuracy of PG&E's excuses.

3. The witness also had dislcosed how unmarked tools were used on-site for welding on stainless steel pipes. This could lead to metal contamination and cracks in the stainless steel. At the time, the employee wrote up a Deficient Condition Notice (DCN) on the problem and tried to stop work with a hold tag until the controversy was resolved. Management ordered him to remove the hold tag and then waited a year before "resolving" the DCN by rejecting it. (March 1 2.206 petition, GAP allegations #195-96, pp. 11-12).

The NRC's response illustrates why this whistleblower has lost faith in the agency. A few weeks ago the agency informed the employee that witnesses on-site had not backed his recollection of events. Further, the NRC explained that the date of the DCN was two days after stainless steel work had stopped, so apparently he had been mistaken.

On the surface the answer sounded reasonable. But the whistleblower realized that something was seriously amiss. He had been an eyewitness to the stainless work and submitted the DCN two days later. The NRC hadn't bothered to check that detail. Second, the NRC talked with the witnesses accused of wrongdoing. They didn't check with the whistleblowers for witnesses who would back him. The employee concluded that the NRC was either being duped, or trying to dupe him. The staff promised to consider further inquiry but has not yet agreed to talk with proposed witnesses.

II. COMPROMISING CONFIDENTIAL SOURCES

The whistleblower feels personally betrayed by a new NRC policy to turn over all employee affidavits and exhibits to the utility for response. Even with his name deleted, the utility was able to identify him as the source of numerous allegations after the NRC turned over his evidence. The utility then published his name in legal briefs.

This policy puts employees in a Catch-22 dilemma: either disclose allegations in an abstract manner which the NRC will then dismiss as too vague; or disclose problems with specificity, which will make confidentiality impossible once the statements and exhibits are turned over. Either way the public is hurt -- through exposing whistleblowers to reprisal, or by drying up the free flow of information on safety issues.

That is why this employee is turning to Congress for help. There are enough coverups at Diable Canyon due to management, without the NRC making it worse. This witness and others are willing to meet with you or any other interested Congresspeople, in an effort to restore Diablo Canyon to legal accountability before it begins commercial operation.

Sincerely,

Thomas Devine

Thomas Devine

INTEROFFICE CORRESPONDENCE

'84 JUN 21 A10:50

DATE MARCH 14, 1984

TO ALL QA/QC AND ENGINEERING PERSONNEL

FROM HAROLD KARNER/SKIP CORNISH

SUBJECT RESPONSIBILITY FOR PREPARATION OF DCN/DRS

Effective immediately, all deficient conditions shall be reported on a DCN, in accordance with ESD-268.

QA and Engineering, during the review of each DCN, will determine whether a DR is warranted and will adhere to the requirements of ESD-240. This directive supersedes all other memos with the exception of arc strikes.

Harold W. Karner
QA/QC Manager

Skip Cornish
Chief Field Engineer

HWK:SC:EW:sam