ORIGINAL

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

MEETING BETWEEN STAFF & C. STOKES
Government Accountability Project

Docket No.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

MEETING BETWEEN STAFF AND C. STOKES
(GOVERNMENT ACCOUNTABILITY PROJECT)

Public Meeting

7735 Old Georgetown Road
Room 6507
Bethesda, Maryland

Tuesday, April 10, 1984

The meeting was convened, pursuant to notice, at 1:20 p.m.

NRC STAFF PRESENT:

J. KNIGHT

H. SCHIERLING

R. HEISHMANN

B. BOSNAK

B. SAFFELL

K. MANOLY

I. YIN

M. HARTZMAN

E. SULLIVAN

OTHERS PRESENT:

C. STOKES

J. CLEWETT

* * *

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P R O C E E D I N G S

MR. SCHIERLING: My name is Hans Schierling. I'm the Licensing Project Manager with the NRC, for Diablo Canyon.

This is a meeting with Mr. Charles Stokes, who is represented by Mr. John Clewett of GAP, a meeting between the NRC and Mr. Stokes.

I think it is a follow up meeting on the last meeting, which we had last Wednesday, April 4th, in San Luis Obispo. And Mr. Stokes intends to raise certain concerns -- oh, the meeting was on April 3rd, last Tuesday. It was Tuesday night, in San Luis Obispo.

This meeting is open to the public. The parties to the Diablo Canyon proceeding have been informed of today's meeting, although on very short notice.

I myself discussed, very briefly, with Mr. Clewett the possibility of having this meeting open to the public or not and Mr. Clewett informed me that he personally, and on behalf of Mr. Stokes, had no objection to having the meeting open to the public.

The meeting is being transcribed and we will issue a transcript of this meeting to all the parties, through Board Notification.

If there are any handouts being provided at this meeting, either by the Staff or anyone else, these handouts

will be made part of the record, part of the transcript.

I will be sending around an attendance sheet for everyone to please sign in. And also, while we are having this meeting, everybody should identify himself, at least the first few times, for ease of the court reporter.

I do notice that except for Mr. Stokes and Mr. Clewett, members of the Staff, we also have -- Chris, would you please identify yourself for the record?

MR. NELSON: Chris Nelson, TERA Corporation.

MR. BURNS: Ed Burns, Westinghouse.

MR. SCHIERLING: With this introduction, Jim, I will turn it over to you.

MR. KNIGHT: I think it would be useful for the record to have each of the Staff members identify themselves.

MR. SULLIVAN: Ed Sullivan, Division of Engineering.

MR. HARTZMAN: Mark Hartzman, Mechanical Engineering Branch.

MR. YIN: Isa Yin, Region III.

MR. MANOLY: Kamal Manoly, Region I.

MR. SAFFELL: Bernie Saffell, Batelle Columbus Laboratories.

MR. BOSNAK: Bob Bosnak, Mechanical Engineering Branch.

MR. HEISCHMAN: Bob Heishman, IE.

MR. KNIGHT: Jim Knight, Division of Engineering.

MR. CHERNY: I'm Frank Cherny from Mechanical Engineering Branch.

MR. KNIGHT: Let me ask -- We have Mr. Stokes' affidavit. Hans, I understand -- I guess there are some copies available and you're having others made?

MR. SCHIERLING: Yes, more copies of the transcript are right now being made. I think some of them have already been handed out.

MR. KNIGHT: And in a quick runthrough, a very quick runthrough, my impression is that a lot of these -- a lot of the items represented in the affidavit are items that I personally am not familiar with before. Are they items that have been brought up to members of the Staff, either in the Region or here before?

MR. STOKES: Many of the statements in this statement of mine, Mr. Knight, are a follow up of previous comments and replies by PG&E and allegations, which have been raised in the past by either myself or other parties interested in the safety concerns at Diablo Canyon.

I will not guarantee that every one is a completely new turn on the past events of that allegation, but primarily I think they are all -- they all have been responded to in the past. None, I don't think, are absolutely new. Some may be new views on an old problem, but I don't think they're new.

MR. KNIGHT: Okay.

MR. SCHIERLING: Maybe John Clewett would like to make some remarks before we get into detailed technical discussions? John, I'm sorry for overlooking that.

MR. CLEWETT: Yes, thank you.

I want, first of all, to thank you all for agreeing to meet with us. I know that Mr. Stokes has, in

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particular, been eager to meet again with Mr. Yin, who was originally assigned to follow up on a number of Mr. Stokes allegations. And in particular, for the two of them to have a chance to discuss these issues.

I know that at the meeting, before the ACRS, Mr. Yin was not given a chance to question Mr. Stokes, and he may have some questions for Mr. Stokes now. Also, I think Mr. Stokes may have some questions for Mr. Yin about his specifics and what the Staff plans are for following up on the 60 percent of Mr. Yin's concerns that I understand are -- that some compromise has been reached on, as well as having a chance to review some specific hardware problems, such as the ones mentioned in this statement that we have circulated.

So with that brief statement, I will turn the meeting over to the technical people here. I might make one suggestion. It might be, in terms of facilitating the focus of Mr. Stokes' presentation, for someone to address the question of what sort of follow up is being planned by the Staff on the issues that it does plan to follow up on. Because it may be that some duplication could be avoided that way, if we would be focusing on issues that you all are already planning on going into in great depth.

That is really all I have to say, at the moment.

MR. SCHIERLING: Jim, do you think it is appropriate

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at this time, since everything is in a rather fluid stage, and I don't know to what degree all plans are firm or still being developed, to address issues as to what steps we plan to take? And in particular, in light of the Commission meeting that is probably scheduled for Friday?

MR. KNIGHT: In fact, one of the reasons that the group is assembled here is that we wish to get our own thinking in the development of programs to follow up the items that we had given ACRS, as the body of our program to be conducted during low power operation.

I think right now, outside of what they have already said at the ACRS meeting, there isn't too terribly much more that we could add. By late in the day Thursday, we would probably have our program a good deal more fleshed out, let's put it that way, than it is right now. But that's the schedule we're working on.

MR. CLEWETT: Okay. My understanding, from the ACRS meeting, was that there were some things that were definitely planned on. And I'm not sure that the transcript was that clear on them. Maybe you could just say if there are certain things that are certain issues that you are definite about. I don't know if you are or not.

MR. KNIGHT: We are definite about all of the items that we've listed. Unfortunately, I didn't bring my -- I didn't anticipate that aspect of today's meeting.

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But just reading now from a copy of the slides, we would require them to complete their review of the small bore computer calculations -- these are piping support calculations. These are the class of calculations that we perceived as having or determined as having an unacceptably high error rate as we reported there, or as has been reported to us, I should say.

The utility is in the process of conducting this review. We have directed them to make it a 100 percent review.

During an earlier part of the program, Mr. Manoly observed the process being employed to perform the review. And he may want to comment in a short time, on his overall impression of that process.

MR. MANOLY: Yes. I've reviewed the sample calculation packages, when I was on site in February. I was accompanied by Mr. Paul Vesta, from Brookhaven National Lab, and we looked at approximately 16 design calculation factors that employed the STRUDL analysis. And we pretty much liked the quality of the calculation, or the review process that they went through in these packages, and the checklist that they had for review.

They have a very comprehensive checklist and there aren't really any comments.

MR. STOKES: Concerning that checklist, there are

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certain points I raised in those calculation packages. Were they on that checklist? Such as, how were they evaluating torsion? The loads calculation sheet, which is included as a part of the package, how many possible combinations were running from the possible probability combinations in the STRUDL, to just five -- the results? Was it typically a one case type approach with five different seismic possibilities?

MR. MANOLY: I think the number, to just pick one of those cases that you're talking about, I don't think there was a code criteria requirement, or any criteria, for how many of those cases you have to run. I believe that's a judgment of the engineer, to cover all possible -- well, whatever he perceives as the combination.

One person might pick two. One person might pick five. It all depends on --

MR. STOKES: That is strictly an assumption based on the ability of each person. There is no criteria dictating how many combinations.

MR. MANOLY: There is not, to my knowledge, and I don't think I have seen it anywhere.

MR. STOKES: Did you review any gang supports?

MR. MANOLY: You mean multiple supports?

MR. STOKES: Yes, multi-line supports.

MR. MANOLY: I'm not sure whether one of them was

multiple support, or not. I have copies of these packages.

MR. KNIGHT: Yes, I might add, at this point, that we took a look at this stage to see if we were satisfied that the process was being carried out by competent people and in a competent manner. We will be going back and looking at when we have a broader sample. We will be going back with another audit, probably a more structured audit, to look at that work.

The next item that we mentioned to ACRS was this matter of shimming, closely spaced rigid supports. And that's an issue that the group is considering now, as refers what criteria would be acceptable, or what methodology would be acceptable.

And over the next couple of days, we'll be forming a Staff position. We mentioned a program that would require that they establish a program for monitoring the thermal gaps. This would be a program that would be in place over the lifetime of the plant, to assure that the gaps are maintained.

We also cited the need for review of the snubber lockup motions, used to evaluate the snubber rigid restraint interactions. Right now, the utility has done an evaluation based on some average values. We will require them to justify -- either justify that use, or to use other, more appropriate values, and carry that evaluation out

to the point of determining whether or not those numbers are functional.

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We also recited the requirement to establish a so-called quick fix in the Diablo problem review program. The goal there will be to establish a review program that would look into questions of both the quick fix and the Diablo problem review system being used outside of the bounds that were established by the utility for their use.

MR. CLEWETT: Is that going to be a review program done by the NRC Staff or by the utility?

MR. KNIGHT: Primarily I would in general say that any one of these actions would be accomplished by the utility and reviewed by the Staff.

MR. SCHIERLING: Jim, let me interrupt for a moment. I think all of this is right now in the developmental stage. And we will brief the Commission on our plans on Friday.

I think it is number one, premature. And number two, inappropriate for us to discuss these matters right now with you, before we brief the Commissioners on these issues.

So I think what regards our plans in the future, I think the first ones to hear about those would be the Commission, and not either the licensee or any other party, or Mr. Stokes, or GAP. So I think we should steer away from what our plans are, but stick to the facts at hand. Because I think it would be inappropriate for the Commission

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to find out about our plans through, for example, through this transcript.

MR. KNIGHT: Yes. Basically all we're doing here is articulating the same information that was basically developed before the ACRS. I think you're probably already aware of the last three, which was the Staff inspection of the main steam and main feedwater hot walkdown, the completion of our review of the technical allegation issues, and the completion of our regional inspection, which is referring largely to Mr. Yin's inspection.

MR. CLEWETT: Thank you, Mr. Knight.

MR. STOKES: I guess I have a few questions for Mr. Yin, basically to start with, if I can, concerning things that he may not have considered in his analysis of the problem to date.

And by that, primarily all his research has been into the design aspects of the plant. I mentioned vaguely the other day, comments concerning his knowledge to the field construction, QA, QC, pre-inspect, fair training. I asked him if he knew people were hired right off the street without any prior experience in QA or QC work. Placed in the site without any training, and asked to inspect and QA document structural hangers.

He told me roughly I think, and he can deny this or accept it, that he did not have any knowledge that people

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were hired under those circumstances and placed in that kind of position.

I also mentioned in passing, under the quick fix program, it was alluded that the people in the program were fully aware and knowledgeable of M-9. I asked him if he was aware of the fact that people were hired right off the street, given a copy of ESD-223 without ever seeing M-9 and placed in the quick fix program.

He told me he was not aware of that either. I know both such statements to be absolute truth. Maybe not for the entire group in quick fix, but at least for several members of the group on Unit 1. Less for the group on Unit 2. And that many of the people on Unit 2 were taken right out of the small bore group on-site.

But the Unit 1 team, in part, was people hired from San Francisco office that were brought in off th street. To my knowledge they didn't spend any appreciable time in the office, either doing calculations, reviewing calculations or having any knowledge of M-9 requirements.

Those people were sent directly to the field. And immediately began writing quick fixes. That is a complete contradiction to what they led you to believe in their discussion.

MR. KNIGHT: I might ask, their discussion? Can you give me specifics?

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MR. STOKES: Both on Monday in San Francisco, and in the discussion which they had in front of the ACRS. Their comments have been very consistent. They've been so consistent, even on one point that in reading this statement -- I believe it was this one --

MR. CLEWETT: That's April 2nd.

MR. STOKES: Yes. Mr. Shipley. Now I don't know if this was an intentional thing on his part. But it was so consistent that I yellowed it in every time he made the statement. Every time he made the statement that hangers or supports were acceptable -- he didn't say they were acceptable. He said they can be proven to be acceptable.

I don't believe he made this statement one time in here that any work has been proven. He said, it can be demonstrated, or it can be proven.

That to me implies that they either haven't done the work. It is not finished, or the results are not valid. I don't know which. But if I had finished the work, and I knew for a fact there was no modifications in that work, I would have said the work is finished. There have been no modifications required. There will be none required. Not that it can be demonstrated.

He said that, I think, three times that I'm aware of in his testimony. It came up so many times that it really caught my attention.

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The specific person that I know came down from San Francisco to write quick fixes without any prior M-9 knowledge came down to work on the night crew as the only night person originally, and I was placed on the same team with that person. The person is really a very qualified person. But I don't feel that anyone is qualified to write quick fixes without any prior M-9 knowledge.

And not only was he brought down, but I know of at least two other gentlemen who had a minor amount of M-9 background who came down. They are --

MR. HARTZMAN: M-9 is the criteria for the design of small piping?

MR. STOKES: That's right.

MR. HARTZMAN: And this person who came down from San Francisco, was he experienced in the design of small piping?

MR. STOKES: On other jobs, as most of the people at the plant were.

MR. HARTZMAN: But he wasn't a Bechtel person, right?

MR. STOKES: Not Bechtel direct. He was a Bechtel contract person, just like most of the people at the site. He ultimately was discontinued at Bechtel because he felt like he had an "in" with one of the vice presidents, and that he wouldn't be forced to go casual.

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I should point out something. I don't know if anyone here has ever been made aware of it. And it's a series of events that occurred at the plant site.

Starting from last November, or November of '82, when we went at that job, all the contracts from all PG&E and Bechtel agencies basically read that the job would last three months to two years. Under those contracts, it is not an accepted practice for any employer to terminate the contract and immediately hire the people, right around, turn-around. There's usually a three-month period which that person cannot be employed by an engineering firm.

In March of '83, before any contracts terminated by date legally, Bechtel forced all contract agencies and contract people to go casual. They simply walked in one day, handed out applications for the people to fill out for Bechtel employment. They turned those in, whether they liked it or not. They were notified that if they didn't accept the change, and roughly a 30 percent decrease in pay, they would be on the street, unemployed.

Some of the people took the unemployment street on their own. They quit. One such person quit and went across the United States to Susquehanna to a Bechtel. When he got there he was told he did not have a job. He had to return to Diablo Canyon for employment.

MR. HARTZMAN: What do you mean by casual?

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MR. STOKES: The industry is pretty well broken down between direct meaning and contract. Contract is completely temporary employment. They are not shown on the books by the employment company. They are not given vacation time off, sick leave or any other benefit under that kind of a deal.

MR. HARTZMAN: That's direct?

MR. STOKES: Those are shoppers. A direct gets all fringe benefits, vacation, sick leave, holiday leave, the entire scope. He is shown in the internal records as an employee of the company. And it's generally accepted that he will not be terminated unless he is super-flagrant in his work activities.

He can produce one hanger in 30 days to a shopper's 100 in 30 days and he still will not be terminated. That specific case happened at Diablo Canyon by the way.

MR. HARTZMAN: Is casual the same as shopper?

MR. STOKES: No. Casual came up in roughly 1982. Well, the first case I heard of it was at Quadrex. I was employed at Quadrex on Zimmer through Sargent & Lundy. The job ended. They wanted to maintain me on the payroll. I was a very good employee for them, based on what they told me and I was very productive. They valued my technical ability.

You can ask them if this is not true. I'm not

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trying to stretch any points. In any case, they proposed that I take a four-week termination without pay, but I was still employed basically. They put me on leave. And what they submitted was to Bechtel to put me at Susquehanna under a deal through them that I would become a casual employee.

Now under that deal, they basically agreed to give me a salary commensurate with the job shoppers salary, but place me on the records as a permanent employee of Quadrex. But in doing so, they would not put me in the records for sick leave, vacation, benefit sharing or any of the other fringe benefit programs. It was strictly a way to bypass Bechtel's requirement that only company personnel, that's direct personnel be used by Quadrex at Susquehanna as a subcontracting agent.

It was a loophole to get around putting shoppers in for Quadrex people. Since then, I have seen the same example used. And it was even used at Diablo Canyon by Bechtel. They forced -- and you can ask the personnel. Bechtel forced all shopping personnel within their scope to go casual and take a 30 percent rate pay decrease.

In some cases, some of the gentlemen even took more than that rather than be unemployed. I should note that they all sent out resumes and they would have all left had not the market been controlled by Bechtel on the other job sites.

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end 2.

One gentleman did try to leave. He ended up coming back because he couldn't work at the other site.

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Now PG&E didn't do this. There were two agencies at PG&E at this time. Actually, three. Code 3 was the one I was working for, owned by Ken Plant. He used to work for PG&E. He's got some very good inside connections, undoubtedly.

In any case, those three agencies were not forced to go casual. There was a little bit of discontent by the Bechtel people who had been forced to go casual, but it was not toward their fellow workers. It was towards Bechtel for forcing them to take the decrease in pay.

MR. SCHIERLING: You mentioned three agencies. I don't quite understand that.

MR. STOKES: There were two others beside Code 3.

MR. SCHIERLING: Code 3? What is that?

MR. STOKES: Contractor. Agencies handle contractor people.

MR. HARTZMAN: Were you casual then?

MR. STOKES: No, I was a job shopper. I was that until I was terminated.

MR. HARTZMAN: The gentleman that was sent down from San Francisco was casual.

MR. STOKES: He came down as a contract person. He thought he had a connection and would not be forced under that switch-over by the Bechtel people to go casual. When

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he was forced to go casual he quit. He now works for Pullman. He came back one week later for Pullman. So he didn't take it lying down, either.

MR. HARTZMAN: But he had experience working with pipe design.

MR. STOKES: In other plants. Not at Diablo.

MR. HARTZMAN: Not even in San Francisco?

MR. STOKES: No, he had done none in San Francisco before he came to the field. And to my knowledge, he has never done any design, period, either at the site or in San Francisco.

He has worked in quick fix and he now works as a Pullman blue hat field engineer. Primarily because he knew a lot about quick fix.

MR. HARTZMAN: But he learned quick fix on the job, that's what you're saying.

MR. STOKES: Quick fix was supposed to be pre-known knowledge of M-9. He should not have been in quick fix making design changes without that knowledge in advance.

The fact that he was in the group without prior knowledge of M-9 completely -- I mean, he may have made --

MR. HARTZMAN: Is this written somewhere?

MR. STOKES: It was in PG&E's testimony that the people they filled the quick fix program with were

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pre-design engineers. Previous experienced personnel.

That's the reason I'm trying to bring this point out, that their statement is false. But I'm trying to give everyone here an atmosphere --

MR. SAFFELL: Hold on a minute. There's nothing to say that this previous experience had to be at Diablo Canyon. I think small piping design experience, regardless of what plant it's at, is valid experience.

MR. HARTZMAN: Let me say one thing. PG&E has stated that all engineers hired, at least in the small bore area, had at least three years experience. Now are you saying that is not true? That is an incorrect statement.

MR. STOKES: If it's in the design trailer itself, OPEC, it's true. If it's involving field applications from Pullman or Foley, it's false.

There are engineers in the field who do not have any three years. Many are right out of school, many aren't even out of school. But I'll get the quote, but I won't do it right at this minute. It's either in that one on the quick fix program. I think it was in that on Monday in San Francisco. It's toward the end, because they discussed quick fix at the last point.

And they specifically state that they had prior M-9 experience.

MR. HARTZMAN: That means that they had prior --

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MR. STOKES: With Diablo Canyon.

MR. HARTZMAN: Experience with designing small bore piping at Diablo Canyon.

MR. STOKES: That's right. You will not find a job shopper, in answer to your question, you won't find a job shopper that hasn't got at least one to two years in design experience somewhere in the nuclear industry.

It's either at a company -- most of the cases that they generally have to have more than one year, unless it was work at Bechtel and they now have a job with Bechtel.

In other words, in my case I had five years experience when I started.

MR. SAFFELL: Do you that qualified you to start?

MR. STOKES: Let's put it this way. I may not have felt that it qualified me, but it undoubtedly did, because I had more job offers than I could take up immediately. Someone felt that I must have been qualified, okay?

MR. SAFFELL: I agree with that.

MR. STOKES: I undoubtedly would not feel I was qualified had I not done what I did, then or now.

MR. SAFFELL: That's reasonable.

MR. STOKES: Even when I was employed during my five-year pre-job shopping experience, I didn't typically take comments by my superiors as being gospel. I went to school, I was taught, I learned as much as I could and I

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continued to study. I maintain one of the largest technical libraries in the firm that I worked for during that period of time. Even surpassing the technical library that they had for the whole department.

The vice president of the floor, in charge of keeping technical publications frequently came by my desk and borrowed books. The reason I believe in books is not that I know everything up front, but I believe that if you know how to find stuff in books, you can fill out what you don't know.

I also don't believe that you should run around trying to remember every form and term and phrase that's in existence in engineering, but at least know how to apply every one. And know where to find it if you need it. And be willing to ask the question in the first place is probably the most predominant point I'd like to make.

Anyone who thinks he knows everything without asking a question is either a fool or he should be a fool.

In most of PG&E's replies, I've encountered numerous additional problems that no question has been asked by an NRC inspector. Because not only did I question his solution, but I called the company and asked them what their comments were concerning it.

For instance, one of the allegations in the past concerned the clamping attachments, which is on page 6.

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MR. YIN: Before we jump to the next subject, let me just say a few words. It is my position, disregarding whether the person is qualified or not, should not be handled the way the quick fix has been handled, because many of the large bore and small bore hangers involving major design changes.

So there is no way, even a qualified person could understand fully about the M-9 should handle the kind of change that we observe. So it's really not a matter of the person is qualified or unqualified or in between.

The matter right now is to check the thousands and thousands of those TC's, so-called that have been defectively reviewed by the San Francisco design organization. So we have already passed the stage of arguing whether or not the people adequately do a job of implementing the program. That is not the point.

The point is, we want to ensure that the hot water that has been changed, has received correct evaluation. Okay?

MR. STOKES: I wasn't trying to argue with anyone here on any point. And if it seems that way, I just want to be heard.

MR. YIN: It is part of our program that is put in front of the ACRS that we are going to discuss with the licensee and the request for evaluation for all the design changes.

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MR. STOKES: I only touched on the qualifications of the people involved in that the statement that was made by PG&E, I felt, was a falsehood, and should be looked at by another member of -- I suppose there might be a member of OI in this group. I'm not sure if there was one mentioned.

MR. KNIGHT: Yes, the OI representative isn't here at the moment. They may be able to break someone loose, but they are looking forward to seeing the transcript.

MR. STOKES: Well, I'll stay away from those aspects.

MR. CLEWETT: To follow up on an earlier point, I think the reference you wanted was on page 128 of the April 2nd transcript.

MR. STOKES: Yes, page 128 and I quote. "Make a judgment based on their knowledge of M-9, which is the guidelines for design of Class I pipe supports and restraints for the project, the design criteria for pipe supports."

MR. HARTZMAN: I had asked where the requirements of M-9 has to be a prerequisite. And I thought this was what you were looking up.

MR. YIN: The M-9 requirement is stated in the TC procedure, requires that any deviation from the M-9 requirement has got to be evaluated by a qualified engineer.

Now the procedure was intended for minor changes, such as deviation for certain dimensions, because of the

feeling, and so on. But based on my evaluation, in many cases that I observed, the system has been really abused, including major changes of structures and face plates and the whole bit.

MR. STOKES: Yes, it was abused primarily because, not only did they not know of M-9, but the three-page format which I showed, which was attached to the ACRS testimony outlining the program guidelines, I was the only member of that group, to my knowledge, including Unit 1 who had those three pages. And on those three pages, the only limiting factor was if it was prior work that had to have a DCN.

And if it was new work that had been green tagged, it was a DR item required. But beyond that, what I trying to stress, is there were no guidelines. And as Isa said, if you review those documents, you will see documented evidence that studs were welded to plates, anchor bolts were cut off.

I ow, because I forced some of that to happen. In many cases, they didn't want to document it with a DR. The whole program was that they didn't want DRs to come out with this kind of information. The only way I got that kind of information in on even a few of those documents was through that center page that said a DR had to be originated before I could fix it.

And even then, in many cases, they would not do

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it.

MR. MANOLY: Do we know which ones we're talking about here?

end 3.

MR. STOKES: Yes. Let's see.

(Pause.)

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They're in the attachment to the ACRS testimony that I gave.

MR. MANOLY: Which page?

MR. YIN: Are we still on quick fix?

MR. KNIGHT: I have a couple of questions that I'd like to pursue, too.

MR. STOKES: I just want to indicate where those three pages are.

(Pause.)

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MR. STOKES: It is not in here.

MR. SCHIERLING: What are you looking for?

MR. STOKES: There are three pages missing out of this document.

MR. CLEWETT: Apparently, Exhibit 4 to Mr. Stokes' testimony to the ACRS is not included in the transcript.

MR. STOKES: Exhibit 4 was the control sheet for the document. It went to my group lead, which was Jeff & Klomptenberg when I was in quick fix.

But the program outline is right here. That and this flow chart.

MR.YIN: Well, again, as far as the program that we recognized subsequent to that. It provided guidance, so-called. Again, it is not considered to be an acceptable format to carry out safety related work.

The procedure should be the avenue to control the

work at the site. So I believe all the issues that you have raised have been really looked at, and perhaps even more. So we are understanding the problem. We are aware of the problem. We understand the problem. And we are taking adequate measures to ensure that everything affected will be evaluated adequately.

So I guess we really couldn't add more to the issues.

MR. KNIGHT: There are just a couple things that I wanted to follow up on. And just to clarify in my own mind. Your reference to cut off bolts and welded studs and such. These were things that you discovered while you were in the process of performing quick fix work?

MR. STOKES: Well, let's say it was things that the field crews pointed out to me while I was doing that work.

MR. KNIGHT: Well, okay. You became aware of it. So, just to follow you further. These were situations that I presume, because of the timing that had gotten through the previous work that had been done on the IE bulletins.

MR. STOKES: Undoubtedly.

MR. KNIGHT: That's what I'm trying to get straight.

MR. STOKES: In regards to IE bulletins, in June

of '83 I and another gentleman called up the trailer on-site and requested all replies from the NRC and PG&E in reply to 79-02, 79-14 and any other guideline bulletin or whatever.

The last letter of those letters from the NRC at that time, stated PG&E had never fully complied with those bulletins as of that date. Now whether or not they had done that since the review, or before, I think they were using the review to do that in part.

I find it very difficult to believe they ever did a 79-14 review at all, before we did the mirror image review, because the calculations for the hangers, base plates and everything else were almost nonexistent before we did that review, and documented what we did.

I asked for an old calculation to see if there was any possibility that I could use any of it in my review, such as a model.

MR. YIN: Wait a minute. I think we've got the issue all mixed up. He is asking whether or not you have observed any cut bolts or any hiding of the facts, and you are talking about 79-14, which has nothing to do with the bolts.

MR. STOKES: Well, he asked me --

MR. KNIGHT: The presumption is they would have been caught.

MR. YIN: 79-14 had nothing to do with catching

those effects. Probably 79-02. Let's stay on 79-02.

MR. STOKES: Well, I was just listing those in regard to his question. The letter stated they had never met the full requirements.

MR. YIN: Well, even with 79-02 there's no way to identify that, because it's only asking the licensee to talk or approve certain bolts, to develop certain confidence levels. I believe it's 99 percent confidence level, with less than 5 percent failure.

So it's not required to redo 100 percent caulking or whatever. Now, it's important if you have seen actual conditions.

MR. STOKES: I have.

MR. YIN: In certain areas that you pointed out to us. Then we can go back and take a look. Otherwise, when we talk about 79-02 and trying to cover whether or not there were cut bolts and all is irrelevant, because it cannot be done. The 79-02 is just not the measure.

MR. STOKES: I'm just pointing out to him, in his answer that we found these things, in light of the fact that both the 79-02 and 79-14 reverification program, supposedly had pre-taken place.

In other words, supposedly we went in in '81 with those programs behind us. We should have had, I feel, a much higher level of confidence in what was in the field

than what we found.

MR. YIN: Yes. But there are two different issues here. Let's not even talk about 79-14 and 79-02. Let's just go on the fact that there were some defects that were written in the plant, and we want to know about it, okay?

If you can point out to us the area, the system, the location we certainly will send people to go out and take a look.

MR. CLEWETT: If I can jump in for a second. I think this may also illuminate the benefit of another possibility that I think has been raised by a number of the individual workers at the plant, who have been meeting over the past week or so with Region V.

I think there are now seven people who have volunteered to take the NRC out to the plant and actually point out specific hardware problems. Seven workers, I think all of them -- well, I'm not sure how many are still at the plant.

MR. STOKES: Three Foley people just recently came forward.

MR. CLEWETT: And my point is that I think that what would be the best way to do this, I think, would be to organize some sort of a walkdown of the plant by some of these individuals. Because I think they could take you and say all right, let me show you. Here it is. Because there

are a number of types of hardware problems.

One that has been repeatedly brought up is vendor welds. And a number of people we've talked to have said that there's just an epidemic of vendor welds that are really shoddy. So I think it would be a device calculated to bring those to the knowledge of the NRC, to take these people on a plant walkdown.

MR. STOKES: I should throw in that the things I learned, if I could document them, they are documented in my PSTDCs, or the quick fix formats. Or in a DR or a DCN someplace.

They were written, if I had anything to do with them. In many cases, I wasn't the primary engineer doing the quick fix, so I didn't get them documented. But I should note, those things existed, were corrected if they were caught.

The thing is, many of the plates never came off the floor. I think that's the biggest point I want to stress. We only found what we had to take off the floor. And that was a very minute number of all the hangers in that plant. And there are 1500 that have never even been looked at, to my knowledge, at all.

MR. MANOLY: How do you propose to do that?

MR. STOKES: I'm only pointing out a problem.

MR. MANOLY: I'm just asking.

MR. STOKES: You're the official. Between you and PG&E you can come up with a reasonable way of doing it to ensure that what they've got is right.

I know the problems are there. The workers know they're there. If you'll come out to the site, we'll put up notices to the workers that everybody who has seen a bolt welded to the back of a plate, or one cut off to meet everybody up at the Madonna Inn on a Sunday afternoon.

If 2- or 3- or 4,000 people show up, each on a different hanger, what are you going to say? So they've caught half of what is in the plant. I'm just telling you that there's a problem there. I've seen it on more than one hanger, a lot more. And other people saw them because they were working on the hangers.

You've just got -- you know, how do you get them to come forward. I'm saying you've got to get them en masse, where they cannot be fired for doing it. Or either have them do it, a tour in the plant where nobody is going to say, oh, John Jones went through this day, and he's going to be getting on the shit list next week.

I'm telling you, those people are still scared. I don't care how much --

MR. MANOLY: I understand. I'm just asking --

MR. STOKES: And I'm trying to help you just as much as I am them. I'm trying to give you the information

that they know.

Many of the people talk to me. I came public. I knew if anything came out of this I had to get public because nobody is going to listen to an anonymous person. But because I'm public, there are people calling me up saying, I won't give you my name, I can't, I would only get fired.

And I'll tell them, I don't want you fired. Just tell me what you know, and I'll be your mouth.

MR. MANOLY: May- you should get more specific when they talk about it.

MR. SCHIERLING: Could we take a break for just a moment?

MR. STOKES: I just want to point out something. Really, I'm not getting upset. This information in this pack is under my initials. It was given to me by a QA inspector who has worked in the plant for 10 years. Many of th things in this statement I should note are directly written about this gentleman's papers right here.

For instance, I make the statement in here that I will give these documents to Mr. Yin because the guy's name is written all over them. He was a QC inspector. If this document gets to PG&E I'm sure he's going to be up the wall.

Now specifically, the first question, the 325 bolts, the reply to that, this gentleman heard what I had

questioned about the bolts and some other gentlemen, and he supplied me these copies of two documents which show that some kind of bolt -- there's no number on it, was welded holding a Class I support.

Now, he was the QA inspector. And he gave me the two documents and I swore I would not give them to anyone unless they agreed that they would be anonymous, because I don't want him fired. I mean, he's providing the information. Any one in this group who will agree to keep those copies to himself and not give them to PG&E, I'll show them to them.

They show that the bolts -- there is no call-out on top -- have been welded. They show that there was no weld symbol as to how the joint was prepared. And there's a comment written by this QA inspector that they could not be visually inspected by him. That they had been bought off.

MR. YIN: Mr. Stokes, can I interrupt for a minute?

end 4.

MR. STOKES: Sure, Isa.

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MR. YIN: The group here is primarily concerned about design control and technical issues. I don't think anybody in this group here has been assigned the responsibility for any installation of QC inspection work. At least I personally have not been involved in any of those areas.

MR. KNIGHT: No, that is a fair characterization. So it is really important that we best utilize our time to kind of sort out the areas in design control and design and technical adequacy, and then maybe perhaps in a second part, maybe we will have GAP and Region 5 people or whoever involved in those activities to hear it. It is much better for them to hear it firsthand than secondhand from us.

MR. STOKES: Well, when I came into this meeting, it seems that I felt all of the decisions as far as your plans have already been pretty much formalized, but I didn't know how far the scope of your review has gone and all of your decisions to do what you have already decided to do when. Okay? So I came in here to show you technical points of material elements of hanger problems, material elements of defective welds, material elements that affect hardware.

Now you are telling me that you don't want to hear hardware.

MR. YIN: Right. Not that we don't want to hear it for NRC. It is the group. You know, it is much better, if

possible, that we separate them. Hey, we have design issues and we have installation and inspection issues, and group them into two areas and we can handle that in two separate ways.

MR. KNIGHT: If I may, that is one of the reasons I was asking earlier whether or not these were all new issues or had you, in fact, already discussed them with the people in Region 5?

MR. STOKES: I haven't discussed them with Region 5 or anybody else until I raised them myself, following reading of the reply by PG&E and getting additional information to back up the point. I am perfectly willing, though, to stay with strictly QA things, Isa. I just want everybody here to know that I have information that goes way beyond where you are at.

I raised the questions that you are now looking at or support in January, or December, November. I have moved past that. It has been months in the works since then and I have a lot of things that I didn't have then.

MR. YIN: Well, the issues that you raised and the additional issues that I personally raised really made public -- and it is nothing that we are holding back. And it has been really looked at by management, by peer review, whatever. And it has been really taken into consideration how to improve the overall program and how to intiate corrective action.

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So believe me, we have taken a lot of actions, as you know, on your allegations and concerns. So you can be comforted about that.

MR. STOKES: Well, in reading the transcript, I will say one thing. For the most part, I am very satisfied with the seven issues as they were listed that the entire Staff has decided to look at, okay? I realize appreiciate this list. It says a whole hell of a lot, really, to me. But the follow-up on this still has a lot that I would like, that, you know, I am interested in.

How you do this is very important to me, and if you decided that these are important from primarily my raising it in the first place, maybe, and Isa's follow-up, then I feel like I have an interest in seeing how it was ultimately determined. Some of these things I am not even familiar with. I was aware that there should be some kind of sequencing event between close hangers. I didn't call it hot shimming. I just knew that it should be applied.

I also proposed a similar proposal to a permanent life monitoring of thermal gaps if they want to use them. I guess the open areas that I have are concerning the fact that you are looking only at the past 400 computer runs and how they are looked at, and then the fact that there has been a statement made that roughly 63 percent of the hangers they looked at had some kind of change to them; but why have

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they not looked at the other 1500 in the system?

MR. YIN: Well, let me say, between the seven points or eight points that we are talking about, it is the NRC's prerogative to control the Licensee's program upgrades, the corrective action that is needed, and also reinspection required. Certainly we operate under the public scrutiny. You are welcome to look at what we have done and we will address any particular concerns, but you must understand that we do not require, by local body government or any public individuals' concerns to carry out our work.

So again, I can assure you that any program that is carried out is going to be sufficient and is going to be adequate as well as effective; otherwise, I can tell you right here, I am the one who will never recommend a full power operation license, and I will put that in writing. So that is the way it is going to be.

MR. STOKES: I am glad to hear that, Isa, because after the other day, I was more or less in doubt as to that point.

MR. KNIGHT: I think it is probably useful at this point to take a short break. Let's keep it short.

MR. SCHIERLING: Before we take the break, anyone who is not NRC employed and you have to leave the office, let me know because we have to let you back in again, and

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don't wander around the offices here, okay?

[Recess].

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MR. KNIGHT: Back on the record. During the break we've been discussing ways in which we can structure the remainder of the meeting to make the most optimum use of this particular group's time. And to establish as sound as record as we can.

In particular, we've discussed, that is Mr. Stokes, Mr. Clewett, and myself have discussed searching out those areas where Mr. Stokes is free or feels free to specifically indicate an item in the plant or a portion of the plant where there are problems that he believes should be looked at. To characterize that problem as best he can, so that we can use that as a shopping list, if you will, to continue with our review of Diablo Canyon.

And to the extent that any of the members of the group have specific questions then, either related to some of Mr. Stokes' past information or to anything that has come up today, I'd like to take them one at a time around the table and see if we have any particular questions.

Mr. Stokes, can you -- can you give use some particulars that we could work with?

MR. STOKES: I believe this is an area that has been looked into. I'm not sure. I know you have looked into U-bolts. Have you looked into how the loads are transferred to the piping? The bearing stress section of ASME B31.1 and 31.7. Has any calculations been done by

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PG&E for the interface requirements per the codes?

Not just for U-bolts, for any of the attaching hardware. For the anchors. Supposedly on every plant I have ever worked we had another group beyond the hangers who were responsible for those attachments, integral attachment. Not only integral attachments, but any attachment, clamps. It is true for lugs, it's true for anchors. It's also equally true for clamps. It's true for any method of restraining a pipe.

The original design is deficient if no one has ever looked at how the loads are transferred to the pipe from the supporting member.

MR. MANOLY: Let me ask you a question. When you talk about non-integral attachments. If you are using a U-bolt that's qualified for a certain load on a certain size pipe, if one guide does it -- if it meets in one case, why doesn't it meet it for other supports?

MR. STOKES: But has it been done for one case? I'll make the statement that in conversations with ITT Grinnell personnel, they did not make the statement that they have ever qualified a U-bolt.

MR. BOSNAK: They don't do that. It is incumbent upon the piping designer to do that. And that's the kind of question that I asked at the Monday meeting in San Francisco. I asked them about the group that has overall

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responsibility. And that's one of the things that the piping people have to do.

Now whether they did it or not --

MR. STOKES: Well, typically I agree with you. It's the piping people. Every plant I've ever worked on, that's the way it was. The reason why I made this statement is in regard to his comment in the Grinnell catalog it states that the load ratings have been established to the requirements of ASME NF sections.

I specifically recall Grinnell concerning that point on whether they did or did not, and would or would not. They told me that if it is included in their contract, they themselves will do that interface calculation as an extra. But typically they don't do it.

The lug ratings are only as to the component ability, not what it will do to the pipe.

MR. HARTZMAN: What do you mean by interface here?

MR. BOSNAK: The interface between the supports and the pipe. In other words, you have two groups and somebody then has to be responsible for putting the thing together.

MR. HARTZMAN: Well, if you take specifically a U-bolt, you're talking about the pipe. The U-bolt is attached, or goes around the pipe and is attached to the

6pb4

angle frame, or to a frame.

Which is the interface there?

MR. STOKES: The interface is the contact area between the U-bolt and the pipe. How it transfers the load to the pipe in a restraint condition. Or the pipe transfers the load to the U-bolt if it's acting on the U-bolt.

MR. HARTZMAN: You're talking about the very local deformation between U-bolt and pipe and U-bolt and beam?

MR. STOKES: Well, the specific sections --

MR. BOSNAK: There is a section in the code that requires you to take a look at the effective clamp or whatever on the pipe to make sure that you haven't exceeded --

MR. HARTZMAN: In other words, crimping the pipe?

MR. STOKES: Specifically bearing stresses on the pipe, on the U-bolt. Either one. They are both going to be similar under that contact zone.

MR. HARTZMAN: This is like preloading of the U-bolt?

MR.YIN: Well, there's a lot of things to that.

MR. STOKES: Well, there are other sections that come into this point other than the bearing stress. Things like vibration analysis.

MR. YIN: Stiff cram and soft cram.

MR. STOKES: Fracture because of the kind of

6pb5

attachment could be a problem. There are several sections in the code that go into these.

It is not just the bearing aspect of it only. But the bearing stress calculation is the most simple, first run calculation for seeing how an attachment transfers loads to the pipe, or vice versa. To see how it affects locally.

MR. HARTZMAN: We have a board over there.

MR. STOKES: Well, I've got the codes with me. And on top of the codes, I will draw a sketch.

Typically, like I said, typically any job I work on I am always told in the hanger group that there is a member of a stress group someplace who specifically is researching out this aspect of the job.

In some cases I am told, you know, nobody is doing it. It's due to an oversight. And that is something that I guess I'm trying to question.

MR. SULLIVAN: Have you ever worked on a job where they did it?

MR. STOKES: I have, yes.

MR. SULLIVAN. Did you ever find out whether or not --

MR. STOKES: Because I was allowed to do it myself.

MR. SULLIVAN: Were there ever any cases where the design had to be changed because the pipe was overstressed?

MR. STOKES: In the case of U-bolts, specifically.

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MR. SULLIVAN: Yes, that's what we're talking about.

MR. STOKES: Yes. At ITT. No, not ITT. Well, at ITT Grinnell 2, back in 1979, I think we raised the question because in their catalog they show predominantly saddle type swings. A lot of clamps.

If you read the code section in NF, it states that things like clevises, slings -- it doesn't mention U-bolts at all in the section under attachments to piping.

I specifically researched that in answering my rebuttal to PG&E's comments. It says component standards are typically cataloged and mass-produced. I went back to what they call -- they have a bunch of things shown here, component standards. They do show a U-bolt in NF.

MR. SCHIERLING: Charlie, what are you reading from right now, for the record?

MR. STOKES: ASME, subsection NF, component supports.

MR. SCHIERLING: It's a 1980 edition, Section 3.

MR. STOKES: Yes, Section 3. They have a very simplistic approach to this interface here. It's a little block diagram of maybe a piece of pipe and a little block diagram out of a piece of support. But they do include the jurisdictional interface requirements.

The specific section on bearings -- I went back

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and checked these by the way because I checked ASME B31.1 and 31.7.

MR. KNIGHT: Why look in there? To follow up on a question that Ed Sullivan asked, is it your position, I guess one might say, that at Diablo Canyon they should have specifically considered load transfers?

MR. STOKES: Load transfer in every support. Someone should evaluate how that load was transferred to the pipe and the effects it has on the pipe.

MR. MANOLY: There are two cases. Integral and non-integral.

MR. STOKES: Both cases.

MR. MANOLY: So the integral, you say they don't do it?

MR. STOKES: I'm saying in the non-integral they don't. And I am not aware of any program for integral. I'm only aware that in integral there was a table that said, for a load up to so much you needed two lugs fully welded, and the size was dictated.

They didn't get full penetration welds in many cases, and that is documented in the DR.

MR. MANOLY: Maybe that's based on some parametric study. Do you know that?

MR. STOKES: I have never seen --

MR. MANOLY: They might not be sure of the design

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but --

MR. STOKES: Well, it's a good point for you to ask because they won't even talk to me at all anymore. But under Section 3182.2, non-integral attachments, paragraph (a) non-integral attachments include clamps, slings, cradles, saddles, straps and clevises. Absolutely no comment of U-bolts. None.

Right under that it says, it mentions sheer lugs for slippage.

MR. MANOLY: The question Ted asked you was about what did you see -- how you saw it evaluated --

MR. STOKES: On one job I didn't take management's statement that someone was evaluating it, and my project engineer of hangers agreed that I could do the calculation for U-bolts, and another gentleman in the group could evaluate my calculation by checking it. That gentleman works at Diablo Canyon by the way, and he is aware that U-bolts, due to the fact that they have no bearing area, so to speak, exceed the bearing allowables under any code, if there is any load applied to them.

The thing is, U-bolts should not -- I don't believe ITT ever felt that U-bolts should be used without shim material. They include various type shims, saddles. I even noted down to half-inch pipe. They've got a little

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saddle protection type thing. And that really caught me off guard because I didn't expect it. I've never seen it used on pipe below maybe four inches.

MR. KNIGHT: I am going to try to move us along, and I'm not trying to restrict in any way what you want to bring up. But for our purposes, today at least, the message I get is that, although it may be not only Diablo Canyon, it may be other places as well.

MR. STOKES: I don't have that knowledge. I've been told they did do it on other plants. But whether or not they did, I don't want to push. I'm just saying, that I don't believe it was done here. And I know I have done it in the past.

MR. KNIGHT: But for non-integral attachments, there was no adequate consideration for want of a better word, of load transfer.

MR. STOKES: Well, they didn't include the code sections that pertained to non-integral attachments.

MR. MANOLY: But you just said they don't say U-bolts.

MR. STOKES: Yes. But let me point out right here. Under NF 3226.1, bearing loads, the average bearing stress for resistance to crushing under the maximum load experienced as a result of design loads, test loads or any service loads.

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Now the reason I looked this up is because they were using a test program on the U-bolts. And I was very concerned as to whether or not they included this in the test load evaluation. But under test loads or any service loads except those for which level D limits are designated -- which is ultimate failure, the plant shuts down -- shall be limited to SY at temperature, except when the distance to a free edge is larger than the distance over which the bearing load is applied. A stress of 1.5 SY at temperature is permitted.

Now I completely forgot about evaluating that distance statement, and just taken the stress at 1.5 SY. And not only U-bolts but some clamps don't have enough width for the loads that they transmit to the pipe.

If PG&E wants to sharpen their pencil --

MR. HARTZMAN: Are you basically saying that they should not use U-bolts at all? Do I understand that?

MR. STOKES: Not in seismic category systems. I don't believe that ITT Grinnell designed -- you have to take into account, ITT Grinnell is a fire protection sprinkler design company. And fire protection systems you use all the U-bolts you want.

But they do not comply with the code. And I'm not saying that they're not acceptable under some procedure. I'm just saying that they didn't evaluate the component,

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much less any other component to comply with the code.

MR. MANOLY: What was the section you just read?

MR. STOKES: 3226.1, NF, bearing loads. It is just in front 3226.1. It is on the back side of the flip section under design by load rating, 3226.0, which is where PG&E got their load rating criteria.

There are some other sections concerning vibrations and things like that that can affect the reduction in stress levels. I'm not even going to get in on those others. I just took the simplistic approach.

The reason, I guess, that I bring this up is I started out in structural engineering before I got to pipe supports. Primarily doing structural steel and concrete. That's where I really got my basis. And I've not only designed concrete slabs bigger than they needed to be, because of bearing. But I have designed base plates bigger than I thought they should have been because of bearing.

I have even looked at things like washers under a net that is high strength steel on the A-36 steel to see if I had enough bearing area to comply with the section.

You say, well, nobody does that. This guy's crazy. But I look at -- unless -- I want to avoid a code section when I'm told that a code applies. I will evaluate any part of a structure to the full requirements of the code.

end 6.

MR. KNIGHT: I think we have covered U-bolts enough to get the message across.

MR. MANOLY: One more question. Are these U-bolts pre-tensioned, because it makes a difference if they are pre-tensioned or not. I mean, is there a requirement for pre-tension of U-bolts?

MR. STOKES: Pre-tension? I'm familiar with pre-tension of concrete rebar members. But a U-bolt, they simply nut two nuts up loose. It's a loose fit.

MR. MANOLY: I'm just asking if there's pre-tension --

MR. STOKES: It includes however you calculate those stresses, interface stresses.

MR. MANOLY: It was a simple question. Yes or no.

MR. STOKES: Yes.

MR. MANOLY: This precribes pre-tension -- this prescribes pre-tension --

MR. STOKES: I'm saying somebody should have evaluated the effects from the pipe to get that load on the U-bolt.

MR. MANOLY: My question is, is there a requirement for pre-tensioning U-bolts.

MR. SULLIVAN: Let me ask the question another way. Did you design or did anyone design pre-tensioning into the U-bolts?

MR. STOKES: At Diablo Canyon, no.

MR. SULLIVAN: Okay. I think that's the answer.

MR. STOKES: No pre-tension.

MR. KNIGHT: Just for my own information, is there any restriction in pipe size for which U-bolts are used at Diablo at all?

MR. STOKES: None. There are none. There are some really big U-bolts that were bent out of a rod on some 20-inch lines in the turbine building. Maybe even some bigger than that. I do know that they custom made them at the site. Like I said, I don't think they evaluated the codes as to how that interface --

MR. KNIGHT: Let's see, a 20-inch line in the turbine building, would that be a safety-related line?

MR. STOKES: I'm pretty sure there are some safety-related lines, even inside the containment. They've got U-bolt rod restraints on the main steam lines, I think, going up beside the --

MR. KNIGHT: Those are pipe whip restraints.

MR. STOKES: Some of them I think are actual restraints.

MR. KNIGHT: The ones I'm familiar with --

MR. STOKES: I know there are some whip restraints that are -- right. Now, that is different.

MR. YIN: Those stress bars -- they're provided,

they're in service to make sure there is no crimping on the pipe when you reach that restraint. That was not the worry or concern you have, though.

MR. STOKES: The what, now?

MR. YIN: We're talking about the pipe whip restraint where you have stretch bars. You are?

MR. STOKES: Well, if they're governed under this same code section. But the thing, whip restraints only come into play when you have a failure. That's the Class D --

MR. BOSNAK: Class D is not failure; it does not indicate a failure.

MR. YIN: No, the pipe whip restraint is not governed by the ASME code, you know.

MR. STOKES. No.

MR. BOSNAK: Pipe whip restraints are not part of the code; they are outside the scope of the code.

MR. STOKES: But they're usually designed --

MR. BOSNAK: They are designed to some criteria, but they are not --

MR. YIN: They are not governed by ASME code.

MR. STOKES: But to have one come into play typically it's after a rupture. In other words, there's already been a failure. You don't have to protect the line after a failure.

MR. BOSNAK: That line has failed.

MR. STOKES: You see what I'm saying? That's why I say I don't think it matters on whip restraints.

MR. BOSNAK: But you've got earlier that Level D indicates failure, and it doesn't.

MR. KNIGHT: I didn't hear that. I think what Charlies was saying was that the restraint comes into play only after failure.

MR. STOKES: That's what I was saying, but --

MR. BOSNAK: But we were talking, before we got into whip restraints, about Level D.

MR. STOKES: That's what I was saying on whip restraints, they do not come into effect unless there's been a break in the line.

MR. KNIGHT: I think we've treated that issue pretty well. Just looking at my own notes here, there's an area in the original affidavit that you passed out today, and you note here that there are two specific -- and this is going back to the question of welded bolts. You note that there are two specific cases in which you can provide support numbers. Are those the instances that you related earlier where you're concerned that the -- giving the support numbers would be a way of perhaps compromising someone's confidence?

MR. STOKES: Well, this is a Unit 1 support.

It's an angle frame connected to a wide flange piece of steel, 14-inch wide flange. The number is 2181-2. It is mainly a vertical restraint, and it does have bolts on it. It says stud; it doesn't say if they are studs, what grade steel. And there is no weld call-out.

It does show that they are inaccessible for visual inspection, on the drawing. It has been as-built reviewed and approved 12/30/83, Rev 4. It's got a PG&E deviation number 253 stamped on it. And there's another one --

(Pause.)

This one has four studs. They don't call out any grade or weld symbol. It's 2181.13 and it is Unit 1. It does state on here it's bore or code Class 1. And the other hanger also says it's Class 1, system 4, area F at 115 elevation. Both are at 115 elevation, area F.

Those two -- and I can give you the numbers. There may be something else here that I can provide you.

There's a preliminary DR written against several -- I should explain this statement. I don't know if I put it in here, because I didn't put all the things the guy told me in here.

There was a DR out against Unit 2. Quite a few stanchions were welded to the pipe, and the welds were supposed to be full penetration welds on the stanchions. They were anchors. And the Unit 2 DR had already been

written up. They were not qualified. They were not approved as being full pins, and they had been written up to be removed.

They were removed, but when they removed them and they ran the pipe down, they did not have a UT-examined pipe wall to justify whether they damaged the pipe. And according to the QA inspector, they were supposed to have it at the time they did the work.

It was done on Unit 2 seven months later. Now, someone at the plant saw the Unit 2 DR and originated a preliminary DR against Unit 1; after doing some investigation he found I think about seven similar stanchions on pipes in Unit 1.

I was trying to come up with a name on that preliminary DR.

MR. KNIGHT: These are all situations where there's been a restraint or a stanchion removed and the pipe ground before --

MR. STOKES: Yes.

MR. HEISCHMAN: Your concern is that they have encroached on the pipe wall? Is that correct?

MR. STOKES: Well, yes. They didn't follow the procedures. The procedures, according to the QA, was they should have UT'd the wall. They didn't UT it, and when they did UT it they had already rewelded the stanchion,

and the results are erroneous, following that test on Unit 2.

Unit 1, I don't think they've ever done any. I'm not even sure they've done any work on these stanchions on Unit 1 because it was a preliminary DR.

(Pause.)

The DR on the welded integral pipe attachments, there's 34.37 is Unit 1, and then there is a 34.66 in Unit 1, and the 35.38, Unit 2; and 34.65, Unit 2; and 44.99, both units. And it says, this DR shows that some piping attachment welds have not been identified and fixed. I will take it as 44.99, the last one, concerning both units.

35.38 DR identifies 250 improperly installed pipe attachments. A large number of these are for large bore anchors, and he says, see DR. 35.37 and 34.66. He didn't have a copy of those.

MR. KNIGHT: I'm sorry, could you give me the subject of that again?

MR. STOKES: Roughly 250 improperly installed pipe attachments. A large number of those are large bore anchors. It's a DR that is out.

MR. KNIGHT: Let's see, should I construe -- if the DR has been written --

MR. STOKES: Well, there's one that's preliminary

written against Unit 1, and that one doesn't have a control number on it. It's just like my DR's were; until they come back with a number for it, it's basically in limbo.

I do have a copy I think of that.

MR. SAFFELL: What was the number of that one?

MR. STOKES: 35.38. He references several other DR's -- 35.37, 34.66 --

MR. KNIGHT: Should I construe from that that this is work in progress? That the DR has been written?

MR. STOKES: Well, it was written by someone who was not sure it is going to --

MR. KNIGHT: Or they perhaps got filed somewhere and not acted upon? Is that the basic concern?

MR. STOKES: Yes, exactly.

MR. CLEWETT: A number of people at the plant that we have talked to have said that almost always, the response to anything like this is "accept as is." Some of them have joked that it should be "accept, as usual."

MR. STOKES: There's a copy of the preliminary DR. It was written by a guy named Dougherty. I would try to keep his name quiet because --

MR. HARTZMAN: Well, it's on the record now.

MR. STOKES: I know that. Well, he didn't give it to me anyway, so. From that standpoint, he shouldn't get into too much heat. You can't say anything around here

without getting someone into trouble somehow. I've gotten friends in trouble just because I had copies of their calculations someway or another. At least we're still friends, for some ungodly reason, I don't know why, although I have gotten a few comments like --

MR. KNIGHT: Okay. Just looking at this one, the recommended disposition is "accept as is," based upon acceptable UT's being performed on the surrounding areas.

Should I construe that, in fact, that UT's have been performed? Well, somebody --

MR. CLEWETT: No. If I could jump in for a second. As I understand it, when a person writes a discrepancy report they give several possible dispositions, and the person who eventually dispositions it will circle the one that they want.

So it appears, from looking over your shoulder here, that number 1 and number 3 are inconsistent recommended dispositions. One is to accept as is, and number 3 is to issue process sheets to rework.

MR. KNIGHT: And number 2 is, PG&E to disposition.

MR. STOKES: Yes. Somebody else makes the decision. All I'm trying to point out is that the problem has been raised, it has been attempted to be raised in that someone wrote up a form. Now,whether it is followed through on and how PG&E -- you know, they will more than likely accept it

on an as-is basis because that's generally the way everybody tells us everything is done at the plant. It's just do an as-built of it, and accept it on an as-built basis.

MR. KNIGHT: Well, if that's carried out in an appropriate way, is there anything wrong with that? I mean, that mean seem a naive question.

MR. CLEWETT: It probably depends on --

MR. STOKES: -- how appropriate is it. I'm not going to make a conclusion. Personally, I wouldn't think that that's an acceptable engineering procedure to do that. But if it's fine with you gentlemen, --

MR. SULLIVAN: Can you give me a typical example of why a DR was written up?

MR. STOKES: Why? To get some kind of action taken on it, hopefully.

MR. SULLIVAN: I realize that. I'm looking for a typical example of what kind of problem you would write up in a DR.

MR. STOKES: It's a problem which you cannot correct by yourself. It's something you have to get management's directives on, like I wrote -- primarily, the one I wrote up was concerning all the welding problems from the symbolism controls, all the way out to the field, and the weld specs didn't interpret how the symbols would be applied. The prep angle was not what I was calling out

in the office.

In other words, it was a problem that we discussed between us and everyone accepted as a problem. But we were not in control enough, or high enough up in management to get an overall directive on it to solve it.

MR. SULLIVAN: But it sounds like you wrote up some what I would call generic DR's.

MR. STOKES: True, I did.

MR. SULLIVAN: But in this conversation that was going on before about "accept as usual" or "accept as is", they must have been specific DR's.

MR. STOKES: Yes.

MR. SULLIVAN: Can you give me an example or two of a specific DR?

MR. STOKES: This one was written against seven pipe supports, basically anchors.

MR. SULLIVAN: What was the problem?

MR. STOKES: They had reworked the stanchion welds and when they took off the old stanchions, they didn't do a UT exam under a process sheet inspection, and they rewelded the new stanchions and someone found out about it.

MR. SULLIVAN: Okay. Any other examples you can give us?

MR. STOKES: I don't happen to have a copy of some that another friend of mine wrote. But other type things --

well typically, a DR -- just for your information, a DCN was required at Diablo Canyon for in-work process. In other words, if it's being built right this minute and there's a problem encountered you can write a design change notice to get it changed.

But a DR was required if the work had previously been done and green-tagged by a QC/QA inspector as approved. Undoubtedly, in this particular case a DR was the viable mechanism by which he would bring up concerns which had in the past been already accepted by a QA inspector. And which were not correct.

It could have been on anchor bolts, it could be -- for instance, we have this problem happening because the QA inspectors have not been told in the ESD that they specifically were to check the hole orientation as it existed in the concrete for the 10d diameters. What they had been told in their instructions was wait until you do the final check of the hanger and you measure the bolts where they stick out of the plate. That tells you where the holes for the plate are and where the bolts are, and you get all of it down there real quick.

Now the problem with that was in quick fix, by the time we got to quick fix we've got a hanger that's been green tagged, and the problem should have been caught day one when the holes were drilled in the concrete. And I enforced

the fact that a DR should be issued because it had already gone through the mill and was accepted.

They didn't want to do that; they wanted a DCN on it because it was in-work process. There's a question there as to which one applies. The DCN definitely applies, it was in work, and DR if has already been green tagged, maybe.

But there was a DR issued against a concrete pour in the containment because, for instance, I was doing the quick fixes for the intake which was all Unit 1 and Unit 2 structure. The drawings came down from San Francisco to put in 10-inch -- actually, it was 12-inch Hilte stud bolts and a 12-inch concrete wall. Undoubtedly, they hadn't reviewed the concrete drawings in San Francisco and they asked for a 10-inch embedment.

Now, what happened was they drilled the holes 10 inches without going through the wall, but when they went to set the studs they typically hit one-inch studs with a five-pound sledgehammer to set them good. That's okay if the slab is four foot thick. In this case, it just went right out the back side of the wall.

Now,the problem was this wall happened to be one of the pump seal rooms down there. That has to be a water-tight room. So I got called, Foley got called, the lead engineer got called from the site mechanical engineer for all hangers that night. His name was Torstrum. Because I was

quick fix, I had the final say-so on how we fixed the problem. The concrete was very, very granular, very sandy looking. You could just rub it with your finger and flake it off. It didn't look like it had enough concrete mix in it, to satisfy me, consistent with the typical plant layout. I required a DR on that to get a fix on it.

8joy1

If they had reviewed the drawing in San Francisco, they would have put something besides 10-inch bolt in the wall if they had reviewed the installation procedures, anyway, for sure. Not only that, one time when they were drilling the holes for a plate, we hit a drain line. We had to patch the drain line. That required a DR. The drain line wasn't where it was supposed to be according to the drawings. It was too close to the surface of the concrete. The slab was 3 foot thick. It was supposed to be more in the middle. That is minor.

I felt I needed to document the fact that I didn't think the concrete was adequate. And another thing was that during the drilling of those bolts, not only did we not go through the wall, but we found a chunk of wood in it, actually two pieces of wood. I wanted the wood documented, so I had a DR written up on it.

MR. YIN: Let me interrupt a minute. Those specifics I think you mentioned a couple of times before. My concern is over the use of DCN, design change notices, and also deficiency reports, the control aspects of the two systems. Maybe you can address that. Maybe you know a lot better than I do what was the practice at Diablo Canyon site.

Now, the DR involves perhaps as-built, accept as is, modify or maybe rework, either change something or accept as is, right?

MR. STOKES: Uh-huh.

8joy2

MR. YIN: Now, the DCN is directly telling you to change it, or what? I am trying to assess the effect of the two systems.

MR. STOKES: Well, they can both be used basically to do identical things. The only difference was the time frame as far as what we were instructed. If the hanger had been green tagged from a previous inspection QA program, which almost every hanger in the plant was, we were told it would have to be a DR if it was reworked, other than under the review program. I suppose there was a DR written against all supports redone under the review program. I don't know.

MR. YIN. Okay. Now, I understand perhaps there was some mishandling of a prior or subsequent use of certain documents. I understand that. I am more concerned about the safety impact of such measures. Now, everything is built, installed. It sounds like we are beating a dead horse.

Now, you tell me. Is there any safety implications that maybe we should follow up? Otherwise, what is the need for following it?

MR. STOKES: The DCNs very definitely could in many cases, and I am sure they do, say "accept as is" the work that has been done no matter how incorrect it is.

MR. SULLIVAN: I think that's a point, though, that needs to be looked at. If it was accepted as is, was there a basis and is it documented? Does it even need to be

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documented?

MR. STOKES: It is documented in the DCN or DR.

MR. SULLIVAN: The reason, the justification.

MR. STOKES: That's probably not there. In many cases all you will see is that there is a problem, and there will be a statement that it is okay as it is or it needs to go back to the home office. You won't see -- if it's okay as is, you won't see any statement as to why. We didn't have to write down why we made our decisions.

MR. SULLIVAN: Was it written down somewhere else as part of the hanger package or as an attachment to a hanger package?

MR. STOKES: No.

MR. YIN: Let me address this a little bit. Basically, during the construction stage it is sometimes to the benefit of a licensee, at least cosmetically, to indicate that -- well, maybe there are not that many problems, so if you trend those problems, gave the public a more favorable impression, that really we're just asking for changes. We didn't have that many construction problems. That was frequently what we encountered. But as far as the actual correction of the problem and fixing the defects, there was no attempt, based on my experience, to try to shortchange the system. It was just to give the people -- you know --

MR. STOKES: It was a camouflage in many respects.

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Writing a DCN was better than a DR.

MR. YIN: So at least in this particular case here, besides the point I just made, you don't see any safety impact on the system or operations or functional aspects. Can you maybe address it more specifically in that area?

MR. STOKES: Well, I have seen an awful lot of DRs that were accepted on an as is basis that I personally felt --

MR. YIN: Well, that was the management's decision to make. Unless you have any specifics to concur your belief that those sections were not correct and so on, then perhaps there is really no basis for us to pursue it.

[Pause]

MR. STOKES: Concerning that point, now this is from another gentleman. The PG&E letter on this one was 17 -- that is the one I was keeping on steel bolts.

I do have reason to believe that some of the follow-ups on those documents were not handled by people qualified to handle them. For instance, the lead engineer for Pullman was not an engineer. The gentleman, I think -- I have been informed by Pullman people that he is 26, he came up from a designer to an engineer. If he is reviewing documents, which I have been led to believe he is, there is no basis for him doing that work. If he puts down "as built," almost any engineer would probably question his ability to

do that or accept "as is." Typically these documents stop at some point in management. How they are ultimately reviewed, I think, should be reviewed by QC or QA, but any one of these items -- like this one is signed by Virgin Tenneson, but it was superseded -- in this particular case it got up to a certain point and the document was told by the guy who was handling it that it should be put on another form other than a DR, and it was put on an inspection report, not a DR.

Now, in solving the inspection report, it was handled by L-a-t-h-r-o-m, it looks like. It ended up that part of it was put right back on a DR. I mean what I am saying is unless someone, an outside party, reviews most of these things, you don't know who really ended up solving it even though the guy signed it. In many cases the signature is shown on the documents before there is ever an answer. I don't happen to have a copy of one of those, I don't think, at the moment.

MR. YIN: Well, let me ask you this. Are you going to give us some specific DR numbers or DCN numbers to follow up, or would you like us to perhaps select some samples for you?

MR. STOKES: Well, this thing started on a non-conformance report, number 8802-667.

MR. YIN: You are too fast for me.

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MR. STOKES: 8802-667 was the nonconformance report number.

MR. YIN: This is Foley's?

MR. STOKES: Foley's. Then it went to an inspection report number 8802-120. Then, believe it or not, it went to this, a little memo that says, "Virgil, all dispositions are acceptable with the exception of number 2. Disposition of number 2 should be to transfer to NCR. Howard." This is where a lot of it is handled.

In any case, then it comes back. There is part of it that has been put back on --

MR. YIN: Wait a minute. Let's get the issue straight here. Are you questioning the process that is really cumbersome and unacceptable? Are you questioning the disposition of -- the disposition of the NCR is questionable. If that is the case, then tell us why you believe that the disposition is not a settlement.

MR. STOKES: Well, the way a nonconformance typically is handled is management person decides it is an NCR item. In this case he decided it was, and it went to PG&E to be solved. That group makes a statement that it shouldn't have been put on one and that it could be handled differently so it wouldn't be on a nonconformance report.

It says basically that it occurred due to an oversight of Howard -- the whole reason for this thing is that

it was an oversight of a Howard P. Foley, Project Engineer, Project Manager, and a PG&E resident engineer. Then I should point out that this all involves the brazing of certain joints and the way the work was handled. They had omitted a vertical up direction in the test program, but the specs read "all directions."

MR. YIN: Again let me remind you that we are mostly concerned about the design control and all that. You are talking about, again, construction, installation, QC inspection. Are there any DRs or DCNs that really affected the overall design adequacy, overall adequacy in design control, or maybe design change control? That I really want to know.

As far as the installation inspection, the use of DRs, DCNs, NCRs, FCRs -- we have got a whole bowlful.

[Laughter]

MR. STOKES: In my judgment it should have been left on a DR or an NR, and the item is subject to review of all the work. All the work was never reviewed. That was covered in this. It was all finally just written off on an "accept as is" basis.

Now, if that is not answering your question, I am not, maybe, real clear -- but to me it looks like --

MR. YIN: Well, normally the DCNs, DRs and so on are really kind of case specific, a unique situation. It never

has been really intended for a generic application. If they do, it is in violation of the procedure anyway, so unless --

MR. STOKES: It is?

MR. YIN: It is. Is there any specific case --

MR. STOKES: All of my DRs were generic, written against Unit 1 and Unit 2. If they were against procedures -- there are DRs like mine that are generic.

MR. YIN: Okay. Well, since you wrote some of the DRs in a generic nature, perhaps you can provide us some information on that and maybe we can pursue that because if there are any specific deviations --

MR. STOKES: Okay, I will try to get you some more DRs that are generic in nature.

MR. HARTZMAN: Well, the U-bolt is generic in nature.

MR. STOKES: The U-bolts, the welding, the anchor bolt locations for studs were all written up and went through management's approval. I should note, if it was against procedure, it looks to me like management should have raised it.

Now, beyond the three that I wrote, I am aware of others that I have seen in other people's possession that were generic and had just as much scope. I will have to get those because I don't have copies of that stuff with me.

MR. YIN: Generic information should carry on

joint specs, DCNs, all that control documents because the DRs may be familiar by certain individuals but definitely it is not intended for everybody to read or understand it because DRs and DCNs are all really unique problems. So if you have any specific cases like that, I believe it is worthwhile to look into it.

The reason I said that is because there is a possibility that somebody was aware of the specific DRs but some other people may not be aware of it, and as a result, they may do something contrary to what is dispositioned in the DRs.

MR. STOKES: There is a memo being used in the same way. In regard to the stanchions a while ago, there is a memo number 411 that is basically a generic type memorandum, but if you are not aware of -- and it does go to design. It's specifically for QA people, and it involves quite a bit of old work, from what I have been told. And that is a memo. It is not a DR. But DRs -- boy, there's a bunch of DRs that are generic in nature. They have got a few out now that they don't even have all the things closed on. It's just an open-ended item.

MR. HARTZMAN: Such as what?

[Pause]

MR. HARTZMAN: These are all construction-related DRs?

MR. STOKES: Well, the memo -- well, the two drawings also came from this gentleman on the studs.

MR. CLEWETT: While he is looking at that, I have a question, Mr. Yin. I'm not sure I understood why a DR shouldn't raise generic issues. Maybe I just misunderstood what you are saying.

MR. YIN: As I mentioned earlier, the generic requirement should be prescribed, documented in drawings, in specifications, in procedures, in instructions that has been really reviewed, approved and issued, controlled for generic application. Now the DR and NCRs and whatnot really address a portion of the system or any specific items that need to be --

MR. CLEWETT: But if a person in the field should discover that there is a generic problem that they are welding bolts that they shouldn't be or that there is a generic problem, that there is inadequate design control or something --

MR. YIN: It could start out as a DR, but when you want to apply it generically across the board, then you should issue --

MR. STOKES: It should be a change notice.

MR. CLEWETT: Right. I see what you are saying.

MR. STOKES: Well, that's a point that I hadn't really thought about. There is a memo 411. It concerns

welds.

MR. YIN: Again, there could be a generic issue raised in the DR, and subsequently the management incorporates it in some kind of a notice. That is perfectly acceptable, too. So unless you are absolutely sure that there was no follow-up action on the generic issue identified in those DRs, then I think we may have a problem.

So if you have that, then give us the specifics so we can follow up on. We would be more than happy to look into it.

MR. STOKES: I don't know how this is going. The memo 411 applies to how welds are interpreted. This is how I was told this by QA. Pullman interpreted the meaning of this memo to be everything could be as-built on a drawing. Rather than indicate it through a DR or a discrepancy report or some kind of other documentation, it is QA. They interpret this memo 411 as meaning that anything wrong with a hanger can be as built rather than DR.

MR. YIN: Are we talking about DR or are we talking about a memo?

MR. STOKES: Well, this memo is used almost like a design change notice.

MR. YIN: Yes, but that's not the DR we are talking about. Do you know of any specific DRs that talk about generic change of the systems?

MR. STOKES: I don't happen to have one handy.

MR. YIN: Could you go back and maybe refresh your memory and provide us with something?

MR. STOKES: I will do more than that. I said I will go back and talk to the guy I was talking to and tell him I need copies of all that stuff that I didn't think I needed.

MR. YIN: Okay. I guess we cannot proceed any further, and you may want to take a look and go back to check with your folks and see if you can provide any specific information.

MR. SULLIVAN: Charlie, how many different people are you in touch with on this thing?

MR. STOKES: How many? Oh, boy.

MR. SULLIVAN: Can you tell us that?

MR. STOKES: All together, 25 or 30. Maybe 50. I get people calling all the time and they don't ever give me their names, so I don't know if they called before or not. but I have got probably in the neighborhood of 25 people that I know I'm talking to, and I not only talk to them but I call them up every now and then and say, look, I've heard about this document and I need a copy of it.

MR. SULLIVAN: Out of how many support engineers all together?

MR. STOKES: I can't tell you that.

MR.SULLIVAN: No, I mean how many are employed at

the site?

MR. STOKES: How many are still there? I will tell you that.

MR. SULLIVAN: Oh, some of these people you talk to don't work there anymore? Is that what you mean?

MR. STOKES: No, they work there. That's who I'm talking about. Twenty-five people I now work there in one form or another.

MR. SULLIVAN: Oh, they are not all support engineers?

MR. STOKES: No. I've got support engineers, which is a limited group, and the number has decreased quite a bit, and that is putting really a lot of pressure on those people if PG&E reads it; but I have friends in Pre-Inspec, QC, QA, welders, bidders. There's almost no -- for Foley, Pullman, both groups, PG&E personnel, QA, QC. There's somebody in almost every group, one department or another, for the entire scope of the plant. Somebody is calling me.

MR. SULLIVAN: Okay. I didn't want to take a bunch of your time with that.

MR. YIN: I have about six or seven specific questions for clarification regarding your summary of remarks before the ACRS on April 6, 1984. If you don't have any other things to talk about, let me address that; okay?

MR. STOKES: Okay.

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END 8

MR. YIN: On page 2 of that summary, second paragraph, you mention another incident: it was because we make erroneous, wildly optimistic assumptions about the quality of construction. And before that, you mentioned people working blindly due to missing information and drawings.

Are there any specific instances or cases which you can identify?

MR. STOKES: I don't happen to have the drawing or a specific drawing in mind at the moment, Isa. Due to the lack of documentation which I kept and notes, I am aware that in some cases the welding call-outs were insufficient. And due to the fact we could not physically go the plant during that time, to visual the drawing or as-built ourselves.

In many cases, the designer simply took what appeared to be as accurate as he could, figured out as best he could from the dimensions, and then put out a calculation package on the item, including all the welds per his own requirements.

MR. HARTZMAN: These were supports in existence?

MR. STOKES: Yes. I should point out, when we went to he site, we were supposed there because we had field access. We went through the psychological review program only to find that the thorn for us taking it was at somebody's desk. And the results stayed in somebody's desk, rather than us getting our own badges for access. And we had to resort to guides which were supplied by Wall-Tech for like five gentlemen.

We had to go through the security screen, all five people had to follow around with one person. If one guy

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went to the bathroom, they all had to.

In any case, people completely stopped going to look. It was such a difficulty to produce, under those requirements, that if you had to put out one and a half a day, the guys just would not go look. Their attitude was if they are going to be asbuilt inspected, per these drawings, QC/QA bought off, hell, I won't wast my time going to look. I'm just going to take the drawing as best it is. And I'm going to put out a calculation package as best I can. And the results will be drawn up the way I want it.

MR. HARTZMAN: But weren't you required to look? I mean, to go actually in the fields and look at these supports?

MR. STOKES: No.

MR. SULLIVAN: How long does it take to go out and do something like that?

MR. STOKES: With full security on, typically there was a craft line at the plant every morning until 10 o'clock. You had to get in line to go after the crafts. You had to have your paperwork up front. It generally took over an hour just to get in the security building.

It typically wasted a half a day for a group to go out and look at pipehangers.

MR. YIN: Let's go back to the subject matter here. Is it your suspicion --

MR. STOKES: It's not suspicion. This is based on my personal knowledge.

MR. YIN: Can you point out what area, what hanger? Maybe you want to go back and talk to your friends and see if they can provide something in that area, because we're talking specifics. Without specifics there's not really much we can go on.

MR. STOKES: I understand. But that's the way the review program was conducted, though. I can't help that.

MR. YIN: Can I go on to the second question, while you make a note? The second question is on the third paragraph, the last sentence. It was done to avoid a failure rate of greater than five percent, which would have forced expansion of sample from 20 percent to a comprehensive review of all small bore supports.

Was that written anywhere in the procedure, that anytime you so-called failed five percent, then you had to--

MR. STOKES: No, to my knowledge, I never saw it in writing. That statement, the 20 percent, comes from the sample. That's the relative size of the sample, in return for the entire scope. And this was in return for all Class I. This whole comment came from Leo Mangoba Alex Schustrom, my group lead.

It was a verbal transmittal of the way the program was written up. They expressed that there was a

specific number listed of supports, which had been given to the NRC, that would be reviewed, sampled, and that this sample comprised roughly five percent -- or not five percent but 20 percent of the hole.

And that if we failed more than five percent out of that sample, as it was originally specified, we would have to redo all the calcs for all the supports, Class I supports.

Now what happened was, now I've gotten this from PG&E responses to how they got around this. I know how they tried to get around it, first, but how they finally got around it was they changed the supports which failed out of that first 20 percent sample to generic problems.

MR. YIN: Well, wait a minute. The 20 percent, again, is not a document number, documented number. It's just really hearsay, so there's really -- it's not worth anything.

MR. STOKES: It's not hearsay anymore, Isa.

MR. YIN: Well, the seond point is, right now we are pushing them to really evaluate 100 percent of those STRUDL calcs. Would this problem go away?

MR. STOKES: No.

MR. YIN: What is the significance of the 20 percent, or five percent, or whatever?

MR. STOKES: The 20 percent represents 5,000 linear

feet.

MR. YIN:

MR. STOKES: The 20 percent represents 5,000 linear feet of 25,000 linear feet total Class I systems, to which PG&E has -- no, let me make sure.

PG&E's comment was 15,000 feet they have not looked at and they have looked at 25,000.

MR. YIN: So you're talking about the piping sampling, not the support failures, right?

MR. STOKES: Yes. Well, no. We had a five percent failure rate out of the hangers on the sample systems.

MR. YIN: Well, you're mixing two things together. You're talking about 5,000 feet of pipe that was used as a sample basis. And now you're talking about failure of supports. I mean, you can't mix those two things together. What does 20 percent and five percent really apply to? Does this apply to additional hanger review or applied to additional linear feet of pipe needs to be reviewed?

MR. STOKES: The way I've always heard this written was against linear footage analysis of pipe, which included a certain number of hangers on that linear footage of pipe. If there was one program for the pipelines and another program for the hangers, then I'm a little bit mixed up myself. But the fact is, I was told that whatever the

original sample was, and I never saw the original sample, that if five percent of that sample failed out of the hangers, they would have to redo not only those hangers but the entire hangers on all Class I systems.

Now I don't know if that's different than looking at the linear footage of pipe under the sample program because I have been told, at the plant, that the hangers were randomly selected out of all the piping. But the sample is on a limited span footage.

Now from that aspect, I guess they are different.

MR. HARTZMAN: Would exhibit one be of some help to you? Because that's the small bore review program.

MR. STOKES: Well, yes. It may even say what I just said there, I don't know.

MR. HARTZMAN: At least it is a small bore program, as it was installed.

(Pause.)

MR. STOKES: They're talking about pipelines in (1) and (2), pipelines in (3). Then a sample of 75 supports operating at 350 --

MR. YIN: Is it possible for you to go back and clarify this sentence, because right now it's kind of foggy?

MR. STOKES: Well, it's foggy to me in that I don't know how big the sample was, to start with, for hangers. I never saw the list. I do have a list of what PG&E --

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MR. HARTZMAN: According to what you say here, this sample pertains to all small bore supports. I mean, it's 25 percent of all small bore supports, the way you have it written here.

MR. STOKES: Well, I took the 20 percent from -- I did that calculation myself, for the 20 percent and that may be incorrect. I took it based on linear footage of pipe. The review program basically, as they have stated, for the pipe was 25,000 linear feet, we justified in doing analysis on 15,000 and there is 10,000 left.

And so there was an original sample of 5,000 for the 25,000 which is 20 feet of the linear sample.

It was in a PG&E document someplace.

MR. YIN: Well, we'll look into that, but I think it's a different issue.

MR. STOKES: Well, if you find a different sample than -- I would like to see a sample list. The only samples that I'm aware of is there's a thermal list of hangers that were reviewed. There is a seismic sample and a SAM and a TAM sample.

MR. HARTZMAN: But this was all at the beginning. This, after a while, became moot.

MR. STOKES: The people working there never knew it became moot. I'm trying to point that out. If it became moot, we didn't know it. The sample, to our understanding,

never changed.

MR. HARTZMAN: Yes, but we know that they worked on a lot more than just those supports, that were under those three lists. We know that.

MR. STOKES: Yes, and the way that I explained this in that statement, and I'll try to explain it now, is from PG&E's comments they took problems that came out of that original sample beyond that.

MR. HARTZMAN: Beyond what?

MR. STOKES: For example, you have seen the thermal sample list and SAM & TAM at the field?

MR. HARTZMAN: Yes.

MR. STOKES: From what I gather, other hangers were looked at and they didn't think they had failed. They didn't think they would have a five percent failure, but they did. And what management did was they scoped all of these into some kind of category.

Now I have never been told what kind of category it was, if it was hot thermal lines, or something to that effect. But we did have a lot of hangers failing on hot lines.

So that could be one area they made generic, that we had hangers failing on lines that were not hot.

Now if they didn't put them in a generic category of hot thermal lines, I'm not aware of another category that

would cover those.

MR. HARTZMAN: Yes, but you don't know that, do you?

MR. STOKES: I'm saying -- no, I don't.

MR. HARTZMAN: So it is possible that they would, and we know that they didn't put them into another category because we have the whole list of all the supports that they reanalyzed.

MR. STOKES: Yes, they said they put them in another category.

MR. HARTZMAN: Presumably, about 1800 supports.

MR. STOKES: But do they put all the ones that were failing into those categories, or do they just put what was in the specific scope? What I'm saying is the program that originally I was aware of, or was told about, had problems with it and I have made this point clear in many of the other meetings.

That I was aware that they were trying to cut out supports out of that sample because they were failing. Now I never did find out how they finally solved that problem. All I know is finally, we ended up where we are, I suppose. And what they said, in the comments that I have read to you, is they have moved problem areas to generic areas and that the sample didn't change.

They specifically told us they have two programs, one for generic, which if you look at the top of the small

bore program sheet, Exhibit 1 --

MR. YIN: Well, we understand that. We are looking into sample programs, generic --

MR. HARTZMAN: You read Mr. Yin's last report, I assume?

MR. STOKES: I have read everything that I've gotten my hands on, but I won't guarantee I've read his last one.

MR. YIN: That's okay. We have some concern in that area. It may not be exactly dealing with what you have, but I guess the issue has been looked into. And we haven't finished our inspection yet, so this is one of the items that Dr. Hartzman and myself will be looking into during our future follow up inspections.

Let me quickly jump to the third item, page 6, in the middle of the page. You talk about the placement of struts, spring cans, and snubbers on the wrong side of rigid restraints. This could cause actual lock up of lines due to thermal movement. Now you drew me a little sketch here. Perhaps maybe you can explain it a little bit better on the large paper board over there.

MR. STOKES: All right. It may have been caught in relation to the 3 and 5d. But the way the 3 and 5d discussion went on had to do with lateral gap requirements for snubbers. But when I was in quick fix, I believe it was

in RCP 1-2 -- I won't guarantee that because I am relying on memory. But there was either a three-quarter or a one inch line that came off the bottom fo the pump. It came out, made an elbow, came over and made an elbow vertically, like so.

(Indicating.)

This would represent this line and this represents what happens up here. Now this distance was in the neighborhood of three to four feet, if I remember correctly, and it was very short here. Typically the same distance, three to four feet. There were two new supports going in on this line.

There was a rigid Y restraint with completely open -- I mean, it could move four feet in one side. It was supposed to go in.

MR. YIN: What do you mean by can move four feet on one side?

MR. STOKES: Well, it had an angle support with two angles cantilevered off and it was completely open on one side so the pipe could move completely out of the support. But it had quite a bit of throw on it, so it was completely guided, I would expect.

Now the problem was the original installation -- this was a five --

MR. YIN: Is it possible to draw an isometric, so

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we can see the relationship better?

MR. STOKES: I'm a good drawer, but, well -- let's just try settlement elevations. That's if the view looking in, this is down on it, that is plan right here. Median isometric -- something like this. It comes out, comes across and comes vertical.

In any case, this was a 5d radius right here. There was a bend. It was more than just an elbow.

MR. YIN: It was tubing, right?

MR. STOKES: Yes, bent tubing. Anyway --

MR. SCHIERLING: What size pipe is that?

MR. STOKES: I think it's about three-quarters, one inch to three-quarters. In any case, there was proposed rigid Y to go in six inches, I believe, roughly from this elbow. Now the elbow wasn't accounted for because of the radious. And putting it in barely came into contact with the transition from the flat to the curve.

Now at the same time, there was a lateral snubber that was supposed to go in at this point.

MR. YIN: A snubber for three-quarter inch, right?

MR. STOKES: There's a lot of snubbers on this line, Isa. In fact, this entire vertical rim has snubbers in two directions for about 20 to 25 feet. There were no supports on this rigid, other than snubbers, until this rigid Y went in. Now what happened was there was a beam steel

under here that sort of ran diagonally. It didn't run straight with the beam and to get the grading out of the way and cut a hole in it and get the angle attaching to the beam, they slid the support right up to the flat part, curved section of the elbow.

Now that was within ESD tolerances. There was no problem by itself. Now I got into this because one of the field engineers called me when they started putting in the snubber. Because the snubber and the rigid Y had not been ruled to go together -- in other words, typically in the industry you will see them both attached together or a note that they should be worked together by the same crew.

But what happened is when they started to put the snubber in, the rigid Y was already here, welded in place, QC/QA and everything, green tagged.

Well, if the engineer hadn't questioned all the snubbers on this thing, he wouldn't have called me. But what he did was he called me because they were fixing to weld the snubber in on this side, within a half inch of the support, so it wouldn't hit cold and put up the steel. And they called me and said I think you should come down here and look at this. This doesn't look like it's right.

Well, I went down and looked and I know there's a lot of movement off these pumps. And I also looked at it in the line spec, and the line temperature for this line,

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I believe, was something like 512 degrees. I looked at what was already there, off a lot of snubbers, and I realized that this snubber if anything probably was going to move into this support, if they put it where they were planning.

I put the thing on hold, and I went into the stress group --

MR. YIN: Well, you mentioned it's a very short piece of pipe, three to four feet. How much do you expect

end9 will be removed?

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MR. STOKES: According to the pipe stress calculations between the thermal load, the seismic movement, this vertical line moved about two inches at the bottom.

MR. YIN: Okay. It's moving upwards, right?

MR. STOKES: No. The snubbers on this thing are lateral.

MR. YIN: Okay. That's no problem, then; right?

MR. STOKES: Well, it says that this pipe, since it didn't have a restraint, was moving in two directions at the bottom, and it was. It was moving roughly laterally, in a lateral direction, about an inch and a half, and it was moving axially, I guess, due to the pump maybe twisting. I'm not sure. But I just know the movement specified where the snubber went in, in the neighborhood of two inches in all directions. That is laterally at this point (indicating).

Now, I knew that the rigid Y was going to limit the Y to about 0, but I know that they had enough distance in here to take out the Y directional movements. But had they put that snubber in front of this support, it would have only moved a half-inch before it started hitting the angle iron and it would have locked the pipe up.

Now, I believe I fixed this particular support where it will not lock up, but if you go back and review the calcs, I may be wrong. I didn't have enough information on the snubber drawing to accurately design this mechanism, nor did

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the original engineers who did it. In some cases there is so much movement when you have a snubber shown where a rigid goes that the snubber can displace, even if it is placed at the same point, completely out of the vertical guide.

MR. YIN: Well, let me ask you before you go any further: the pump is anchored on the floor, right, or some kind of a structure?

MR. STOKES: It is bolted down. I will agree with that.

MR. YIN: It is bolted down. And there you have a short piece of tubing going down and turning.

MR. STOKES: Well, it is actually coming out.

MR. YIN: Okay. It doesn't matter. So the total displacement from either direction may be not more than four or five feet, as you mentioned. How is it possible to have two inches of movement?

MR. STOKES: I didn't do the analysis. This is temperature, line pump movement -- the annulus steel -- It was sitting on the annulus steel, on top of that.

MR. YIN: It's physically impossible.

MR. STOKES: If it is physically impossible for a problem to occur from a high temperature line on annulus steel, then forget what I said. If you don't even want to look at it, if you don't think there is absolutely any way that could be a problem, forget what I said. But with a

half-inch gap between supports, even if you had a one-inch movement, you will have lock-up if the thing is not designed correctly, and I know for --

MR. YIN: Wait a minute. Have you done the analysis yourself or are you saying just because you are looking at th 'rawing it shows two-inch --

MR. STOKES: I didn't see it on the drawing. They don't put movements on drawings.

MR. YIN: Well, where did you get the two inches from?

MR. STOKES: I got it from the Stress Group, but they don't put any of that information on the drawings any more. We did initially put the movements, the thermal temperature changes. We put the normal operating temperature, the design accident temperature. We put the movements. We put all of that. And I could have used it.

MR. YIN: Let me ask you. The two inches or directional movement, is that a verbal information, or is that a document that is written, instructions that certain movement that will be used.

MR. STOKES: Written instructions? It wasn't written instructions.

MR. YIN: It's just a verbal type --

MR. STOKES: It came from my own -- to my memory, I went to the Stress Group and actually pulled the stress

printout showing the displacements on that line. There was no transmittal of information, no -- as a matter of fact, had I not even looked at it -- well, you say there couldn't have been a problem, and possibly there couldn't be, but they didn't put snubbers on that line for 20 feet because there was no thermal growth on it, or no displacement that they could handle with the rigid.

MR. YIN: Yes. Well, you mentioned position of struts, spring cans and snubbers. So far you've mentioned snubbers. Do you see instructions on struts and spring cans?

MR. STOKES: Spring cans are just as likely, and struts, in particular, are handled -- I have never seen so many uses of struts at a plant as I have seen at Diablo Canyon for rigid restraint. Typically you have to have two-direction restraints for a snubber to interplay without folding down, and then the line has to hold it up in one direction. They use snubbers at the plant, or struts.

MR. YIN: Okay. On page 8 it says, on the upper page here, "It did not seem reasonable to have a mixture of 20 hertz and 33 hertz support on a single pipeline, but management required us to design it that way." Is that a procedural requirement or is it a verbal requirement?

MR. STOKES: That was written down in the early M-9s. I don't know if it is still written down in the M-9.

MR. YIN: Well, when you say early, do you remember what revision?

MR. STOKES: Probably -- I haven't seen it lately. Probably around Revision 3.

MR. YIN: Actually, safety implication is really minimum, isn't it, because right now the criteria calls for 20 hertz, so you have got 33 hertz. It won't bother you, right, because 20 hertz could be 25, could be 30 or whatever because the minimum acceptance deflection is .025. So really --

MR. STOKES: True. But there is another number being used besides the .025 inch displacement; this .009 has been used.

MR. YIN: Where does the .009 come from?

MR. STOKES: 33 hertz.

MR. YIN: Okay.

MR. MANOLY: Do you feel that 20 hertz is not adequate? Let's get down to the bottom of this. Is that the concern?

MR. STOKES: The concern is that they have two different procedures for doing the same work. If 20 was valid for one support, why was it not valid for the other one?

MR. YIN: Again, if you look at the scenario of the thing here, you originally designed 20 hertz, and then later

on you determined a 33 hertz requirement. Now, definitely there is a problem. But the reverse is true. Before you used 33 hertz, and now you back off to 20 hertz. So everything you have done before is still acceptable.

MR. STOKES: If it's 33, it's better than 20, but at one time there was a split system.

MR. YIN: Well, the intent is to make sure that you have a rigid structure to hold up the pipe. That's about it, right?

MR. HARTZMAN: Your answer to his question was that you have no objection to the 20 hertz; is that correct?

MR. MANOLY: Yes, that was my question. If they can meet 20 hertz, is there a safety concern there? I don't see it; do you?

MR. STOKES: Not just to the stiffness, no.

MR. MANOLY: Well, you know what it's for, the number of hertz?

MR. STOKES: Frequency correlates to the seismic accelerations. Fits it within a dampening mode.

MR. MANOLY: Well you know what it means that it tries to get as much close to the stiffness of a support. They assume the stiffness in the piping analysis -- So the 20 hertz can give you there a close proximity to the assumed stiffness, then you are set. If you go more, then you are incorrect, right? So I'm asking, is there

a safety concern there?

MR. YIN: I think he addressed that already. He is not concerned with the 20 hertz. I guess -- let's jump to the next one. It's getting late. I'm getting hungry.

MR. STOKES: Me, too.

MR. YIN: On page 9, the first paragraph, last sentence. Now the drawings have been stripped of the minimum information. Instead, we got tardy telephone -- suspicious accuracy? Is this related to what I was talking about in my draft report where there was lack of control for telephone-provided information? Or something --

MR. STOKES: No. It has to do with the practice of including the information concerning snubbers on the drawing, movements -- that typically would flag a problem if it's placed in too close conjunction to a rigid.

Not only does it include that kind of information, but it also would include information which -- like loads. Spring cans typically had load data, the old ones did. They completely took that off of the drawing.

Anytime you had a question down in the field as to some change in the support, you didn't have the data to do a rough hand calc or -- for instance, if you wanted to put a

spring can on a cantilever, it hadn't been on a cantilever. That would be a minor calc if you knew the load.

MR. YIN: Well, legally there is no requirement to put down on the thermal movements and so on on the installation joints, as long as it is provided in some other design document.

MR. STOKES: Legally, you are right. I said industry practice.

MR. YIN: I think the issue is whether or not there is somewhere that those documents exist.

MR. STOKES: Computer printouts.

MR. YIN: Have you given a copy of that for your work?

MR. STOKES: No, we were never given that.

MR. YIN: You were not?

MR. STOKES: No.

MR. HARTZMAN: In none of the analysis that you did you were never given any thermal movements for the supports?

MR. STOKES: We were given the loads in the thermal movements for the support, but not in the field. There was no correlation for the drawings for field use on that same point. It did come to the design trailer, sometimes on a torn-off sheet of paper without anybody's name on it.

MR. KNIGHT: Do you have any idea where that

torn-off piece of paper came from? I mean do they come from random places or was it the same place?

MR. STOKES: Yes, they came from quite random places. Sometimes they came from a stress engineer in the stress trailer. Occasionally it came from a group lead. There's just no way --

MR. KNIGHT: Let me ask something else. What was the motivation to send the torn-off piece of paper? The intimation is that there was some sort of system, and I am just trying to get some sort of feel for what it was.

MR. STOKES: You would think that they had inter-office memos in use, but believe it or not, I didn't ever see any forms for that. So there was no actual form that could be used, such as an inter-office memorandum or something that you would put on. Typically, after a while some of it did come over with a cover sheet on it and Xerox copies attached under a file number, but more times than not, it was just a random bit of information without any substantiatoin.

MR. SAFFELL: I guess another question is that you obviously had to document this in your analysis, and I would have thought that the checker would have requested the source.

MR. STOKES: Many times they don't request the loads. You could show them that torn-off piece of paper and he'd buy it just as well as you did the first time.

MR. SAFFELL: It doesn't bother me that that information is not on those drawings. That doesn't bother me at all.

MR. YIN: It helps to be on the drawing.

MR. STOKES: If it was on the drawings, it would have cut down on problems of interferences and so forth in the installation.

MR. SAFFELL: Or it could be looked at as a means of them controlling who and how used that information.

MR. STOKES: Well, as an industry practice, it is typically put on there when they go to do a walkdown on the line. They don't come out with a calculation program. They come out with the drawings because it has them on it, okay? I mean I see where you are coming from, but there is a hell of a basis for putting it on there in the first place, and we did start out doing it at the plant. To tell you the truth, everybody questioned why it was finally taken off.

MR. YIN: My last question, page 10, first paragraph. I t talks about key plans, and I guess you are talking about orientation, and I think it's very important because if the orientation is wrong, then everything is wrong. All the moments and the forces and so on would be all incorrect.

Now, before we determine that that was the fact, can you give us more indication on what makes your concern

that there is some problem in that area?

MR. STOKES: Well, as I stated the other day, it primarily revolves around that little key plan, which is an attachment to Exhibit 8. I have not worked at the plant since last October 14th, and as of a year working on that site, based on what I was told by my group leads and superiors, this key plan is contradictory to what I was told as a basis for the loads on the pipe, the hangers, the plant, everything in relation to Unit 2, as is stated in that little write-up.

MR. YIN: But again, from what I understand, the pocket guide is used for a quick reference on what the design versus installation requirements are. It is not really used for design per se, right?

MR. STOKES: It wasn't ever used in the design group. They never had a document like that document right there. That's what I'm trying to say. When I worked in the design trailer, we didn't have absolutely any written documentation as to what the mirror image problem had been and what it should be for Unit 2. We were only told, and based on that knowledge, what I'm telling you here today is I was told something different than what that drawing represents.

Now, PG&E admitted in the ACRS that this drawing is correct, and over six months after I quit working at the

plant, just looking at that document brought a problem for Unit 2 up in that I had a question from what I was told and what I was told as knowledge and what I used versus what the drawing represented.

The whole question, then, that came up was, even though Unit 1 is the one that is being licensed, is there a problem presently with what we have been doing on Unit 2? And as far as I know -- and I will stretch that -- to my knowledge no one at the site has been informed of this in the Design Group because this is the only place I have ever seen this little document shown, was in that little black book.

MR. YIN: Okay. So you have no concern as far as Unit 1, the mirror image or whatever the problem, design problem, Unit 1 is okay, but you have some concern with whether or not it was applied correctly on Unit 2 so you have asked us to maybe look into the Unit 2 design.

MR. STOKES: Yes, someday.

MR. YIN: In the future. All right.

MR. STOKES: I'm really interested in that in the future. But I was using that as an example. If this thing had ever come out, it would have been a good thing for management because it is the only written thing I ever saw with that on it, and they didn't do it.

MR. YIN: Before I wrap up my questions, let me

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ask you: This affidavit that you provided to the Staff today, is there anything involving safety-related design control and design issues? It looks to me like it is all construction and QC-related.

MR. STOKES: Well, yes. I've been trying to get away from QA because that is one area that you have been looking at, and I am trying to get you into QA and the field aspects. So from that standpoint I suppose it probably does relate predominantly with field practices.

MR. KNIGHT: I have been looking this over while you have been talking. On page 10, you note that there is no angle limitations for skewed T-joints. Now, that would seem to be an area that would affect the designer's approach.

MR. STOKES: Well, it does, yes. It was raised, I should note, by a gentleman in the field.

END 10

11pb1

Well, you can see a Xeroxed portion of this book in the back of this attachment. Specifically, page 75 on attachment 1. It's the second from the back pages in the right. This table was taken from this little black book, but I believe it is identical to what is in ESD-223.

I had this question in my DR. And a pre-inspect engineer has been reraising this same issue and he's drawn up a lot of these little sketches at various angles. But I have never seen an explanation as to how you really use this table. And from my determination of it, it appears that for a 15 degree angle, if S is 3/16ths required, then you should have -- or a W is 3/16ths. You need an S of 3/16ths, and I would allude that at 15 degrees you need at least 1/4th inch over that due to the throat deduction.

Either I am not reading this table right, and the pre-inspect engineer who works in the field is not, because he has to use this table on interior angles, to determine if the weld has indeed been installed.

It seems to him and to me that at 30 degrees, if you need 3/16ths throat, which would be W, you would have to have an S of 1/4th plus 3/16ths in this table to give you that measurement.

Now I would really like to have some clarification on this. Not only for myself, but if this table is what is being installed and does account for the throat deductions

11pb2

in the installation, then the welds as installed are not in compliance with the design requirements for the effective throat. And they do impinge on the designs.

They also affect installation. This is one typical area that has been, I guess, a thorn to me. It's the way they handled welding at that plant.

I should note that this information on welding which is shown on this same attachment and the next page is -- there's actually four pages on symbolism. That would have been the most useful information that they could have put out on that plant site. Because the reason that I got put into quick fix was on partial penetration welds I was showing S and E in angle preparation and 60 at 45.

The field couldn't read those dimensions, and quick fix was having to remove them. My lead engineer when I left the trailer said, straighten out the weld problems. And that's primarily why I went to quick fix. Because either he had something to do with it, or somebody did.

But had they put out this little book, they would have cleared up many of the problems from our drawings, because they would have been able to read them. And they really needed a few more pages of these examples.

But they didn't need to do the kind of program that they had. I mean, this little table for the inspectors really didn't look right to me. But maybe I'm just not

11pb3

understanding how you use it. But I wish somebody would tell me so I can forget about it someday.

MR. HARTZMAN: Let me ask you something. Again, let's go back to this little book. You said that you were told about bolts, both orientation being by right-hand rule. Was this verbally or was this written down somewhere?

MR. STOKES: No. I already stated, there was no other drawing. This is the only written document that I've ever seen of the plant right here.

When I went to the plant site, it was all verbal. We continually had a question as to which way zero azimuth was in the Unit 1 building.

MR. HARTZMAN: Why? In other words, where does this information come in in the checking of the supports?

MR. STOKES: Well, depending on which way is what, when the stress gives you the loads, the positive side would go one way and the negative a different way. And we wanted to know that the way we were applying it was the way stress intended it to be applied to the structure. As all the seismic accelerations were applied to the structure.

And if we didn't follow through the way they wanted it placed, you could possibly have the positive going in the opposite direction from the way it should have been. And the magnitudes varied in many cases.

MR. HARTZMAN: So what you're really implying her

11bp4

is that there may have been some kind of a deficiency in the loads from the pipe stress group being transmitted to the support group.

Why would there not be now in Unit 1 and only in Unit 2?

MR. STOKES: Based on what I was told, Unit 1 follows the rule.

MR. HARTZMAN: And are you comforted that in Unit 1 the loads were transmitted correctly? That's what you're saying.

MR. STOKES: No, not what you just said. When you put it to me that way --

MR. YIN: It's not an immediate concern. He just wants us to go back, check the Unit 2 in the future, right?

MR. STOKES: Well -- but what he is raising is am I absolutely sure that we transferred the loads in the Unit 1 from stress to the hangers correctly.

MR. HARTZMAN: I'm trying to see if that's what you're stating.

MR. YIN: We have no concern with Unit 1.

MR. HARTZMAN: Let me ask you a broader question. You said that in this problem over here, they told you that the displacements were two inches. This was the pipe stress group.

11pb5

MR. STOKES: They had a specific system for that, yes.

MR. HARTZMAN: Well, before that, last week when we spoke to each other, there was a question about the 1,000 degree rise. That also came from the pipe stress group.

It seems, you know, I'm beginning to wonder just what kind of information they were giving you.

MR. STOKES: Well, there has been another statement along those lines that's been raised concerning how many procedure books are in what trailers. And for the longest time, there was only one control book in the stress trailer, one set of documents.

I'd be very interested to know how many control books are still in that trailer.

MR.HARTZMAN: What has this got to do with control books?

MR. STOKES: It has to do with whether the people were aware of the system that they were supposed to be using.

MR. HARTZMAN: Yes. But the point of this is, when they told you that these things expanded two inches. That's what you said, expand two inches. How much of the thermal --

MR. STOKES: I said it moved, from expansion,

11pb6

whatever. Anchor movement, from the pump movement. That was total movement at that point. It was listed as two inches in two directions.

MR. HARTZMAN: Yet we heard here that it's almost a physical impossibility for something like that to happen.

MR. STOKES: I didn't perform that analysis.

MR. KNIGHT: First of all, we're never going to know until we go look. And secondly, maybe it's anchor movement. That strikes me as a big number.

MR. HARTZMAN: All right. Let me just finish my last question. When we spoke about the 1,000 degress last week, did you ever go back and really try to determine where that came from, by any chance? I know that we left it -- we didn't pursue it any further. But I just wondered if perhaps your curiosity was -- was aroused.

MR. STOKES: Initially there were two numbers provided to us. That was an accident condition and an operating condition. Now the numbers originally came out, I was told off of that list I showed you last week.

MR. HARTZMAN: That showed up to 688 degrees.

MR. STOKES: Yes. Now there was a time when that list was not used. And I don't know who derived the numbers, but during that time we saw a lot of temperatures higher than what was on that list.

And a Mr. Lepke was in charge of that, if you

11pb7

want to know who to ask.

MR. HARTZMAN: Okay.

MR. STOKES: I can only tell you, we were supplied the data and told to do the calcs, and it varied in a lot of cases. And I guess that's the reason I'm sitting here. It was never written down.

Had they given us -- we had a copy of that line list, by the way, when we were doing these calculations. And I questioned some of the temperatures then.

MR. HARTZMAN: But you didn't see anywhere that there was 1,000 degrees.

MR. STOKES: No. Except what was supplied to us. You know, I've got two things to base it on. Documents that I saw and then things that people told me to do. And that's where I'm coming from.

MR.HARTZMAN: Okay. Thanks.

MR. YIN: I have no further questions.

MR. KNIGHT: Anybody?

(No response.)

MR. KNIGHT: Charles, is there anything -- I will admit to almost hesitating to ask.

MR. STOKES: The only thing I want to mention is basically I'm interested in having -- torsion is ultimately decided on. Technically they've resolved that, I won't say more.

I am also concerned with how you ultimately

11pb8

decide toward the Australian Paper on Angles. I have reviewed the document partially. There are several load case combinations and Pullman is in the back of that document, which to me implies that there is much more work in the design calculation to justify the use of their program than we did.

I hope you would at least consider those formulas in the back and how they are applied to the calcs. I also am concerned about the admission, by PG&E, the other day of finding one and a half T tube steel in the plant. And in an earlier statement by PG&E that implies that there is foreign steel in the plant, due to American standards being of 2T requirement. I'd like to know what material specs the steel conforms to, how it would affect the safety of whatever it is installed on and beyond that, before any major amount of functional testing or whatever is performed, I would really appreciate everyone looking at the asbuilt drawings in regards to welding specifically. And maybe do their own walkdown of a few, just to see if they can have any confidence in the drawings for later rework or rereview program.

I don't. And the people that work in the plant now don't. And I really think those drawings are very important if we're going to allow --

MR. KNIGHT: Just to be sure I understand what

you're saying, do you feel that there is a likelihood that you will find that the asbuilt drawings do not, in fact, reflect the geometry?

MR. BOSNAK: Particularly the welds, the type of welds.

MR. STOKES: Particularly -- well, on fillet welds most every guy in the field can call out a fillet. He's given a fillet guage call-out or measuring device, little guages. I've even got a set. But specifically, anytime there was a preparation type joint, whether or not the joint was ever prepped should be documented somewhere, having been a QA approved on the original prep of the joint.

Without that documentation, you shouldn't take face blank that that weld exists there, without doing a very, very in depth look at the joint yourself. Scratch the point off. Try to see if it was cut, look at the heat effects. Maybe it still shows the temperature that was applied to it.

There are ways to get an idea of whether that joint was prepped, even if you don't know how much or what angle. I can tell you what the old angles were uniformly, and that was 37 1/2 because that's what was in Pullman's weld specs up until June of '83, when I raised the question.

I can give you a specific date on when the transition took place, because I have a copy of the original document right here. It was made on 6/23/83. Before that, there was absolutely no use of 45 or 60, to my knowledge, by Pullman. Anything designed, built, installed, per them, was at 37 1/2.

Now in the calculations, I would expect that that be reflected accurately and that the final analysis document that the affected throat is indeed acceptable by some procedure. If they only used AWS D11, Bechtel should issue their own standards for what the effectiveness is at that angle, I would think.

MR. BOSNAK: You are mostly concerned about the work done by Pullman, or anybody else?

MR. STOKES: No, Pullman, in relation to piping. I am also very concerned in Foley's work, in that one of the comments from Foley people that I am getting is that the way they applied the crisscrossing of the safety and non-safety cable tray systems, the way it was worked out for small bore, was if a non-safety related line crosses a Class I line, it will be evaluated to upgrade the system to Class I in this area of concern.

end11

Some of the people have stated that if the trays did not cross Class I trays that they did not look at them. Only when they directly crossed the trays --

MR. BOSNAK: Do you think they may have misinterpreted the interaction or the two over one criteria?

MR. STOKES: The way we handled small bore when it crossed, was roughly at two over one or three spans, two on each side, three supports.

In the cable trays, I've been told, their runs were for 25 feet or so. A Class II tray will sit roughly nine inches above Class I. And because it physically never crossed, it was never looked at. That is a very literal interpretation of the word "cross" and the word shouldn't have been "cross." It should have been "supported above."

But that's because the people in the plant typically do not or haven't had prior experience. The people working inside the plant, other than job shoppers -- they have never seen that process applied before. And they take literally every word as someone on the street would. And you have to look at it from that aspect.

And I believe, as far as I'm concerned, the only other point I'd like to stress is we really -- and I'm talking for me and all the whistly blowers, all the people that have fed me information and probably will continue to would like to take everyone here on a field trip.

It's something I've been asking for for months. And don't expect that I'll continue to ask for it, but I'm getting a lot of support from the people in the field, now. They are willing to say well, I'm anonymous, but if they'll do that, I'll go with you.

And that is something that, to me, is unbelievable because these people don't want to lose their jobs, but other than that, that's all I have to say.

MR. KNIGHT: Thank you very much.

In my judgment, from looking around the table, it has been a busy afternoon. I see a lot of tired people.

Thank you.

(Whereupon, at 4:52 p.m., the meeting was adjourned.)

CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the NRC COMMISSION

In the matter of: Meeting between Staff and C. Stokes (Government Accountability Project)

Date of Proceeding: Tuesday, April 10, 1984

Place of Proceeding: Bethesda, Maryland

were held as herein appears, and that this is the original transcript for the file of the Commission.

Suzanne Young
Official Reporter - Typed

Suzanne Young
Official Reporter - Signature

11 pages with 7 page document

NRC Meeting with C. Stokes
April 10, 1984
Bethesda Md

Affidavit

My name is Charles Stokes. I am submitting this affidavit to the Nuclear Regulatory Commission (NRC) to inform them of material false statements and other evidence of activities which could compromise the quality of the Diablo Canyon nuclear power plant, if it should be turned on. The misconduct involves welding, procedure qualification tests, and plant modifications during the hot functional tests. In my professional judgment, if these issues alone are confirmed as examples of general practices, the plant could not possibly be licensed to go critical under the NRC's legal requirements in 10 C.F.R.

In fact, the practices revealed below and others I have disclosed would even flunk Bechtel's own standards. I am enclosing as Exhibit 1 portions of Bechtel's "Field Engineer Pocket Hanger Reference," Diablo Canyon Project, Bechtel Power Corporation. Bechtel's booklet is not a bad document. Although there are a few minor errors, it describes a reasonable design control and quality assurance (QA) program.

Unfortunately it was not issued on-site before I left. I obtained a copy before distribution was stopped. I can understand why Bechtel didn't want the booklet released. The plant wasn't built at all like the system described in Bechtel's own handbook. The handbook will be discussed in more detail below.

(1) <u>In reply to PG&E's letters no. DCL-84-067 and no. DCL-84-078 concerning welding of A-325 bolts</u>. PG&E contends that "10 supports were identified which used welded A-325 bolt design." That is highly misleading. In reality, there are many more cases where bolts have been used.

Because of inadequate documentation, welded bolts have been used and it is impossible to say whether they are A-325 or A-307 or anything else. Even QA Personnel concedes not knowing. In two specific cases, for which I can provide the support numbers, undocumented bolts were used to connect support members to structural steel.

In my opinion, PG&E's reply is so far from complete that it does not provide accurate information to the NRC concerning the use of A-325, A-307 or other bolts. The two specific supports do not even have a weld symbol describing how they were welded on the drawings. The QA inspector was not able to visually inspect the connection.

(2) A second illustration of deficient documentation for welding bolts is inadequate material traceability. Material was not stamped for traceability back to the Certificates of Compliance as required. The significance of stamping for traceability is that without this traceability there existed no methodology to ensure that the material used in many hangers, or other seismic class one structures, complied with the requirements (e.g., proper metallurgical properties).

In ANSI B31.7 chapter 10723, entitled "Materials," it is stated that "all material shall be clearly identified" by "the applicable material specification and grade, heat number, or heat code of the material, and any additional markings required to facilitate traceability of the reports of the results of all tests and examinations performed on the material." ANSI B31.7 also states that "Certificant of Compliance with the material specifications may be provided in lieu of Certified Material Test Reports unless otherwise required by the design specification." (Emphasis added)

Material traceability is only one aspect of the required traceability. In ANSI B31.7 Para. 1-727.5.3 and Para. 1-727.6, weld traceability is also required. "The welder or welding operator shall identify it as his work by applying his assigned symbol for permanent record in a manner specified by his employer. As an alternative, the employer shall keep a record of the joints and of the welders working the joints." This is also true under ASME Section IX QW-301.3, entitled "Identification of Welders and Welding Operations," which states: "Eace qualified welder and welding operator shall be assigned an identifying number, letter, or symbol by the manufacturer or contractor, which shall be used to identify the work of that welder or welding operator."

In discussions with Pre-inspection Engineers, QC and QA inspectors, some of whom have worked for as long as ten years at Diablo, it is obvious that neither material nor welder traceability was maintained. All that was required was that the "Certificate of Compliance" be provided. This superficial attempt to comply with the requirements of ANSI B31.7 and ASME Section IX does not satisfy the code requirements. This is evidenced by past and present industry practice at other plants across the United States. The abuse of traceability destroys the foundation of a valid Quality Control Program -- accountability and traceability.

Since many of the pre-inspection engineers and QC, QA personnel have never before Diablo worked at a nuclear plant nor other heavy industry construction site nor read ANSI B31.1, B31.7 or ASME Section IX, they worked at Diablo under the false assumption that the work was being performed correctly, and that management was implementing all the necessary directives for them to do their work. Management did not train personnel, nor did they correct this misconception.

Having worked on other nuclear plants, I know the importance of these sections in ANSI B31.7 and ASME Section IX. At other plants almost everything in Class I systems was stamped and logged, and records were kept to insure that traceability was maintained. Per B31.7, "The marking or marking code shall be transferred to all pieces when material is cut to make more than one piece." In my experience at other plants, this was required for all Class I material except miscellaneous material, such as "gaskets, packing, seals, springs, bearings, retaining rings, washers, fluids for hangers, etc." This was not done at Diablo Canyon. The practice of using "non traceable" steel was widespread throughout the plant. At other plants shim stock was not required to be stamped, and I suppose shim stock was considered to be "etc."

B31.7 states in the case of miscellaneous items that "A list of such materials shall be furnished, and such materials do not require certified materials test reports or certificates of compliance as defined in 1-723.1.2." (Emphasis added) Management at Diablo Canyon have failed to provide the chain of documentation which is necessary under 10 C.F.R. 50 before the plant can be operational. Not only did they fail to provide an "up-to-date heat number log," but also failed to publish a list of material that did not have to meet the scrutiny of ANSI B31.7.

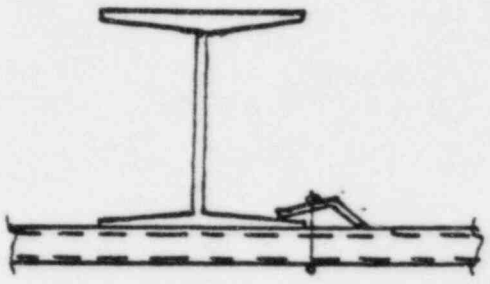
(3) Deficient training reinforced the problems, and perpetuated them. QA inspectors told me that their training consisted of reading ESD 223 for one week and being given a list of suggested reading. This list contained B31.7, B-31.1 and other codes. In one conversation, when I asked if the QC inspectors were required to read the suggested readings, his reply was "no, we only had to know what B31.7 was, not what it says." "I and others thought that these codes had been incorporated into ESD 223 by management." This was, and remains, a wrong assumption. The inspectors undoubtedly performed to the best of their

ability. However, the instruction, training, and practices necessary to adequately perform their functions were deficient. The inspectors only discovered their "wrong beliefs" through discussions with better trained, more experienced inspectors from companies other than PG&E.

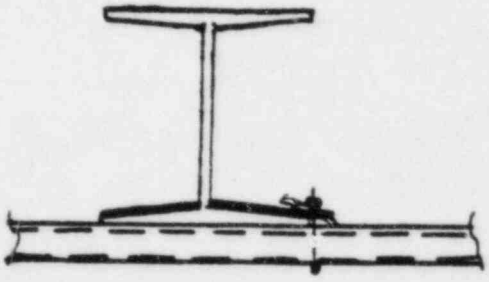
(4) In letter no. DCL-84-094, PG&E states, "Pipe support number 100-111, identified for NRC review by Mr. C. Stokes, resulted in a minor modification . . . This change was made for consistency with Project Standard Practices even though analysis showed the change was not necessary to meet acceptance criteria."

I don't know if PG&E reported other modifications performed during the hot functional testing to the NRC. I do know of at least one other support which was modified during hot functional testing. I can not give the support number here. My informant would be immediately on the "firing" line. I will supply the support number to NRC inspector Isa Yin, if the NRC supplies a list of supports to me for which they know modifications have been performed.

(5) In PG&E's answer to the intervenor's motion to reopen licensing issues on Construction Quality Assurance, "Affidavit of D.A. Rockwell, L.R. Wilson," Paragraph 3 states in part: "Since this contact is provided by the plate of the clamp to the Unistrut, the plate is not necessarily horizontal and may appear 'cockeyed.'" This statement is too incomplete to be meaningful. The use of the term "cockeyed" is not explained or supported nearly enough to support any conclusion that the clamping plates were correctly installed. If incorrectly installed, the clamp will tend to slip off the structural steel to which it is attached. See sketches below of correct installation compared to incorrect installation.



Correct. Notice Line contact at toe and heel of plate. When bolt is tongued properly, clamp should not be easily displaced.



Incorrect. Line contact but not at toe. When tongued, this tends to slip off the steel marker.

In both the examples above, the plate is "cockeyed." One is correct, and if installed correctly, should not be easily moved. On the other hand, the incorrect installation could slip easily. This fact can be checked by consulting engineering manuals from either Unistrut, Superstrut, or other brand names.

(6) In paragraph 5 as a remedy for possible slipping, PG&E states, "For support type S221, U-bolts were torqued and U-bolt nuts tack welded. For other support types, the Unistrut channel was directly welded to the beam flange." (Emphasis added) Based on my experience in the nuclear industry, the proposed fix by PG&E/Foley would do more damage than good. To my knowledge, there are no engineering documents presently available or in use that support the practice of welding Unistrut or similar material. In fact, the material type used in making "Superstrut" and similar products should not be welded In a phone call on 3/27/84 with a Superstrut Product Engineer, I was told that Superstrut is coated with an electro-plated galvanized chromate coating (an epoxy paint) which burns when welded, giving off toxic gases. Two problems result from welding it. (1) Air quality problems for the welder and (2) the joint corrodes. The Product Engineer said he would never

advise that Superstrut be welded when used as Class I supports in a nuclear plant near the ocean. He said that the material could be destroyed in one year if exposed to adverse conditions.

(7) In reply to intervenor's Petition to reopen Construction Quality Assurance, Affidavit of H.R. Arnold, F.C. Breismesiter and R.K. Rhodes Paragraph 6. "During a planned review of existing brazing procedures for copper and stainless steel by Foley QA Personnel in September 1981, it could not be verified that stainless steel tubing PBS number MD045 had been qualified in all braze flow positions (vertical-up, vertical-down, horizontal and flat) since the procedure qualitfication tests performed in 1977 did not include the vertical-up flow position. This variation was properly documented on Foley Non-Conformance Report (NCR) #8802-675 in accordance with approved procedures." (Emphasis added) The statement quoted above is in direct contradiction to the first line in Para. 1 and line, Page 1. "This allegation is completely false. The procedures in question were qualified prior to their use." (Emphasis added) To correct this problem, one worker was tested. Under ANSI B31.7 and ASME Section IX, each welder must be qualified to perform the work to which he is assigned. Foley's solution does not correct the use of the procedure from 1977 to 1981 for brazing a vertical-up joint as was originally stated in the procedure. Nor does it resolve the issue as to whether the brazers before 1977 were qualified to perform work. The test of one worker does not satisfy ASME requirements that each worker be qualified unless the worker tested was the only person on-site who was assigned the brazing work. Nor do the present tests qualify old work, since past work could be considered training thus not qualifying as acceptable work. ASME Section IX requires that the welder be qualified first before work is performed. There is a reason for this,

which is to ensure that the work is performed correctly. The other point not sufficiently covered in Foley's reply is that "Neither the ASME Code nor Foley procedures require documentation of these inspections. Therefore none were documented." Nor in the statement that "ASME Section IX recognizes the function of independent mechanical test contractors such as Central Coast Lab, and does not requre them to witness the actual brazing." (Paragraph 3, page 6 and 7) This is an example of Management 's near-sightedness. Can they say that this documentation is not required in B31.1, B31.7, ASME Section IX, AWS D1.1-79 or 10 C.F.R? From my previous experience in the nuclear industry, it has been the practice to test and document results therefrom for welders. This would certify that the weld was made by the specific welder and that the test results were for the welds performed by that individual. These logs and records were controlled and monitored by the QA. The policies at Diablo by PG&E, Pullman, and Foley are at the opposite end of the scale from what has been typical industry practice. Where documentation was in question, other plant owners considered it good engineering practice and a good policy to go ahead and provide documentation to prevent the problem of a future question. At Diablo, just the opposite is true.

(8) In a discussion with a friend, I was shown a Discrepancy Report written against Unit #2. This document listed many anchor and smaller supports which did not have acceptable full penetration welds at the stantion to pipe and were to be reworked. The problem with this work was that there had been no process sheets issued for the removal nor had the pipe been ultrasonically tested to ensure that the minimum wall remained after grinding away the old material. The new stanchions were installed without an ultrasonic test (UT) being performed. The tests were performed seven months later. Per ASME Section IX and ANSI B31.7, the ultrasonic testing should have been conducted

at the time after removal and before new stanshions were welded in place. When ultrasonically testing this type of joint, incorrect readings are possible.

A worker who was familiar with this Discrepancy Report (DR) on Unit 2 realized the same problem might have occurred on Unit 1. I was shown a copy of a Preliminary Discrepancy Report listing about 15 supports in Unit 1 which the worker had determined had the same problem as the Unit 2 problem narrated above. I can supply the DR number on Unit 2 and the author of the Unit 1 DR. This will be suppled under similar conditions listed on a previous issue to Isa Yin.

(9) In closing and as the only exhibit to this affidavit, I have a copy of a document which was scheduled to be issued to all field engineers to aid them in their work at Diablo. It was prepared by Bechtel Power Corporation. The title of this document is Field Engineer Pocket Hanger Reference. This document was sent to the field for issuing, but was recalled under the excuse that it contained errors which needed to be corrected. I and other engineers at Diablo had copies of this document. It contains valuable information to which an engineer could refer and rely upon during his work. In truth, this document represents Bechtel policy at previous jobs. Much of it is in direct contradiction to the procedures used to build Diablo. Had it been issued many problems would have surfaced in a relatively short time. Why is this true? The document puts at finger tip location contradictory guides, providing typical industry practice in many areas, to the procedures and management directives issued at Diablo. There are minor errors in this document. However, I have reviewed it and have found it to be a valuable and handy document to have when working in the field. It should have been checked, corrected, issued and used.

Enclosed are pages 1-10 and 1-11, "Notes: Pipe Insulation Chart." In reading these two pages several points are evident which were not complied with at Diablo: (1) vapor barrier requirements; and (2) the aoplication of a double layer of insulation on high thermal lines. In PG&E's answers to the staff concerning stress walkdown, they tried to explain away interferences by local crushing of calcium silicate. Note, this is not acceptable on Page 1-10.

Also enclosed is a copy of page 1-13, "Insulation Removal Request Flow Chart" and page 1-14, "Request for Insulation Removal." I am not aware of either of these procedures being followed at Diablo.

Also enclosed is a copy of Section 7, "Welding Instruction." On page 7-2, item 15, it is stated that there are no dihedral angle limitations for skewed T-joints. I feel this policy will cause problems by design personnel failing to consider welds shown as fillet as partial penetration groove welds unless a note specifically stated that it should be considered otherwise. I personally know many engineers will assume a fully effective throat for any weld indicated as a fillet. I suggest a test at site on this point before a decision is made on how to represent a skewed T-joint.

Also on page 7-5, see "attachment I." Either I don't understand this table or no allowance was added for the throat deduction for inadequage penetration. This last conclusion was also that of a pre-inspect engineer at Diablo Canyon.

Lastly, on pages 7-7 thru 7-10, I would like to point out the concise clarification of weld symbol terminology. Had this part of the book been in effect at Diablo, many questions would have been resolved (although many

other questionable practices would have become evident to many field personnel).

I have read the above 11-page statement and it is true and correct to the best of my knowledge and belief.

Charles Stokes

CCS

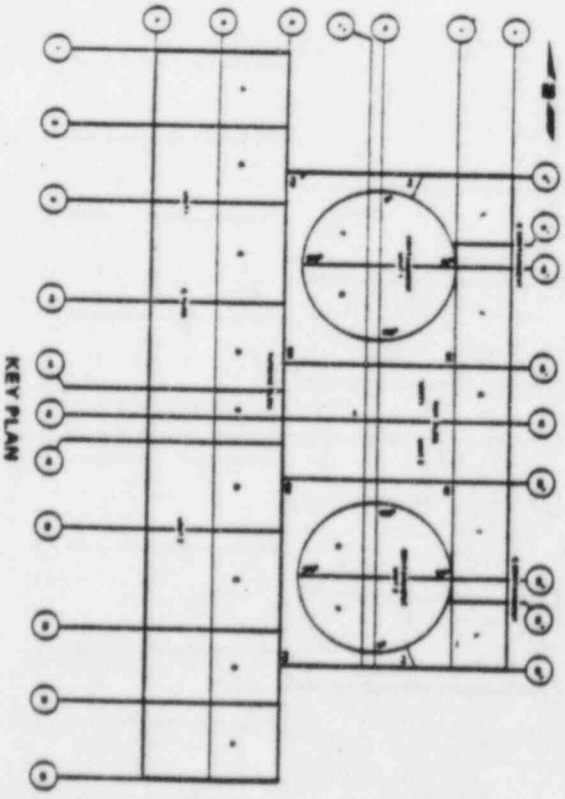
Field Engineer Pocket Hanger Reference

Diablo Canyon Project

Bechtel Power Corporation

1983

BFAN



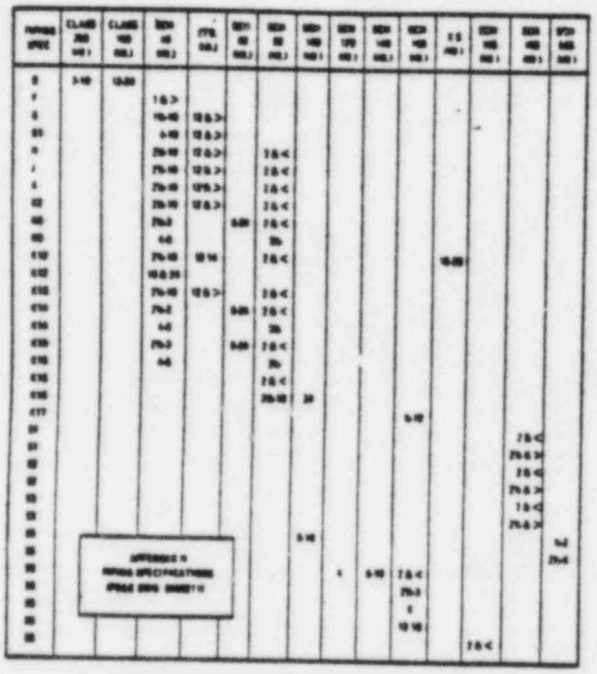
KEY PLAN ELEVATION

TURBINE BUILDING EL.		AUXILIARY BUILDING EL.		CONTAINMENT BUILDING EL.	
GROUND LEVEL ACCESS	85'-0"	GROUND LEVEL ACCESS	85'-0"	LOWER LEVEL FLOOR	91'-8"
	104'-8"		100'-0"	ANNULUS STEEL	101'-8"
	119'-8"		115'-0"	ANNULUS STEEL	106'-8"
TURBINE DECK	140'-0"	FUEL ROD CLEANING ROOM	125'-8"		117'-8"
		CONTROL ROOM	140'-0"	CONTAINMENT ACCESS	140'-0"

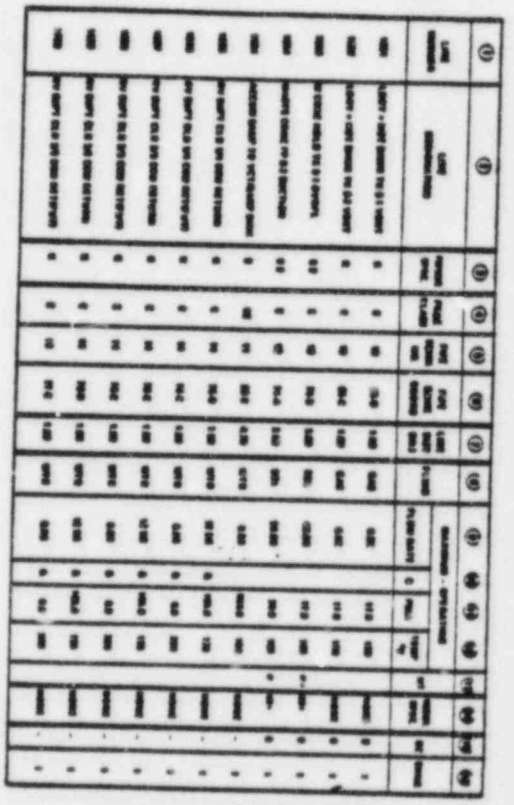
COLUMN LINE SCHEDULE

LINE	DIST. (ft.-in.)	TOT (ft.-in.)	LINE	DIST. (ft.-in.)	TOT. (ft.-in.)	LINE	DIST. (ft.-in.)	SUBTOT. (ft.-in.)	TOT. (ft.-in.)
A	0	0	1	0	0	10	0	0	371-6½
B	24-10	24-10	2	15-6½	15-6½	10	27-3½	27-3½	398-4
C	15-0	39-10	3	15-6	31-0½	20	27-3½	54-6½	425-7½
D	29-6	69-4	4	15-6	51-6½	20[3]	4-6½	59-0	430-0½
E	29-6	98-10	5	25-6	76-6½	21	22-6½	81-6½	452-10½
F	21-0	119-10	6	21-6	107-6½	22	27-3½	109-1	480-1½
G	15-10	135-8	6[4]	12-6	120-0½	23	1-4	110-5	457-6½
H	6-2	142-10	7	15-6	135-6½	24	28-2	140-7	513-7½
J	17-6	160-4	8	17-6	152-10½	25	11-7	156-2	529-2½
K	25-0	185-4	9	27-3½	180-2	25[3]	6-4	162-6	535-6½
L	27-6	212-10	9[5]	7-10½	188-0½	26	10-10	173-4	551-4½
M	25-6	237-10	10	2-6	190-6½	26[6]	3-6	153-0	554-6½
N	29-6	283-4	10[7]	15-10	210-6½	27	7-10½	166-10½	581-11½
S	38-6	322-4	11	6-4	215-10½	28	27-3½	219-2	608-2½
T	36-6	3158-4	12	11-7	226-5½	29	17-4	235-6	625-6½
U	32-6	368-4	13	28-2	254-7½	29[6]	6-6	251-0	622-6½
V	36-6	373-4	14	1-4	281-11½	30	13-6	265-6	636-6½
			15	27-3½	309-3	31	21-0	286-6	655-6½
			15[7]	22-9½	312-0½	32	25-6	319-6	659-6½
			16	6-6½	318-6½	33	16-6	334-0	707-6½
			17	27-3½	343-6½	34	16-6	350-6	723-6½
			18	27-3½	371-6½	35	10-10½	371-6½	1424

SPECIFICATION/PIPE SCHEDULE CONVERSION



EXAMPLE OF LINE DESIGNATION – UNITS 1 AND 2
(DWG. NO. 102040 – PAGE 38 – DATE 10/02/72)



PG&E DESIGN CLASS SYMBOLS

A – DESIGN TO ANSI 831.1-1967; MATERIAL, N.D.E., FABRICATION AND ERECTION TO ANSI 831.7 CLASS I-1969 EDITION PLUS 1970 ADD., PG&E DESIGN CLASS I

B – ANSI 831.7 CLASS II, 1969 EDITION PLUS 1970 ADD., PG&E DESIGN CLASS I

C – ANSI 831.7 CLASS III, 1969 EDITION PLUS 1970 ADD., PG&E DESIGN CLASS I

E – ANSI 831.1-1967, PG&E DESIGN CLASS II

E1 – CLASS E, MODIFIED TO REQUIRE "FILE-44" – DESIGN EARTHQUAKE ANALYSIS

G – NFPA; ALSO COMPLIES WITH ANSI 831.1

G1 – NFPA STANDARDS, PG&E DESIGN CLASS II (10 CFR 50 APPENDIX B QUALITY ASSURANCE PROVISION APPLIES TO THIS PG&E DESIGN CLASS II SYSTEM)

P – DESIGN TO ANSI 831.1-1967, FABRICATION, ERECTION AND INSPECTION TO ASME BOILER AND PRESSURE VESSEL CODE SECTION 1, 1968 EDITION, PG&E DESIGN CLASS I. (EXCEPTION: LINES No. 1 THROUGH No. 12 AND No. 16 ARE DESIGNED TO THE 1956 EDITION OF ANSI 831.1 AND APPLICABLE NUCLEAR CODE CASES.)

LINE DESIGNATIONS (NOTES (1) THROUGH (16))

NOTES: PIPE INSULATION CHART

Fittings and valves are normally insulated with pre-formed sections of the same material as used on the pipe. However segmental blocks are sometimes used by wiring them on the fitting or valve and filling the gaps with asbestos cement.

Many and varied types of jackets for insulation are available. Some of these are: canvas, asphalt-saturated asbestos felt, plastic-impregnated asbestos felt, thin gage sections of galvanized steel, and integral or separate jackets of aluminum alloy or stainless steel.

The selection of the type of jacket to be used should be made with due consideration given to the following: amount of abrasion and mechanical abuse to be encountered. Weather protection for outdoor installations, fire proofing, vapor barrier requirements, cost of application, and last but not least the finished appearance.

Most insulation failures are caused by water entering through breaks in the finish, such as expansion cracks, or un-flashed openings, therefore, particular attention should be given to complete detailed specifications in regard to weatherproofing.

The usual insulating materials and jackets for heated piping and equipment allow the moisture to escape in the form of vapor. However in the medium temperature range, and where shut-downs are frequent, moisture in the insulation is not driven off and water damage is most likely to occur. For these conditions, the insulation should be thoroughly dry before applying the jacket, the surface of the pipe should be primed and painted, and corrosion-restraint wire or bands used for securing the insulation. If possible, insulation should be applied to high temperature piping while heated to insure the complete dryness of the completed installation.

The layout of insulated piping and equipment should provide adequate clearances for proper application of the insulation and also safeguard against mechanical damage during normal operation and maintenance.

1-10

Thicknesses, as shown are nominal. Actual thicknesses, which are based on "simplified thicknesses," will vary slightly from nominal in that the outer diameters of the insulation approximate the diameters of iron pipe sizes in order to obtain nesting of layers.

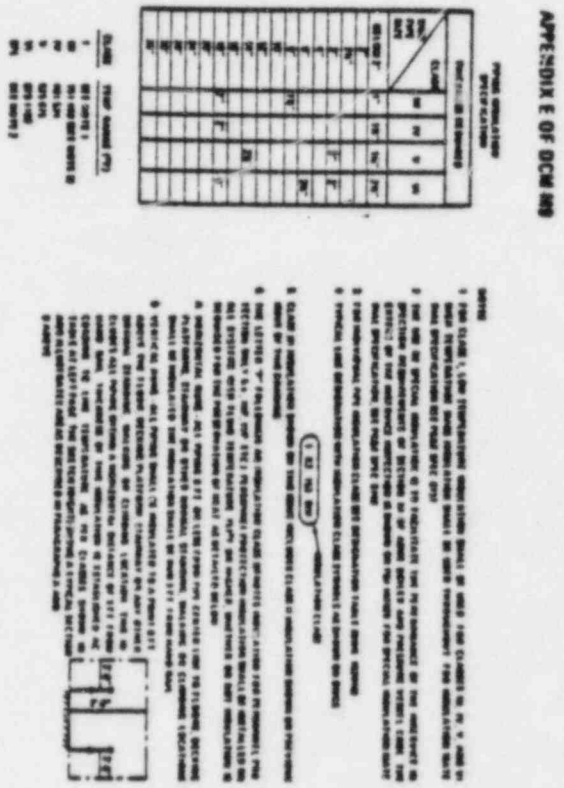
Weights, as shown, are for actual thicknesses and are based on densities of 11 pounds per cubic foot for 85% magnesia and calcium silicate, and 21 pounds per cubic foot for diatomaceous earth (calcined diatomaceous silica and asbestos fiber). Weights for materials with different densities may be proportioned accordingly.

At temperatures above 600°F, pipe expansion is a significant factor. For best results pipe insulation should be applied in double layers with staggered joints for all operating temperatures above 600°F. This construction prevents excessive heat losses and surface temperatures at the joints, opened by pipe expansion, thus eliminating scorched or burned jackets. This construction also eliminates the potential fire hazard of exposing jackets to higher temperatures at the joint. Double-layer, staggered-joint construction also minimizes thermal stresses in the insulation by reducing the temperature differential across each layer.

The recommended thicknesses in the above table are calculated on an economic basis for heat conservation under average operating conditions for steam generation and process piping, and assure adequate temperature control. To determine the most economical thickness for any particular installation the cost of fuel, fixed charges, need for definite temperature control, or other special conditions must be considered. If necessary, insulation thickness can be increased.

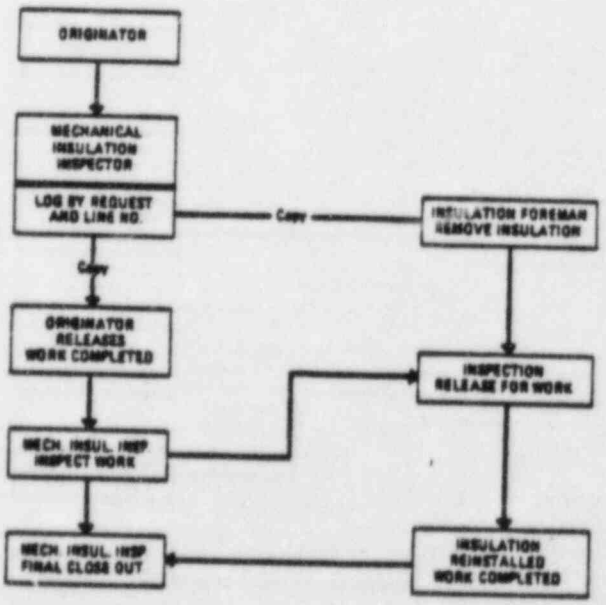
Generally, pipe insulation is furnished in 3-foot half sections for pipe sizes up to 24-inch in calcium silicate and up to 14-inch pipe size for 85 percent magnesia and diatomaceous earth. Insulation for pipe sizes larger than those mentioned is usually furnished in 3-foot long segments or curved blocks.

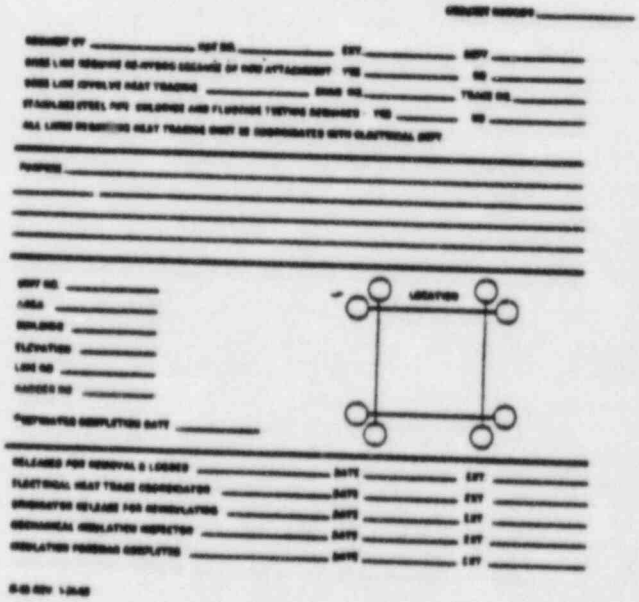
1-11



APPENDIX E OF DCM R8

INSULATION REMOVAL REQUEST
FLOW CHART





WELDING INSTRUCTIONS
(EXCERPTED FROM ESD-223 REV. 7)

1 WELDS SHALL NOT BE PEENED.

2 FULL PENETRATION WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURES DESIGNATED BY THE FIELD ENGINEER. ROOT OPENINGS USING BACKING STRAPS SHOULD BE 1/4" PLUS OR MINUS 1/16". ROOT OPENING REQUIREMENTS FOR OTHER WELD PROCEDURES ARE 1/8" PLUS OR MINUS 1/16".

3 PARTIAL PENETRATION GROOVE WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURE DESIGNATED BY THE FIELD ENGINEER. THE JOINT SHALL BE BROUGHT INTO AS CLOSE CONTACT AS POSSIBLE. THE GAP BETWEEN PARTS SHALL NOT EXCEED 3/16".

4 SQUARE GROOVE WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURE DESIGNATED BY THE FIELD ENGINEER. ROOT OPENING SHALL BE 0" TO 1/16" MAXIMUM.

5 FILLET WELDS SHALL BE FIT IN ACCORDANCE WITH THE WELD PROCEDURE DESIGNATED BY THE FIELD ENGINEER. PARTS TO BE JOINED SHALL BE BROUGHT INTO AS CLOSE CONTACT AS POSSIBLE. NO PACKING, SHIMMING, OR WELDING WILL BE PERMITTED TO CORRECT POOR FIT-UP OF JOINTS. IF THE SEPARATION IS 1/16" OR GREATER, THE LEG OF THE FILLET SHALL BE INCREASED BY THE AMOUNT OF THE SEPARATION. THE GAP SHALL NOT EXCEED 5/16". 7-3

6 ALL MEMBERS SHALL BE VISUALLY PLUMB, TRUE TO LINE, AND SUBSTANTIALLY FREE FROM BENDS, TWISTS, OR EXCESSIVE GAPS.

7 ALL WELD PREPARATION SURFACES SHALL BE FREE FROM FOUNDRY OR MILL SCALE, OIL, RUST, SAND, SLAG, PAINT, AND ANY TYPE OF SURFACE ORIDE OR DIRT.

8 WELD PREPARATION SHALL BE SMOOTH AND UNIFORM. IF WELD PREPARATIONS ARE FORMED BY FLAME CUTTING, THEY SHALL BE GROUND AND DRESSED BEFORE WELDING.

9 UNDERCUT, EXTENDING THE LENGTH OF THE WELD, SHALL NOT EXCEED 1/32" IN DEPTH. LOCAL UNDERCUT SHALL NOT EXCEED 1/16" WHEN THE LENGTH OF A LOCAL UNDERCUT AREA DOES NOT EXCEED 1/2" IN ANY 6" LENGTH OF WELD.

10 FOR GROOVE AND FILLET WELDS, THE SUM OF THE DIAMETERS OF POROSITY SHALL NOT EXCEED 3/8" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 3/4" IN ANY 12" LENGTH OF WELD.

11 MINOR ARC STRIKES ON SUPPORT MEMBERS SHALL BE REMINIZED. SERIOUS ARC STRIKES ON SUPPORT MEMBERS SHALL BE REMOVED AND/OR REPAIRED PRIOR TO QC ACCEPTANCE. NO ARC STRIKES ON PIPE SHALL BE PERMITTED. ARC STRIKES ON PIPE AND SEISMIC LIMITERS SHALL BE REPORTED ON A DEFICIENT CONDITION NOTICE FOR DISPOSITION PER ESD-260.

12 THE FILLET WELD SIZE SHALL BE AS SPECIFIED ON THE DRAWING. WHERE THE SIZE IS NOT SPECIFIED, THE FILLET SHALL BE OF THE SAME SIZE AS THE THICKNESS OF THE THINNER OF THE TWO MEMBERS BEING JOINED. AS-BUILT IS REQUIRED TO SHOW WELD SIZE.

13 OVERWELD: FOR EXISTING WELDS ANY AMOUNT OF OVERWELD IS ACCEPTABLE, PROVIDED DISTORTION IS NOT EXCESSIVE. FOR NEW WELDS THE MAXIMUM OVERWELD SHALL BE 50 PERCENT OR 1/8", WHICHEVER IS GREATER, PROVIDED THAT DISTORTION IS NOT EXCESSIVE. (SEE PARAGRAPH 6.8.2.4.c.) AS-BUILT IS NOT REQUIRED.

14 UNDERWELD: FOR EXISTING WELDS, ANY UNDERWELD IS ACCEPTABLE PROVIDED THAT THE AISC RECOMMENDED MINIMUM WELD SIZE FOR THE MATERIAL BEING WELDED IS MET. A NEW FILLET WELD IN ANY SINGULAR CONTINUOUS WELD SHALL BE PERMITTED TO UNDERRUN THE NOMINAL FILLET WELD SIZE REQUIRED BY 1/16" WITHOUT CORRECTION, PROVIDED THAT THE UNDERSIZED PORTION OF THE WELD DOES NOT EXCEED 10% OF THE LENGTH OF THE WELD.

AS-BUILT IS REQUIRED TO SHOW EXISTING WELDS WHICH ARE MORE THAN 25 PERCENT UNDERSIZED AND/OR UNDERSIZE FOR MORE THAN 20 PERCENT OF THE TOTAL LENGTH OF THE WELD. 7-3

FILLET WELD SIZE TABLE

MATERIAL THICKNESS OF THICKER PART JOINED	MINIMUM SIZE OF FILLET WELD
UP TO AND INCLUDING 1/4	1/8
OVER 1/4 THROUGH 1/2	3/16
OVER 1/2 THROUGH 3/4	1/4
OVER 3/4 THROUGH 1-1/2	5/16
OVER 1-1/2 THROUGH 2-1/4	3/8
OVER 2-1/4 THROUGH 6	1/2
OVER 6	5/8

15 FILLET WELDS ON SKEWED T-JOINTS

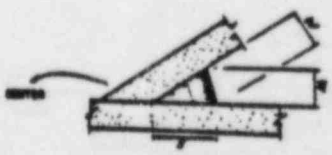
- THERE ARE NO DIMENSIONAL ANGLE LIMITATIONS
- THE SIZE OF FILLET WELDS ON SKEWED T-JOINTS SHALL BE DETERMINED BY MEASURING THE NOMINAL LEG, AS FOLLOWS:

W = NOMINAL WELD LEG

NOTE: WELD SURFACES MUST BE FLAT OR CONVEX.

16 PARTIAL PENETRATION WELDS

- WHEN VERIFYING THE SIZE OF PARTIAL PENETRATION BEVEL WELDS, THE FACE MUST BE AT LEAST FLUSH WITH THE FACE OF THE BEVELED PIECE.
- QC FIT-UP INSPECTION IS REQUIRED ON PARTIAL PENETRATION GROOVE WELDS DESIGNED AT SKEWED T-JOINTS. THE SIZE OF PARTIAL PENETRATION GROOVE WELDS, WHICH HAVE BEEN DESIGNED TO BE INSTALLED AT SKEWED T-JOINTS, SHALL BE DETERMINED BY MEASURING THE FACE OF THE WELD, AS FOLLOWS:



W = NOMINAL WELD LEG

S = SPECIFIED SIZE

USE W MINIMUM IN DETERMINING WELD SIZE.

THE ACCEPTABILITY OF THE WELD SIZE SHALL BE DETERMINED BY USING THE CHART IN ATTACHMENT I. 7-3

17 FLARE-BEVEL WELDS WHICH ARE FORMED BY AT LEAST ONE PIECE OF TUBE STEEL SHALL HAVE THE SIZE DETERMINED AS FOLLOWS:

- WHEN NO SIZE IS SPECIFIED ON THE DRAWING, THE FACE OF THE WELD SHALL BE AT LEAST FLUSH WITH THE FACE OF THE TUBE STEEL BEING WELDED
- WHEN THE SIZE OF THE WELD IS SPECIFIED ON THE DRAWING, THE SIZE OF THE WELD SHALL BE DETERMINED BY MEASURING THE FACE OF THE WELD AS FOLLOWS.

W = NOMINAL WELD FACE

S = SPECIFIED SIZE

THE ACCEPTABILITY OF THE WELD SIZE SHALL BE DETERMINED BY USING THE CHART IN ATTACHMENT J.

3.8 PREHEAT AND INTERPASS

- THE FOLLOWING PREHEAT AND INTERPASS TEMPERATURES SHALL BE USED FOR THE WELDING OF CARBON STEEL SUPPORT MEMBERS TO EXISTING STRUCTURAL STEEL AND RUPTURE RESTRAINTS (EXCLUDING INSERTS):

MATERIAL THICKNESS (INCHES)	PREHEAT (MIN) (°F)	INTERPASS (MAX) (°F)
UP TO 3/4	50*	800
OVER 3/4 - 1-1/2	150	650
OVER 1-1/2 - 2-1/2	225	600

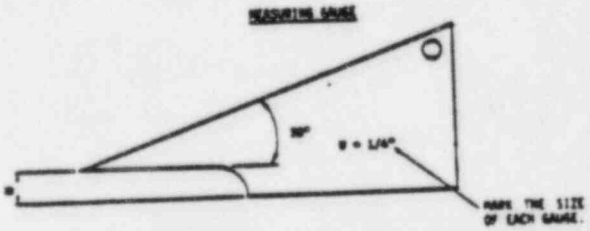
NOTE: FOR WELDING OF DISSIMILAR METALS, THE MINIMUM PREHEAT TEMPERATURE AND MAXIMUM INTERPASS TEMPERATURE SHALL BE IN ACCORDANCE WITH THE WELD PROCEDURE

*MATERIAL TO BE FLAME DRIED WHEN BELOW 70°F.

- PREHEAT REQUIREMENTS SHALL BE DETERMINED BY THE HANGER FIELD ENGINEER DURING INITIATION OF THE REQUIRED PROCESS SHEETS PRIOR TO RELEASE OF WORK. THE PREHEAT SHALL BE A QC HOLD POINT ON THE GENERAL FIELD PROCESS SHEET.

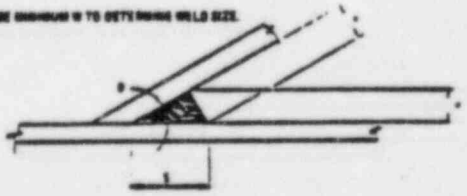
ATTACHMENT H

MEASURING GAUGE



W = 3/16"
1/4"
5/16"
3/8"
7/16"
1/2"
5/8"
3/4"
7/8"
- ONE SET

ATTACHMENT I



IF MINIMUM W MEASURED IS GREATER THAN OR EQUAL TO S SPECIFIED, NO MORE SIZE CHECKING IS NEEDED.

IF MINIMUM W MEASURED IS LESS THAN S SPECIFIED, CONSULT THE TABLE BELOW TO VERIFY THAT W MEASURED IS GREATER THAN OR EQUAL TO W REQUIRED.

IF MINIMUM W MEASURED IS LESS THAN W REQUIRED, WELD IS UNACCEPTABLE.

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED

T / θ	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
45°	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/4	1/4	1/4	1/4
50°	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/4	1/4	1/4	5/16	5/16	5/16	3/8
55°	3/16	3/16	3/16	3/16	3/16	1/4	1/4	5/16	5/16	5/16	3/8	3/8	7/16	7/16
60°	3/16	3/16	3/16	3/16	1/4	1/4	5/16	5/16	3/8	3/8	7/16	7/16	1/2	1/2
65°	3/16	3/16	3/16	1/4	1/4	5/16	3/8	3/8	7/16	7/16	7/16	1/2	9/16	5/8
90°	3/16	3/16	1/4	1/4	5/16	5/16	3/8	7/16	7/16	1/2	9/16	9/16	5/8	11/16
45°	3/16	3/16	1/4	5/16	5/16	3/8	7/16	7/16	1/2	9/16	5/8	5/8	11/16	3/4
50°	3/16	3/16	1/4	5/16	3/8	3/8	7/16	1/2	9/16	5/8	5/8	11/16	3/4	13/16
55°	3/16	1/4	1/4	5/16	3/8	7/16	1/2	9/16	9/16	5/8	11/16	3/4	13/16	13/16
60°	3/16	1/4	5/16	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	3/4	13/16	7/8

EQUIVALENT WELD SIZE "W" FOR PARTIAL PENETRATION BEVEL WELDS (SEE PARAGRAPH 6.8.2.5.2(2))

ATTACHMENT J

IF W MEASURED IS GREATER THAN OR EQUAL TO S SPECIFIED, NO MORE SIZE CHECKING IS NEEDED.

IF W MEASURED IS LESS THAN S SPECIFIED, CONSULT THE TABLE BELOW TO VERIFY THAT W MEASURED IS GREATER THAN OR EQUAL TO W REQUIRED.

IF W MEASURED IS LESS THAN W REQUIRED, WELD IS UNACCEPTABLE.

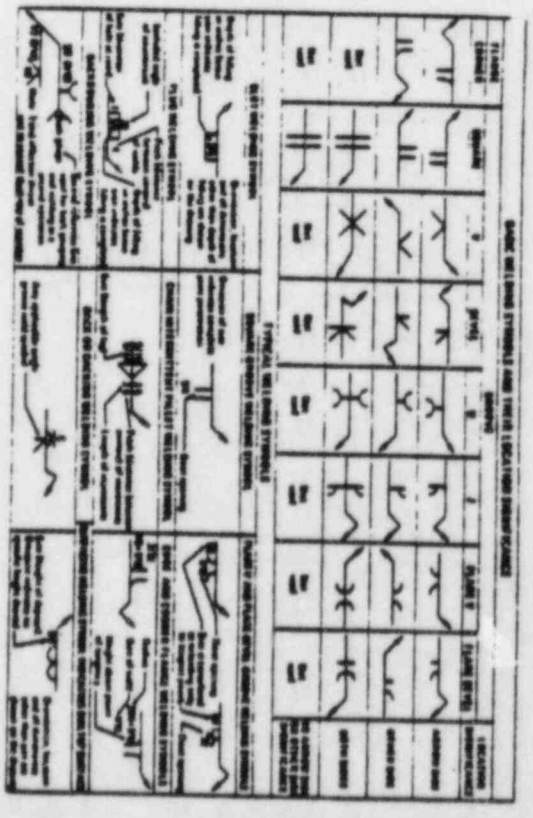
THOSE STEEL PERIMETERS LESS THAN OR EQUAL TO 24 INCHES
ALL DIMENSIONS ARE IN INCHES

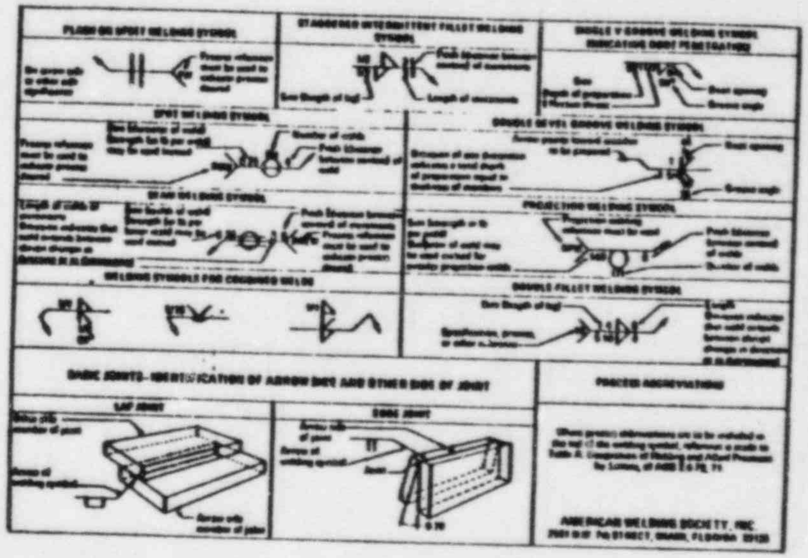
T / SMALL THICK	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
.188	3/16	3/16	3/16	3/16										
.188 < T ≤ .250	3/16	3/16	3/16	3/16	5/16	1/2								
.250 < T ≤ .313	3/16	3/16	3/16	3/16	3/16	1/4	5/8	5/8						
.313 < T ≤ .375	3/16	3/16	3/16	3/16	3/16	3/16	1/4	3/8	1/2	3/8				
.375 < T ≤ .500	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/4	5/16	3/8	7/16	5/16	11/16	1

THOSE STEEL PERIMETERS GREATER THAN 24 INCHES
ALL DIMENSIONS ARE IN INCHES

T / SMALL THICK	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
.188	3/16	3/16	3/16	3/16	3/16									
.188 < T ≤ .250	3/16	3/16	3/16	3/16	3/16	1/4	3/8	5/8						
.250 < T ≤ .313	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	7/16	5/16				
.313 < T ≤ .375	3/16	3/16	3/16	3/16	3/16	3/16	1/4	1/4	5/16	3/8	1/2	3/8		
.375 < T ≤ .500	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/4	1/4	5/16	3/8	7/16	1
.500 < T ≤ .625	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	1/4	5/16	5/16	5/16	3/8	3/8

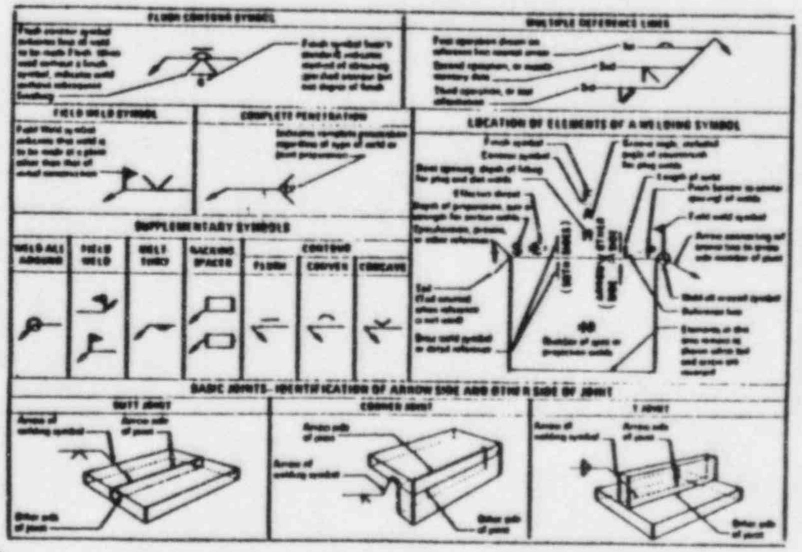
EQUIVALENT WELD SIZE "W" FOR PLATE BEVEL WELDS (SEE PARAGRAPH 6.8.2.5.2(2))





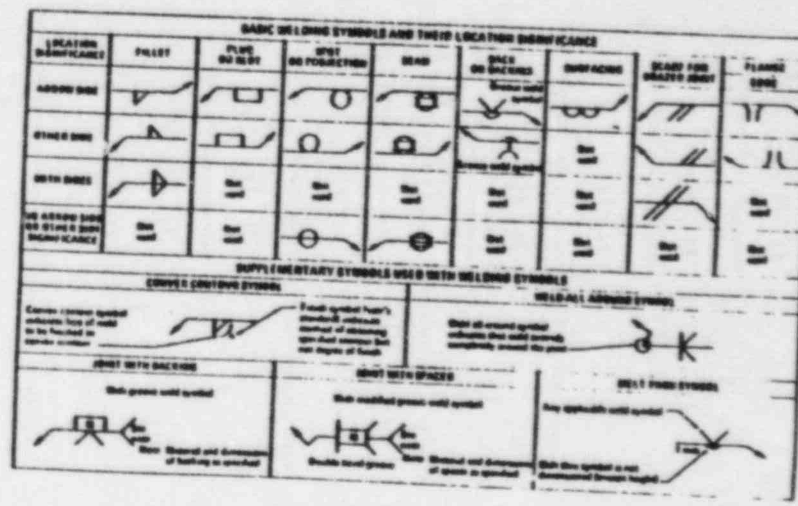
BASIC JOINTS—IDENTIFICATION OF ARROW SIDE AND OTHER SIDE OF JOINT
AMERICAN WELDING SOCIETY, INC.

7-10



FLUSH CONTOUR SYMBOL
MULTIPLE REFERENCE LINES
FIELD WELD SYMBOL
COMPLETE PENETRATION
LOCATION OF ELEMENTS OF A WELDING SYMBOL
SUPPLEMENTARY SYMBOLS
BASIC JOINTS—IDENTIFICATION OF ARROW SIDE AND OTHER SIDE OF JOINT

7-8



BASIC WELDING SYMBOLS AND THEIR LOCATION SIGNIFICANCE
SUPPLEMENTARY SYMBOLS USED WITH WELDING SYMBOLS

7-9

Meeting April 10, 1984
NRC / C. Stokes

H. Schierling	NRC Licensing Project Manager
C. STOKES	former Diablo Canyon engineer
J. CLEWETT	GAP
J. P. KNIGHT	NRC/DE
R.F. Heishman	NRC IE
J. BOSNAK	NRC/DE/MEB
B.F. JAFFELL	Battelle Columbus Laboratories
K.A. MANOLY	NRC - REGION I, Div. of Eng & Tech. programs
I.T. Yin	NRC - RIII
M. HARTZMAN	NRC - DE - MEB
E. Sullivan, Jr	NRC - DE
C. Nelson	TERA
F.C. Cherny	NRC/DE/MEB
E.M. BURNS	WESTINGHOUSE
T. Rehm	NRC
G C Cwm	Brehtel Gaithersburg
S. Ward	Bechtel "