NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD

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DATE: November 23. 1981 PAGES: 1165 - 1367



400 Virginia Ave., S.W. Washington, D. C. 20024

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1	UNITED STATES OF AMERICA
2	NUCLEAR REGULATORY COMMISSION
3	ATOMIC SAFETY AND LICENSING BOARD
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5	In the Matter of:
0	UNION ELECTRIC COMPANY : DOCKET NO. STN 50-483 OL
7	(Callaway Unit No. 1) :
8	x
9	
10	Jefferson Room B
11	Stouffer's Riverfront Inn
	St. LOUIS, MISSOURI
12	Monday, November 23, 1981
13	The hearing in the above-entitled matter reconvened, pursu-
14	ant to recess, at 9:00 a.m.
15	BEFORE:
16	JAMES GLEASON, Chairman,
17	Atomic Safety and Licensing Board
	GLENN O. BRIGHT, Member,
18	Atomic Safety and Licensing Board
19	JERRY R, KLINE, Member,
20	Atomic Safety and Licensing Board
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APPEARANCES:

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THOMAS BAXTER, Esq. RICHARD GALEN, Esq. Shaw, Pittman, Potts & Trowbridge 1800 M Street, N.W. Washington, D. C.

-and-

JOSEPH E. BIRK, Esq. General Counsel's Office Union Electric Company 1901 Gratiot Street St. Louis, Missouri

Appearing on behalf of the Applicant.

KENNETH M. CHACKES, Esq. and KAY DREY Chackes and Hoare 314 North Broadway St. Louis, Missouri

> Appearing on behalf of the Joint Intervenors, Coalition for the Environment, Missourians for Safe Energy, and Crawdad Alliance.

ROY LESSY, Esq. ROBERT G. FARLIS, Esq. Office of the Executive Legal Director Nuclear Regulatory Commission Washington, D. C. 20555

Appearing on behalf of the Staff.

A. SCOTT CAUGER, Esq.
Assistant General Counsel
Missouri Public Service Commission
P. O. Box 360
Jefferson City, Missouri

Appearing on behalf of Intervenor Missouri Public Service Commission

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2	WITNESS	DIF	RECT	CROSS	REDIRE	CT RECR	OSS	VD	BOARD
3	Donald F. Schnell								
4	Eugene W. Thomas Bernard L. Meyers								
5	By Ms. Drey			1193					
6	By Mr. Galen By Ms. Drey				123	4	46		
7	By Judge Kline By Judge Bright								1217 1221
8	Eugene J. Gallagher								
9	By Mr. Lessy	1	259						
10	By Ms. Drey By Judge Gleason			1263					1322
11	By Judge Kline By Ms. Drey			1328					1325
12	J. A. Holland								
13	Harold J. Starr								
14	By Mr. Baxter By Judge Gleason	1	342						1345
15	EXHIBIT NUMBER	FOR	EXH	UBITS NTIFICA	TION	IN EVIDI	ENCE	REA	JECTED
16	Joint Intervenors No.	28	1	1193		1193			2.04
17	Joint Intervenors No.	25		1196					196
18	Joint Intervenors No.	31		1247		1247			050
	Joint Intervenors No.	32 sical		1252					1252
19	Exhibit B Joint Intervenors No.	33		1273 1318		1273		215. 2 1	1318
20	NDC Staff Publibit No.	6		1251					
21	NAC SCALL EXHIDIC NO.	0		1201					
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	1	PROCEEDINGS
	2	(9:00 a.m.)
	3	JUDGE GLEASON: Shallwe proceed, please?
	4	MS. DREY: I'd like to start this morning with an
345	5	apology about what happened yesterday.
554-2	6	JUDGE GLEASON: I wanted to ask aquestion which I
(202)	7	wanted to ask yesterday when the other gentlemen were here, but
20024	8	I'm sure Dr. Meyers can answer.
l. D.C.	9	Whereupon,
VGTON	10	BERNARD L. MEYERS
VIHSV	11	DONALD F. SCHNELL
NG, W	12	and
ICILDI	13	EUGENE W. THOMAS,
ERS B	14	the witnesses on the stand at the time of recess, having been
EPORT	15	previously duly sworn by the Chairman, resumed the stand and
W. , R	16	were further examined and testified as follows:
SET, S.	17	JUDGE GLEASON: When you bend test a stud to fifteen
I STRF	18	degrees or more, is it then hammered back into its vertical posi-
4TT 00	19	tion or is it left that way?
ē	20	WITNESS MEYERS: It can be left and in most cases is.
	21	JUDGE GLEASON: I presume that judgment is dependent
	22	upon what load it's going to carry, what it's purpose is or what?
	23	WITNESS MEYERS: No. The bending to fifteen degrees
	24	and leaving it in the same position has absolutely no effect, so
	25	it can be left. One does not have to go back and look at any-

1 thing. The code -- the design allowables are such that a 2 3 decrease in the length associated with this fifteen degrees has 4 no effect on the carrying capacity. Therefore, it may be left in that position. 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 6 JUDGE GLEASON: Thank you. 7 (Pause.) 8 While we're waiting, I'll clear up another concern I 9 have, Mr. Schnell. 10 WITNESS SCHNELL: Yes, sir. 11 JUDGE GLEASON: In your testimony you indicated that 12 when you applied the reinspection to the approximately 80 or 13 81,000 machine-welded studs, the rate of failure was less than 14 one percent. 15 WITNESS SCHNELL: Yes, sir, less than a tenth of one 16 percent, I believe. 17 JUDCE GLEASON: One-tenth of one percent, that's right. 18 But that was not really a test of all 80,000 welds. It was a 19 test of those that originally inspected first saw some defects in 20 the weld and then it was at that 400-and-some that were found to 21 have visual defects that the test was made. And so that when you 22 make that statement of one-tenth of one percent, it seems to me 23 it should be qualified a little bit. Or should it? 24 WITNESS SCHNELL: I don't believe so, sir. 81,000-25 plus studs were inspected for the criteria that were discussed.

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in other words, 360-degree flash around the base. Those that did
 not have the flash 360 degrees around the base were then subjected
 to the bend test.

So one would have to say that the study rejected were
really those that could not withstand the bend test out of the
81,000. There would be no reason to bend-test study which
visually comply with the AWS requirements.

8 JUDGE GLEASON: I'm not arguing that point.
9 WITNESS SCHNELL: All right.

JUDGE GLEASON: Just a minute and I'll find your -- I think I'll find it.

WITNESS SCHNELL: Is it in the written or in the verbal?
JUDGE GLEASON: It's in the written testimony.

WITNESS SCHNELL: Page 28, I think. Let's see -- excuse me. Page 19.

(Pause.)

JUDGE GLEASON: All right. Now on page 19 -- and this is & small point. It just follows more the matter of choice of words more than anything else, but I just want to clear it up in my own mind. Your fourth point, you say 66 studs failed the bend test. That's one in 1,237. You really don't literally mean that, do you?

23 WITNESS SCHNELL: I see what you mean. The one in
24 1,237 represents a ratio between 65 and 81,000.

JUDGE GLEASON: And 81,000. That's right.

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•	2	matter of
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WITNESS SCHNELL: Yes. I see what you mean. It's a tter of semantics, I think, sir. The 81,000 studs were not nd-tested, obviously. You're right.

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The presence of the flash --

JUDGE GLEASON: So when you say that eight-tenths of
one percent failed the bend test, you have to quality that. That's
all I'm saying.

WITNESS SCHNELL: All right, yes, sir.

(Pause.)

JUDGE GLEASON: Mr. Baxter, how are you coming with the Daniel people?

MR. BAXTER: We were able to contact -- well, I'm not sure we contacted them or their relatives, but we have arranged for them both to be here today.

MS. DREY: Yesterday I hoped to finish organizing or organizing my notes on the way downtown in my friend Vera Falk's car, but her car is small and it was filled with my boxes of documents, a dolly to carry them with and a big coffee pot for veryone here.

She had realized that on Sunday morning there would be no provisions for hospitality services for meetings and conferences. It was she also who made arrangements for us to have water yesterday here.

JUDGE GLEASON: We're very grateful to her for that.
MS. DREY: I would like to apologize most sincerely

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on the record for my conduct yesterday morning. I had not known until 6:00 p.m. or shortly thereafter Saturday evening that there 2 could be a Sunday session. I had known of the Saturday session 4 for many weeks and the fact that we were meeting on a Saturday had surprised me too.

But it had never occurred to me until Mr. Gleason's announcement at 6:00 or thereafter that a Sunday session was even a possibility. I had intended to spend the entire day and evening Sunday going through the Tuesday through Friday transcripts which I had. Mr. Gleason had been nice enough to lend me his copies overnight for photocopying each day in response to Joint Intervenors' request during the pre-hearing conference that we be provided a copy, free of charge, of the transcript as per 10 CFR 2 ---

(Pause.)

15 JUDGE GLEASON: Mrs. Drey, we're familiar with the 17 provision of the regulations.

18 MS. DREY: Where is it where we are entitled to ask for 19 a transcript free? For those here who may not have understood --20 or may not understand what happened yesterday, I would like to 21 describe for the record what happened and what --

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1 My watch indicated 9:00 a.m. I told Mr. Gleason I was 2 ready to have the session begin. I had noticed that the tran-3 script records indicate the hour and minute of the day in which 4 each session begins and in the interest of recognizing Mr. 5 Gleason's intent to be fair to me in giving me a full three hours 6 of time in which to cross examine the two Lehigh University 7 experts, I wanted to record to show that the parties were present 8 and that we entered into my three-hour session promptly.

I had clearly been forewarned that the 12:00 noon closing time to my session was firm. During my early morning Sunday work session, which had started early, as I was going through the transcript and my new and old notes, I realized that I could not possible ask and receive answers to all the questions I felt I needed to ask of the Lehigh experts on behalf of the Joint Intervenors.

16 It occurred to me then that it was important not to 17 waste any time on legal arguments about admissibility and so forth. 18 It also occurred to me that I could preserve those questions in 19 ways other than through the traditional way of cross examination. 20 It was then I decided to crganize the questions in my Lehigh 21 expert witness -- in my Lehigh test folder so that I could end up 22 with a collection I could swear under oath contained exactly the 23 number of written questions I had still remaining at the close 24 of my three-hour session. I had decided that in order to make 25 certain that the full Atomic Safety and Licensing Board and its

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	1	staff knew what answers that I felt were still necessary to
	2	accumulate before making a decision on this operating license
	3	application, I wanted to compile those questions.
	4	(Pause.)
345	5	I had sort of figured out during the early morning
0 554-2	6	Sunday work session that I sort of owned the three-hour period of
1 (202	7	the Lehigh gentlemen's time. I could use those three hours in
2002	8	whatever way I wanted. I had been granted by the Chairman three
N, D.C	9	hours of their time and I believed when I learned of Mr. Gleason's
NGTO	10	decision that it was an incredibly fair decision and I still
VASHL	11	believe that.
INC.	12	My interest was in establishing the credibility or lack
RUITIO	13	of credibility of the Lehigh tests.
SHAL	14	(Pause.)
NOTED	15	I have been under so much time pressure, as you know,
3.W.	16	and in bearing such a tremendous sense of responsibility, that if
E.E.1. 2	17	you will remember on Saturday I had to stop in the middle of a
H SIK	18	sentence and go out into the hall because I had started crying.
11 005	19	Neither the time pressure nor the sense of responsibility has
	20	subsided, but I figured out finally that I had some options and
	21	those were the options I believe I presented to you, that in order
	22	to preserve the questions I believe this Board has an obligation
	23	to examine and I believe they are far more than a two-week or
	24	one month courtroom proceeding can establish, especially when
	25	witnesses on one side are being given an opportunity to answer

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questions, I had decided yesterday, as I tried to say just then. that I would keep track of all the questions I came into yester-3 day morning's session with and any that developed during yesterday morning I would add to that and then I would hand those questions to you, Mr. Chairman, and ask that they be entered in evidence and I had announced, I believe, at that same time vesterday that if you chose not to accept them -- and I can certainly understand why -- that I would then give them to my friend Vera who had agreed to get them typed so that they would represent 10 just what I felt at that moment when the Lehigh University men would have to leave would be unanswered questions that I think are 12 very important.

13 I shall treat my three hours today in the same way. I 14 hope that it won't take me as long to organize what I would like 15 to do. Partly, I want to be certain, first, that I take care of 16 getting materials into the record or at least offering them and 17 because of my total lack of experience in any proceeding like 18 this, except as a witness and sometime as an advisor, I am certain-19 ly operating at a disadvantage.

20 I wanted, before I arrived this morning, to look up two 21 parts of 10 CFR that I think are relevant to my comments this 22 morning. One is not important. It had to do with the transcripts. 23 I think we are entitled to them even though the NRC funding has 24 perhaps been reduced. But the other is that as I read the Code 25 of Federal Regulations, title X, chapter 1, citizens and organi-

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zations may appear as intervenors if they meet certain criteria, such as if they have membership within fifty miles of the accident, pretending as if there is no impact on us in St. Louis, who live beyond that distance, but as long as they meet criteria that are spelled out somewhere they may appear as Intervenors and you could tell me quickly. They may be represented by an attorney or by a member.

And I rejoined the Coalition for the Environment, which my husband helped formulate, and he was one of the first presidents, in order to be able to appear before you. And I'm not --I hope -- I certainly have delayed the proceedings because of my inexperience, but I have not done it because of any intent to do that.

14 I believe, on the contrary, we have snortened these 15 proceedings by untold weeks, if not longer, because we have 16 reduced our contentions from two major contentions to one. Even 17 the one that we have preserved has been slashed as far as time is 18 concerned. We have told you that we will not be asking questions 19 of any witnesses on the dome. We chose to -- not to pursue the 20 concrete cracks such as the twelve-foot crack in the auxiliary 21 building wail or control room building wall, I don't even 22 remember right now, and concrete cover because we knew that we 23 did not have the time to deal with all of the many hundreds of 24 documents that we purchased at 15 cents a page from Union Electric. 25 Furthermore, we knew when we even submitted our Joint

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petition that we would absolutely not ask anyone to appear on our behalf as an expert witness. I personally have suffered with 2

Bill Smart's family for years now.

(Pause.)

We have been in a position to help him financially, not as much as I would like, but I had no intention of jeopardizing occupations and futures of anyone else who might choose to speak out against the nuclear industry.

May I have a few moments, please, sir?

JUDGE GLEASON: Please do.

(Pause.)

MS. DREY: Actually I guess I'm going to ask for a long 13 pause again today so that I can not stop and start. Before I do that, I had sort of wanted to ask about some ground rules for 15 this morning's session.

16 I had hoped to do that yesterday morning. And I had 17 hoped to have what I have separated out as my introduction, which 18 is I don't know how many different piles. Everything says 19 introduction and lots of them say start absolutely here first, 20 and I have lots of those, so it's kind of hard to know what , do. 21 I'll grab one. It says to start absolutely first, ground 22 page one, and I'll just read this.

23 Dear Mr.Chairman, I would like to start this morning's 24 three-hour session by asking some questions about the ground 25 rules for a federal evidentiary proceeding, if I may. I have



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1 MS. DREY: Well, I don't think -- you know, as I said --2 well, I have been a witness in a case we won in the Missouri 3 Supreme Court and my lawyer told me all I should say was yes, no, 4 or I don't remeber, and one time I was so frightened I said all 5 three. 300 77H STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 6 JUDGE GLEASON: I might say in distinction to that --7 MS. DREY: Pardon me? 8 JUDGE GLEASON: I might say in contrast to that it is 9 not inappropriate to ask leading questions on cross examination. 10 MS. DREY: Okay. Well, part of my problem in this 11 proceeding is -- well, everyone yelled at me and I think I have 12 said that on the record before, except my mother, because that's 13 just not my personality and I'm not comfortable doing that. 14 I have something here that says the last thing to read 15 at the end of the introduction but before I pause to make sure 16 I'm organized -- maybe that doesn't come next -- I have -- I 17 would like to spend a little time this morning, and I honestly 18 don't know how much, I certainly did not dream yesterday that it 19 would take me as long as it did to get organized. 20 JUDGE GLEASON: All right. Let us --21 MS. DREY: I guess there was one other -- one of the 22 things I tried to do this morning, and I have been working for 23 many hours, was to at least figure out categories of questions 24 that I wanted to ask these gentlemen and I wanted -- I would like 25 to be able to present my questions in such a way that I would be

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allowed to ask a series without be interrupted and I'm perfectly î willing to at the end of -- I'm sorry to split an infinitive, but 2 I would be perfectly willing at the end of a given series of 3 4 questions to run the gamble of having the attorneys for either party object to the package, but I finally realized yesterday 5 that the mere gimmick of raising an objection is a very clever 6 7 and terribly effective way, particularly with somebody like me 8 who has no experience of -- what's the phrase, leading the witness? 9

JUDGE GLEASON: That is the phrase that you asked me about.

MS. DREY: Well -- so that I was hoping to avoid that.
I would very much like to be able to today to the best of my
ability in some cases to ask a series of questions and, as I said,
I want to work right for a while making sure that those documents
I want to submit were in groups -- packages -- of questions and -I think that's all I need to say right now.

JUDGE GLEASON: Let me say this, Mrs. Drey. The procedure by which cross examination takes place is a method which has generally throughout the years been found effective for an individual to challenge the probative value of testimony, to challenge --

MS. DREY: I don't even know what that word means.
JUDGE GLEASON: It means the statements, the evidence,
that they have put in is put in as proof of their position. It's
probative. Cross examination also is a method that has been

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found very successful throughout the years of attacking, if you will, or challenging, bringing into question the credibility, the integrity of the witnesses.

But this is not a process that can be abused. This is a process that must be used and it is used in typical manner by you asking the question and waiting for a response and then asking another. Attorneys who represent -- who are representatives of the witnesses who have sponsored, in effect, these witnesses in presenting their cases, have an obligation to challenge questions that contain or ask for irrelevant answers, contain irrelevant statements, contain material that is not probative and therefore is prejudicial in the sense that it clouds the record with statements that don't lead anyone -- or confuse people or confuse, certainly, the Board in trying to make a decision at the time the Board has to make a decision.

16 Now I can't say anything more, I guess, than what I have 17 said, which is a fairly brief summary. I don't think that I would 18 permit and I don't think the process would be helped by you 19 asking a long series of questions before the individuals answer. 20 If you have three or four questions that you want to ask them, 21 you can, I am sure, say these are the guestions I am going to ask 22 you and read them off. The questions should not contain speeches. 23 They should not contain self-serving statements, because those 24 also are not helpful as far as keeping the record full of substan-25 tive, probative evidence.

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Mr. Baxter?

MR. BAXTER: Yes, Mr. Chairman, I regret taking up hearing time, but I feel that the record would not be complete if some of Mrs. Drey's statement were left unresponded to by the Applicant.

I appreciate the Chairman's remarks about the role that attorney's objections play in developing a reliable and sound 8 record and I do personally feel that we have been very restrained 9 and we have consciously attempted to be so in recognitior of Mrs. 10 Drey's inexperience in legal proceedings.

11 But on that point I will also have to respond that Mrs. Drey was in attendance at the construction permit hearings before 12 13 the Atomic Safety and Licensing Board on this plant and I know 14 from my client that she has participated in and observed numerous 15 hearings over the course of the years in connection with the 16 Callaway plant, including permit proceedings before the Corps of 17 Engineers on the Clean Water organization and that her organization 18 has participated actively in many hearings with respect to this 19 plant.

20 With respect to yesterday's proceeding and hearing it 21 should be clear that on Saturday morning, after over two days of 22 cross examination of this panel, we asked if Mrs. Drey could 23 concentrate her cross examination on Drs. Fisher and Slutter so they could be released. It was at the conclusion of that day, a 24 full day of hearing, when she had rot completed her cross examina-25

tion of those two gentlemen that it was decided to hold a half a
day session on Sunday.

3 It's my impression that this was done solely to accommo4 date Mrs. Drey and not in any way to inhibit her presentation here,
5 but to assist her in providing her with a few extra hours in order
6 to cross examine those witnesses.

I also have to respond to the comment that yesterday's
session or any others is time which Mrs. Drey or the Joint
Intervenors own. It should be understood that this Board has a
responsibility to the public interest and not just to the parties
who are in atcendance at this proceeding. And I think it's one
of the Board's obligations in light of that responsibility to see
that the hearing moves along in some kind of an expeditious manner.

14 And on that point I understand Mrs. Drey is requesting time again this morning, as was done yesterday, in order to organize. 15 16 I think we need to ascertain whether there are ever going to be questions posed of this panel before the noon recess, and if there 17 are not, if we are just going to have written questions again 18 19 provided to the Board or anyone else, I think we ought to allow 20 Mr. Galen to conduct his redirect examination now. It may help 21 Mrs. Drey to focus in on what her positions are and direct the remaining parts of her questions to that cross examination. But at 22 23 least we will have the record developing rather than spending 24 idle time here, which I don't think is in the public interest. 25 MR. PERLIS: Staff also has one brief comment on Mrs.

1 Drey's remarks.

She stated earlier that witnesses on only one side were given an opportunity to answer questions here. We think the record should be very clear that Joint Intervenors have the option under NRC rules both to call their own witnesses and subpoena any other witnesses they think would be relevant here. The decision not to call any witnesses was made solely by the Joint Intervenors and not by any other party.

9 JUDGE GLEASON: All right, Mrs. Drey, I really think if 10 you're going to take time, which I gather you need to do or you 11 want to do, to prepare your questions, could we have some indi-12 cation, because yesterday, you know, it went until 11:30, and so 13 by the time the Board got through making its statement you had a 14 half-hour left to ask questions. Are you going to be able to do 15 it in a quicker fashion than that yesterday?

MS. DREY: It's the same problem, you know. I thought this was the compromise that we -- or that you figured out, that I -- I don't think that's fair that Mr. Baxter would say that I didn't ask any questions yesterday. I asked them in a great hurry. I asked enough to submit some material into evidence.

I certainly am not -- I have this folder full of notes having to do with materials I do want to offer in evidence and I was -- I have not read much about law, but I did think even from my experience here before when I'd bring up some document to introduce, if I haven't established a foundation that brings it

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1 into some kind of context with the Callaway plant or quality assurance or whatever, it's thrown out. And so that is what I 2 3 have been trying very hard to do, is to demonstrate by a series of questions which if I were experienced could be much shorter. 4 I have -- that's what the series of questions are that I have worked 5 on and I would be happy at this point to give whoever needs time 6 within this period before noon, now you're putting pressure on 7 8 me that I have, what, less than noon to ask these men questions? 9 Is that what they are implying? Is that what Tom Baxter is 10 implying?

JUDGE GLEASON: No, they're not. Mr. Baster -- Mr. 12 Baxter --

MS. DREY: That's right.

14 JUDGE GLEASON: -- asked --

MR. BAXTER: Mr. Chairman, I think that was veryinappropriate.

17 JUDGE GLEASON: I think that's an inappropriate remark 18 and should be stricken.

Mr. Baxter asked so we do not get into a situation like we had yesterday that you'd give an indication that you are going to complete your work and will ask questions so that we're not forced into that kind of bind. I don't think you're in a position, apparently, to give us that kind of indication, so we're going to recess --

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MR. LESSY: Just one suggestion. Perhaps you could show

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put in evidence and counsel for the Applicant, as well as counsel for the Staff, can look at those and if there are no problems with certain of those documents, if they have been identified before, if we have seen them, if they have copies of it, maybe, as it worked the other day, we can avoid having /ou go through the formal procedures with respect to those documents and let the governing procedures govern only the document to which there is an objection. MS. DREY: I appreciate that, Mr. Lessy. And as I have appreciated -- and I mean this genuinely -- your offers of help

11 appreciated -- and I mean this genuinely -- your offers of help 12 as we have gone along. I -- that's part of my problem this 13 morning. Someone, one of the attorneys of the other parties, said 14 to me yesterday in one of the breaks, our experience with Calla-15 way construction has been, you know, really very good and I 16 realize that if he thought that there must be other people who 17 think that as well, and so some of the time I have spent this 18 morning has been to pull out some records that I think indicate 19 quality assurance problems and in order -- I knew if we didn't 20 ask all of these it would make it harder for everybody.

us the documents in the first part of the recess that you want to

21 So another friend, Bobie Silverblatt, is at the Xerox 22 place right now trying to get ten copies of each of the documents 23 that I felt I wanted to offer.

JUDGE GLEASON: All right, Mrs. Drey, why don't you get started on your review and I'll be coming back periodically to ask

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	1	if you are prepared to proceed.
		ir you are propared to proceed.
•	2	MS. DREY: May I ask one other question too?
	3	JUDGE GLEASON: Yes, go ahead.
•	4	MS. DREY: I thought you made it very clear that I
345	5	that this panel would lose the whatever that's called the
554-2	6	table at noon.
(202)	7	JUDGE GLEASON: Right.
20024	8	MS. DREY: And I have been trying to operate with that
4, D.C.	9	understanding and I think you said Mr. Gallagher, the NRC witness
VGTON	10	would start at 1:00. Is that right? So there will be one hour
VASHD	11	in-between?
ING, V	12	JUDGE GLEASON: Right after the noon recess, whenever
	13	that is, yes.
rers 1	14	MS. DREY: All right. I guess what we didn't resolve,
EPOR	15	and I think I would appreciate it if you would do it right now,
.W.	16	because I need to figure backwards, would you please decide, as
EET, S	17	you did on Saturday at 6:00 when you made the decision that you
H STR	18	you figured out I asked you to figure out just one moment,
TT 008	19	please.
	20	MR. BAXTER: If it would help, Mr. Chairman, we do have
	21	twenty to thirty minutes of redirect, as we indicated vestorday

help, Mr. Chairman, we do have thirty minutes of redirect, as we indicated yesterday. JUDGE GLEASON: Thank you.

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23 MS. DREY: I would like --

24 (Pause.)

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I would like to say for the record that, Mr. Gleason, you

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had asked me -- I wrote down at 6:00 on Saturday, you said how much longer are you going to take on embeds, which was a question I have been asked by people from the first day and it's a legitimate question. I responded, I'll take as long as you let me take. And then I believe that was when you went back and discussed it with your colleagues and I think, as I said, I thought that was an excellent answer. But then you said -- you said I could have until noon with the Lehigh gentlemen, and I have said at the very beginning that the only thing I knew was that I had a chronological sequence I wanted to follow and obviously the Lehigh University test would be last.

12 I will say I was taken off-guard to find out there was 13 another set of Lehigh University tests about which I had known 14 zero and that came out late Saturday afternoon. And so that 15 really confused me, but I had intended to ask guestions about the 16 Lehigh University test of the summer of '80, but I would like to 17 know, as I said, if these gentlemen are stepping down at noon, 18 would you please give me a time in that I can do whatever I 19 wanted, if I want to ask one question or no questions. I would 20 like that opportunity.

21 JUDGE GLEASON: Mrs. Drey, they are available and have 22 been since 9:00 for your juestions.

23 MS. DREY: I understand that. I can't -- I have so
24 many questions. You asked a couple of questions and I would like
25 to ask questions in response and that's what happens, so I would

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D.C.

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1 like to stick with my own questions and I'd just like to ask you 2 when you wont me to stop talking.

3 JUDGE GLEASON: You should not attempt to put the 4 presiding officer in a position of deciding things which you must 5 decide alone. I have told you that pased on my judgment the time 6 that this panel has been on the stand, the areas in which the 7 questions have covered, and the opportunities that you have had to 8 interrogate them, that they will be finished here today at 12:00, 9 so you make up your mind before then, after your review, as to 30 when you want to start asking questions. They are available 11 now.

MS. DREY: No, that's not my question. I want to know how much of that time before noon you want to save for the other two parties. That's my question.

JUDGE GLEASON: I'm not saving any of that time for them.
Their time will come subsequent to that, so you have until 12:00.
MS. DREY; Okay, that's what I wanted to understand.
JUDGE GLEASON: Let's stand in recess and the reporter

(The recess began at 9:50 a.m.)

19 will please record the time.

20

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22 23

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JW5each #4	
1	JUDGE GLEASON: Let's go back on t
2	Please record the time. Go ahead, Mrs. Drey.

20024 (202) 554-2345

D.C.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

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(The recorded time is 11:13 a.m.)

Let's go back on the record.

MS. DREY: I would like to try to submit for the 4 record a copy of a -- what did you call the embed? Some 5 material exhibit, or something? 6

JUDGE GLEASON: Item? Specimen? 7 MS. DREY: Pardon me? 8 JUDGE KLINE: Physical exhibit. 9 JUDGE GLEASON: Physical exhibit? 10 MS. DREY: Physical exhibit? I would like -- Joint 11 Intervenors would like to offer in evidence a box of cards 12

that were used yesterday, or maybe the day before, that has 13 one piece of paper for each embedded plate, and they're filed 14 by place type. I wonder if I could --15

MR. BAXTER: Mr. Chairman --

JUDGE GLEASON: Well, I think that that is going 17 to be objected to. 18

MS. DREY: Well, is there some way to have -- Well, 19 then, I would like it in the record as a rejected exhibit. 20

JUDGE GLEASON: Well, you have offered it, and I 21 think the record is clear as to what it is. 22

What is the Applicant's position? 23 MR. BAXTER: We object to this, Mr. Chairman. 24 25 This is Mrs. Drey's own work product, or her group's work

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	1	product, and not that of any of the witnesses. We have not
	2	had the opportunity to review it. We can't test it or
	3	confront it. For all those reasons.
	4	JUDGE GLEASON: And I would have to sustain the
10	5	objection, Mrs. Drey.
994-Z3	6	MS. DREY: Okay. But so I can give it to you
(202)	7	as a rejected exhibit? That's what I'd like to do.
12007	8	JUDGE GLEASON: Yes, I suppose so.
D.U.	9	MS. DREY: As rejected exhibit number too? Is that
CIUN	10	what you call it?
ASHEA	11	JUDGE GLEASON: No, no. We've had more than that.
L.G. W	12	MR. LESSY: Sequentially, it is Joint
IGTIO	13	JUDGE GLEASON: It is Joint Intervenors' Exhibit
EKS B	14	No. 28, rejected.
DIG	15	MR. LESSY: And we're going tohave to be furnished
W. * vI	16	the parties are going to have to be furnished copies of that.
51. 3	17	MS. DREY: Well, what'd you do oh. Oh, I see.
SILC I	18	Well, then, maybe we better not do that because there's no way
111 (11)	19	to copy all that.
9	20	Okay. Well, I rescind that offer, then. Would we
	21	have to give you ten of those?
	22	JUDGE GLEASON: Pardon?
	23	MS. DREY: Is that right? You have to have ten of
	24	those boxes like that?
	25	JUDGE GLEASON: You would have to have copies of it.

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	1.11		
	1		MS. DREY: Okay. Well, we'll have to not do that.
	2	Tne reason	I wanted to refer to it, it was used yesterday.
	3	It's a box	which is index to the 610-page Joint Intervenors'
	4	Exhibit.	
545	5		JUDGE GLEASON: Yes. We understand.
554-2	6		MS. DREY: Yesterday we referred to NRC Inspection
(202)	7	Report No.	77-05. Did I submit it or the day before?
20024	8		JUDGE GLEASON: I don't believe it's been
4. D.C.	9	submitted.	
NGTOP	10		MS. DREY: It's somewhere around here.
ASHI	11		(Pause.)
INC. V	12		Well, we'll have to wait on that. When it's found,
SUILD	13	is it okay	to offer it into evidence?
FERS	14		JUDGE GLEASON: Mrs. Drey, you can offer into
EPOR	15	evidence an	ything at any time.
. W. , H	16		MS. DREY: Do I have to have it in my hand and
EET, S	17	show it to	them? Or do they look at it?
H STR	18		JUDGE GLEASON: You have to show it to the attorneys
11 005	19	to	
	20		MS. DREY: All right.
	21		(Pause.)
	22		MS. DREY: Do I have to say something?
	23		JUDGE GLEASON: Are you offering this?
	24		MS. DREY: We are offering Nuclear Feedulatory
	25	Commission	Inspection Report No. 77-05 in evidence, please.

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	1	(Documents distributed.)
	2	JUDGE GLEASON: Gentlemen?
	3	MR. GALEN: Mr. Chairman, to the extent that this
	4	inspection report deals with embedded plates, we have no
345	5	objection to its introduction.
) 554-2	6	MR. LESSY: The same position for the Staff,
1 (202	7	Mr. Chairman.
2002	8	JUDGE GLEASON: All right. The Inspection Report
N. D.C	9	will be admitted as Joint Intervenors' Exhibit No. 28, as it
NGTO	10	relates to matters contained in the embedded plate issue.
NASHI	11	(The document referred to was
ING. 1	12	marked as Joint Intervenors'
BUILD	13	Exhibit No. 28 for identification
TERS	14	and received in evidence.)
REPOR	15	BY MS. DREY:
S.W. , I	16	Q Dr. Meyers, have you looked at this lately? Would
EET.	17	you please look at page 7?
H S/B	18	A (Witness Meyers) I have page 7, Mrs. Drey.
300 71	19	Q This speaks about the 360-degree welds as required
	20	by AWS D1.1-75, and then above it says at the very top line:
	21	"Bechtel shop inspector must verify final inspection of the
	22	completed fabrication for materials, construction, dimensions,
	23	general workmanship, cleanliness, marking, tagging, and
	24	preparation for shipment for each item."
	25	Does one of those verifications include making

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1	certain that the plate was fabricated according to AWS D1.1?
2	Which one of those words would indicate that compliance to
3	the Code?
4	(Pause.)
5	I just wanted a word.
6	A Well, actually I think all of the words indicate
7	that the final inspection verification includes verifying that
8	the materials to be delivered satisfy the technical
9	specification.
10	MS. DREY: Okay. Thank you. I would like to
11	offer this into evidence or did I?
12	JUFGE GLEASON: You already have, Mrs. Drey.
13	MS. DREY: Is that all I have to do?
14	JUDGE GLEASON: That's all you have to do.'
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	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 21 22 23 24 25

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	1	MS. DREY: Joint Intervenors would like to offer into
	2	evidence a set of newspaper articles from the 3t. Louis Post-
	3	Dispatch concerning construction at the Callaway plant.
554-2345	4	(Pause.)
	5	There is an article
	6	JUDGE GLEASON: Mrs. Drey, we'd like a copy.
4 (202	7	MS. DREY: Could I just read it?
2002	8	JUDGE GLEASON: Do you have a question?
N, D.C	9	MS. DREY: I will have. I want to offer this collection
NGTO	10	of three pages of reprints from the St. Louis Post-Dispatch.
ASHI	11	(Pause.)
ONIC.	12	JUDGE GLEASON: Gentlemen?
BUILL	13	MR. BAXTER: We have not got a copy yet, Mr. Chairman.
TERS	14	(Documents being distributed.)
REPOR	15	MR. BAXTER: Mr. Chairman, the Applicant does not
S.W	16	object to the documents being used in examination to try to
RET.	17	impeach the witnesses' testimony or discredit it. However, we
TR STI	18	would oppose receipt into evidence of these documents for the
300 77	19	truth of the matters. They are hearsay, third party at best.
	20	They are unreliable. We have not been given copies on the
	21	schedule required by the Board's orders, and we don't think it
	22	would assist in the development of a sound record to have news-
	23	paper articles speaking for the truth.
	24	MR. LESSY: The Staff joins in those objections. It
	25	objects to the first page on the grounds of the best evidence

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1 rule. On the copy, May 11, 1978, there is a reference to an NRC report and a summary of that report in context -- I mean, out of 2 3 context, and that clearly is not the best evidence of the subject 4 of those matters. 5 JUDGE GLEASON: I am ready to sustain the objection. The D.C. 20024 (202) 554-2345 objection is sustained, Mrs. Drey. They can not be admitted in 6 7 the record. You may use them to impeach the credibility of the 8 witnesses with questions if you so desire. 9 MS. DREY: All right, this means it's in with a group 300 7TH STREET, S.W. , REPORTERS JUILDING, WASHINGTON, 10 of rejected documents? 11 JUDGE GLEASON: It will be Exhibit 29, rejected. 12 (The document referred to was 13 marked Joint Intervenors Exhibit 14 Number 29 for identification and 15 was rejected.) :6 MS. DREY: Mr. Schnell, are you familiar with --17 JUDGE GLEASON: I should say it's a front page St. Louis 18 Post-Dispatch dated May 11, '73. The second item is an excerpt 19 from the St. Louis Post-Dispatch, page 4A, dated October 16, 1977. 20 And the last one is also from the St. Louis Post-Dispatch, 21 September 29, 1977, which appears to be the front page. 22 Go ahead, Mrs. Drey. 23 24 BY MS. DREY: 25 Mr. Schnell, have you seen any of these articles before Q

	1944	
	1	that you can remember?
	2	A (WITNESS SCHNELL) I don't remember.
	3	Q Do you remember a time in the fall of 1977 when there
	4	were some articles about the fact that the there was a delay,
345	5	for instance, at the Callaway construction site?
554-2	6	A Mrs. Drey, I normally read the St. Louis Globe-Democrat.
1 (202)	7	Q So you don't think you saw these articles.
20024	8	A I may have. I said I can't remember.
N, D.C.	9	Q There's an article here, October 16, 1977, looking into
NGTOP	10	complaints of Callaway plant defects. Do you think that the fact
VASHL	11	that there were well, do you think there were any articles in
ING, V	12	the newspaper in 1977 in the St. Louis media?
BUILD	13	A Yes, there are articles.
TERS	14	Q About the problems with construction at the Callaway
REPOR	15	site?
S.W 1	16	A I appear to be looking at some from the Post-Dispatch,
EET,	17	yes, ma'am.
H STB	18	Q Do you think that the fact that the media paid any
300 71	19	attention to these problems made any difference in whether or not
	20	Union Electric was able to resolve questions such as the embeds
	21	more grickly perhaps than if the media hadn't been paying atten-
	22	tion?
	23	A Media attention had no effect on our actions.
	24	Q Okay, thank you.
	25	(Pause.)
		이 아파 이 아파 가지 않는 것이 아파 가지 않는 것이라. 이 가지 않는 것이 아파 가지 않는 것이 가지 않는 것이 가지 않는 것이 하는 것이 하는 것이 아파 가지 않는 것이 아파 가지 않는 것이 가 나는 것이 가지 않는 것이 아파 가지

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	1	MS. DREY: Mr. Chairman, I have a collection of ten
	2	letters which I, Kay Drey, wrote spanning a period of time from
	3	December 6, 1977, through March 26, 1979, which I would like to
	4	distribute.
345	5	(Documents being distributed.)
) 554-2	6	The first letter is to the two Missouri United States
4 (202	7	Senators, Eagleton and Danforth, dated December 6, 1977
. 2002	8	MR. LESSY: Wait one second, Mrs. Drey, we have not
N, D.C	9	seen
NGTO	10	MS. DREY: I thought I'd read the list.
WASHI	11	JUDGE GLEASON: They want to follow it.
NNG, 1	12	MS. DREY: I would like to offer this collection.
BUILL	13	JUDGE GLEASON: I understand.
TERS	14	MS. DREY: Just as a collection. They can either be
REPOR	15	rejected as a collection or not. That's what I'm offering.
S.W. , 1	16	JUDGE GLEASON: Do you have copies yet?
REET,	17	MR. GALEN: Yes, we have copies.
UIS HJ	18	JUDGE GLEASON: Now identify them, Mrs. Drey.
300 71	19	MS. DREY: The first letter is dated December 6, 1977,
	20	to Senator Thomas Eagleton and Senator John Danforth. The second
	21	letter is dated January 12, 1978, to Mr. James G. Keppler, Director,
	22	Region 3, Nuclear Regulatory Commission.
	23	The third letter is dated February 19, 1978, addressed
	24	to the Missouri Members of the U.S. Senate and House of Represen-
	25	tatives. The fourth letter is dated April 20, 1978, to the former

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The fifth letter is dated July 17, 1978, to Mr. Keppler.
The sixth letter is dated July 27, 1978, also to Mr. Keppler. It's an addendum to the letter of July 17.

7 The seventh letter is dated August 28, 1978, and is also
8 to Mr. Keppler. The eighth letter is dated September 1, 1978, to
9 Messrs. Wolf, Clark and Tubridy, Atomic Safety and Licensing
10 Board, U.S. Nuclear Regulatory Commission.

The ninth letter is dated September 11, 1978, to Mr.
Keppler. And the tenth letter is dated March 26, 1979, to Mr.
Keppler.

14 MR. GALEN: Mr. Chairman, the Applicant objects to the 15 introduction of these letters. They are clearly hearsay material. 16 They contain hearsay within hearsay, quotes from other persons. 17 We have had no opportunity to cross examine either the author of 18 these letters or the individuals guoted therein. They contain 19 extraneous and totally irrelevant materials, from my guick review 20 of these letters, dealing with many items not at issue in this 21 hearing.

22 Mrs. Drey is attempting to testify through these docu23 ments and I think it is a wholly inappropriate mechanism to be
24 used in this hearing.

JUDGE GLEASON: All right.

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MS. DREY: Sir, may I submit an offer of proof? JUDGE GLEASON: Yes.

MS. DREY: Joint Intervenors believe the existence of these letters helps explain some of the reasons why it took over three years before Bechtel and Union Electric were able to elicit the requisite closeout on the impact requested from Callaway.

We believe these letters and others like it are part of this history. Joint Intervenors believe that without these letters there would have been no tests beyond those described in Bechtel's final report of August 1977.

12 Furthermore, we believe the existence of these letters 13 made it more difficult for the Nuclear Regulatory Commission to 14 ignore the honeycombing of the base mat and other challenges of 15 the quality assurance system. More important, Joint Intervenors 16 believes that if it were not for the courage of whistleblowers 17 like ironworker Bill Smart, who lost his job as a result, and the 18 countless hours donated by other workers on-site to inform 19 citizens of construction problems, corrections would have never 20 been made about those problems.

21 We are concerned about the quality of construction 22 revealed by the small sampling of defects. We also believe these 23 letters help demonstrate the arbitrary and, we believe, unwarranted 24 and dangerous decisions which have been made by the Nuclear 25 Regulatory Commission regarding the areas of the plant over which

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		1	it's limited staff attempts to audit construction.
•		2	JUDGE GLEASON: All right. The objection is sustained.
-		3	The letters will be referred to as Joint Exhibit Number 30
•		4	rejected.
XXXX	45	5	(The documents referred to were
	554-25	6	marked Joint Intervenors Exhibit
	(202)	7	Number 30 for identification and
	20024	8	rejected.)
	l, D.C.	9	MS. DREY: Mr. Chairman, I am sorry. I forgot to
	NGTON	10	copy get copies of this document that I would like to offer in
	ASHIN	11	evidence at this time, but I will circulate it for you all to
	ING, W	12	look at. Is that okay for right now?
•	BUILD	13	JUDGE GLEASON: Are you offering it?
	rers 1	14	MS. DREY: Yes, I'm offering it in evidence.
	LEPOR	15	JUDGE GLEASON: We can't accept it if you don't have
	S.W. , B	16	copies of i' The reporter has to have copies of it.
	EET, S	17	MS. DREY: Is it possible to identify it?
	H STR	18	JUDGE GLEASON: What purpose does that serve?
	300 7T	19	MS. DREY: In other words, we would have to try and get
		20	copies first?
		21	JUDGE GLEASON: Yes, as the rules state.
		22	(Pause.)
		23	BY MS. DREY: (resuming)
0		24	Q Dr. Meyers, as an engineer would you please tell me
		25	when you first saw an embedded plate used in a wall to support a
		11.1	이야 같은 것이 같이 같은 것이 같아요. 그 것이 같이 같이 가지 않는 것이 같아요. 이야 하는 것이 많아요. 이야 한 것이 같아요. 이야 한 이야 한 ? 이야 ? 이야

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1	part of a steel floor beam?				
2	A (WITNESS MEYERS) Did you say in a nuclear power plant,				
3	Mrs. Diey?				
4	Q No.				
5	A I can't remember when the first time I saw it used in				
6	other applications. I do remember the first time I saw an				
7	embedded plate in a nuclear power plant was in my first visit to				
8	a power plant after coming to work for Bechtel in approximately				
9	1974.				
10	Q Where was that, please?				
11	A I can't recall which of the power plants that I visited				
12	it was in.				
13	Q Was it a plant for which Bechtel was architect-engineer?				
14	A Yes, ma'am.				
15	Q Have you ever seen a an embed plate excuse me a				
16	minute. Have you seen an embedded plate used in a wall to support				
17	a part of a steel floor beam in any construction in any building				
18	other than a nuclear power plant since that time?				
19	I mean, maybe when I phrased it first. Have you ever				
20	seen that kind of construction anywhere other than in a nuclear				
21	power plant since 1974?				
22	A I haven't looked at other kinds of construction in				
23	recent years.				
24	0 Did you study the specifications and qualifications of				
25	embeds when you attended engineering school?				
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25				

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1	A No, ma'am.
2	Q Where did you first study them?
3	A At Bechtel, since my employment with Bechtel Power
4	Corporation.
5	Q Was that a course you took?
6	A No, ma'am.
7	Q How did you conduct your study of embedded plates?
8	A In the design in the normal design review of the
9	design of embedded plates, it's a fairly standard design method.
10	Q It's fairly standard and yet you didn't study it in
11	college, right?
12	A That's correct. Many things are not specifically
13	studied in college, just the science required to do the analysis.
14	Q Had you heard of this use of plate with studs on it. or
15	anchor rods during your undergraduate or graduate training in
16	college or the university?
17	A Yes, ma'am.
18	Q When was that?
19	A I really don't know. I went to college from approxi-
20	mately 1954 to 1958 and then I got a Master's Degree from
21	approximately '58 to '60 and a Ph.D. from '64 to '67, and I can't
22	pinpoint when and the number of times.
23	Q But you do remember reading about embeds used for this
24	purpose in a textbook?
25	A I can't guarantee I remember reading about it in a text-

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	[1.2.1] 이 가슴 가슴 가슴 가슴 가슴 이 가슴 이 가슴이 가슴이 있다. 이가 가슴
1	book. You asked me if I had heard of the application and I said
2	yes.
3	Q Would that have been from a professor?
4	A It could have been.
5	Q How do you know you've heard of it?
6	A I remember I know that as Professor Fisher pointed
7	out yesterday various forms of embedded or various forms of
8	embedded plates or connections have been used
9	Q I am asking about one specifically, please. I'm asking
10	specifically about a plate with manually-welded anchor rods on
11	it which would be used in a concrete wall to support a portion of
12	a steel floor beam. A steel floor beam, that's what I'm asking
13	about. That's what I want to know about your background and
14	where you got your information about that kind of construction
15	specifically. I don't mean about bridges and stuff.
16	A All right. What's your question?
17	Q You said you'd heard about this when you were either an
18	undergraduate or a graduate, is that right?
19	A I said I had heard about the use of embedded plates to
20	support the kinds of structures that you described during my
21	educational process.
22	Q Would you please tell me what you heard about it at the
23	time?
24	A Mrs. Drey, I can't remember details. I have testified
25	that I knew as a student that plates of this nature were used.

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	1	That's all I can remember.
	2	Q What was your Ph.D. dissertation on?
	3	A The time-dependent behavior of concrete materials.
	4	Q If you can do it briefly, would you please describe how
010	5	an architect would have designed a building before embeds were
7-1-00	6	used to support a floor?
(202)	7	A Again, I think that was done.
-7/07	8	Q I could have said would you do it again. I have that
	9	written down, but I just wanted to know just briefly, please.
1	0	A Well, there are a number of ways to support steel beams
IIIeva 1	11	on concrete structures. Concrete pockets can be used where the
	12	steel beam sits into the interior of the concrete structure.
	13	Pedestals can be cast, pedestals for the beam can be cast into the
1	14	vertical members; other forms of embedments using welding and
1	15	riveting can be used. Briefly those are the ones that come to
· · · ·	16	mind now.
1 1	7	Q Is this a standard part of the design of the Bechtel
	8	nuclear power plant to use an embedded plate with the kind we
1	19	have been talking about, manu-lly-welded anchor rods?
	20	A I really don't know if it's standard for all projects.
1	21	Q You remember seeing it, however, in 1974?
:	22	A Yes, ma'am.
:	23	Q Did you take a trip around all the Bechtel plants?
:	24	A No. I saw some projects that were being constructed or
:	25	designed by the office the Laithersburg office where I worked.
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	1	O Did you see any nuclear power plant which was in oper-
	2	ation which had been designed for which Bechtel was the architect-
	3	engineer in 1974 in your travels, in which this kind of construc-
	4	tionwas employed, any plant in operation in 1974?
345	5	A I'm trying to remember.
554-2	6	(Pause.)
(202)	7	I don't think the plants I visited were in operation.
2002	8	Q They were under construction?
N, D.C.	9	A Yes, I believe so.
NGTO	10	Q How do you know that what you saw in 1974 was an embed
NASHI	11	with manually-welded studs on it holding up a beam?
NO.	12	A It was an extrapolation and an assumption on my part.
BUILD	13	Q Did you see any of the manual welds?
TERS	14	A Probably not.
REPOR	15	Q Has Bechtel wait just a moment. Do you know who was
S.W. , 1	16	the architect-engineer for the Crystal River plant in Florida?
UEET, 1	17	A No, ma'am.
H STI	18	Q Where would a person find out such information? I wrote
300 77	19	to the Florida Power Corporation as soon as I noticed the LER
	20	report we discussed yesterday.
	21	A I think there's a listing in the document room of the
	22	probably you could find out from the Safety Analysis Report in
	23	the document room who the architect-engineer is.
	24	Q Thank you.
	25	Did Bechtel ever have performance tests made of manu-
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	1	ally-welded embed plates?
	2	(Pause.)
	3	A I really don't know the answer to that other than the
	4	ones on the SNUPPS project.
345	5	Q And when you speak of that, which ones are you talking
554-23	6	about? I'm wondering if I'm going to hear about a certain set.
(202)	7	Are you talking about the ones in the summer of 1980?
20024	8	A I'm talking about both studies that have come up in this
, D.C.	9	hearing.
GTON	10	Q Which was the other one besides the summer of 1980?
ASHIN	11	A There was I don't remember the date. There was a
NG, W	12	study having to do with, in addition to the ones pertaining to
NULLDI	13	this Contention, there was a study having to do with establishing
FERS B	14	having to do with bending machine-welded studs more than
EPOR	15	fifteen degrees, which we discussed with Dr. Fisher yesterday.
W. , R	16	
ET, S	17	
STRF	18	
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	1	Q Mr. Schnell, do you know whether Bechtel has ever				
	2	had performance tests of manually-welded embed plates?				
	3	A (Witness Schnell) I don't know, ma'am.				
'	4	Ω Dr. Meyers, is it possible that what we were discuss-				
2345	5	ing yesterday was weren't those machine-welded plates that				
554-	6	were tested in the summer of 1978 at Callaway?				
4 (202	7	A (Witness Meyers) I think that's what I said.				
3, 2002	8	Q I'm asking about manually-welded embed plates.				
N. D.C	9	A I'm terribly scrry.				
INGTO	10	Q How does the architect-engineer decide whether he				
WASH	11	is going to use a manually-welded plate or a machine-welded				
DING,	12	plate?				
BUILI	13	A Generally it depends on the required size of the				
RERS	14	anchor rod. The machine-welding process is limited to a certain				
REPOI	15	size stud or stud. If the required anchor is greater than				
S.W. ,	16	that limit in diameter, it must be manually-welded.				
REET.	17	Q Who says so?				
TH ST	18	A If you can't do it by machine, you have to do it				
300 7	19	manually. In my opinion				
	20	Q Can you make a machine that would take care of a				
	21	bigger diameter?				
	22	A Becatel Power Corporation is not in the business				
	23	to make machines.				
	24	Q I mean couldn't Bechtel order such embeds?				
	25	You mean, in other words, you purchase from				
		말 같은 것 같은				

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	1	fabricators what they offer you? You don't design your own?
)	2	A We don't design our own. In fact, we wouldn't
	3	design equipment of that nature; either machine-welding or
,	4	manually-welding is adequate for the job.
2345	5	Machine-welding is done for certain size studs.
554-5	6	The technology available now requires manual welding.
4 (202	7	Q We have been talking about plates with numbers
. 2002	8	like EP311, as an example. Is that a manually-welded plate or
N. D.C	9	a machine-welded plate, Dr. Meyers?
NGTO	10	A Mrs. Drey, I don't know the difference between
VASHI	11	them by number from memory.
ING.	12	Q Mr. Themas, would you please tell me?
BUILL	13	A (Witness Thomas) I believe an EP311 is a manually-
TERS	14	welded plate.
REPOR	15	Q Now is that a designation, that EP business, is
S.W. 1	16	that something I think we talked about this, but I'm still
EET,	17	unclear that EP, I think you said, stands for embedded
H STR	18	plate, and EF stands for what does that stand for?
300 7T	19	A That stands for embedded frame.
	20	Q Frame. And ES is embedded sleeve?
	21	A Correct.
,	22	Q Is it correct that those EP numbers and so forth
	23	are Bechtel numbers? Is that right?
)	24	A That's correct.
	25	Q Who designed the specifications for those, or do you

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1	have to get	what industry has to offer?	
2	А	No, those were designed by Bechtel.	
3	Q	The size of the base plate, for instance, was	
4	designed by	Bechtel?	
5	А	Yes, ma'am.	
6	Ω	And the number of studs?	
7	А	Yes, ma'am.	
8	Ω	The size of the weld?	
9	A	Yes, ma'am.	
10	Q	I'm looking at some brochures which I'd like to sho	W?
11	you, which w	ere all I believe they are all from the Nelson	
12	Stud to D	er. Meyers, please Nelson Stud in the middle -	-
13	Division of	TRW.	
14		Would you please look at those, Dr. Meyers? Have	
15	you ever see	n anything like that before, anything like those	
16	brochures?		
17	A	(Witness Meyers) I'm sure I have.	
18	Q	Do you have those lying around at Bechtel?	
19	A	Mrs. Drey, I don't know what	
20	Q	Where have you seen them?	
21	A	I'm sure I have seen them in Bechtel, possibly at	
22	the site, ma	ybe. I don't know. I said I believe I have seen	
23	things like	that. I can't pinpoint where.	
24	Q	What are you looking at there?	
25	A	Right now I'm looking at something that says	
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	1 have to get 2 A 3 Q 4 designed by 5 A 6 Q 7 A 8 Q 9 A 10 Q 11 you, which w 12 Stud to D 13 Division of 14 1 15 you ever see 16 brochures? 17 A 18 Q 19 A 20 Q 21 A 22 the site, ma 23 things like 24 Q 25 A	 have to get what industry has to offer? A No, those were designed by Bechtel. O The size of the base plate, for instance, was designed by Bechtel? A Yes, ma'am. O And the number of studs? A Yes, ma'am. O The size of the weld? A Yes, ma'am. O The size of the weld? A Yes, ma'am. O I'm looking at some brochures which I'd like to sho you, which were all I believe they are all from the Nelson Stud to Dr. Meyers, please Nelson Stud in the middle Division of TRW. Would you please look at those, Dr. Meyers? Have you ever seen anything like that before, anything like those brochures? A Mrs. Drey, I don't kncW what Where have you seen them in Bechtel, possibly at the site, maybe. I don't kncW. I said I believe I have seen things like that. I can't pinpoint where. Q What are you looking at there? A Right now I'm looking at something that says

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Nelson Weld-Through Deck Design.

Q What I'm wondering is how Bechtel would have decided what the design load capacity would be for a given plate. Is there a code?

A The process -- there are codes that give allowable stresses for the materials and the components. Bechtel then would take the materials and components and design or dimension a structural element so it can withstand the maximum expected load with appropriate margins of safety without exceeding the allowable values given by codes and standards.

Q But I want to know if there's a code that gives that allowable standard. Which code is it for a plate that has manually-welded studs on it?

A There are a number --

Q Used to support floor beams.

A I'm sorry. There are a number of codes and standards that I am sure that would be involved in that design. I can't remember them all from memory. They are referred to in the Safety Analysis Report, but there are a number of codes and standards that are used to establish these allowable stresses.

21 Q Would the codes -- there are certainly codes for
22 bending of studs a have been hearing about. Would a code,
23 the kind you are talking about, say whether or not an architect24 engineer should put a plate with machine-welded studs in an
25 area where he might have to have the worker bend the studs in

1 order to fit it in?

A I don't think it would say anything about that.
 Q Is that why you did performance tests at Callaway?
 A No, I think we adequately desoribed yesterday why
 the performance tests were done at Callaway.

Q Would you do that again, please.

A Certainly. It was found -- brought to our attention and it was found that construction workers had been bending studs beyond 15 degrees to move them around reinforcing steel.

As we also indicated yesterday, there was an analysis procedure available, and there was also technical physical data available that bending them 30 degrees did not affect the load carrying capacity. Since there was no physical data available, we felt it was prudent with the client's concurrence to carry out tests to verify that bending beyond 30 degrees would also not degrade the load carrying capacity of the embedments.

Q Were there data available on the bending of studs on manually-welded plates in such situations?

A I don't know.

21 Q Who decided to do machine-welding testing at 22 Callaway in the summer of 1978 and not do manually-welded 23 plate testing?

A Mrs. Drey, I wasn't in the decision-making process,
 and I really don't know the answers to those questions.

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Do you know, Mr. Schnell?

(Witness Schnell) The problem or the question that A arose had to do with bending of machine-welded studs, so that's why we conducted the tests on machine-welded studs.

Who determined out in the field? Was the problem 0 because some of them were falling off, or why was the 50.55(e) report filed? Because you ware curious to know if perhaps some were bent? Is that what 50.55(e) reports are for?

A 50.55(e) reports is a mechanism whereby designers and builders of nuclear power plants report significant events to the Nuclear Regulatory Commission. There are in the regulations guidelines for when you submit such reports.

Okay. Would you please tell me what the significant 0 event was in the summer of 1978 that elicited from you a decision, or from somebody at Union Electric, a decision that a potentially significant defect was apparent at Callaway vis-a-vis the machine-welded plates?

18 When a question comes up regarding construction A 19 and what is allowed and what is proper, if it can't be handled directly by the designer, if it requires significant analytical 20 evaluation, then as a precautionary measure we submit to the Nuclear Regulatory Commission a verbal indication that we might 22 have a significant event.

It's simply a precaution. If, after we have 24 completed the investigation of such an event, it is determined 25

		[19] 영상에서 그렇지 않는 것이 없는 것이 많은 것이 집에 가격에 많은 것을 많은 것이 많은 것이 많이 많을 것이다.
	1	that it is not a problem, we inform the Nuclear Regulatory
	2	Commission that if it had not been discovered, it would not
	3	have affected the safety of the plant.
	4	That's the case we are talking about here insofar
345	5	as bending machine-welded studs is concerned.
1 (202) 554-23	6	MS. DREY: Is my time up, sir?
	7	JUDGE GLEASON: You've got two minutes.
20024	8	BY MS. DREY:
V, D.C.	9	Q Do you know whether the Fritz Laboratory also
NGTON	10	does testing for Omar Industries? Does any one of you know?
VASHID	11	Which makes well, what is Omar Industries? Does that ring a
ING, V	12	bell?
BUILD	13	A (Witness Schnell) Someone asked that question, I
TERS 1	14	think it was you, Mrs. Drey, two or three days ago, and I can't
LEPOR	15	recall what the answer was.
S.W. , F	16	Q Well, they make the KSM anchors. I just wondered
EET, S	17	whether did Bechtel indicate on its technical specifications
H STR	18	when it ordered from Cives the plates, whether or not they
300 7T	19	wanted KSM or Nelson stud anchors?
	20	A (Witness Thomas) No, Mrs. Drey, to the best of my
	21	knowledge, we didn't.
	22	Q Are the specifications the permissible loads
	23	for KSM and Nelson studs on machine-welded plates are they
	24	identical?
	25	A Yes, if they meet the material requirements, yes,

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they are.

0 What material requirements?

A Requirements in regard to the parameters that Dr. Fisher mentioned.

0 Do you know? Can you cite a code on that? Those requirements were -- yes, I can. I think A vour Joint Exhibit No. 17 --

> Gives an ASTM and it gives a load. 0

What if a worker in the field sees a plate with a manually-welded stud and he wants to decide whether or not it's undersize? Does it have with it an indication of what the required size should be for the weld? Is that imprinted somewhere on the plate so he'll know whether or not it's undersize or whether or not it should be repaired?

For a machine-welded stud, no, ma'am.

0 No, we're talking about undersize. I'm not talking about machine-welded stud. I'm asking him, please, Dr. Meyers. A

Ma'am, I'm sorry.

I can help him if he doesn't understand.

Could you please repeat the question. A

How would a worker in the field who sees a plate, look at it and know whether or not it has an undersize weld? He has to know undersize from what. How would he know by looking at the plate whether it has an undersize weld? He couldn't, ma'am. A

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	1	Q Then how does he know whether to report it as
•	2	defective or not?
	3	A Well, that information is supplied in the drawings.
•	4	Q So every time who installs manually-welded plates
345	5	in the wall in a wall when a steel beam is going to be
) 554-2	6	attached to it, to which a whole floor system is going to be
4 (202	7	attached? What kind of a craft, what kind of a worker would do
2002	8	that?
N. D.C	9	A I am not sure.
NGTO	10	Q Possibly an ironworker?
NASHI	11	A Quite possibly.
ING. 1	12	O Does any one of you gentlemen know whether Bill
•	13	Smart, the ironworker, was one of the people tho went along
TERS	14	with the Cives inspector looking at defective plates in 1977,
tEPOR	15	after the Nuclear Regulatory Commission discovered that there
S.W. , 1	16	were some machine-welded plates which were onsite which had not
BEET.	17	been inspected according to the AWS D1.1 code?
H STR	18	A I'm not aware of that.
17 005	19	Q Mr. Schnell, do you know that?
	20	A (Witness Schnell) That was a lengthy guestion, Mrs.
	21	Drey. Regarding Mr. Smart's activities, I don't know if he
•	22	accompanied an inspector, if that is the question. I don't know.
	23	Q I see.
•	24	JUDGE GLEASON: All right. Thank you, Mrs. Drey.
	25	Any cross-examination?

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5-10		1217
	1	MR. LESSY: No, Mr. Chairman.
٠	2	JUDGE GLEASON: You do have some redirect. Go ahead.
-	3	And I might say we have four or five guestions
•	4	ourselves.
2345	5	MS. DREY: Do I get equal time?
2) 554-	6	JUDGE GLEASON: Yes, ma'am.
24 (20)	7	Would you prefer if we asked our questions ahead
. 200	8	of your redirect? It's up to you.
N, D.C	9	MR. BAXTER: That's okay.
INGTO	10	JUDGE GLEASON: All right. Dr. Kline has a question.
WASH	11	BOARD EXAMINATION
DING,	12	BY JUDGE KLINE:
BUIL	13	Q I want to look at your testimony on page 25. It's
RTLAS	14	line 18, where the equation starts, "The probabilistic
REPO	15	calculation."
S.W. ,	16	I specifically wanted to look at the term "piece of
REET,	17	one," which is I understand from the cestimony, the probability
IS HI	18	of stud failure.
300 7	19	What I'm interested in is how the effects of
	20	systematic error were considered in utilizing that term, and
	21	I mean by systematic error, I mean nonprobabilistic error,
•	22	and I have something specific in mind.
	23	When Cives first started manufacturing these plates,
•	24	did they have what might be described as start-up problems or
	25	a learning curve, something that would lead to a higher defect

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	1	rate early in the process rather than later?
	2	A (Witness Meyers) Yes, there was. As a matter of
	3	fact, in some of the correspondence, early correspondence on
4-2345	4	the job, and also in some of Cives' response to our queries,
	5	there was indication that there were start-up problems.
554-2	6	However, I hasten to say that start-up problems
1 (202	7	in the machine-welding process are fairly easily rectifiable
2002	8	and pretty obvious. But there were such problems.
N, D.C	9	Q The start-up problems you refer to were early in
NGTO	10	the production process. Could you give a time period when
NASHI	11	this might have been?
BNG.	12	JUDGE GLEASON: Just an approximate time.
FHUR	13	WITNESS THOMAS: I'm not positively sure of this, but
TERS	14	I think they were the first three-month period, I believe,
REPOR	15	from roughly February February, March and April of 1976.
S.W. 1	16	BY JUDGE KLINE:
EET, 3	17	Ω And would it be reasonable to suppose that the
H STB	18	earliest plates would have been the earliest ones installed at
17 008	19	the plant?
	20	A (Witness Thomas) That's not necessarily true.
	21	Q Not necessarily true?
	22	A You must understand, Dr. Kline, that these plates
	23	I don't know the total number, but they were reproductions of
	24	each other, so to speak, so that they could have used any given
	25	plate at a given location.

1	Q I understand that. I am just wondering if as a
2	normal part of the delivery process, the first ones produced
3	would be the first ones to be delivered and used.
4	A (Witness Meyers) Well, not in use. There is a
5	laydown area where large numbers of these plates are delivered,
6	and there is always a significant accumulation or plates
7	available at the site. The delivery process for materials
8	like this is quite in advance of their use. So it probably
9	would be an incorrect assumption that the early ones were used
10	first.
11	Q Okay. Are you satisfied then that the value of
12	the term "piece of one" that you derived from plates after
13	June '77 also applies to plates already installed which you
14	could not inspect?
15	A (Witness Thomas) Yes, Dr. Kline. We looked into
16	that consideration, and again I don't have the numbers in front
17	of me, but there was not a substantial a substantial change
18	between the rejectable studs found before and after, and I
19	think the real basis for this is that you are talking about
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

18 between the rejectable studs found before and after, and I think the real basis for this is that you are talking about 20 a less than .1 percent reject rate, anyway.

21 The term . . 4, which is explained on page 26, 0 22 appears to have been estimated and i. contributes very strongly 23 to the overall estimate of probability of failure, and we have 24 heard that in fact on at least one occasion a plate was overloaded 25 by virtue of an accident which did cause a plate to be pulled

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2	I'm wondering if there is any other experience that
3	would enable you to calculate the term P-4 rather than estimate
4	it, since it plays a large role in your probability calculation.
5	A Well, let me start by making this brief comment,
6	Dr. Kline, that P-4 term is influenced predominantly in
7	fact, absolutely by the occurrence of a seismic event. The
8	plate that had pulled out of the wall was one that was not
9	did not have loads imposed on it from a safety-related system
10	and, therefore, did not necessarily have the high seismic
11	loading that the 204 plates that do have a safety significance
12	have.
13	In regard to the estimate of 10^{-4} or one in 10,000,
14	that's the result of a study that Dr. Newmark had completed,
15	and I think we reference it in here, done in May '75. His
16	estimate was that in fact the occurrence of a component,
17	structural component, ever seeing it. design load was something
18	on the order of 10^{-8} .
19	Our selection of 10^{-4} was to make sure that we had
20	ample conservatism in these estimates.
21	Q Well, what had occurred to me is that in at least
22	one instance a plate saw its design load as a result of an
23	accident.
24	Is there industry data available on such events
25	that would enable you to compute perhaps a different source of

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failure?

2 A (Witness Meyers) Well, I think an important comment 3 needs to be made. The accident load that the plate saw was 4 not in an operating stage. "here were a number of other supports 5 that it should have been on. So it was a construction accident. 6 There is very, very little data available for what 7 you're looking for, which is design overload during the operating 8 stage. I don't know of a large hody -- I don't know of any data, 9 actually. 10 JUDGE KLINE: Thank you. That's enough. 11 JUDGE GLEASON: Mr. Bright has some questions. 12 BY JUDGE BRIGHT: 13 Would you turn to JI Exhibit 22. This is the Cives 0 14 inspection of the manually-welded embed, and I want to be sure 15 I understand all of the terminology in here. 16 If you will look at page 6, the third item down, 17 it says "reject," and then it says "lap." Is that what it says? 18 (Witness Meyers) Yes. A 19 0 What does that mean? 20 I would guess that means the term "overlap" that we A 21 nave been talking about before. 22 Overlap? 0 23 Yes, sir. A 24 Okay. So then page 7, I guess, would be the same 0 25 thing.

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A That would be my guess.

Q On page 9, I guess it is here, about the -- oh, roughly 15th item down, in A16-11, it has a notation here after showing three defective studs, it says "welded both ends." What does "welded both ends" mean? Both ends of what?

A (Witness Thomas) Mr. Bright, some of these plates have a -- well, they serve as an embedded plate for each face of the wall, and so they have the anchor rods welded in both ends, rather than use the bolt and the plate that's embedded in the concrete. The anchorage system is simply the plate on the opposite wall, and I'm sure that if we were to go back into the records, we would find that this is one such plate.

Q So that is perhaps why he says one end only? A Yes. In fact, I did go back in the records and it is such a plate. In fact, if you refer to some of the additional notes, he points out that it is welded in both ends, and he's only rejecting one end.

Q That's what I was asking you. What does this mean. I'm afraid I never -- page 10 -- never quite understood what the -- I thought these were manual welds, so in deteription of the one, two, three, four, five -- fifth one down, it says "hand-welded." Does that have any significance of any kind?

A In Joint Intervenors Exhibit No. 17, Part F of AWS D1.1 Stud Welding, there is a provision that would allow either a repair, I should say of a machine-welded stud by

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	1	manually welding.
	2	My best guess here and, in fact, this is a
	3	it could possibly be a situation, as I have described.
	4	A (Witness Meyers) The point is there are some
345	5	machine-welded plates, as Dr. Fisher indicated yesterday, that
0.054-2	6	a workman of somewhere at Cives or at the Callaway site could
202) +	7	elect to do manual welding to repair a machine-welded stud,
2002	8	rather than bend-test it. So that's probably manual welding
N. D.C	9	that's referred to here.
1	0	Q Okay. So it would be what you think was an
ILISEN 1	11	original machine welded embedment that has been repaired by
1	12	manual welding?
	3	A (Witness Thomas) No, in looking at the records, I
1	4	probably spoke before I reviewed. In this particular case, this
1 10	5	wasn't a manually-welded plate.
1	6	However, the scenario that I gave you is a
1	7	possibility.
	8	Q I was just a little puzzled about what is the
1	9	significance of noting that hand welding on here. It seems
2	20	to be superfluous, somehow or other.
2	21	A (Witness Meyers) If EP211 is a manually-welded
2	22	stud, we agree with you.
2	23	Q So you don't know of any particular significance that
2	24	it would have.
2	25	There are I notice that most of these rejections

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	1	in here are for undersize and undercut. There are a few that
	2	do say now they address profile and say reject on that basis,
	3	for example.
	4	When Cives made this inspection, they looked at all
2345	5	the elements that would go into determining whether a weld
2) 554	6	was conformed or not?
24 (20	7	A Yes, sir.
C. 200	8	Q So the lack of very many notations such as
0N, D.	9	"reject because of incorrect profile" merely indicates that
HNGT	10	there was no problem except for the profile. Would that be a
WASH	11	correct statement?
DING	12	A It would be a correct statement for those welds
S BUII	13	that only indicate "reject because of profile." I would assume
RTER	14	that that was the only problem on that weld.
, REPC	15	Q So if they were inspecting this these welas,
. S.W.	16	and they had more than one reason to reject the weld, would
TREET	17	they write it down on this inspection report, or would they just
S HLL	10	say, "Well, this one is no good, so I'm going to kick it out"?
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	1	A (Witness Meyers) I would hate to get in the
	2	inspector's head. I don't know what he would write down. I
	3	would assume that they wrote down those qualities that were
	4	rejectable on a particular weld.
240	5	Q When you asked them to do this inspection, you
554-20	6	didn't or what were your instructions to them?
(202)	7	A Inspect it according to the technical specifications.
20024	8	Q And not just for undercut and undersize?
l, D.C.	9	A No, sir.
NGTON	10	Q So they would indeed they should report
(IHSE)	11	anything that they saw that would reject that particular weld?
ING, W	12	A They should, sir.
GHUD	13	Q There is one other thing, and I do not understand
FERS I	14	this. I can't even find it. Back here somewhere there is a
EPORT	15	notation
W. , R	16	(Pause.)
EET, S	17	page 16, in the next-to-the-last inspection
H STR	18	report on that page. What is that thing that is in
TT 008	19	parentheses?
	20	(Pause.)
	21	A The only word we can make out makes absolutely no
	22	sense.
	23	(Laughter.)
	24	Q That was my problem, too. I was just wondering if
	25	that was a term that was a part of the jargon of the trade,

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6-2 jwb

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	1	because I'm certainly not aware of "hornets." None of you have
	2	any idea?
	3	A I'm afraid not, sir.
	4	JUDGE ERIGHT: That's all I have.
45	5	JUDGE GLEASON: Dr. Kline?
554-23	6	BY JUDGE KLINE:
(202)	7	Q I am going to go back to this one more time. Did
20024	8	you all make a probabilistic analysis of manually welded
D.C.	9	plates?
CLON	10	A (Witness Meyers) No, sir.
ASHIN	11	Q I know you didn't present one; I was wondering if
NG. W	12	you made one?
10.10	13	A No, sir.
ERS B	14	Q I wondered why.
PORT	15	A The engineering analysis done for the manually
W. , H.F	16	welded plates deterministically showed, with the worst
ń	17	assumptions possible, that a failure was not possible.
STRF	18	Therefore, a probability analysis was not called for.
HILL O	19	Q If a probability analysis had been made, would it
	20	give probabilities in the same range as the machine-welded
	21	plates? That is, the failure probability for machine-welded
	22	are on the order of 10 ⁻⁹ . Would we have had such an analysis
	23	had such an analysis been done, would we also have had
	24	similar probabilities on the same order of magnitude for
	25	manually welded plates?

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6-3 jwb

	1	A (Witness Thomas) Dr. Kline, because of the high
	2	deficiencies found on the welds as a result of the reinspec-
	3	tion programs, there was in no case a plate that had a load
	4	that exceeded its design intended design capacity within
345	5	the original margins of safety. And on that basis, I would
) 554-23	6	say that had we done such an analysis, we would have shown
1 (202)	7	that there was nil probability of a plate failure.
2002	8	JUDGE KLINE: Okay. Thank you.
V, 2.C.	9	BY JUDGE GLEASON:
NGTO	10	Q Leaving that last question for a moment, I am not
HISEA	11	clear why you decided to reinspect the manual welds when the
ING, 1	12	deficiencies only came up in the machine-welded plates?
BUILD	13	A (Witness Meyers) That was a prudent action that
TERS	14	Union Electric determined, with advice from its agents, that
REPOR	15	we should look at all embeds, since the problem came up on
W. , I	16	embedded plates.
EET, 3	17	BY JUDGE KLINE:
H STR	18	Q One more question. On manually welded plates, were
17 00t	19	you also bending the anchor rods to accommodate the rebar? Or
	20	to get in around the rebar when they're installed?
	21	A (Witness Meyers) I suppose that's a possibility.
	22	Q Is there a possibility of any data available to
	23	indicate stud failure upon that bending? That is, one of the
	24	tests on the machine-welded is to knock on it 15 degrees, and
	25	it might break off. Now I am wondering if there is a know .

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break-off rate for manually welded studs when they are bent to get in around rebar, or if it is known? A (Witness Thomas) Dr. Kline, to answer your question, there is no criteria to bend manually welded plates,

and there is a very good reason for that.

In regard now to the stud welds, the automatic or machine-welded plates, the whole purpose here is to provide an inspection means to determine that the weld can't be seen. That is, the weld directly under the stud, between the stud and the plate, is sufficient to carry the load.

Now as a result of that process, there is some flashing that occurs around the outside. If that flashing is not completely around the outside, then it becomes suspect, and therefore the bend test is conducted.

15 Q I understand the formal criteria for inspection. 16 What I am saying is: In the field, workers might be called 17 upon to bend a stud every now and then in order to make the 18 installation. Do they knock one off one in awhile when they 19 do that? And is that rate of failure known -- inadvertently, 20 not related to the formal inspection process?

A I honestly don't know the enswer. I would suspect
that if it occurs, it's a very, very infrequent occurrence.

BY JUDGE GLEASON:

Q There has been some reference to prior personnel
 action I think involving the Daniel International Company.

6-5 jwb

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	1	Perhaps Mr. Schnell, you could respond to this. The name
	2	"Smart" rings a bell. Was this case involved in the embedded
	3	plate issue at all, this personnel problem?
	4	A (Witness Schnell) Mr. Chairman, there were a
345	5	number of allegations raised by an individual at the job site
554-2.	6	to the Nuclear Regulatory Commission. I can't give you the
(202)	7	dates, or the total number
20024	8	Q Excuse me. I like to ask questions very briefly,
4, D.C.	9	and I like to get answers very briefly, because time is
NGTON	10	running on.
(IHSV)	11	A I appreciate that, sir.
ING. W	12	Q I mentioned the name "Smart." Did Mr. Smart's
CHID	13	case involve embedded plates?
TERS 1	14	A I think he had an ellegation involving embedded
EPORI	15	plates; yes.
.W. R	16	Q Did the NRC Staff Inspection and Enforcement
EET, S	17	poople at some point request the Applicant, or subcontractors,
H STR	18	to look at efforts to shore up any deficiencies that might
LL 00	19	occur in the embedded plates already installed "shore up"
-	20	in the sense of additing additional strength, or whatever the
	21	technical term is?
	22	A Was that recommendation made by the NRC?
	23	Q Yes.
	24	A I cannot recall no such recommendation.
	25	Q How about you, gentlemen?

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6-6 jwb

	1	A (Witness Meyers) I can recall no such recommenda-
	2	tion.
	3	Q When one has a possible deficiency in a manufactured
	4	item, is it a usual routine for the manufacturer to be called
345	5	in to, in effect, do a reinspection program? Is that
554-2	6	considered a first-step in the re-evaluation as to whether the
(202)	7	items are efficient or not?
20024	8	A Yes, sir.
N. D.C.	9	Q It's not considered as letting the what do we
VGT ON	10	let into the barn? the fox, or something?
ASHD	11	A No, sir. It is the manufacturer's responsibility,
ING. W	12	and also the manufacturer's warranty.
anna	13	Q So I presume that you believe that reinspection
LERS 1	14	program by Cives would be an effective evaluation of what
EPORT	15	was, if anything, wrong with the rods? That it would show
.W., R	16	that up?
SET, S	17	A I certainly do.
H STR	18	Q "Did"?
J.L 001	19	A I did, as well, yes.
	20	Q Let's see. Who was it that hired the Lehigh
	21	professors? Was it the Applicant? Or was it Daniel? Or
	22	was it Bechtel?
	23	A It was Bechtel, sir.
	24	Q Before you did that, did you investigate their
	25	prior relationships, and did you in fact investigate their

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	1	prior relationships?
	2	A (Witness Thomas) Normally, yes, we do investigate
	3	their prior relationships. We Dr. Fisher and Mr. Slutter
	4	are well known in the civil engineering profession.
554-2345	5	Q I was not suggesting anything adverse to either one
	6	of those two gentlemen. I was just asking if you in fact
(202)	7	investigated their relationships?
20024	8	A Yes.
V. D.C.	9	Q On Applicant's Exhibit No. 6, what is in essence
NGTO!	10	the fourth page, one, two, three, four it's page 2 of the
VASHI	11	March 10th Memorandum which has Mr. John Bryan at the top of
ING. V	12	it. There is a reference Do you have the page, "Analysis
BUILD	13	of the Problem" is the paragraph there.
TERS	14	A (Witness Schnell) Yes, sir, we have it.
REPOR	15	Q There is a reference to, in the last paragraph, a
S.W. 1	16	memorandum from Daniel International dated November 28th, '77,
EET, S	17	which is entitled "enclosure three." Are those enclosures
H STB	18	referenced in that memorandum in the record somewhere?
300 71	19	A That may be, sir; let me check.
	20	(Pause.)
	21	Q I think there are a couple of additional enclosures
	22	on the next page, and the next couple of pages, and the only
	23	question I had is, if they are not in, I would like to have
	24	them submitted for the record.
	25	MR. GALEN: Mr. Chairman, we did not attach to the

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	1	exhibit all of the enclosures that were listed
	2	JUDGE GLEASON: I understand, and I am just
	3	wondering if it is in the record somewhere.
	4	MR. GALEN: Mr. Chairman, I am aware that the
345	5	enclosure seven to this report, DLUC 2899, that one has been
554-2	6	introduced as a joint intervenor's exhibit, I believe No. 14.
1 (202	7	JUDGE GLEASON: All right. I can find that.
2002	8	WITNESS SCHNELL: I don't
N, D.C	9	JUDGE GLEASON: Well, let's leave it Excuse me.
NGTO	10	Go ahead, Mr. Schnell.
HSVASHI	11	WITNESS SCHNELL: I don't believe that's been
ING.	12	entered into the record.
BUILD	13	JUDGE GLEASON: If we could have that put into
TERS	14	the record, I would appreciate that.
REPOR	15	MR. GALEN: You want
S.W. , 1	16	JUDGE GLEASON: Those enclosures starting on page 2,
RET,	17	enclosure three, and it goes over or enclosure four on that
H STF	18	page, and enclosure five in other words, I would like to
300 71	19	look at the enclosures referred to in that mer randum.
	20	MR. GALEN: Do you want them in the record,
	21	Mr. Chairman?
	22	JUDGE GLEASON: I would like to see them. I would
	23	like them in the record, yes.
	24	MR. GALEN: So that is three, four, and five, did
	25	you say? I guess I am just not clear. You want enclosures

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		numbers three four and five? Is that correct?
	1	numbers enree, rour, and rive. is enac correct.
	2	JUDGE GLEASON: Just a minute, please.
	3	(Pause.)
	4	JUDGE GLEASON: I would like to have all of the
345	5	enclosures referred to in that memorandum referred to inserted
554-22	6	in the record.
(202)	7	MR. GALEN: That's fine.
20024	8	JUDGE GLEASON: It goes from three to eight, I
i, D.C.	9	believe.
NGTON	10	MR. GALEN: Well, actually I chink all of them, one
ASHI	11	to nine, are referred to in that memorandum.
ING, V	12	JUDGE GLEASON: Well, I just wanted three through
BUILD	13	eight. If you want to put all of them in, go ahead.
reks 1	14	MR. GALEN: My only comment is, I believe one is
REPOR	15	attached to enclosure seven.
S.W. , F	16	JUDGE GLEASON: If it's already in, you don't have
EET, S	17	to duplicate it. Excuse me. I didn't mean to interrupt you.
H 5 B	18	What were you going to say?
300 7.L	19	MR. GALEN: Well, I will determine if it is in
	20	the record. I am just saying that this 610-page document also
	21	may be a part of that, and if it is in already we will not
	22	reintroduce it again.
	23	JUDGE GLEASON: We certainly don't want that
	24	duplicated.
	25	(Laughter.)

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	1	WITNESS SCHNELL: That is included in those
	2	enclosures, Mr. Chairman.
	3	JUDGE GLEASON: Yes? Which one?
	4	WITNESS SCHNELL: It would have to be number seven.
345	5	JUDGE GLEASON: Then we can eliminate that,
554-2	6	please.
1 (202)	7	Proceed with your redirect, please.
2002	8	REDIRECT EXAMINATION
N, D.C.	9	BY MR. GALEN:
NGTO	10	Q Mr. Thomas, I direct your attention to Joint
HISVA	11	Intervenor's Exhibit No. 18, which is a Daniel International
ING. 1	12	Corporation lett r DLUC 990, dated December 3rd, 1976. I
BUILD	13	believe there was some questioning concerning this document
TERS	14	several days ago.
REPOR	15	It refers in the document to an inspection of
S.W. , 1	16	374 pieces received from the Cives Corporation, and indicates
tEET.	17	that there were discrepancies found on four of those pieces.
H S H	18	I would like to direct your attention to the
300 71	19	third page of this document, which is dated July the 18th,
	20	1977, entitled Daniel International Corporation QC inspection
	21	report, and ask you if there is anything on this document
	22	which indicates to you, or which pertains to the condition of
	23	one of those four discrepant pieces?
	24	A (Witness Thomas) Yes, it does. I would like to
	25	read one sentence. It's the fifth line down. It says:

6-11 jwb

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"While inspecting EF-614 A 814 against the drawings, et 1 cetera, I determined that the embed was not nonconforming." 2 This document on the third page also refers to a 0 3 nonconformance report, NCR-2-0270-C-B. Mr. Thomas, have you 4 had an opportunity to review that nonconformance report? 5 20024 (202) 554-2345 Yes, I have. A 6 What, if anything, did the nonconformance report 0 7 indicate as to the condition of the remaining three items 8 D.C. which are listed in DLUC 990 as having discrepancies? 9 WASHINGTON. It identifies plate EP 312 A 126-5 as having an A 10 undercut of 1/16th of an inch for a length of 1/4 of an inch. 11 STREET, S.W., REPORTERS BUILDING, At plate EP 411 A 10-43, also has an undercut of 3/32nds of 12 an inch for a guarter of an inch around the stud weld. Both 13 of these are very minor. 14 The third plate in question is EP 912 A 115-168, 15 where it's indicated that one stud only has incomplete fusion 16 of flash at the weld stud. 17

18 Referring to Joint Intervenors' Exhibit No. 17, 19 Section 4.28.10, indicates that a later revision of AWS Dl.1, 20 that is the '77 revision, allows this as a perfectly acceptable--21 as perfectly acceptable.

Q Mr. Thomas, after review of this additional documentation, what conclusion, if any, can you draw as to why no further investigation was undertaken when these four discrepancies were identified in DLUC 990 in December of 1976?

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6-12 jwb

	1	A These imperfections were all of such a minor nature
	2	that they would in no way affect the intended function of
	3	the structure. Because of their minor nature of these
	4	imperfections, there was no basis for concern regarding the
2345	5	remaining material identified in DLUC 990.
) 554-2	6	Q Mr. Thomas, I would like to direct your attention
4 (202	7	now to some questioning conducted yesterday by Mrs. Drey
. 2002	8	concerning a change in the detailed procedure for the Lehigh
N. D.C	9	tests conducted on the manually welded anchor rods in 1980.
INGTO	10	She pointed out that there was a change in that
WASHI	11	procedure between Revisic: 1 and Revision 2, and read into the
OING,	12	record the language which had been changed.
BUILI	13	Would you explain for us what the change was, and
TERS	14	why it was made?
REPOI	15	A The change was to delete some surface, nondestructive
S.W. ,	16	examination of the plates prior to testing. This was It is
UEET,	17	inappropriate to test the anchor welds at Lehigh, or any other
TH STH	18	place, in a fashion other than in their as-received condition.
300 7	19	Q Mr. Thomas, I would like to direct your attention
	20	now to these various inspection reports which had been
	21	prepared for Cives embedded plates, both manually welded and
	22	machine welded plates, for inspections that were conducted
	23	after the issuance of the stop-work order in June of 1977.
	24	Let me ask you initially whether the inspection
	25	procedures for manually welded plates and machine-welded plates

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are the same, or are they different?

A Different.

Q And is the analysis that was performed to determine the structural integrity of the plates installed prior to June of 1977 by Bechtel, was the analysis the same or different for the manually welded plates and the machine-welded plates? It was different.

? Then I would like to focus your attention in, at this point, solely on the machine-welded plates. Could you tell me, in the reinspection program how does one go about inspecting a machine-welded plate?

A Well, the inspection is purely a visible one to determine whether there is lack of flashing, or fillet, around the periphery or circumference of the stud.

15 Q If there is a full flash around the stud, what 16 does that mean?

17 A It indicates that the stud is acceptable.
18 Q If there is a lack of a full 360-degree flash, does
19 that mean that the weld is defective?

A That means that an additional test has to be
conducted, and that test is the bend test where the study is
struck by a heavy hammer to bend it 15 degrees vertically.
Q And then how do you determine at that point whether
or not it is acceptable or rejectable?

25 A Again, by a visual inspection. If there is no

6-14 jwb

indication of cracking at the base of the stud, the stud is 1 acceptable. 2 in conducting a large-scale inspection program 0 3 like was done for Cives on machine-welded rlates, is there any 4 need to record the nature or degree of the weld deficiency 5 20024 (202) 554-2345 which is discovered? 6 A No. 7 What do you have to record? 0 8 D.C. A You have to record the number of studs that were 9 WASHINGTON rejected as a result of the bend test. 10 And could you just quickly recap for us what the 0 11 300 7TH STREET, S.W., REPORTERS BUILDING, results of the Cives inspection was of the machine-welded 12 studs? 13 The reinspection of over 81,000 studs at the job A 14 site in accordance with AWS Dl.1 criterion, which we discussed 15 previously, 66 of those were rejectable. 16 And what conclusions would ou draw from that 0 17 information only? 18 The conclusion is that there was less than .1 percent A 19 of the material which was rejectable, and it results in a 20 product that will satisfy the design intent. 21 Was this data from the Cives reinspection program 22 0 used in the Bechtel engineering analysis which is contained in 23 Applicant's Exhibit No. 4? 24 A Yes, it was. 25

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6-15 jwb

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	1	Q And what Well, I believe you previously
	2	testified for us what the results of that were.
	3	Mr. Schnell, there has been much discussion of
	4	this Joint Incervenors' Exhibit No. 12, which is a 610-page
45	5	document which has been identified as containing reinspection
554-23	6	data for both manually welded and machine-welded plates. Is
(202)	7	that correct?
20024	8	A (Witness Schnell) Yes.
, D.C.	9	Q And there has been an implication, or a suggestion
GTON	10	made that Bechtel and Union Electric have attempted to get this
VIHSV	11	document thrown out and not considered.
NG, W	12	Did the Danial data package, Joint Intervenors'
IGHO	13	No. 12, contradict the results of the Cives reinspection
ERS B	14	program for the machine-welded embeds?
EPORI	15	A No. As a matter of fact, Daniel also compiled
.W. , H	16	information out of Joint Intervenor Exhibit No. 12 on
SEL S	17	machine-welded plates, and this really confirmed the Cives
A SFR	18	inspection.
00 11	19	Q Do you know what the results of the Daniel review
	20	of its own data package was in terms of the machine-welded
	21	embeds?
	22	A Yes. They found 106 studs out of some 96,472 were
	23	rejectable at a rate of about .1 percent. And this of course
	24	is comparable to the Cives results.
	25	Q Are those results reported anywhere, Mr. Schnell?

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	1	A Yes. Those results are reported in Daniel's letter,
	2	DLUC 2142 dated November 14th, 1977, and the results recorded
	3	in that Daniel letter to Union Electric were also passed on to
	4	the Nuclear Regulatory Commission in my letter to them dated
345	5	May 23rd, 1980. That's ULNRC 354, and I believe that's a part
554-23	6	of the NRC testimony.
(202)	7	Q For the record, that is attached to the document we
20024	8	have referred to previously in this testimony, Inspection
V. D.C.	9	Report 80-14, which is an attachment to Mr.Gallagher's
1GTON	10	prefiled testimony.
VASHL	11	Mr. Thomas, in conclusion, on what basis can we
ING, V	12	conclude that the machine-welded embeds installed prior to
BUILD	13	June 9, 1977, will perform as designed?
TERS	14	A (Witness Thomas) There were really three bases.
RPOR	15	One, the low rejection rate the less than .1 percent failure;
S.W. 1	16	the engineering analysis which resulted in approximately one
RET, 3	17	change in a billion of plate failure due to a defect; and
H STR	18	thirdly, by the tests that were performed by Lehigh University
300 71	19	on actual plates installed prior to June 9th, 1977, at the job
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	1	Q Dr. Meyers, I would like to now focus on the reinspec-
	2	tion program concerning the manually-welded embeds in terms of the
	3	machine-welded embeds. I believe Mr. Thomas testified that the
	4	important factor that was looked for was the number of rejectable
345	5	studs that was found as opposed to the nature or extent of the
554-2	6	welding deficiencies.
1 (202)	7	Were the concerns the same in the manually-welded embed
2002	8	inspection?
4, D.C.	9	A (WITNESS MEYERS) No, they were not.
NGTO	10	Q Could you elaborate on that, please?
HSVA	11	A Yeah. The significant factor that needed to be deter-
ING.	12	mined in the manually-welded anchors were the extent of the defi-
BUILD	13	ciencies. We needed to know the extent so they could be used in
TERS	14	the deterministic engineering analysis that has been discussed
REPOR	15	here.
S.W. 1	16	Q Dr. Meyers, how did you go about how did Bechtel go
REFT,	17	about determining what the greatest extent of the weld deficiencies
H STF	18	was?
300 71	19	A Discussions with Cives Corporation indicated that the
	20	average undersize on welds was always less than one-eighth of an
	21	inch. The average undercut on welds was always less than one-
	22	sixteenth of an inch, and that these occurrances never were around
	23	the full circumference of the weld.
	24	Q Mr.Thomas, would this information from the Cives Corpor-
	25	ation as to the extent of the weld deficiencies, how did you
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this information, then, in conducting the engineering analysis of the manually-welded embeds?

A (NITNESS THOMAS) We considered the worst case defici-4 ency reported by Cives and imposed that in an analysis on every stud, behind every manually-welded plate, and determined that the 5 capacity of those plates using the original intended design margins were not reduced below the loads that would be imposed 7 upon them. 8

9 This next question gets to something that I think Mr. 0 10 Bright was questioning you all about and that would be the 11 existence of two -- or more than one of these welding defici-12 encies on a particular anchor rod. Would you comment on whether 13 or not there is any cumulative effect on a particular anchor rod 14 if it has, let's say, both weld undersize and weld undercut?

15 There is none, no cumulative effect. The load transfers A 16 from the attachment to the wall to the anchor to the concrete. 17 Weld undersize as one example affects only the transfer between 18 the metal and the weld itself. The undercut affects only the load 19 capacity of the rod.

20 Thus, one can correctly assess that both of these 21 phenomenon can occur at the same time on all manually-welded rods 22 installed without affecting their intended design capacity.

23 Dr. Meyers, after this engineering analysis was performed 0 24 by Bechtel in August of 1977, can you explain why a concern was 25 raised by the subsequent -- why a concern was raised by the Daniel

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1 reinspection of the manually-welded plates which is reported in 2 Joint Intervenors Exhibit Number 12?

3 A (WITNESS MEYERS) The only concern was that there were 4 indications in the Daniel data package greater than those assumed 5 in the analysis.

Did it have anything to do with the number of those 0 indications on the data package?

> A No, sir.

Now I believe your testimony indicates that Bechtel 0 10 determined that the Daniel data package for manually-welded embeds was determined to be usuable for an engineering analysis. Can 12 you explain why Bechtel made that determination?

13 3 Well, after about a month of the team of engineers that 14 Mr. Parikh described earlier looking at the package, we found 15 inaccuracies and inconsistencies, duplications and the like, of 16 dimensional information that would be needed for an engineering 17 analysis.

18 0 Can the full extent of these inaccuracies, inconsisten-19 cies, duplications and the like of dimensional information that 20 you have spoken of be determined from just looking at one or two 21 pages out of this document in isolation?

No, they can't. A

23 You have spoken of this investigation that was undertaken 0 24 by Mr. Parikh and a group of Bechtel employees. Are the results 25 of that investigation reported anywhere?

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	1	A Yes, they are.
	2	Q Do you know if that is an exhibit which has been admitted
	3	into this proceeding?
	4	A I believe it is but I have to check.
45	5	Exhibit 7.
554-23	6	Q Is that Applicant's Exhibit 7?
(202)	7	A Applicant's Exhibit 7.
20024	8	Q Thank 250.
, D.C.	9	Mr. Schnell, the testimony indicates that Bechtel and
GTON	10	Union Electric determined that this Daniel data package cannot be
ASHIN	11	used for an engineering analysis for the manually-welded embeds.
NG, W	12	Again, there has been a suggestion that this was a determination
ICILDI	13	made apart from Daniel, who actually had prepared the data package.
ERS F	14	Do you know what conclusion Daniel itself reached as to the use o_{f}
EPORI	15	this Joint Intervenors Exhibit Number 12 for performing an
W., R	16	engineering evaluation of manually-welded embeds?
CET, S	17	A (WITNESS SCHNELL) Yes. Daniel agreed that it was
I STRI	18	inappropriate for this information to be used for engineering
00 7.LI	19	analysis. That is stated in their letter, DLUC-2399, which is
	20	Joint Intervenors document Exhibit Number 14 on the second page.
	21	The quotation is: "Because of the manner in which weld defici-

encies were reported, an engineering evaluation which assumes a 23 maximum undersize condition around the complete weld circumference

24 will not represent a true image of the actual conditions."

> Mr. Schnell, in your prefiled testimony you state that Q

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the purpose of the Daniel inspectors conducting their inspections
 which are reported in this Joint Intervenors Number 12 was to
 simply either accept the plate or reject it and qualify it for
 rework.

A That's right.

Q What is the basis for that testimony?

7 A Discussions that my staff has had with inspectors that
8 were present at the time.

9 Q And I believe your testimony also indicates that the 10 indications in the Daniel inspection reports tended to overstate 11 or not accurately state the actual physical condition of the weld 12 which had been inspected.

13 Are you aware of any physical confirmation that the 14 Daniel inspectors tended to be overly conservative and overstate 15 the weld deficiencies?

16 Yes. We have a number of embedded plates, manually-A 17 welded embeded plates, that were rejected by the Daniel inspectors 18 during this time. We have those in a condition unrepaired, in 19 other words, the same as when they were inspected the first time, 20 and we have confirmed that the Daniel inspections were overstated 21 and inaccurate by having a joint team of Union Electric, Bechtel 22 and Daniel people inspect those plates together and make an 23 assessment of them.

24 That inspection confirmed that there were no deviations 25 among the population of plates, which is over forty, greater than

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-	1	those assumed in the Bechtel analysis.
•	2	MR. GALEN: Mr. Chairman, no further questions.
-	3	JUDGE GLEASON: All right.
ø	4	Mrs. Drey?
2112	5	MS. DREY: I wonder if I may show you a document to which
0 133	6	one of these gentlemen just referred. May I do that? Is that
10007	(202)	appropriate?
- como	8	JUDGE GLEASON: You can ask them a question about it.
	9	MS. DREY: I mean, should I show it to them?
ACT OF	10	JUDGE GLEASON. Uh-huh.
	11	MR. GALEN: Tell us which document it is.
	12	MS. DREY: I'll give you one. It's DLUC-2142.
0	13	(Ms. Drey distributing documents.)
XXXXX a	14	RECROSS EXAMINATION
dou a	15	BY MS. DREY:
	16	Q I have just handed you DLUC-2142, dated November 14,
- 4-1-A	17	1977, and you say you have a copy of that at your table already,
a sere	18	is that right?
4-2 VNN	19	A (WITNESS SCHNELL) Yes.
	20	Q Would you please look at the bottom of the first page
	21	where it talks about embedded plates? I believe you were just
	22	quoting the figure of 96,472 automatically-welded studs, I guess
	23	I mean concrete anchors, had been inspected. Of that, the
•	24	rejected number of anchors was 106, which is .11 percent. Would
	25	you please read the next three numbers?

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-	10	A Yes. Manually-welded stude inspected, the number is
•	2	6.103. The number of studs rejected, 2,729; reject rate, 44.72
-	3	percent.
•	4	MS. DREY: Excuse me. How much time do I have, sir,
	sta 5	please?
	6	JUDGE GLEASON: Twenty minutes.
	(202)	MS. DREY: Mr. Chairman, I do not have a full comple-
	20024 8	ment of copies, but I coull get the full number that you woul?
	4' D.C.	require over the lunch break. May I please offer a copy of this
	101.5N	letter into evidence?
	IIISVA 11	JUDGE GLEASON: Isn't this already in evidence?
	0 12	MR. GALEN: This document is not in evidence.
0	GTU/)8	JUDGE GLEASON: Do you have objection for it going in?
	SH 14	MR. GALEN: I have no objection to this letter, Mr.
	NO431	Chairman.
	. 16	MR. LESSY: No objection.
	17	JUDGE GLEASON: All right. It will be introduced and
	H 18	we will need the additional copies over lunch. It will be intro-
	12 19	duced and marked as Joint Exhibit Number 31.
XXXX	20	(The document referred to was
	21	marked Joint Intervenors Exhibit
	22	Number 31 for identification and
	23	received in evidence.)
•	24	BY MS. DREY: (resuming)
	25	Q May I ask you gentlemen please to look at Joint Inter-

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and the second s	venors Exhibit Number 28? I had it in my hand at some point but
	I'm not sure
	JUDGE GLEASON: That' 77-05.
in the second se	MS. DREY: That's what I thought it was. Okay, I found
Contraction of the	it. Thank you.
and the second	BY MS. DREY: (resuming)
	Q Joint Intervenors Exhibit Number 18, that's okay.
	Now Number 18 is DLUC-990 and I believe you, in your redirect
Constant of the	testimony one of you centlemen referred to the third rage, I
	believe, of DLUC-990, which is dated December 3, 1976, which
	would make it before the stop work orders were issued.
and and a state	On page three, what is the date of that QC inspection
	report, please?
	A (WITNESS MEYERS) 7/18/77.
	Q So that would have been what? It would have been after
	the stop work order, is that correct?
	A Yes.
	Q Would you please now look at Joint Intervenors Exhibit
	Number 23, page 8? That's the NRC 77-05. Do you have page eight?
	A Yes.
	Q Would you please tell me if perhaps the quality control
	inspection report has been written about it says area inspected,
	material control laydown area, and then it says embed plate EF,

which I guess we have been told means embedded frame 614-A-814.

Would you please tell me if that's the same as one of

the four plates on page eight, next to which there is an asterisk? 1 That is the same, is it not, the same numbers? Is that the same 2 3 plate? A (WITNES; SCHNELL) It's the same plate. It's the same 4 number, certainly. 5 20024 (202) 554-2345 How do you know that's the same plate? 6 0 7 It appears to be the same plate. A 8 0 Mr. Thomas, do you have a list that would indicate D.C. 9 whether a plate, EF-614-A-814 would be -- is that -- would that 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, 10 mean there is only one plate with exactly that number, or is 11 A-314 sort of a generic term? 12 (WITNESS THOMAS) Mrs. Drey, the A-814 portion of that A 13 number is, to the best of my knowledge, a unique plate. 14 Well, I'm very confused about that because I have --0 15 Mrs. Drey, I'm sorry. I could be in error. There could A 16 be additional plates. 17 0 Would somebody please read the -- okay, I guess I 18 mentioned -- they list four plates in the 77-05 report and the 19 third line down, I guess, it says the item denoted with an 20 asterisk, which was reportedly, which is an interesting word, 21 I think, reinspected, determined acceptable and used in a pour. 22 Timely corrective action was not documented since the NCR. It was 23 not dispositioned up to the time of the NRC inspection. 24 Gentlemen, is it perhaps that this QC inspection report

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of July 77 was an effort to satisfy this item on page eight

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A (WITNESS SCHNELL) That would be speculation, Mrs. Drey. I don't know.

3 May I please distribute a document, and I hope I don't 0 4 do this wrong. I think it would help us, and I have to apologize 5 for this interesting bit of Xeroxing, but we -- the gentleman who prepared this chart which you are about to receive used scratch 6 7 paper at my house, which was courtesy of McDonnell-Douglas, so 8 I would appreciate it if you would only look at the half of the 9 side of this document that has -- it would really be only two 10 pages that I'm trying to bring to your attention. The pages, in 11 each case, that I am talking . bout -- the page in each case would 12 be headed Daniel Number -- and I want to say, by the way, it's 13 McDonnell-Douglas' wastebashet -- Cives mark, type of weld, and 14 weld size going across the top.

And I will ask you all to look at that, please. Is that enough time, Mr. Chairman?

JUDGE GLEASON: Yes.

BY MS. DREY: (resuming)

19 Q Mr. Thomas, would you please -- I realize you haven't 20 had time to review this and I also am not saying that this is 21 authentic because we cannot figure out how to deal with all the 22 numbers that we are having to deal with, so please don't hold me 23 to any of these numbers and I wouldn't want anyone to use these 24 in any official capacity. I will say, however, that looking at 25 the far right column, where it says weld size, if we look at the

far left column, where it says there is a Daniel Number which I 1 2 think from testimony here might be a Bechtel number, and look at 3 the far right, we do see that these always have conformed in any 4 records that we have been able to check. If they wouldn't have 5 we would have put both weld sizes on the far right column. 300 77H STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 6 Mr. Chairman, I would really like to offer this into 7 evidence for whatever it's worth. 8 JUDGE GLEASON: Gentlemen? 9 MR. GALEN: We object. 10 JUDGE GLEASON: I have to sustain the objection. 11 MS. DREY: Is there some way to do something to identify 12 it? 13 JUDGE GLEASON: You can ask questions off of it. 14 BY MS. DREY: (resuming) 15 Mr. Thomas, can you tell by looking at this whether 0 16 perhaps the A-814 is a generic number? In glancing quickly I 17 don't see it there, but it looks sort of like some of the A 18 numbers. I mean, for instance, if you look at EP-311 you will see 19 an A-916. You know, those kinds of numbers, three-digit numbers 20 appear occasionally. Do you know whether you have ever seen an 21 A-314 as a Cives mark? 22 A (WITNESS THOMAS) I don't recall whether I have seen an 23 A-814 as a Cives mark. It very well could be, though. 24 0 All right. Okay. 25 MS. DREY: What I would like to do is offer this in

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		1	evidence and you are rejecting it, right?
•		2	JUDGE GLEASON: Yes.
-		3	MS. DREY: I'd like it as a rejectable whatever.
•		4	JUDGE GLEASON: All right. It will be marked as Joint
	345	5	Intervenors Exh.bit Number 32, rejected.
XXXXX) 554-2	6	(The document referred to was
	4 (202	7	marked Joint Intervenors Exhibit
	2002	3	Number 32 for identification and
	N, D.C	9	rejected.)
	NGTO	10	MS. DREY: Sir, is there some way we can indicate not
	WASHI	11	to look at the back side of it?
	ING, V	12	JUDGE GLEASON: Off the record.
•	BUILD	13	(A discussion was held off the record.)
	TERS	14	BY MS. DREY: (resuming)
	REPOR	15	Q That's a Civis mark, is that right? Would you please
	S.W. , 1	16	tell me, Dr. Megers, what a worker in the field when he's told
	UEET,	17	to go get a plate, would he find and he is working with a blue-
	H STF	18	print, would you tell me whether he would look for the Cives
	300 TI	19	mark or the Bechtel number, the Bechtel mark which apparently is
		20	the same as the Daniel number?
		21	A (WITNESS MEYERS) I believe he would look for the Bech
		22	number.
		23	Q He'd look for the Bechtel number?
•		24	A That's correct.
		25	Q How do you know that?

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	1	A I'm not sure. I said "I believe".
	2	Q Would please tell me who did the field drawings for
	3	Bechtel for the Callaway plant, the name of the company, or did
	4	Bechtel dc . own drawings?
345	5	A We do our own drawings.
554-2	6	Q And who is Paper-Calmuson?
(202)	7	A They do detail, as for reinforcing steel.
20024	8	Q Would an embedded plate be considered reinforcing steel?
, D.C.	9	Who would do that kind of drawing that would include reinforcing
VGTON	10	steel? Would that be included in an embedded plate?
ASHIN	11	A I'm sorry. I don't understand your question.
NG, W	12	Q Would a Paper-Calmuson drawing have an indication of
CHEDI	13	which plate to put where?
ERS F	14	A I don't think so.
EPORI	15	Ω So what would a worker do using a Paper-Calmuson draw-
W R	16	ing out in the field which has the detailed ironwork specifications
SET, S	17	and so forth, where would he go to find out which plate to grab
I STR	18	to put in where?
(LL 00)	19	A He would have to use the Bechtel drawing that tells him
	20	where the plates are.
	21	Q So you provide the workers in the field with both the
	22	Bechtel drawing and a Paper-Calmuson drawing?
	23	A We provide Union Electric and Daniel with a set of
	24	design drawings. From that point on, Daniel and Union Electric
	25	take care of it.
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1	Q Does Bechtel did you have anything to do with Paper-
2	Calmuson?
3	A They were contracted to do the detailing for the rein-
4	forcing steel which is the steel the round reinforcing rods
5	that are inside the steel by Bechtel.
6	Q Just the rebar is what you are saying?
7	A Yes, ma'am.
8	Q And sometimes those rebars have bends in them and so
9	forth and sometimes they are straight, is that what you're saying?
10	A I didn't say that, but that's true.
11	Q In other words, the whole complement of reinforcing bars,
12	but just bars?
13	Now there was you contracted with Paper-Calmuson
14	just to make a drawing that would have bars in it and no embedded
15	plates, is that what you're saying?
16	A We contracted with Paper-Calmuson to do the detail for
17	reinforcing steel. I believe that just involves drawings which
18	have the bars only.
19	Q May I ask one of you gentlemen where the document show-
20	ing which of the plates contained 66 failed studs, about which
21	you were speaking earlier?
22	A (WITNESS THOMAS) The documents in regard to this
23	reinspection is included in one of the Joint Intervenors Exhibits,
24	I don't have the number real handy, along with information provided
25	in the Applicant's Exhibit Number 4.
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1 Q I guess -- are you talking about the Cives data pack-2 age? Is that what you mean? 3 A Yes, ma'am. 4 And that would indicate which of the 66 studs failed? 0 5 Is that what you are saying? 6 Yes, ma'am, that along with Applicant's Exhibit Number A 7 4 . 8 No, I don't mean that. I just wanted to know where would 0 9 the documents be that indicate which studs actually were the 10 66 studs that failed when they were bend-tested. Where would 11 those documents be? 12 The documents that exist are the Cives reinspection A 13 reports. 14 Okay. In other words, we were looking at those yester-C 15 day or sometime and no one could tell me which exact plate was 16 which. 17 May I ask, is it possible for an inspector, whether 18 he be from Cives or Daniel, to walk down one aisle along machine-19 welded plates and know whether or not a stud had a 360-degree 20 circumferential weld or flash? Would he have to walk around the 21 plate or could he walk down one aisle? 22 I think Dr. Fisher had addressed that, ma'am. He does A 23 not necessarily have to walk around the plate in order to see 24 360-degree -- the whole way around the stud. 25

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	1	Q Who is going tolook at the other 180 degrees? Do
345	2	you think he might have asked an iron worker to look for him?
	3	A Oh, I'm sure he didn't.
	4	Q You are sure? How do you know that? Were you
	5	there?
554-2	6	A No, ma'am.
(202)	7	Q And you think at the time that they did that, then
20024	8	they also would have hammer tested at the same time, and then
V. D.C.	9	indicated on that data package sheet that they had hammer
AGTON	10	tested a particular plate?
(ASHI)	11	A During that reinspection, they did that, as you
ING. W	12	call it, "hammer test," the bend test. Whether he did it at
GHUB	13	that particular time, or came back later and did it, I'm not.
ERS I	14	sure.
SPORT	15	Q Do you know over how long a period of time this
.W. , R	16	gentleman spent to examine 81,000 studs?
EET, S	17	A The testing started in late June, and finished
I STRI	18	in around August 10th.
LLL 00	19	Q Of the machine-welded plates?
50	20	A Of the total reinspection, which included both
	21	machine- and manual.
	22	Q It concluded on August 10th, did you say?
	23	A Approximately August 10th.
	24	Q What's the date of
	25	A It may have been later than that.

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1 Would you please tell me the date of the Bechtel 0 2 first final report? 3 August 10th. A 4 So how could he possibly have included in that 0 5 81,000 -- how could the data from that 81,000 studs possibly 554-2345 6 have been included in that first final report? 20024 (202) 7 A I was referring to the entire reinspection effort. 8 I don't know the dates, but I do know that the reinspection D.C. 9 of the 81,000-plus studs was completed prior to the August 360 7TH STREET, S.W., REPORTERS HUILDING, WASHINGTON. 10 10th date, because that information is included in the report. 11 0 So we have to assume it must have been in the 12 report? 13 Yes, ma'am. A 14 Would that period of time -- let's see. You said 0 15 it went until August 10th, and started when? 16 A The total reinspection effort may have continued 17 beyond August 10th. It started some time after June 9th, 1977. 18 You were talking about the Cives --0 19 A Reinspection. 20 Yes. And I'll just ask one more question. In 0 21 other words, what you're saying is, the Cives inspectors -- and 22 we know at least Totten and Teed, because their names are on 23 there, and we've identified them. One I think was a top QC 24 man at Cives, and maybe the second was also somehow associated 25 with Cives -- they in that period of time, prior to the first

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	1	final report, looked at 81,000 studs at the you said you
	2	used "flash" and "fillet," I think interchangeably? Is that
	3	correct?
	4	A Yes, ma'am.
554-2345	5	Q Is a fillet just usually referred to about a manual
	6	weld?
4 (202	7	A In the context of a stud weld, it's referred to as
2002	8	"flash."
N, D.C	9	Q Yes. Right. In other words, you sort of misspoke
NGTO	10	there, but they were able to look at 81,000 flashes and
WASHI	11	plus all the manual welded manual welds that are included in
NO.	12	the Cives data package, in the period of time, and that
BUILI	13	would include looking at all of the possible weld deficiencies
TERS	14	on the manual welds, as well as the inspection of the machine
HOASIN	15	welds? Is that correct?
2.W.	16	A That's correct.
(F.F.I.	17	MS. DREY: Thank you.
	18	JUDGE GLEASON: All right, we will come back at
1 000	19	2:30, please.
	20	MR. BAXTER: Is this panel excused, Mr. Chairman?
	21	JUDGE GLEASON: Yes, they are excused.
	22	(Witnesses Thomas, Meyers and Schnell excused.)
	23	
	24	(Whereupon, at 1:20 p.m., the hearing was recessed, to
	25	reconvene at 2:30 p.m., this same day.)

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AFTERNOON SESSION

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	2	(2:32 p.m.)
	3	JUDGE GLEASON: Can we get started please?
	4	MR. LESSY: The Staff calls Mr. Eugene Gallagher.
345	5	JUDGE GLEASON: Mr. Gallagher, would you please raise
554-2	6	your right hand?
1 (202)	7	Whereupon,
2002	8	EUGENE J. GALLAGHER,
N, D.C.	9	was called as a witness by counsel for the NRC Staff and, having
OTON	10	been duly sworn by the Chairman, took the stand and was examined
IHSEA	11	and testified as follows:
ING, V	12	DIRECT EXAMINATION
S.W., REPORTERS BUILD	13	BY MR. LESSY:
	14	Q Would you please state your name, sir?
	15	A Eugene J. Gallagher.
	16	Q Would you state your employer and position?
UEET, 1	17	A Yes. I am employed by the U.S. Nuclear Regulatory
H STF	18	Commission in the headquarters Office of Inspection and Enforce-
300 71	19	ment, located in Bethesda, Maryland. My position is Senior
	20	Civil Engineer.
	21	Q There is a document entitled "NRC Staff Testimony of
	22	Eugene J. Gallagher." Is this the testimony which you have filed
	23	in this proceeding?
	24	A Yes, it is.
	25	Q Now on page two of your testimony, on the list of

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	1	exhibits, about one-third of the way down the page, there is an
	2	Exhibit number which would be the next sequential Staff number
	3	Exhibit. Would that be number 6, to your knowledge?
	4	A Yes, it is.
345	5	Q Other than that, are there any other changes which you
) 554-2	6	have to your testimony?
1 (202	7	A Not to my knowledge.
2002	8	Q Is the testimony true and accurate to the best of your
N D.C	9	knowledge and belief?
0.LON	10	A Yes, it is.
NASHI	11	Q Also filed with your testimony was a document which the
TERS BUILDING, V	12	first page of which is a letter from U.S. Nuclear Regulatory
	13	Commission dated September 17, 1980, to Union Electric Company,
	14	attention Mr. John K. Bryan, and handwritten on the right-hand
REPOR	15	side are the numbers 90-14. Is that an inspection report prepared
S.W. , 1	16	by you?
UEET,	17	A Yes, it is.
ITS H	18	MR. LESSY: I ask that that document be identified as
300 71	19	NRC Staff Exhibit Number 6.
	20	JUDGE GLEASON: It will be so identified.
	21	MR. LESSY: Mr. Chairman, the Staff requests that the
	22	testimony and Exhibit Number 6 of Mr. Eugene Gallagher be bound
	23	into the record as if read.
	24	JUDGE GLEASON: Is there objection?
	25	(No response.)

ALDERSON REPORTING COMPANY, INC.

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UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of UNION ELECTRIC COMPANY (Callaway Plant, Units 1 and 2)

Docket Nos. STN 50-483 STN 50-486

NRC STAFF TESTIMONY OF EUGENE J. GALLAGHER

Q. Please state your name and position with the NRC?

A. My name is Eugene J. Gallagher. I am a civil engineer with the U.S. Nuclear Regulatory Commission. Since February 1981, I have been assigned to the Reactor Engineering Branch, Division of Resident and Regional Reactor Inspection, Office of Inspection and Enforcement. Prior to February 1981, I was a reactor inspector assigned to the Region III, Reactor Construction and Engineering Support Branch, Office of Inspection and Enforcement. A statement of my professional qualifications is attached.

Q. Please describe the nature of your involvement with the Callaway facility?

A. As a civil engineer inspector for the Region III Office of Inspection and Enforcement, I conducted five inspections with respect to the Callaway Plant, Unit 1, in order to: (1) ascertain whether adequate quality assurance plans, instructions and procedures had been established for the construction of concrete structures; (2) provide an independent evaluation of the performance, work in progress and completed work to ascertain whether activities relative to concrete construction were accomplished in accordance with NRC requirements; and (3) review the quality related records to ascertain whether these records reflected work accomplished consistent with NRC requirements and license commitments. The results of these inspections are contained in the following NRC inspection reports:

50-483/77-11,	conducted December 13, 1977 through January 8, 1978.
50-483/78-01,	conducted January 10, 1978 through February 8, 1978.
50-483/78-03,	conducted March 29, April 18-19, 1978.
50-483/80-14, (Exnibit)	conducted April 10, 1980 through August 14, 1980.
50-483/80-16,	conducted June 10-12, 1980.

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to address Joint Intervenors' Contention I-A dealing with embedded plates.

Q. Could you describe the embedded plates?

A. Embedded plates are steel plates set in concrete to serve as supports for piping, electrical conduits and cable trays, HVAC components, and structural steel framing. The plates are constructed by welding studs to one side of the plate. A plate is then positioned before concrete for the walls is poured. The concrete hardens around the studs, thereby affixing the plate to the wall.

Q. Could you describe the welding processes used to attach the studs to the plates?

A. Studs are welded to the plates by one of two methods. They can either be manually welded to the plate material by use of the shield metal arc process in accordance with American Welding Society (AWS) code, or the studs can be welded to the plates by use of automatically-timed machines in accordance with AWS code. Generally, the larger studs are manually welded, the smaller ones are machine welded. Both manual and machine-welded plates are used at the Callaway Plant. All the plates for the facility were welded by the Cives Steel Company at their plant in Gouverneur, New York.

Q. How were defective plates first discovered on the site?

A. On June 9, 1977, during a routine NRC inspection (documented in Report No. 50-483/77-05), an NRC inspector identified embedded plates with machine-welded studs which did not contain full 360 degree weld (flash) material and had not been bend tested as required by AWS 01.1-75 (Part F) welding code. The bend test requires machine-welded studs without 360 degree weld to be bent fifteen degrees in the direction opposite to the gap in the weld. If a crack in the weld appears (or if the stud breaks off from the plate), repairs must be made. Otherwise, the weld and the stud may be used as is.

As a result of the NRC inspection, Daniel Construction issued two "stop work" orders pending a complete investigation of the problem. One stop work order prevented further placement of concrete with embedded plates; the other prohibited issuance of plates to the field. Prior to June 9, 1977, 480 safety-related plates had been embedded in concrete. 255 of these plates used machine-welded studs; 225 used manually-welded studs.

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Q. What steps were taken to assure that the plates would not adversely affect the safe operation of the facility?

A. As a first step in resolving the problem, a 100% reinspection program of all plate welds was performed by Cives and monitored by Applicant's architect-engineer (Bechtel). This inspection included manually-welded as well as machine-welded studs.

Machine-welded studs that upon visual inspection did not reveal a complete 360 degree weld were subjected to the required ASW bend test. Of 81,673 machine-welded studs, only 66 studs failed the AWS bend test. This defect rate of 0.08% is exceedingly low and demonstrates that adequate quality controls were in effect during fabrication of the embedded plates. All the studs that failed were subsequently repaired.

The inspection also revealed that certain of the manually-welded studs contained visual weld defects. These visual defects were all corrected before the affected plates were used at the site.

In addition to the 100% reinspection program, the NRC requested that Applicant have some tests performed on embedded plates to give assurance that the 480 installed plates would not consitute a safety problem. Twelve manually-welded studs with visual weld defects were tested at Lehigh University. Six studs were bend tested to 30 degrees; six studs were subject to tensile tests. None of the stud welds failed the tests. This provides adequate assurance that even if manually-welded studs with visually defective welds had been embedded, they would behave acceptably over the life of the plant.

Six of the installed plates with machine-welded studs were randomly selected and tension-tested to design load conditions. All performed

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acceptably. This testing, coupled with the extremely low stud failure rate, provide adequate assurance that the machine-welded studs will not adversely affect the safe operation of the plant.

Q. Did the NRC Staff review the inspection and testing you have just described?

A. Yes, we reviewed and evaluated the inspection and testing program related to the embedded plates. The results of our review are set forth in NRC Report 50-483/80-14 (Exhibit 6). As there documented, we find adequate assurance that the 480 installed plates will not threaten the safe operation of the plant and that none of the uninstalled plates contain any studs with defective welds.

Q. Could you describe the exceptions to the AWS code listed in Section 3.8.3.6.4.3 of the Callaway FSAR?

A. The exceptions which are listed in FSAR Section 3.8.3.6.4.3 pertain only to manually-welded studs. Briefly, the exceptions state: (1) a vertical leg of the weld may be up to 1/16 of an inch smaller than specified in the design drawing; (2) the vertical legs need not be equal in length; (3) weld profile and convexity requirements need not be imposed; and (4) an undercut of up to 1/16 of an inch for 10% of the weld length may be permitted. These exceptions are minor in nature and do not affect the basic weld design or the capacity of the connection.

Q. Did you submit an affidavit in support of the NRC Staff Motion for Summary Disposition of Joint Intervenors' Concention I-A?

A. Yes, I did.

Q. Have you subsequently looked at Joint Intervenors' Answer to the Staff's motion?

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A. Yes.

Q. Is there anything in Joint Intervenors' Response which causes you to disagree with the substantive conclusions set forth in your affidavit concerning the safety implications of the embedded plates?

A. No, there is not.

Q. The following are questions concerning the Joint Intervenors' Response to MRC Staff's Statement of Material Facts on Part I.A, appearing on pages 28-31 of their answer. In response to Fact #2, Intervenors state that an NRC inspector identified machine-welded studs which did not contain a full 360 degree weld, but claim that there is no evidence the inspector knew at the time whether the studs had been bend tested as required by the AWS code. Could you comment on that response?

A. If a machine-welded stud shows less than a full 360 degree weld, the AWS code requires that it be bent 15 degrees in the direction opposite the gap in the weld. After this test, assuming the weld passed (i.e., did not exhibit a crack), the stud would be left in the bent position. In other words, after studs are bend tested, they are not hammered back into an upright position. Thus, an inspector who observed a machinewelded stud with less than a full 360 degree weld could visually tell by the angle of the stud whether it had been bend tested or not.

Q. In their response to #3, Intervenors state that 691 plates (rather than 480) were embedded in Seismic Class 1 structures and systems on or before June 9, 1977. Could you comment on the difference between these numbers?

A. Intervenors are correct in their statement that more than 480 plates were embedded in structures on the site on or before June 9, 1977. As

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stated in my affidavit supporting the Staff motion (at p. 3), the 480 figure refers to <u>safety-related</u> plates. While other plates may have been embedded on the site, it is only the safety-related plates that are a potential source of concern.

Q. In their response to #4, Intervenors allege various deficiencies in the reinspection program. Could you comment?

A. A distinction must first be made between manual and machinewelded studs. The AWS code does not require that manual-welded studs be bend tested; these studs are often too big physically to be hammered 15 degrees. A visually defective manual-welded stud would be reworked instead. It is only the machine-welded studs that are subject to the 15 degree bend test and then either used as is or reworked (depending on the outcome of the test). All the machine-welded studs that showed less than a complete weld were bend tested. It remains my view that there were no deficiencies i.. the reinspection program.

Q. In their response to #5, Intervenors disagree with the number of defective welds found. Could you comment?

A. First, I would like to correct a figure used in the NRC motion. The correct number of machine welded studs inspected is 81.673 and not 81,643. This discrepancy was caused by a typographical error in Inspection Report 80-14.

The figures cited by Intervenors in their response relate to manualwelded studs, not machine-welded studs. The Staff's Statement of Material Fact #5 addressed <u>machine-welded</u> studs. I know of no documents that challenge the figures for machine-welded studs (66 failures out of 81,673 studs).

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Q. Could you comment on Intervenors' response to Staff Statement #7 which criticizes the tests pertaining to manually-welded studs performed at Lehigh University?

A. Again, Section 4.30 of the AWS code does not pertain to manuallywelded studs. The tests performed at Lehigh are not prescribed by the AWS code; they were selected an engineering basis to determine whether the installed manual welds would pose a threat to the safe operation of the plant. It would have been physically impossible to hammer the twelve studs selected to a 15 degree angle. In any event, the tests at Lehigh subjected the studs to a greater bend test of 30 degrees and none failed.

While the record does not indicate when the plates involved in the test were fabricated or delivered to the site, the plates were fabricated before June 9, 1977, and were thus representative of the manually-welded plates embedded on the site prior to that date.

Q. Could you comment on Intervenors' response to Statement #8 which criticizes the tests performed on the machine-welded studs already embedded in concrete?

A. Intervenors are correct in that the test procedures called for selecting four EP-512 plates and two EP-912 plates. The tests are considered random in that nothing was known about the quality of the studs tested. Intervenors also indicate some confusion as to whether the plates were "tension-tested, load tested, or what." The plates were tested by attaching a hydraulic tensioning device to a plate and then applying the tension load to the plate. Attachment E to Report 80-14 indicates that the tested plates did in fact perform acceptably.

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EUGENE J. GALLAGHER

OFFICE OF INSPECTION AND ENFORCEMENT U.S. NUCLEAR REGULATORY COMMISSION

PROFESSIONAL QUALIFICATIONS

I am a Civil Engineer in the Divis on of Resident and Regional Reactor Inspection, Reactor Engineering Branch, Office of Inspection and Enforcement.

I received a Bachelor of Engineering Degree in Civil Engineering from Villanova University in 1973 and a Master of Science Degree in Civil/Structural Engineering from Polytechnical Institute of New York in 1974. I am a registered Professional Engineer in the States of Illinois (#37828), Florida (#29114) and Louisiana (#16376). I am a member of the American Society of Civil Engineers, American Concrete Institute and Tau Beta Pi National Engineering Honor Society.

In my present work at the NRC, I provide technical assistance in the area of civil engineering to Regional offices and resident inspectors with particular emphasis on the design and construction of reinforced and prestressed concrete structures, foundations, structural steel buildings and in structural testing and surveillance. In addition, I provide technical input for the development and interpretation of industry codes, standards and regulatory requirements relating to inspection activities.

From 1973 to 1981 I was a member of the NRC Region 3 inspection staff responsible for the inspections of civil engineering aspects of plants under construction and in operation. This included the Inspection of laboratory and field testing of concrete, steel and soils materials, earth embankments and dams, material sources, piping systems and reinforced and prestressed concrete structures. In addition, a review of management controls and quality assurance programs were performed at plants under construction. I participated in approximately 90 inspections of reactor facilities.

Prior to joining the NRC Staff I was employed by EBASCO Services, Inc. in New York City from 1973 to 1978. I performed designs of reinforced concrete and steel structures, design of hydraulic and water supply systems and preparation of specifications for construction. From 1976 to 1978, I was the civil resident engineer at the Waterford 3 Nuclear Plant site responsible for providing technical assistance to construction.

During 1972 and 1973 I was employed by Valley Forge Laboratory in Devon, PA performing inspection and testing on concrete, steel and soil materials.

ADDITIONAL NRC TRAINING

Fundamentals of Inspection, NRC, February 1973 (40 hours) BWR Fundamentals Course, NRC, March 1973 (40 hours)

Concrete Technology and Codes, Portland Cement Assoc., May 1978 (80 hour)

Quality Assurance Course, NRC, August 1978 (40 hours)

Nondestructive Examination and Codes, Rockwell Int'l., August 1978 (120 hours)

PWR Fundamentals Course, NRC, November 1973 (40 hours) Welding Metallurgy, Ohio State University, September 1980 (80 hours)


UNITED STATES NUCLEAR REGULATORY COMMISSION REGION III 199 ROOSEVELT ROAD GLEN ELLYN, ILLINOIS 60137

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Docket No. 50-483

Union Electric Company ATTN: Mr. John K. Bryan Vice President - Nuclear Post Office Box 149 St. Louis, MO 63166

Gentlemen:

This refers to the meeting conducted in your office in St. Louis, MO on April 10, 1980, by Messrs. E. J. Gallagher and R. Landsman of this office and a subsequent meeting held in our office in Glen Ellyn, IL by Mr. G. Fiorelli and members of his staff on May 28, 1980, for the purpose of discussing the resolution of the embedded plate matter at the Callaway Unit 1 plant. This also refers to an inspection of available embedded plates and review of quality records that was performed by Messrs. E. J. Gallagher and H. Wescott on June 10-12, 1980 at the Callaway site and the observation of physical testing of plates at Leigh University on August 6, 1980 and at the Callaway site on August 14, 1980.

The enclosed copy of the report documents the final review and evaluation of the embedded plate matter and details of items discussed during the meeting. Based on these reviews and evaluations, load test results, discussions with cognizant personnel of your staff and the Bechtel Power Company and direct NRC inspections, we concur in the findings that the subject embedded plates using both manually and automatic machine welded anchor studs meet requirements. We have no further questions at this time in regard to this matter.

No items of noncompliance with NRC requirements were identified during the course of this inspection.

In accordance with Section 2.790 of the NRC's "Rules of Practice." Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room, except as follows. If this report contains information that you or your contractors believe to be proprietary, you must apply in writing to this office, within twenty days of your receipt of this letter, to withhold such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

De Generation provident Homen Reporter June Deach Dallagher Docket No. STN 50-4930L Official Eath No. Stall # 6 In the matter of Callaway 5 NUCLEAR REGULATORY COMMISSION 7 Staff Applicat. lictervenus:

Union Electric Company - 2 -

and "

SEP 1 6 1945

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

nes & Kapple James G. Keppler Director

Enclosure: IE Inspection Report No. 50-483/80-1.

cc w/encl: Mr. W. H. Weber, Manager Nuclear Construction Central Files Reproduction Unit NRC 20b PDR Local PDR NSIC TIC Regions 1 & IV Ms. K. Drey Mr. Ronald Fluegge, Utility Division, Missouri Public Service Commission

U.S. NUCLEAR REGULATORY COMMISSION OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-483/80-14

Docket No. 50-483

License No. CPPR-139

Licensee: Union Electric Company P. O. Box 149 St. Louis, MO 63166

Facility Name: Callaway, Unit 1

Meetings/Inspection At: Union Electric Office, St. Louis, MO Callaway Site, Callaway County, MO NRC Region III Office, Glen Ellyn, IL

Meetings/Inspection Conducted: April 10, 1980 May 29, 1980 June 10-12, 1980 August 6 and 14, 1980

Inspector: E. J. Gallagher D. W. Hayes, Chief

3-2.80

Reviewed By:

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Approved By:

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Fiorelli, Chief Reactor Construction and Engineering Support Branch

Engineering Support Section 1

9-3-5

Meetings/Inspection Summary

Meetings/Inspection on April 10, May 29, June 10-12, and August 6 and 14, 1930 (Report No. 50-483/80-14

Items Discussed: Callaway Unit 1 submittal of March 10, 1978 entitled "Acceptability of Embedded Plates Installed at Callaway Plant, Unit 1".

The review, evaluation and inspection involved 160 inspector-hours by two .NRC inspectors.

Results: Resolution of embedded plate item at Callaway Unit 1.

DETAILS

Meeting Attendees at Union Electric Office, April 10, 1980 <u>NRC Region III</u> E. J. Gallagher, Civil Engineer Inspector R. B. Landsman, Civil Engineer Inspector Union Electric Personnel

D. F. Schnell, Manager, Nuclear Engineering
D. W. Capone, Assistant Manager
F. Field, Quality Assurance Manager
R. L. Powers, Quality Assurance Supervisor
D. B. Stecko, Nuclear Engineering
K. W. Kuechenmeister, Construction Engineering

Meeting Attendees at NRC Region III Office, May 29, 1980

NRC Region III

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1.

G. Fiorelli, Chief, RC&ES Branch
E. J. Gallagher, Civil Engineer Inspector
R. B. Landsman, Civil Engineer Inspector
H. Wescott, Project Inspector

Union Electric Company

D. F. Schnell, Manager, Nuclear Engineering
W. Zvanut, Supervisor, Nuclear Engineering
R. L. Powers, Quality Assurance Site Superintendent
K. W. Kuechenmeister, Construction Engineer

Bechtel Power Company

B. L. Meyers, Project Manager
E. V. Thomas, Supervising Civil Engineer
P. H. Divjak, Project Engineer
A. Pagano, Assistant Supervising Civil Engineer
K. G. Parikh, Engineering Specialist

Inspection Exit Meeting Attendees at Callaway Site June 10-12, 1980

NRC Region III

E. G. Gallagher, Civil Engineer Inspector H. M. Wescott, Project Inspector

. Union Electric Company

D. F. Schnell, Manager, Nuclear Engineering

- W. H. Weber, Manager, Nuclear Construction
- F. D. Fields, Manager, Quality Assurance
- R. L. Powers, Superintendent, Site Quality Assurance
- M. Doyne, General Superintendent
- K. W. Kuechenmeister, Construction Engineer

Daniels Construction

H. J. Starr, Project Manager

2. References

The following references were used for the review and evaluation of the embedded plates installed at the Callaway Plant Unit 1:

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a. NRC Reports

- (1) Inspection Report 483/77-05 dated July 8, 1977
- (2) Investigation Report 483/77-10 dated December 27, 1977
- (3) NRC Region III Action Item A/I F30360H1 to Headquarters dated April 6, 1978
- (4) Transfer of Lead Responsibility to Region III for evaluation of Callaway report on embedded plates dated April 14, 1980

b. Union Electric Reports

- Letter ULNRC-197 dated August 4, 1977, response to inspection report 483/77-05
- (2) Letter ULNRC-221 dated January 27, 1978, response to investigation report 483/77-10
- (3) Letter ULNRC-238 dated March 10, 1978 entitled, "Acceptability of Embedded Plates Installed at Callaway Plant, Unit 1" including enclosures 1 through 9
- (4) Letter ULNRC-349 dated April 24, 1980, NRC questions on Union Electric embedded plate report
- (5) Letter ULNRC-354 dated May 23, 1980, responses to NRC questions on Union Electric embedded plate report with attachments A through D
- (6) Letter ULNRC-361 dated June 19, 1980, additional responses to NRC Questions

c. Other References

SNUPPS letter SLU 6-14 dated November 1, 1976
 SNUPPS letter SLEM 6-514 dated November 5, 1976
 CIVES letter SL:124 dated June 30, 1977
 CIVES letter SL:126 dated July 12, 1977
 SNUPPS letter SLEM 7-302 dated July 27, 1977
 BECHTEL letter BLSM-5959 dated August 8, 1977
 SNUPPS letter SL:134 dated August 18, 1977
 SNUPPS letter SLM 7-108 dated August 18, 1977
 DANIEL memo PQWP-152 dated October 15, 1977
 BECHTEL letter BLSE-5195 dated November 21, 1977
 BECHTEL letter BLSE-5227 dated November 29, 1977
 CIVES Telecopy dated May 22, 1980

3. Background

Embedded plates supplied prior to June 9, 1977 to the Union Electric Company Callaway Plant Unit 1 were accepted and installed based on the fabricator's, Cives Steel Corporation, and Bechtel's vendor inspection program. A total of 480 safety-related embedded plates were installed in concrete prior to June 9, 1977, of which 255 plates utilize headed stud anchors attached by automatically timed stud welding equipment, and 225 plates with threaded rod anchors attached using manually welded fillet welds by the shielded metal arc process.

An NRC inspection conducted June 7-9, 1977 (Report No. 483/77-05) identified machine welded studs to embedded plates which did not contain full 360 degree weld material (flash) and was not bend tested as required by AWS D.1.1-75 welding code, Part F (stud welding).

As a result of the NRC inspection, Union Electric Company issued . "stop work order" #9 on June 9, 1977 suspending the use of safetyrelated embedments until a reinspection program was initiated at the Cives fabrication plant and on uninstalled plates at the Callaway site. This reinspection included both machine welded and manually welded anchors and is discussed later in this report.

An NRC investigation was also conducted between October 14 and November 22, 1977 (Report No. 483/77-10) which included the question of the adequacy of the concrete embeds used in construction prior to June 9, 1977. The investigation report indicated that the embedded plate matter would be reviewed by the NRC Headquarters staff.

Union Electric Company's analysis of the acceptability of the embedded plates dated March 10, 1978 (Letter ULNRC-238) concluded that "all embeds installed at Callaway are sound and meet design load requirements".

Upon receipt of Union Electric's analysis, the NRC Region III office -- issued Action Item A/I F30360H1 dated April 6, 1978 for NRC Headquarters review. The following review and evaluation was conducted by Region III staff in order to address this unresolved matter.

Meeting Details

Meetings between NRC, Union Electric Company, and Bechtel were held on April 10, 1980 in St. Louis, Missouri and on May 29, 1980 in Glen Ellyn, Illinois. During these meetings a series of questions.from the NRC were presented and responses provided by Union Electric and Bechtel. The questions and responses are documented in letters ULNRC-349 dated April 24, 1980, ULNRC-354 dated May 23, 1980, and ULNRC-361 dated June 19, 1980. These are included as attachments A, B, and C to this report.

The meetings contained discussion of the background of the embedded plate matter, results of reinspection by Cives and Bechtel, analysis of the data, AWS Welding Code requirements, specification requirements, and Daniels nonconformance reports.

5. MRC Inspection of Embedded Plates at Callaway Site

During the NRC inspection on June 10-12, 1980, a visual inspection of embedded plates installed in concrete prior to June 9, 1977 was performed. The manually embedded plates used to support the structural steel framing was substantially loaded by the floor slab dead loads with no sign of distress or indication of overstress. The machine welded embedded plates, some of which were loaded with support attachments and others not yet loaded, were observed to be fully intact with no sign of distress.

6. Evaluation of Embedded Plates at Callaway Unit 1

The evaluation as to the acceptability of the embedded plates installed at the Callaway plant is separated into two categories: (a) machine welded studs installed prior to June 9, 1977 and (b) manually welded threaded rod anchors installed prior to June 9, 1977.

a. Machine Welded Anchors (Headed) Studs

Embedded plates in concrete with automatically timed machine welded headed study to plates are used to provide support for attachments of piping and components to the concrete structure.

In an effort to identify the condition of the 255 embedded plates installed in concrete prior to June 9, 1977, the licensee initiated a 100% reinspection of plates not installed as of that date and available on-site in storage or located at the supplier's fabrication shop. The reinspection was performed by both Bechtel and Cives Steel Corporation.

- 5 -

The results of the reinspection were reported as follows:

Number of Plates	Number of Studs	Number of Indications	
7543	81,643	457	
Number of Failures	% of Studs w/Indications	% of Studs Failed	
66	0.56%	0.08%	

NOTE: 1. Indications were studs on which a full 360° weld flash was not obtained when machine w ded and were required to be bend tested.

> Failures were identified by striking the stude with a hammer and bending the stude to an angle of 15 degrees according to AWS D1.1-75, Section 4.30.1.

It was also indicated in Union Electric Company response (Item 3) of ULNRC-354, attachment "C" that the 66 studs that failed when bend tested were contained on 43 plates out of the total 7543 plates. Of these plates, 10 had multiple stud failures with 4 of the 10 plates having adjacent stud failures. Therefore, the percentage of plates having 1 or more stud failures relative to the total number of plates reinspected was 43/7543 or 0.57%.

The above information regarding machine welded studs was considered not completely sufficient in itself to base a final decision on the acceptability of embedded plates. The NRC requested the licensee to test actual embedded plates installed in concrete prior to June 9, 1977. The licensee developed test procedures which were reviewed by the NRC prior to being implemented. The test program was entitled "Test Program to Evaluate Welds of Anchor Rods and Studs to Embedded Plates" dated August 5. 1980 and is included in Attachment D. The tests were performed at the Callaway site under the supervision of Drs. R. Slotter and J. Fisher of Leigh University. The results of these tests were as follows:

Six plates were loaded to allowable design load without plate failure or plate deflection more than 1/4 inch. The plates tested exhibited acceptable behavior under the applied load.

Details of the test and results are contained in Union Electric submittal ULNRC-380 dated August 28, 1980 (Attachment E).

The automatically machine welded embedded plates installed prior to June 9, 1977 are considered to provide adequate structural support for piping and component supports based on the following:

- (1) The 100% reinspection of 7543 plates which contained 81,643 machine welded head studs, of which 66 studs (0.08%) were identified as not meeting AWS bend test requirements.
- (2) Actual load tests to rated capacity performed on embedded plates in concrete prior to June 9, 1977.
- b. Manually Welded Ar hors (Threaded Rods)

Embedded plates fabricated by manually welded threaded rods to plates are used for structural steel framing supports at the Callaway Site.

The original licensee commitment in the PSAR, Section 3.8.1. 6.6.2 (Steel Construction stated that, "AWS D1.1-72 and D1.1 Revision 73, Structural Welding Code, is used without exception for welding structural steel". This commitment has been revised in the current FSAR submittal for Callaway. FSAR Section 3.8.3. 6.4.3 now states that, embedded items are erected in accordance with AWS D 1.1 Structural Welding Code, except that the qualification of welders and welding operators may, alternatively, be in accordance with ASME Section IX. The following exceptions are permitted for welding between anchor rods and plates embedded in concrete:

- Vertical leg of weld may be up to 1/16 inch smaller than that specified on drawings.
- (2) Unequal legs are permitted.
- (3) Weld profile and convexity requirements for these welds need not be imposed.
- (4) An undercut of up to 1/16 inch for 10% of weld length may be permitted.

In addition to these exceptions it was also determined that welds were less than the minimum AWS requirement of 5/16 inch. The licensee demonstrated that the the welds less than 5/16 inch are permissible based on an analysis that the smaller weld developes the strength required.

The above exceptions were incorporated in Revision 9, dated July 21, 1977 of Specification C-131, Miscellaneous Metal, Section 8.4 and 8.6.

- 7 -

During the months of July and August 1977 Cives Steel Corporation reinspected over 400 manually welded plates of which 80 did not meet the specification requirements of C-131, Revision 9.

However, the licensee indicated in Letter ULNRC-354 dated May 23, 1980 (Item 9) that the welds inspected had an undersize not exceeding 1/8 inch.

Enclosure 1 to Union Electric letter ULNRC-238 entitled "Investigation of Welded Studs" provides an analysis which calculates the reduced load capacity of the anchor due to a 1/8 inch undersize (assumed full 360° around) and a 1/16 inch undercut defect. The results of the analysis indicate that the reduced load capacities as shown below are not significantly effected by the 1/8 inch undersize. The analysis for the 1/16 inch undercut does not effect the load capacity of the anchor since the reduced diameter due to the threads on the anchor rods control the rated capacity of the anchor.

The reduced capacity of the plates due to 1/8 inch undersize are as follows:

Plate Type	Load Capacity (1bs)* per Dwg C-0012 Sht. 9	Reduced Capacity (lbs) Due to 1/8 Inch Undersize		
EP 211	200,000	187,000		
EP 312	175,000	168,000		
EP 412, EI	2 511 75,000	60,000		
EP 611	50,000	47,000		

NOTE: *Load capacity shown on Drawing C-0012 are for vertical loads from structural steel framing reactions.

Sample calculations used to determine the reduced load capacities were reviewed. The reduced capacities provide adequate stength for the design load.

A number of Daniel inspection reports generated after June 9, 1977 indicated more than allowable undersize on many studs; however, the extent of undersize was generally not recorded. These reports are contained in NCR-2-0831.

In order to illustrate that the Daniel inspectors overstated the weld deficiencies in their reports, 47 available manually welded plates typical and fabricated in the same manner as those installed prior to June 9, 1977 were reinspected by a team of Union Electric, Bechtel and Daniel inspectors. All 47 plates were originally rejected by Daniel site inspection and recorded in NCR-2-0831.

The reinspection was performed in order to characterize and quantify the cause of the rejection since this was not fully recorded on the original Daniel inspection. The results of the reinspection indicated that 39 of 47 plates did not meet the requirements of Specification C-131, Revision 9 or AWS including the four exceptions described previously. The reinspection did indicate that none of the anchors on the plates exceeded the 1/8 inch undersize or 1/16 inch undercut assumed in the analysis of determining reduced capacities. The reinspection finding indicated undersized welds of 1/8 inch for a portion of the weld circumference.

These 47 plates have been retained on hold at the site. During an NRC inspection on June 10-12, 1980 the NRC inspectors visually inspected the subject plates. The results of this inspection determined that the Union Electric, Bechtel, and Daniel team inspection was valid. The visual appearance of the welds did indicate poor workmanship characteristics.

To demonstrate that the welds provide adequate structural integrity the NRC insocitors requested the licensee to perform load tests on selected welds which appeared to have poor workmanship. In addition, selected anchors were bend tested. These structural tests were performed in accordance with procedure entitled "Test Program to Evaluate Welds of Anchor Rods and Studs to Embedded Plates" dated August 5, 1980. The tests were performed at Leigh University on August 6, 1980.

The results of the load and bend tests are as follows:

- Six anchor rods were bend tested to approximately 30 degrees. All of the welds successfully withstood the bend test with no sign of failure.
- (2) Six anchor rods were tension tested to ultimate load. All of the welds and rods exceeded the minimum allowable load acceptance criteria established prior to the test and included in Appendix A of the test procedure attached to this report.

Detailed discussion of the test and results are contained in Union Electric submittal ULNRC-380 dated August 28, 1980 (Attachment E).

The manually welded embedded plates installed prior to June 9, 1977 are considered to provided adequate structural integrity for the intended loads based on the following:

- (1) The reinspection of manually welded plates available in storage which indicated that in no case was the welds undersized by more than 1/8 inch.
- (1) The analysis that the reduced load capacities are not significantly effected by an 1/8 inch undersized weld or 1/16 inch undercut due to capacity being controlled in the threads of the anchor rods.

- (3) NRC inspection of 47 plates retained on hold at the Callaway site which appear to have poor welding workmanship; however, adequate structural strength.
- (4) Load test performed on undersized welds and welds of poor workmanship quality which demonstrate adequate structural strength.
- (5) VRC inspection of manually welded embedded plates substantially loaded by structural steel framing and floor slab dead load without sign of distress.

7. Closure of Embedded Plate Report at Callaway Unit 1

Based on the foregoing review and evaluation of the referenced documents, results of reinspections of embedded plates, the analysis of reduced load capacities due to weld deficiencies, direct NRC inspection and actual load test performed, it is considered that the embedded plates using both manually welded and automatic machine welded anchor studs are capable of providing the intended support for structural steel framing, piping, and component support.

ATTACHMENTS:

A .	Caloa	Electric	Submittal	ULNRC.	-349	dated	April	24,	1980
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- B. Union Electric Submittal ULNRC-354 dated May 23, 1980
- C. Union Electric Submittal ULNRC-361 dated June 19, 1980
- D. Detailed Procedure for Test Program to Evaluate Welds on Anchor Rods and Studs to Embedded Plates, Revision 2, dated August 5, 1980
- E. Union Electric Submittal ULNRC-380 dated August 28, 1980 final report on test of embedded plates

UNION ELECTRIC COMPANY

April 24, 1980

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Mr. E. Gallagher U. S. Nuclear Regulatory Commission Region III 799 Roosevelt Road Glen Ellyn, Illinois 60137

ULNRC- 349

Dear Mr. Gallagher:

NRC QUESTIONS ON UE EMBED REPORT CALLANXY PLANT

The following generally summarizes the questions transmitted to Bechtel as a result of our April 10, 1980 meeting on the subject report:

- 1. NRC takes exception to statement in J. K. Bryan cover letter,
 - P.1: "As noted in the Bechtel specification for these embeds, even AWS requirements limiting undersize, profile and other weld characteristics cannot be applied to manuallywelded embeds and are unnecessary to assure their ability to carry design loads."

Mr. Gallagher has talked to Moss Davis of AWS plus NRR and ISE NO people expert in AWS requirements. He posed this question: "Are AWS weld profile, underout, etc. requirements applicable to manually-welded studs?" The answer from these people is "YES".

 How does Bechtel support deviations from DL.1 on undercut, profile & allowable underthickness in fillet lengths as allowed in Rev. 9 of Specification C131?

It was unclear to the NRC from specification Cl31 whether AWS Ol.1 is a full requirement. Bechtel is to clarify specification intent that AWS Dl.1 is applicable with exceptions clearly defined.

 Even though Bechtel specification allows 1/16" under on Vertical leg, can we confirm that minimum weld leg is 5/16"? Apparently anything less than 5/16" violates AWS code for fillet welds in this application.

 NRC noted that current (1980) AWS D1.1 section 3.15 does not allow 1/16" undercut. Mr. E. Gallagher April 24, 1980 Page Two

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- Did Cives Corp. inspect the same mechanically-welded embeds reported in Daniel Data Package under cover DLUC-2399 (Enclosure 7 to ULNRC-238)?
- 6. Why was section 9.6 added to Bechtel Specification Cl31? Prior to this revision (9) didn't Cives bend test machinewelded studs with less than 360° weldflash? Wasn't Cives following Dl.1 4.30.1 prior to June 8, 1977? If Cives was not bend testing questionable studs prior to this time, how or what were they inspecting prior to shipment? If they were performing bend tests, is there any documentation?
 - Note: Several Cives & Bechtel letters in NRC files indicate that bend tests were not being done prior to Rev. 9 (e.g.: Cives letters to Bechtel, SL:126, July 12, 1977, and SL:134 dated July 14, 1977 and Bechtel letters BLSM-5959, dated Aug. 8, 1977 and BLSE-5195, dated Nov. 21, 1977). Was there any Bechtel followup to these letters?
- 7. Reference Cives letter to Bechtel SL:134, dated Aug. 18, 1977. NRC is concerned about several things in this letter--References to "new" inspection criteria; statement about "no other sections of AWS apply to our work" and "tolerance for welds having less than 360° flash". Also, was request in this letter to use '77 version of AWS acted upon by Bechtel?

See also BLSE-5227 dated Nov. 29, 1977 which may respond to concerns in SL-134.

8. Enclosure 1 to UE report (Bechtel probability study):

Messrs. Gallagher & Landsman of NRC are not expert in probability analysis and will not personally support an analysis of this type to defend acceptability of machine-welded embeds.

NPC concerned not with probability of stud failure but number of defective studs per embed and probability of embed failure. D. Schnell pointed out the study <u>does</u> cover probability of failure of plate for each area of plate. NRC was suspicious of this analysis. NRC would like to see complete dialogue for probability report.

Do we have evidence of multiple defects per embed? How many plates were involved in the 66 stud defects? Becntel is to provide a list of plates which contain the 457 defective studs (including 66 failed studs) and determine how many plates had more than 1 defective or failed stud.

9. Bechtel states in Enclosure 1 (pg. 1 in Bechtel Report) that

Mr. E. Gallagher April 24, 1980 Page Three

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the "majority" of manually-welded plates did not meet dimensional/profile requirements of specification.

How many plates are in this "majority"?

How many plates were considered acceptable (meeting spec) after relaxations (items a, b, c & d) listed in Bechtel Report?

In a general statement the NRC questioned whether AWS D1.1 was fully implemented prior to June 8, 1977. Bechtel is to verify that AWS was fully utilized as criteria before specification C131 was relaxed and determine how effectively it was imposed.

- * 10. DIC memo PQWP-152, dated October 26, 1977 has results of inspections of machine-welded embeds which differ markedly from numbers in Enclosure 1. How is difference explained? Was different criterial used in inspection?
 - 11. Enclosure 1, Appendix B, Table I,:

Why were different allowable stress levels used (27ksi vs. 3(ksi) to calculate embed "load capacity" and "reduced load capacity" because of assumed undersize?

Usin Nelson "cookbook" rules for determining load capacity, it appears capacity of EP-512's should vary for the different configurations A thru F. (NRC could not verify any Bechtel capacities for any configuration of 512's.) How did Bechtel compute capacities and why don't capacities vary for different configurations of EP-512's? Would also like to see calculations to determine how "reduced load capacity" for all types of plates was arrived at.

12. Enclosure 1, Appendix 3, Table 3:

Rationalle followed by Bechtel in Table 3b on allowing 1/16" undercut is based on fact that area of threaded stud is less than area with 1/16" undercut. NRC & UE confirmed that some unthreaded studs are manually-welded. It appears that load capacities for manually-welded Nelson (or headed) studs with 1/16" undercut are not addressed in Bechtel report.

Are load capacities in table nos. 1 and 3 based on tension, shear or a combination?

Demonstrate how calculations are made to show that reduced fillet weld legs either affect or don't affect load capacity of plate.

Mr. E. Gallagher April 24, 1980 Page Four

> A copy of BLUE-675, dated April 9, 1980 was handed out which provides a listing of manually-welded embeds with loads calculated assuming 1/8" undersize welds. After a short discussion, NRC requested to see calculations of how the reduced load capacities were determined.

13. Regarding Bechtel recommendations in Enclosure 6:

On plates deemed acceptable with an average undersize of 1/3", if undersize is concentrated in one area of plate and load is applied at this point, does theory that plate is acceptable remain valid? (localized undersize)

Furthermore, if the average weld undersize of 1/8" resulted in a weld profile of less than 5/16", are the Bechtel conclusions on load capacity still valid in light of AWS limit on weld size of 5/16" minimum? The NRC's concern is that AWS indicates welds less than 5/16" do not contribute sufficient strength to be reliable.

14. Cives letter SL:124 dated June 30, 1977:

- Table 1: Attempts to show 1/16" undersize is acceptable but in making this point, allowable stress of 43ksi is used instead of 36. What is rationalle?
- Bechtel letter to Cives dated June 24, 1977, from Divjak to Ross:

How do the numbers quoted in this letter (no. of study inspected, etc.) fit with the numbers in the probability study?

* 16. Seiken letters to Schnell, SLU:6-41, dated Nov. 1, 1976 & SLBM-6:514, dated Nov. 5, 1976:

> Letters indicate Cives was not in control of production quality based on Bechtel/SNUPPS inspection findings. What measures were taken? Did DIC/UE perform the recommended inspections at the site? NRC believes this should have highlighted problems before embeds were installed.

17. Enclosure 6 (to UE submittal) contains a Bechtel attempt to analyze NCR 0831. At random, NRC picked entry #44 of Attachment V, pg. 3 and asked why the corresponding DIC inspection report was eliminated as a data point.

NAC suggested (but did not insist on) a reanalysis of each manual and machine-welded embed installed prior to June 9, 1977. About 225 manually-welded embeds and 255 Mr. E. Gallagher April 24, 1980 Page Five

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machine welded embeds are in this group. A program to evaluate each might consist of:

- a. Identification of each plate location.
- b. Determine where load is applied on plate.
- c. Calculate actual load (vs. plate capacity).
- Assume most heavily-loaded stud fails and determine what happens.

Investigation may show that-

- a. Some plates may not have been used. Some may have all load applied now.
- b. Some may be so lightly loaded that failure is precluded (even with failing stud).
- c. Some may not involve safety-related attachments.
- d. Failure analysis may show that failure does not threaten any system or structure from a safety point of view.

The above analysis may remove most of the embeds in question from further concern. It is recognized, however, that this approach may be totally impractical.

NRC would like to have answers to foregoing questions within 30 days. Mr. Gallagher is attempting to complete his analysis of the Callaway embed report by the end of June (1980).

* Response must have UE/DIC input.

Please call me if you have any questions or if something of importance was omitted from the foregoing list.

Very truly yours,

Donald F. Schnell Manager - Nuclear Engineering

DFS/sla

UNION ELECTRIC COMPANY 1901 CRATIOT STREET ST. LOUIS

May 23, 1980

MAILING ACORESS P 0.801 49 ST LOUIS. MO 63166

Mr. E. Gallagher U. S. Nuclear Regulatory Commission Region IIJ 799 Roosevelt Road Glen Ellyn, Illinois 60137

ULNRC-354

Dear Mr. Gallagher:

RESPONSES TO NRC QUESTIONS ON UE EMBED REPORT--CALLAWAY PLANT

My letter to you dated April 24, 1980 (ULNRC-349) listed 17 questions generated during our meeting of April 10, 1980 concerning the subject report. The following summarizes our responses to these questions:

- AWS D1.1-75 is applicable for the manual welding of threaded rods and as such, is invoked for welding in Specification 10466-C131, with technically acceptable exceptions as noted for undersize, profile, uneven legs and undercut.
- The welding of threaded rods or anchors is in accordance with D1.1-75 with the following exceptions:
 - A. The leg of the weld adjacent to the anchor may be up to 1/16 inch smaller than specified on the design drawings.
 - B. Unequal leg welds are permitted.
 - C. Weld profile and convexity requirements for these welds need not be imposed (but concavity limits apply).
 - D. An undercut of up to 1/16 inch for 10% of the weld length may be permitted.

These deviations are supported as follows:

- A. The undersize leg is satisfied by oversizing the welds on the design drawings such that even with the undersize deviation the welds will satisfy design requirements.
- B/C. The variation in weld profile including unequal legs and convexity does not result in an effective throat thickness less than required to satisfy the design strength.



Mr. E. Gallagher May 23, 1980 Page Two

> D. Undercut is limited such that the reduction in crosssectional area is less than that which occurs as a result of the threads.

The installation (fabrication) of welded study is in accordance with AWS D1.1-75, Section 4.0 Part F as it applies to "other than shear connectors." In Rev. 9 of Specification 10466-C-131 the inspection requirements of Section 4.30.1 (applicable to shear connectors) were imposed in lieu of the requirements of Section 4.30.2 (applicable to other than shear connectors). See also response to question 6.

- 3. The smallest weld size shown on the drawings has been and is 3/8 inch. Therefore even with 1/16 inch undersize the minimum weld size is in accordance with AWS D1.1.
- 4. Permissible weld undercut values for buildings have been revised in the 1980 edition of AWS D1.1 (see Attachment "A"). The permissible weld undercut values of 1/16 inch, however, are not applicable to the embeds in question.
- 5. We are certain that Cives inspected many of the plates listed in NCR 2-0831-C-B of which some were machine-welded and others were manually-welded. It should be noted, however, that NCR 2-0831-C-B was generated over a period of several months; thus Cives may not have inspected all the plates contained in the NCR.
- ANS D1.1-75 (Section 4, Part F) identifies two types of studs, characterized by their intended use.
 - A. <u>Shear connectors</u> used in composite steel-concrete construction (see Section 4.25) and
 - B. <u>Concrete anchors</u> for other than composite steelconcrete construction to attach membersand connection devices to concrete.

AWS provides appropriate installation and inspection criteria for each of these stud types. By AWS definition the machinewelded studs in question are concrete anchors and it was on this basis that production initially proceeded. During the in-process inspection (quality control), studs-on which a 360 degree weld fillet was not obtained were either replaced or repaired in accordance with AWS D1.1-75 Subsection 4.29 for concrete anchors. During the final inspection, at least one stud in every 100 was bend tested in accordance with Subsection 4.30.2. Mr. E. Gallagher May 23, 1980 Page Three

> Section 9.6 of Bechtel Specification 10466-C-131 Revision 9 upgraded inspection requirements by adding bend testing of studs having less than a full 360 degree weld fillet, in accordance with AWS D1.1 Subsection 4.30.1. This addition provided visual evidence that studs with less than 360 degree weld fillet were inspected and minimized the possibility of future questions or another massive reinspection effort to prove the acceptability of the welded studs. No documentation of the bend tests was required either before or after Revision 9 of Specification 10466-C-131; however, Bechtel inspection reports indicate that bend testing was performed as required.

7. The Cives letter to Bechtel (SL:134) emphasizes Cives' viewpoint that the product is classified as concrete anchors and not shear connectors. The basis for this is explained in the answer to Question 6. Please note that the statement in Question 7: "No other sections of AWS apply to our work" does not appear in the referenced Cives letter. Rather, the letter states that: "No other sections which refer to shear connectors will apply to our work."

The referenced Bechtel letter to SNUPPS (BLSE 5227) was written purely to clarify commercial considerations. The letter further reiterates the need for a full 360 degree weld fillet or bend test.

The revisions cited to AWS D1.1-77, Section 4.0 resulted in relaxations to the AWS code which were not granted to the supplier.

8. The probability analysis was performed using well-defined and accepted statistical rules. The data used was generated by field inspection of 81,673 studs and analytical computation of load carrying capacity of machine-welded plates embedded prior to June 9, 1977. The analysis established that the probability of a plate failure affecting a safety-related system was significantly low.

There is evidence of multiple defects per embed; ten plates are in this category and they are shown in Attachment "B". Embeds with defective studs (less than 360° weld) and failed stude are listed in Attachment"C".

9. During the months of July and August, 1977 Cives Corporation reinspected over 400 manually-wolded plates of which 30 plates (not a majority) were found in violation of the Specification 10466-C-131, Rev. 9 and design drawings C-0011, Rev. 7 and C-0012, Rev. 3, and were therefore repaired by Daniel under Cives' supervision. The welds inspected had an undersize not exceeding 1/8 inch. Bechtel Quality Surveillance prior to June 9, 1977 was performed in accordance with AWS D1.1-75 and Specification 10466-C-131. Circa 10 percent of the material for this order was inspected by Bechtel which constitutes Mr. E. Gallagher May 23, 1980 Page Four

> more than a representative sample. The items in the sampling were visually inspected 100%. There was no indication at the time of a generic welding problem. In addition to welds, Bechtel Supplier Quality inspects for physical dimension, paint thickness, documentation, general workmanship, etc.

- 10. The difference in number of machine-welded studs inspected is simply due to the fact that the inspections were conducted at different times and the quantity of embeds available for inspection changed. DIC used the term "reject" to indicate failure. DIC rejected 106 studs out of 96,472 inspected, a failure rate of 0.113. Cives rejected 66 out of \$1,673, a failure rate of 0.08%. These results are comparable.
- 11. The load capacities shown in Appendix B Table 1 under the heading: "Load Capacity for 27 ksi" represent the allowable tonsion load on the plate assuming that the load was applied in the middle of the plate bounded by a four-stud cluster. Note that the capacity is computed only for a four-stud cluster, hence, the same capacity is listed for all lengths of plates. The reduced load capacities in Zones 1, 2 and 3 were determined using a plate-bending stress of 36 ksi (the minimum yield strength of 36 ksi was used since this is a failure analysis) and assuming that one of the adjacent studs failed (zero load capacity). The reduced load capacities were used to determine the probability of plate failure due to imposed loads.
- 12. The reduced load canacities for manually-welded unthreaded (or headed) studs are not addressed in the report since the relaxed welding requirements of Specification 10466-0131 are not applicable to welded stude of this type. The appropriate inspection requirements for the manual welding of unthreaded studs are found in AWS D.1.1. The fabricator has confirmed that he is utilizing these requirements for manually welding headed studs. The load capacities in Table 1 are based on tension applied in the middle of a four-stud cluster on each plate; the capacities for Table 3 are based on a combination of shear and bending moment. The weld size required is that necessary to develop the capacity of the threaded rod. When the specified wold size exceeded that required, the plate capacity was not affected. .
- 11. An average weld deficiency of 1/8 inch or less for all studs provides adequate strength (within allowable stresses) for design loads only if the individual welds have average deficiencies of 1/3 inch or less. A plate hiving localized weld deficiencies greater than 1/3 inch average per stud could be locally overstressed. In Enclosure 3 to UE's March 10, 1973 report, we attempted to characterize the condition of manually-welded embeds

Mr. E. Gallagher May 23, 1980 Page Five

> using DIC inspection reports with less than complete information. As indicated in the ground-rules for the survey made in this enclosure, if a DIC inspection report indicated a weld deficiency greater than 1/8" without identifying the extent of the undersize around the circumference of the stud, it was assumed that the deficiency extended 360° around the periphery. An average weld deficiency for all studs on the plate was then calculated, recognizing that the resulting well deficiency would be overstated. This survey did not consider localized undersize as a determining factor.

- 14. The yield stress of 43 ksi was based on CMTRs for the threaded rod material used prior to June 1977. The CLURS were an attachment to Cives latter SL:124. Note that the results of this analysis were not used to arrive at the ronclusions in the report.
- 15. The referenced latter was written when the reinspection effort was in process and provides only partial results. The numbers in the probability analysis incorporated this data along with the reinspection results of the balance of the plates.
- 16. As a result of the referenced letters, an inspection of embeds was initiated at Callaway. The results did not indicate evidence of weld problems. This is documented in Attachment"D".
- Entry #44 was rejected since a rainspection report by Cives found the plate to be acceptable.

The probability analysis, based on the reinst betion of more than \$1,000 muchine-welded studs, was perfected using welldefined and accepted statistical rules. This is an appropriate approach since an individual stud of thate foilure does not necessarily compromise the overall sticty of the system or the plant. The degree of redundrnet in design, and the strict overall quality control employed in the design and construction of nuclear power plants limits the mode of ultimate failure of various components and systems and reasonably assures that an undue risk is not imposed by failure of an individual component such as a stud. The probability i alysis underlines this rationals by incorporating various fact is which must be considered in assessing the impact of the in pection results . On the safety of the plant.

In the case of manually-welded threaded rods an analysis was made assuming an undersize of 1/8 inch for a full 360 degrads on every stud. This assumption was supported by the Cives reinspection of approximately 400 plates and a reinspection effort by DIC, UE and Bechtel on 45 plates. Assuming the 1/9" undersize extends completely around the portphicy of every anchor is a significant conservatism. Mr. R. Callagher May 23, 1980 Page Six

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In addition, the level of conservatism in the design for this type of embed is much higher since shear action engages all studs. Also note that the analysis prepared during the investigation of these anchors shows that the actual imposed loads on these plates are lower than the calculated design capacity.

We will be propared to discuss these responses with you in our meeting May 29.

Very truly yours,

Part Securit

Donald F. Schnell Manager - Nuclear Engineering

134 / DESIGN OF NEW BUILDINGS

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size in any length of six times the effective throat or weld size. When the length of the weld being examined is less than six times the effective throat or weld size, the permissible sum of the gratest dimensions shall be proportionally less than the effective throat or weld size.

(b) The space between two such discontinuities which are adjacent is less than three times the greatest dimension of the larger of the discontinuities in the pair by ng considered.

8.15.2.2 Independent of the requirements of 8 15 2.1, discontinuities having a greatest dimension of less than 3/32 in (2.4 mm), if the sum of their greatest dimensions exceeds 3/8 in (9.5 mm) in any linear inch of weld.

8.15.3 Ultrasonic Inspection. Welds that are subject to ultrasonic lasting, in addition to visual inspection, shall be acceptible if they maet the requirements of Table 8.15.3. Ultrasonically tested welds are evaluated on the basis of a discontinuity reflecting ultrasound in proportion to its effect on the integrity of the weld.

8.15.4 Liquid Penetrant Inspection. Welds that are subject to liquid penetrant testing, in addition to visual inspection, shall be evaluated on the basis of the requirements for visual inspection.

8.15.5 When welds are subject to nondestructive testing in accordance with 8.15.2, 8.15.3, and 8.15.4, the testing may begin immediately after the completed welds have cooled to ambient temperature. Acceptance ontena for ASTM AS14 and AS17 steels shall be based on nondestructive testing performed not less than 48 hours after completion of the welds.

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Fig. 8.15.1.5 - Permissible undercut values for buildings

Contraction States

2						failed	stude
A	115	-	214	(22	9120	*	
A	114		39				
A	114		170				
A	114		29				
A	115		34	(22	9120;	*	
A	115	•	251	(EP	9120)	*	
A	115		62				
A	115	-	457				
A	116	•	35	(12	312A)	*	
A	103		43				

i.

* These plates had 2 failed studs in a four stud cluster.

ATTACHMENT "B"

		Number of	Number of		
Type of Embed	Piece Mark	Defective Studs	Failed Studs		
Non-O Sleeves	A98	1	1		
	498	3	• 3		
	498	3	1		
	1100	i i			
	108	i			
Inn-O Slaeves	=5031-173	ī	ò		
011-4 2 = c = c = 2	F5027-126	;	2		
	F5052-130	2	· · · · ·		
	25053-447		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
lates with	1127-8				
samina taldad	127-25	÷	2		
	127-25	÷	, i i i i i i i i i i i i i i i i i i i		
	127-27	-			
	1115 21/	2	1		
	ALL3=214	2	3* -		
	A113-210	÷	0		
	A114-134		0 .		
	A114-396	1	0		
	A114-29	- 2	2*		
	A115-152	1	1		
	A115-67	-2	0		
	A115-72	4	0		
	A115-69	1	1		
	A127-55	5	0		
	A127-466	1	0		
	A127-15	3	0		
	A127-14	4	0		
	A127-13	4	0		
	A115-126	7	0		
	A115-310	2	0		
	A115-133	5	0		
	A115-134	ô	0		
	A115-130	7	0		
	A115-281		0		
	A115-280				
	4115-112	ã	.0		
	4115-25	i i i i i i i i i i i i i i i i i i i			
	4115-114	,	i i i		
	1115-115	4			
	1115-700	19 19 19 1 2 19 19 19 19	ě l		
	ALL0-470	1			
	1115-122		· · · · · ·		
	A115-125	· · · · · · · · · · · · · · · · · · ·			
	ALL3*133				
	A110+22	1	0		
	A115-277		0		
	A113-276	5			
	A113 · 124	3	8		
	A115-105	8	0		
	A115-118	7	0		
	1115-108	7	0		

EMBEDS WITH DEFECTIVE AND FAILED STUDS



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Plates with Machine Welded Studs

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G103-7

G108-6

G108-3

A115-198

A115-203

A115-202

A115-62

A115-65

A115-307

A115-457

A115-456

G108-10

A108-1

G108-14

A114-171

A114-173

A114-158

A261-14

A261-431

A261-454

A261-391

A261-16

A231-7

A231-4

A231-3

A114-145

A114-71

A114-67

A114-90

A114-146

A114-119

A114-92

A167-36

A167-414

A167-234

A162-377

A116-35

A162-190

A113-10

A123-22

A123-13

A123-20

A123-29

A103-43

161

A114-198

Attachment "D"

DANIEL INTERNATIONAL CORPORATION

CALLAWAY PLANT P 0. 90X 106 FULTON. MISSOURI 65251 (314) 676-3111

May 22, 1980

DLUC-3407

No Response Required

Union Electric Company . P. C. Box 143 (Code 470) St. Louis, Missouri 63166

DJ.

Attention: Mr. W. H. Weber Manager, Nuclear Construction

Subject: Response to UTD 5935, Item 16 - "NRC Questions on UE Embed Report - Callaway Plant"

Reference: CLUC-990 (Attached) SLU 6-41 SLBM 6-514

Cear Walt:

The subject UTD (Itam 16) raises questions regarding the actions taken as a result of SLU 6-41 and SLBM 6-514. These letters indicated that Cives was allegedly not in control of production quality based on Bechtel/SNUPPS inspection findings. As a result, DIC performed an inspection of 10% of the Cives embeds subplied prior to 11/15/76. The results of this inspection were documented via DLJC-990 (Attached).

Should you have further questions in this regard, please do not besitate to contact the writer.

Very truly yours. 23-80

H. J. Starr Project Manager

Attachment: JLUC-990 CC: E. D. McFarland (5) K. Klechanmeister (advance copy) M. K. Srith B. C. Tye File (All.56)



DANIEL INTERNATIONAL CORPORATION

CALLAWAY PLANT P. 0. 80X 108 FJLTCN. MISSOURI 65251 12143 676.3111

Secember 3, 1976

DLUC - 990

Vaion Electric Company P. O. Box 149 St. Louis, Missouri 63166 Attention: Walter H. Weber Manager, Nuclear Construction Subject: Miscellaneous Steel Specification C-131 Reference: SLU: 6-41 Telecon S. J. Seiken of 11/2/76 Dear Walt:

In accordance with the referenced requests, we have completed an inspection of miscellaneous steel shipped to the project from the Cives Corporation as indicated by the following tabulation:

Stattaformance reports have been initiated for the four -. fiftrepart pieces.

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In view of the above findings, we conclude that uncertainriss intrassed in the referenced SLU:6-41 are unfounded, and the-miterial does in fact adhere to the standard of quality requires.

Very truly yours,

M. R. Hamby, Jr. Project Manager

178. C11. cla

so: L. Harmon F. Field D. Schnell S. Seiken W. van der Zalm TINE 19, 1930

themant C

Mr. Jan & G. Keppler, Elfector Region III Office of Inspection & Enforcement U. S. Nuclear Regulator Commission 799 Roosevelt Road Glen Ellyn, Illinois 60137

ULNRC- 361

Dear Mr. Keppler:

24

NRC QUESTIONS ON UE EMBED REPORT ADDITIONAL INFORMATION CALLAWAY PLANT

In response to requests by NRC Region III representatives at a meeting at your offices on May 29, 1980 for additional input on the subject report we are submitting herewith one copy of the following information.

- BLUE-700, dated June 12, 1980, including all attachments.
- Daniel International Corp. Telecon Record Sheet, dated May 29, 1980, Acceptance Criteria Used for Inspection of Undercut Welds, including attachments.
- Daniel International Corp. Quality Control Procedure QCP-507, Rev. 5, Inspection of Structural and Misc. Safety Related Welding.

In reference to our investigation to determine the exact number of embeds involved in the subject report, we are in the process of determining this count and expect to be completed in the first part of July.

Very truly yours,

Donald F! Schnell

Manager - Nuclear Engineering

DBS/sla

cc: E. Gallagher w/a



JUN 2 3 1980

Bechtel Power Corporation

Engineers-Constructors

15740 Shady Grove Road Gaithersburg, Maryland 20760 301-258-3000



JUN 1 2 1980

45

BLUE- 700 File: 0499.4/C-131 Bechtel Job Number 10884-001 SNUPPS Project Investization of Welded Studs -Additional Information

Ref: 1. ULNRC 238 dated 3/10/73

- 2. ULNRC 349 dated 4/24/50
- 3. ULNRC 354 dated 5/23/80
- ALF Program Report on Reactor Licenting and Safety, Vol. 2, No. 1, May, 1975
- Encl: A. Cives Steel Company Letter SL:367 dated June 10, 1980 B. Fechtel Surveillance Inspection
 - Bechtel Surveillance Inspection Reports for Assignment 10466-0-131 Report Nos. 2, 3, 7, and 45
 - C. Sample Calculation for Manually Welded Plate Assemblies (IP 312)
 - D. Sample Calculation for Machine Welded Plate Assemblies (EP 512) -Reduced Capacity Due to a Postulated Ineffective Stud
 - E. DIC Memo Subject: UE Inquiries -Stud Welding

Dear Mr. Schnell:

Mr. D. F. Schnell

Manager . Nuclear Engineering

St. Louis, Missouri 63166

Union Electric Company Post Office Box 149

This letter provides additional input requested by NRC Region III representatives at a meeting in their office on May 29, 1980. Specifically, this information includes:

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 Documentation of the fabricator's stud welding practices for machine welded embed plates prior to June 9, 1977.

RECEIVED

JUN 1 9 1920

D. F. SCHNELL

Bechtel Power Corporation

Mr. D. F. Schnell

 A sample calculation, including discussion of approach, for establishing the reduced capacity of machine welded plates due to a postulated loss of one weld stud. Embed Plate EP 512A is used as a basis for this discussion.

2

3. A sample calculation, including discussion of approach, to determine the reduced capacity of manually welded emond plates (specifically embed plate EP 312) resulting from a postulated 1/16 and 1/8 inch undersize weld, as well as the analytical basis for accepting a 1/16 inch undercut on the shank of the anchor rod.

The following additional information is also offered as an aid to the NRC personnel in their evaluation of the welded studs:

- The effect of a maximum 1/32 inch undercut on the shank of manually welded machine weld stude.
- A discussion of the logic employed in the probability analysis for machine welded studs.

Item I

In response to Item 1 above, the practice employed by the machine welded embed plate supplier for installation and inspection of machine welded studs prior to June 9, 1977 is summarized in Enclosure A. Enclosure B provides examples of Bechtel inspection reports which indicate the review of welded studs (and stud bending) by the Bechtel inspector during the period in question.

Items 2 and 3

Sample calculations for the embed plates discussed in Izems 2 and 3 above are included in Enclosures D and C respectively.

Item 4

Although the vast majority of machine welded study are installed automatically with special "guns" under controlled conditions, there are a limited number of occasions where the study may have either been installed or repaired by manual fillet welding. As indicated by field personnel in Enclosure E, such field welding was on a very limited basis. UE has indicated that the field practice in inspecting these limited number of study for undercut was to use a 1/32 inch accellance criterion on the shank of the stud in lieu of the more restrictive requirements of .01 inches as specified in AWS D1.1-75 Para. .6.4. The result is that some reduction in the safety margins coull occur on these isolated study. However, in the unlikely case

Mr. D. F. Schnell

-that a maximum 1/32 inch undercut is postulated to extend around the entire perimeter of a stud, the revised stud capacity, as computed using the minimum specified yield strength, still would exceed the design requirements. Design drawings have been revised to clarify the design intent.

Item 5

The probability analysis for plates with machine welded study presented in Reference 1 was prepared to evaluate the potential for failure of plates installed in concrete prior to the reinspection effort. In order to establish this probability the analysis accounts for several factors; the probability of a stud being ineffective (P1), the probability of a plate (which is assumed to have an ineffective stud) supporting a safety related attachment (P2), the probability of a load on a plate being of sufficient magnitude and at a location relative to an assumed failed stud to exceed the failure capacity of the plate (P3) and the probability of the plate to ever experience the attachment design load (P4). None of these factors in itself is representative of plate failure. Rather the resultant probability against a single plate failure is the product of these factors, or:

 $P = \sum_{n}^{\infty} (P_1 \cdot P_2 \cdot P'_{n3} \cdot P''_3 \cdot P''_3 \cdot P_4)$

The factor (P1) is established from the reinspection data of 81,673 studs which were installed and shop inspected in the same manner as those studs on the plates in question. One could express the results of this reinspection in terms of a "Confidence Level" in a fashion similar to that employed by the MRC in IE Bulletin 79-02. This bulletin requires licensees to review concrete expansion anchors which serve essentially the same function as the embed plates in question. The acceptance criterion established in this bulletin was to have a 95". confidence level that less than 5% defects exist. Using the formalations included in the bulletin (which are based on a 95% confidence level) and the reinspection results, less than 0.1% defects are identified. Many of the plates support attachments which are not safety related. Although these plates share an equal probability of having ineffective studs there is no safety consequence. Plates retrieved from the laydown area prior to June 9, 1977 would have been taken from the same stock whether used for a safety related or non-safety related function. The factor (P2) accounts for those plates which have safety related attachments.

The factor (P3) addresses the effect the attachment load and its location have on a given plate, assuming the plate has an ineffective stud on or adjacent to the attachment location. Actual loads resulting from the attachment for each plate were determined. In order to include the possibility that the attachment may be at any location on the plate, the load was applied in each of 9 zones shown in Sketch 1a of the report (Reference 1). It is assumed the load has an equal possibility of being in any one of mine zones, hence P"3 = 1/9. This is a conservative assumption in that the load will normally be applied in the center
Mr. D. F. Schnell

of the plate. In fact a drawing "svision since the report was prepared requires that the centroid of the attaching weld be within the middle third of the plate. These applied loads were compared to the failure load in each zone of each place assuming the stud in zone I to be ineffective. If the actual load exceeded the failure load a postulated failure was identified. The failure load is identified for each of these zones if any of the stresses reach the minimum specified yield stress. For computational purposes the ineffective stud was assumed to occur in zone I. A finite number of postulated failures were identified for zones I, II, III and VI as shown in the report (P'3). Since the ineffective stud has an equal chance of occurring in any one of the four study within a cluster the chance of it being in zone I is one in four. Conversely, zones IV, VII and IX have as equal chance as zone I of having the load applied over a postulated ineffective stud. Combining the random possibility of an ineffective stud at a given corner with the possibility that one of four corner zones could have a load over a postulated ineffective stud yields a factor of 1/4 X 4/1 = 1 (3"3), A similar argument holds for loads applied in other zones. Since a one is nine chance was assumed for the load to be applied in a given zone, it is necessary to sum the result for all nine zones. In fact, since no potential failures were identified for zones IV, V, VII, VIII and IX $(P''_{n3} = 0)$ the actual summation includes only zones I, II, III and VI. Note that P3 indicates only the probability of a plate failure for a postulated ineffective stud adjacent to the load point which is a safety related attachment with the computed attachment load applied.

The factor P3 in itself is meaningless for it is computed on the premise that every attachment is on or adjacent to an ineffective stud. Furthermore, it is based on applying each attachment load in each of the nine zones to deliberately seek postulated failures. Realizing that plates with safety related attachments have a combined total of approximately 2,500 studs, the reinspection results would suggest that only approximately two studs could be postulated to fail. Of course these two studs may be located in areas of the plate not affected by the attachment loads. The point is that one cannot isolate one factor independent of others in the probability analysis. Rather, the probability of a plate failure must consider all factors in concert.

An equally important consideration is the possibility of the plate ever experiencing the design load. As one example, a significant contribution to the loads imposed on the plate is due to the seismic event. Dr. Newmark, in Reference 4 suggests that in combining the safety margins used to identify the seismic event and the multiplication of margins of safety resulting from the criteria and analytical methods imposed, a probability that the structure will ever experience the design loads may be in the order of 10⁻⁸. A probability of 10⁻⁴ was conservatively assumed in the report for this consideration. Mr. D. F. Schnell

In summary the probability of a plate failure is the product of the probability of having an ineffective stud, the probability of the plate with an assumed ineffective stud supporting a safety related load, the probability of that load exceeding the plate capacity due to an assumed adjacent ineffective stud, and the probability of the attachment load actually occurring.

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As provided in Reference 1, a total of 10 plates had multiple stud failures. Multiple stud failures on a given plate have no additional effect on the probability analysis unless they occur on adjacent studs. Four occurrences of adjacent stud failures can be identified from the data. No case exists where more than two studs failed within a stud cluster (the basis for design being a four stud cluster).

An analysis has not been conducted to evaluate the probability effect if a two adjacent stud failure were considered. Based on some simple comparisons we believe it is evident that this consideration will not substantially affect the results. The probability computation for a two stud failure is similar to that given above for a single stud failure, except that rather than considering the probability of a failed stud to the total number of studs inspected (P1) one must compare it to the total number of stud clusters available. Based on a total of 81,673 studs, at least 81,673/4 = 20,418 stud clusters exist. Actually there are somewhat more than this number of stud clusters available since plates with more than 4 studs have studs that can be in more than one stud cluster. However, a similar equal increase in the number of cluster possibilities for the pair of ineffective studs also exists so that the effect is essentially self-cancelling. The result is that P1 becomes $\frac{4}{20,418} = \frac{1}{5,104}$

for the single stud failure.

An increase in the probability of P3 will occur. Although the calculations have not been generated to establish magnitude of this increase firmly we believe it to be in the neighborhood of a factor of 2 to 4. All other factors remain essentially the same as for a one stud failure. The net result is that the probability for plate failure due to a postulated multiple stud failure is of the same magnitude (exponent wise) as for a one stud failure i.e., the increase in P3 is approximately offset by the decrease in P1.

Since the probability for a one stud failure and a two stud failure are additive, the overall probability may at worst double. However the order of magnitude (exponent wise) remains essentially the same as presented in Reference 1.

ler truly yours,

Project Zigineering Manager

EWT:bg cc: N. A. Petrick 8 CHURCH STREET, GOUVERNEUR, NEW YORK 13642 (315) 287-2200 TWX. 510-257-6961



June 10, 1980 SL: 367

Bechtel Power Corporation P.C. Box 607 Gaithersburg, MD 20760 Attention: Mr. Paul Divjak Reference: SNUPPS Project 10466-C-131 Miscellaneous Metals

Gentlemen:

In regard to Purchase Order Item No. 2 embedded plates with concrete anchors, we hereby verify that Cives intent since the beginning of the production of these plates has been to obtain a 360° fillet on the machine welded studs. If the applied stud did not have 360°, the stud was either a) bend tested per AWS 4.30.1, or b) repaired per AWS 4.29.3, or c) replaced.

Very truly yours,

CIVES STEEL COMPANY Northern Division

Ted Totten Project Manager

TTISW

CC: Dean W. Parshley

DETAILED PROCEDURE

FOR

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TEST PROGRAM TO EVALUATE WELDS OF ANCHOR RODS AND STUDS TO EMBEDDED PLATES

> BECHTEL POWER CORPORATION GAITHERSBURG, MARYLAND

> > Prepared by: K. Parikh

* - *

July 2, 1980

Revised July 11, 1980 Revised Aug. 5, 1980

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2.	Description of the Test Program		1
3.	Organization for the Test Program		2
4.	Detailed Procedures		3
5.	Results and Report	•	6

Figure 1

Set Up of Testing Rig and Typical Section Through Bent Anchor Rod. Dwg. C-UCO9 Rev. 0

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APPENDIX A: Acceptance Criteria For Welds of Anchor Rods and Studs To Embed Plates.

1.0 Purpose of the Test Program

This program is authorized by Union Electric Company to evaluate the performance of weldments which secure anchor rods and studs onto embedded plates. These tests will supplement Union Electric's report of the Acceptability of Embedded Plates dated March 10, 1978 (ULNRC-238) and its findings. Although the referenced report established that the welds on both the manually welded anchor rods and the machine welded studs installed in concrete prior to June 9, 1977 were a "completely acceptable" product, physical lests on a random sample of those embeds manufactured during that period were requested by the NRC. The test program is directed only at the evaluation of the welds between the studs and anchor rods to the plates.

The bend tests as identified herein are being conducted for information only. Tests of this nature are not required by the governing codes or specifications, nor does such testing reflect loads imposed on the welded assembly by design intent. Therefore, failure of a weld during the bend test cannot of itself constitute a determination that the weld was not suitable for the purpose intended by the design.

2.0 Description of the Test Program

The following tests will be conducted:

2.1 Manually welded embeds

From the 45 plates segregated and stored at the Callavay jobsite twelve plates have been selected for testing. Six rods on six separate plates have been selected for bend tests. The specific rods have been designated and their direction of bend specified by the NRC. Six additional rods on six other plates were selected by Union Electric for tension testing. The selections included rods having welds with most apparent visual deviations. These selections will be available for NRC review before the test. Bend and tension testing will be done at Lehigh University.

2.2 Machine welded plates

Six plates, embedded in concrete prior to June 9, 1977 shall be identified at the jobsite and tested in place to a load not exceeding the design load conditions (plus load tolerances). The plate selections will be reviewed by the NRC prior to testing.

2.3 Results and Reports

The testing will be witnessed at the jobsite and/or the laboratory by the persons specified below or their authorized representatives. A report, based on the tests, will be issued shortly thereafter.

5	Organization for the Test Program
~	The following lists various entities and their affiliated personnel involved in the test program including their primary responsibilities, where applicable
	Union Electric Company
	D. Schnell - Overall responsibility and coordination with NRC
	W. Zvanut - UE coordinator and witness for testing
	K. Kuechenmeister - Field coordinator with DIC
	R. Powers - QA and witness for testing
	Nuclear Regulatory Commission
	E. Gallagher - Witness and observer for test program; Review test program for acceptability to NRC
	Bechtel Power Corporation
	P. Divjak - coordinator between UE/NRC.
	E. Thomas/A. Pagano - Technical direction, responsible for the test set-up.
	K. Parikh - Overall coordinator for test program and report. Witness for the test program.
	Daniel International, Inc.
	- Assistance in the field test program. Furnishing labor, materials and transportation as required for the test program.
	Dr. Fisher and Dr. Slutter - Consultants; advise test set-up and test pro- cedures and for conducting testing at Lehigh University and at the jobsite as well as record- ing and reporting <u>all</u> test results at both the laboratory and jobsite.

4.0 Detailed Procedures

4.1 Manually welded rods

From the 45 plates isolated and held in storage at the jobsite, twelve plates designated herein shall be shipped to Dr. Roger Slutter, Lehigh University, Department of Civil Engineering, Fritz Engineering Laboratory #13, Bethlehem, PA 18015. The following plates and anchor rods are to be used for the designated testing method.

	Tens	ion Ter	sts		Ben	d Tests		
P412	A16-19	Left,	Rod	#5	E2611	A31-2	Rod	92
EP711	A7-155		Rod	#5	EP511	A32-2	Rod	45
P511	A11-1		Rod	#5	EP511	A11-46	Rod	#9
EP412	A16-18	Bot.,	Rod	#12	EP511	A11-42	Rod	#10
P412	A16-18	Top,	Rod	#10	EP611	D24-1	Rod	#5
EP711	A7-223		Rod	#6	EP611	A24-2	Rod	#1

Upon arrival at the test laboratory, the plates shall be properly stored in a secure place.

The anchor rods which are to be tested shall be visually examined for any damage during the shipment. If the anchor rod or the 3" \times 3" plate at the end of the rod is found to be damaged, the overall coordinator shall determine its suitability for the test program.

The welds that are tested shall then be photographed from at least two angles.

The 3" x 3" plates for the qualified bolts shall be painted red for the tension test and green for the bend test. At least one additional anchor rod other than those identified previously in each category shall be selected for use in refining the loading procedures. Thus, seven bolts in each category are required for the test pregram. The selection process described above shall be performed in the presence of a consultant and the overall coordinator. In the event the selection of an anchor rod for the test program has changed, the overall coordinator shall notify Union Electric, before testing proceeds. 12 12

The selected anchor rods shall be isolated by cutting a nominal 4" x 4" square plate around each bolt. The initial "rough" cutting of the plate may be done by gas torch; however, the final cutting shall be done by saving the plate under the supervision of the consultant. Precautions shall be taken to assure that the weld at the juncture of anchor rod and the plate is not affected by the cutting processes.

The individual assemblies obtained shall be sequentially numbered with a waterproof marker such that the marks or tags will be visible during testing. A record referencing the assembly numbers to the original plate numbers shall be maintained by the consultant. The tasking shall take place in the presence of designated personnel. The tension tests and the bend tests shall be done in the 300,000# capacity Baldwin machine. Certified calibration records indicating dates of calibration of the Baldwin machine, strain gages, and associated instrumentation shall be given to the overall coordinator prior to testing. Photographs of each test and a video cassette of test progress shall be recorded and referenced in accordance with the rod numbers.

4.1.1 TENSION TEST - RODS

Tension tests shall be conducted by gradually increasing the load in 10 kip increments until failure of the rod shank or the failure of the weld occurs. The change in the length of the rod shall be recorded for each load increment. Additional intermediate readings may be taken to obtain sufficient data to develop an elastic curve with a well defined yield point. All test data shall be recorded by the consultants and the originals of the recorded data shall be signed by at least one person from each entity represented.

4.1.2 BEND TEST - RODS

A bend test shall first be performed on a selected anchor rod other than those listed above to establish detailed loading procedures. During this first test the relationship of the applied load to deflection angle, the grip at base to hold the assembly, recovery of deflection when the load is released and approximate bend line above the plate shall be noted.

For bend tests on the designated anchor rods a strain gage shall be attached to the shank of the rod where maximum strain is expected, based on results of the initial test. The load shall be applied in 100 lb. increments or less as required to develop data for a load-strain curve. The applied loads and the corresponding strains from the strain gage shall be recorded. The anchor rod shall be bent up to a 30 degree angle with tolerances of ±2 degrees. The welds shall be observed for any sign of cracking during the application of the load. If cracking occurs, the corresponding strain in the rod shall be recorded.

Upon completion of the tests all assemblies shall be packed and shipped to Daniel International Corporation, State Righway CC - 3 miles north of Highway 94, Portland, MO 65057, Attention: K. Kuechenmeister.

4.2 Machine welded studs

The overall coordinator, with the assistance of field personnel, shall select six plates which were embedded in concrete prior to June 9, 1977. The field coordinator shall obtain copies of material certificates for the plates and concrete cylinder test results for the applicable pours and forward them to the overall coordinator. The selection shall be based upon accessibility to the plates and feasibility of mounting a test rig for the plates. The selected plates shall be sequentially numbered and a record of the assigned number to the designated plate number shall be maintained by the field coordinator.

The testing rig, a 30-ton jack and accessories, and two dial gages to measure deflection shall be supplied by the consultants. Certified calibration records indicating the date of calibration for the jack and associated instrumentation shall be given to the overall coordinator prior to testing.

A 1-1/2 inch diameter threaded rod of at least ASTM A-36 quality as shown in Figure 1 shall be welded to each plate near the center of a four stud cluster as defined by the overall coordinator. The weld shall be examined by the magnetic particle method prior to testing. The attachment shall be welded 24 hours prior to the actual testing and care shall be exercised to ascertain that the attachment is not loaded by the construction personnel prior to testing. For holding the testing rig in place 4 expansion anchors 1/2 inch diameter and 4" long shall be installed as shown on Figure 1 (See Specification C-103A).

The testing rig shall be mounted on the expansion anchors and firmly secured in place. The jack shall be installed on the threaded attachment to the plate and the hydraulic pump shall be set on a table next to the wall. Dial gages shall be mounted by the consultants on the plate at desirable locations. Load shall be increased gradually on the plate and the deflection readings corresponding to the applied load shall be recorded. The maximum applied load shall be at least the design load but shall not exceed the design load plus 15%. When the maximum load is reached, the final reading for the deflection shall be taken two minutes later and the load shall be released. The test rig shall be moved to the next plate and the same procedure shall be continued.

The originals of the field results shall be signed by the overall coordinator and the consultant. Photographs and a video cassette shall record the test progress. Note: Minor concrete spalling may occur during plate testing and should not be considered an unusual occurrence.

5.0 Results and Report

The recorded results shall be represented in a tabular and a graphic format in a report. The report shall be prepared by Bechtel with assistance from the consultants. The report shall include conclusions of the test.

APPENDIX A

Acceptance Criteria for Welds of Anchor Rods and Studs to

Embed Plates

1. Tension Test on Anchor Rods (Laboratory)

All rods selected for testing are 1 inch in diameter. The design load (allowable load) based on a factor of safety of 1.6 (load factor) on these rods is 13.65 kips maximum for an EP511 plate. The design load of 13.65 kips is related to the rated plate capacity of 75 kips (in actual use the maximum load on an EP511 plate embedded in concrete prior to June 9, 1977 did not exceed 60 kips). The welds between the anchor rods and plates shall be deemed acceptable if the connection carries a load of 13.65 kips without any sign of distress. In any event the testing shall be carried out to failure as specified in the detailed procedure.

2. Pull Test on Machine Welded Plates (Field)

The selected plates are EP512 and EP912 in one or more four-stud clusters.

For EP512 plates the acceptance criteria shall be a 14.5 kip load applied within a four-stud cluster without plate failure or plate deflection more than 1/4 inch. Similarly, EP912 plates shall be deamed acceptable at a 29.2 kip load safely applied within a four-stud cluster.

ATTACHMENT E

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INTERIM IDST REPORT WELDS OF ANCHOR RODS AND STUDE TO EMBEDDED PLATES

BECHTEL POWER CORPORATION

Gaithersburg, Maryland

Auguse 27, 1980 Prepared by: K. Parikh

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Appendix A - Test Result Data Sheets

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1. Statement of Problem

The testing program described herein was authorized by Union Electric Company following a request by the NRC. The tests furnished physical evidence regarding the adequacy of welds at the junction of anchor rods and studs to plates which were to be embedded in concrete. The testing program supplements a previous study and report submitted to the NRC on March 10, 1978 (see ULNRC-238).

2. Description of Testing

All tests were performed in accordance with the "Detailed Procedures for the Test Program to Evaluate Welds of Anchor Rods and Studs to Embedded Plates" which was submitted to the NRC (see ULNRC-365 dated July 17, 1980).

Six anchor rods selected by Union Electric for tension testing were tested at Lehigh University on August 6, 1980. Six additional anchor rods were bend tested to a 30° angle at Lehigh University on the same day. The rods chosen and direction of bend were specified by the NRC.

With NRC concurrence six readily accessible embedded plates with machine welded studs were selected at the Callaway jobsite by Union Electric (D. Stecko and K. Kuechenmeister) and Bechtel (K. Parikh) for tension testing. The plates were prepared for testing by Daniel International Corp. in accordance with the program test procedures and were tested on August 14, 1980.

All test results were observed and recorded by Dr. R. Slutter of Lehigh University. Dr. Slutter also assisted with the development of test procedures and implementation of the test program. An NRC representative witnessed all tests.

3. Test Results

Field data sheets of the test results and a graphical representation of the data obtained for the tension and bend tests are included in Appendix A.

Tension tests on the six designated rods showed the capacities of the welds to be fairly close to the ultimate strength of the rod material, and significantly higher than the 13.65 kips designated in the criteria for acceptability of the welds. The ultimate loads on the six rods were found to be between 46.2 and 51.5 kips.

The six bend tests were successfully completed to an angle of 30+ degrees without any sign of visual distress or other detrimental effect on the welds.

Jobsitz tension tests on four EPS12 embedded plates tested to a load of 15 kips and two EP912 embedded plates tested to a loal of 30 kips indicated that the embeds satisfactorily support the imposed load (note design loads were 14.5 kips and 29.5 kips respectively). Recorded deflections were less than one tenth of the acceptance criteria.

4. Conclusions

Samples were selected for testing either randomly (embeds at the Callaway jobsite) or specifically (rods with the most undesirable visual weld characteristics). All test results met or exceeded the design requirements and acceptance criteria and further demonstrate the acceptability of the subject embeds.

The testing supports the conclusions presented in the report forwarded by ULNRC-238 dated March 10, 1978 that the embeds at the Callaway jobsite are an acceptable product.

APPENDIX A

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TEST RESULT DATA SHEETS

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15103100 16-BETHLEHEM, PENNOYLVANIA 12015 SPECIMEN __ 200.80.240.1 PLATE EP711 A7-223 Rd#6 SHEET 12 OF 12 LORD MEAD TRAVEL Gyc Layth = 4" Ussit READING DIEE 0.4000 1000 0.20 0.431 2000 0.03/ 0.05.4 2000 0,4-0 0.4% 6000 17 0.512 0.526 0.547 0.11 10000 0,120 12000 0142 0.154 0.554 14120 0.578 0.1660 10mo 12000 3 1143 20000 0.575 2.207 220000 0.4.27 25-400 0.317 0.217 26 00 91210 29,700 Co.6 28 000 3000 32,000 0.626 0.226 0.776 0 376 0.432 34 600 0.977 0 677 36 100 0.930 7. 53% Li mi 1,004 0 1.02 12.000 0---1. 24 1,122 0 756 46 000 3377 95 42 00 A6. 200 .502 22 Forta in weld 12 Mina 81 6/80 ----8/6/72 Su Julit Chanly 816190 . lesting Muchine: 300,000 LA. Concerty Delating Social Ma 39460 Test by i la Eter te Thit Day and the Evolution 22620200 -0-Delde of Ancher Reds and study to Emperate Prifared Plats. 2 Sur Ke Ravised 7-11-80 Bechter A. wei-- renaria



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	1	JUDGE BRIGHT: Mr. Gallagher, would you look on page
	2	eight of your testimony? In the sixth line down it reads: AWS
	3	code. They were selected in engineering basis. Is that "on" an
	4	engineering basis? Or "with" an engineering basis?
345	5	MS. DREY: What page is that, please?
554-2	6	JUDGE BRIGHT: This is a very minor thing.
4 (202)	7	THE WITNESS: Yes, I believe there is a correction,
2002	8	inserting the word "on".
N, D.C	9	JUDGE BRIGHT: "On" between selected and in?
NGTO	10	THE WITNESS: That's correct.
NASHI	11	MR. LESSY: Thank you, sir.
NING, 1	12	BY MR. LESSY: (resuming)
BUILD	13	Q Mr. Gallagher, could you please orally summarize the
TERS	14	testimony which you have submitted and filed in this proceeding?
REPOR	15	A The prepared testimony provides a technical review of
S.W. , 1	16	Union Electric's submittal entitled acceptability of embedded plates
REET,	17	installed in the Callaway plant Unit 1, dated March 10, 1978.
H STF	18	The details of that review are contained in NRC Staff report
300 7T	19	80-14, attached as NRC Exhibit Number 6.
	20	The NRC Staff review was based on a combination of
	21	inspection data compiled on uninstalled embedded plates and an
	22	engineering analysis of recorded deviations from the AWS welding
	23	code and the results of the physical testing performed by Lehigh
	24	University in the Lehigh University's lab and on-site.
	25	I concluded, as a result of my review, that the embeds

ALDERSON REPORTING COMPANY, INC.

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	1	installed at the Callaway plant are capable of satisfying their
•	2	intended design requirements and provide adequate confidence that
	3	the structures, systems, and components will perform satisfactor-
•	4	ily in service.
345	5	MR. LESSY: Thank you.
554-2	6	Mr. Chairman, members of the Board, Mr. Gallagher is
1 (202)	7	available for cross examination.
2002	8	JUDGE GLEASON: Mrs. Drey?
N, D.C	9	(Pause.)
XXXXX 015N	10	CROSS EXAMINATION
VASHI	11	BY MS. DREY:
and, 1	12	Q Mr. Gallagher, would you please look at NRC inspection
BUILT	13	report number 77-11?
ITERS	14	A I don't believe I have a copy of that readily available.
REPOR	15	Q I have in my hands a copy of NRC inspection report
S.W. , 1	16	number 77-11. It is an NRC report covering an investigation on
AEET,	17	December 13 and 14, 18 to 22, 1977, and January 3 to 6, 1978.
TH STI	18	MR. LESSY: Mrs. Drey, the witness doesn't have a copy
300 7	19	of that. Neither does the Staff. Do you have any extra ones?
	20	MS. DREY: I have I can let him see this.
	21	MR. LESSY: Off the record.
	22	MS. DREY: Mr. Lessy, would you like to see this?
	23	MR. LESSY: Do you have some questions from that report
•	24	of Mr. Gallagher?
	25	MS. DREY: Yes.

8a:6

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	1	MR. LESSY: You don't have any extras?			
	2	MS. DREY: No. I would like to I would like to have			
	3	it this exhibit marked for identification purposes and I will			
	4	be getting copies and I will be asking for it to be submitted and			
345	5	entered in evidence, but I don't have extra copies at this time.			
554-23	6	MR. LESSY: Do you know when you will be getting the			
(202)	7	extra copies?			
20024	8	MS. DREY: This evening, but I can show it to you.			
4, D.C.	9	(Pause.)			
NGTON	10	MR. LESSY: Mr. Chairman, the problem is that this was			
ASHIN	11	not an identified document and we don't even have it with us.			
ING, W	12	My suggestion would be that to save time we either get copies of			
GUILD	13	this tonight or get them later this afternoon and let Mrs. Drey			
FERS 1	14	proceed on another line, because it's going to be difficult to			
EPOR'	15	follow the questioning.			
8.W. , B	16	Neither the Board has it nor the other parties.			
EET. S	17	JUDGE GLEASON: What is the date of that document?			
H STR	18	MR. LESSY: The date of the document is well,			
300 7T	19	actually it's an incomplete document. This is an inspection			
	20	report dated December 13 to 14 and 18			
	21	MS. DREY: Are you missing this page? Is that the problem?			
	22	MR. LESSY: 18 to 22, 1977, January 23 through 26,			
	23	1978. I had asked Mrs. Drey prior to the lunch break if she had			
	24	any documents which were not heretofore identified so that we			
	25	could proceed and she didn't have those at this time. It's going			
		ALDERSON REPORTING COMPANY, INC.			

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	1	to be difficult to follow the examination.
	2	MS. DREY: Mr. Chairman, I'm sorry. I hadn't I
	3	physically
	4	JUDGE GLEASON: Excuse me, Mrs. Drey. We understand the
NGTON, D.C. 20024 (202) 554-2345	5	problem.
	6	Mr. Gallagher, are you familiar with this document?
	7	THE WITNESS: I had very little time just now to refresh
	8	my memory as to the contents. I am
	9	JUDGE GLEASON: Is this a document that refers to one
	10	of the inspections that you reference in your testimony?
WS.	11	Why don't you give it back to him, please? I'm trying
DING,	12	to save some time here.
BUILI	13	(Document handed to witness.)
RTERS	14	(Pause.)
REPOI	15	MS. DREY: What did I hand you? Is that 77-11?
S.W. ,	16	THE WITNESS: That's correct.
REET,	17	BY MS. DREY: (resuming)
TH ST	18	Q That's one of the things you refer to on page two.
300 7	19	JUDGE GLEASON: Mrs. Drey, I have already referenced that
	20	MS. DREY: Okay, I'm sorry.
	21	JUDGE GLEASON: Just have patience a minute so we can
	22	see if we can get by this problem of no copies.
	23	(Pause.)
	24	(Witness examining document.)
	25	MR. LESSY: My suggestion would be that he is a part

1 author of that document, but there are numerous documents referenced 2 in his own inspection reports that I would suggest we wait until 3 we get copies of it. If the Board wants to proceed without that 4 --

JUDGE GLEASON: Mr. Lessy, I am trying to see whether we can, with that understanding that she will submit copies before the day is out. Many times she has put in a document and she's just asked one question off of it. I just don't know how extensive her questions are going to be.

MS. DREY: I'm sorry. I didn't realize he wouldn't have a copy and that's my only copy, so I have to see it again too before I can --

JUDGE GLEASON: Why don't we try --

MS. DREY: I was going to ask him to describe what it said there and ask him if this was an inspection in which he participated regarding embeds. And I think it was an inspection that was referenced this morning.

JUDGE GLEASON: Why don't you respond to that, Mr.Gallagher? THE WITNESS: The document I have before me is the report of an investigation that was conducted during Decmeber of 1977 and January of 1978 at which time we were following up on a series of allegations, one of which dealt with a non-conforming concrete embed.

24 The other allegations dealt with reinforcing steel 25 problems and other site allegations.

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	1	JUDGE GLEASON: Mrs. Drey, what questions do you want					
	2	to ask?					
	3	BY MS. DREY: (resuming)					
	4	Q Would you describe the non-conforming embed? Which way					
345	5	was it non-conforming and did you see it yourself?					
554-2	6	A Yes, I did see the embed myself. As the inspection					
(202)	7	report indicates, at one point in time there had been a hold tag,					
20024	8	quality control hold tag, attached to the embedded plate. A					
4, D.C.	9	portion of that hold tag was still intact on the embedded plate					
NGTON	10	during the inspection.					
ASHI	11	I believe that we later confirmed that a non-conformance					
ING, V	12	report had also been generated on this specific embedded plate					
SUILD	13	and had been dispositioned, at which time a portion of the hold-					
FERS 1	14	tag had been removed. The allegation was that non-conforming					
EPOR	15	concrete embed was not being properly controlled.					
s.w., B	16	And after our investigation into this specific item,					
EET, S	17	we concluded that the embed had been controled properly and there					
H STR	18	had been a quality control hold tag applied, a non-conformance					
TT 008	19	generated, and it had been adequately dispositioned.					
	20	JUDGE GLEASON: Mrs. Drey.					
	21	BY MS. DREY: (resuming)					
	22	Q All right. I would like to ask you to look at the docu-					
	23	ment you submitted with your testimony please, number 30-14.					
	24	(Pause.)					
	25	Would you please look at the letter from Union Electric					
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	1	to you, UL-NRC number UL-NRC-349. Would you please explain
	2	JUDGE GLEASON: How far back is that?
	3	MS. DREY: I'm sorry. I have it as page 13.
	4	THE WITNESS: It's Attachment 8 to the report 80-14.
145	5	MR. LESSY: It's the letter that begins after page 10,
554-23	6	which is the end of the actual inspection report, the first
(202)	7	attachment.
20024	8	JUDGE GLEASON: Go ahead, Ms. Drey.
, D.C.	9	BY MS. DREY: (resuming)
IGTON	10	Q Would you please explain in what way these questions
ASHIN	11	were what way and when these questions were transmitted to
NG, W	12	Bechtel? Was Eachtel alone at an April 10, 1980 meeting?
IGHIO	13	A As I recall, I requested the meeting to be held to
ERSE	14	discuss some questions that I had regarding the Union Electric
EPORI	15	submittal of March 10, 1978. We had a meeting on April 10, 1980,
W. , R	16	in the Union Electric's office here in St. Louis, and I verbally
set, s	17	communicated as series of questions of which this document
300 7TH STRE	18	memorialized it.
	19	Q May I ask you, since you were here in St. Louis at the
	20	UE headquarters, do you remember who else was in attendance?
	21	A If you would turn to page two of report 80-14, under
	22	meeting attendees at Union Electric office, April 10, 1980, it
	23	documents those in attendance.
	24	Q Well, you're looking at it. Who was it, please?
	25	A From Region 3

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	1	Q Page two, you're saying?
	2	Oh, I'm sorry. Would you tell me, please?
	3	JUDGE GLEASON: They're listed right there.
	4	BY MS. DREY: (resuming)
345	5	Q So it's two people from the NRC, one, two, three, four,
554-2	6	five, six people from Union Electric. Is that correct?
1 (202)	7	JUDGE GLEASON: That's correct.
2002	8	THE WITNESS: That's correct.
N, D.C.	9	BY MS. DREY: (resuming)
NGTON	10	Q May I ask why, then, this letter says the following
VASHII	11	generally summarizes the questions transmitted to Bechtel? Is
ING, V	12	that how was that in other words, you weren't transmitting
BUILD	13	the questions? Union Electric was?
TERS	14	A I verbally communicated these questiosn to the parties
REPOR	15	that were in attendance at the meeting. I presume that Union
S.W. , 1	16	Electric then transmitted in some form these same questions to
LEET,	17	Bechtel for their assistance in answering the questions.
H STB	18	Q I see. Do you know to whom at Bechtel?
300 71	19	A No, I don't.
	20	Q Are you satisfied with the summary of your questions
	21	that were presented here?
	22	A I believe they accurately describe my questions during
	23	that meeting, yes.
	24	Q Would you please, with reference to item number 1 on
	25	the first page, would you please tell me who Moss Davis is at the

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	1	American Welding Society?
	2	A Mr. Davis is, I believe, the Secretary to the American
	3	Welding Society.
	4	Q Is he somebody who would be knowledgeable about welds
345	5	and AWS requirements?
554-2	6	A I believe so, yes.
(202)	7	Q What did you phone him, or did you go and talk to him
20024	8	in person?
I, D.C.	9	A I telephoned him.
NGTON	10	Q Uh-huh. Do you know to whom at NRR would be, what,
VASHI	11	Nuclear Reactor Regulation at the NRC, is that right, Office of
ING, V	12	Nuclear Reactor Regulation?
GUILD	13	A That's correct.
FERS 1	14	Q In headquarters in Washington, is that right?
EPORT	15	A That's correct.
.W., R	16	Q Do you know to whom you spoke there?
EET, S	17	A I believe I spoke to a Mr. Georgeiev George Georgeiev
H STR	18	G-e-o-r-g-e-i-e-v, I believe.
LL 001	19	Q Do you know to whom you spoke at I&E headquarters
	20	Inspection and Enforcement headquarters?
	21	A If I recall correctly, it was Mr. Shewmaker S-h-e-w-
	22	m-a-k-e-r.
	23	Q And how had you determined that Messrs. Georgeiev and
	24	Shewmaker were expert in AWS requirements?
	25	A One of those individuals, Mr. Shewmaker, is a civil

	1	engineer: Mr. Georgeiev is a welding metalurgist, both of which
	2	are familiar, both by education and training, in the requirements
	3	of AWS and welding in general.
	4	Q Did you speak with them specifically about any portion
2345	5	of the American Welding Society code, I mean any particular code?
) 554-2	6	A The specific code was AWS D.1.1.
203	7	Q Any particular revision, do you remember? Or just the
0. 2002	8	current revision? Or i/s didn't make any difference?
N, D.(9	A In general terms, we spoke about that code.
INGTO	10	Q And within that code were there any specific portions
WASH	11	of it with whom, when you spoke with them?
DING,	12	A I don't recall the specific section. It was with
BUIL	13	respect to the workmanship requirements.
RTERS	14	Q Would you speak about workmanship when you are talking
REPO	15	about a stud or an anchor rod that is welded by machine? Would
S.W. ,	16	you talk about workmanship?
REET,	17	A In this context, it was with specific reference to
TH ST	18	manually welded anchor rods, yes.
300.7	19	Q Had you an indication that they were knowledgeable about
	20	manually-welded anchor rods is opposed to machine-welded?
	21	A Yes.
	22	Q So they would know the difference?
	23	A Yes.
	24	Q Are you hung up by the use of the word "stud" as opposed
	25	to anchor rods? Is that one of your do you agree with all the

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problems we've been having these few days about what you	should
call something like that?	
A I don't believe I have a hang-up on that.	
(Laughter.)	

That's probably not the way I should have said it. 5 0 JUNGE GLEASON: Off the record. 6

(A discussion was held off the record.)

JUDGE GLEASON: We're on the record.

BY MS. DREY: (resuming)

Sir, may I ask you, have you seen any manually-welded 10 2 studs, the studs, not plates -- the studs? 11

A I have seen both manually-welded anchor rods and manually-12 13 welded studs.

Oh, my gosh. Would you please distinguish between the 14 Q 15/ two?

A Well, we've been doing that for the last four days. 16 Q But, well, everybody's been doing it a little differently. 17 18 I don't mean to make you repeat anything.

19 JUDGE GLEASON: Let's assume he's seen all kinds of 20 studs.

21 MS. DREY: I want to know what is the difference. 22 BY MS. DREY: (resuming)

23 Q Would you tell me what is the difference very briefly? 24 A The stud was described as a round bar with a form-headed 25 figure on the end of it, whereas a rod was merely a circular bar.

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1 It wouldn't have anything on the end? 0 2 It could have something on the end, but not a formed A 3 head, as we refer to a stud. 4 JUDGE GLEASON: It could have a thread on the end. 5 THE WITNESS: It could have a thread on the end; it 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 6 could have another plate on the end. 7 (Ms. Drey distributing physical exhibits.) 8 MS. DREY: Mr. Chairman, I have placed before Mr. 9 Gallagher a piece of metal that has two things attached to it. I 10 would like to offer this as Physical Exhibit Number 2 -- Joint 11 Intervenors Physical Exhibit Number 2 -- in evidence. 12 JUDGE GLEASON: For what purpose, Mrs. Drey? 13 MS. DREY: I would like to ask Mr. Gallagher to describe 14 it and to describe that weld as compared with the weld that is 15 on the Joint Intervenors Physical Exhibit Number 1. I also would 16 like to understand in my own mind what Mr. Gallagher's personal 17 knowledge is with respect to that plate and the welds. 18 MR. LESSY: In order to expedite things, I have no 19 objection to that. 20 JUDGE GLEASON: Without objection, the item will be 21 received into evidence as Joint Intervenors Physical Exhibit B. 22 MS. DREY: Oh, B. Oh, I'm sorry. 23 (The item referred to was marked 24 Joint Intervenors Physical Exhibit 25 B for identification and received

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-	1	JUDGE GLEASON: At some point, put a little piece of
•	2	paper around it.
-	3	MS. DREY: Yes, we'll mark it immediately.
•	4	BY MS. DREY:
345	5	Q Mr. Gallagher, would you please describe that thing?
) 554-2	6	A Yes. Before me I have a steel angle which has
4 (202	7	attached to it two headed studs with an "N" stamped on it, of
2002	8	which they have both been attached by some form of manual-
N, D.C	9	welding technique. I have no other personal knowledge of this.
NGTO	10	In fact, it's the first time I have ever seen it.
VASHI	11	Q How do you know that's a manual weld?
ING, V	12	A I think my experience allows me to determine what
BUILD	13	is a manual weld and what has been machine-welded.
TERS	14	Q Is there another word for manual weld? Is there
EPOR	15	another way of describing it? Is that a flash?
S.W. , H	16	A No, it is not a flash.
EET, S	17	Ω Do you know another word for it?
H STR	18	JUDGE GLEASON: Is there another word?
300 7T	19	THE WITNESS: I don't believe so, other than
	20	describing it by the technique that was used for manually-
	21	welded.
	22	BY MS. DREY:
-	23	Q I think you said there were two headed studs with
•	24	an "N" stamped on it. Is an "N" stamped on each?
	25	A On both of those, yes.

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	1	Q Do you have any idea what the "N" stands for?
	2	A I guess I would think it's Nelson.
	3	Q Have you ever seen a headed stud with anything else
	4	stamped on it?
345	5	A I have not personally, no.
554-2	6	Q Have you ever seen any embeds wait just a moment.
1 (202)	7	MS. DREY: Do you have to make some kind of ruling,
20024	8	or have you already done it, as to whether or not that was
N, D.C.	9	admitted? Oh, you admitted it?
NGTO	10	JUDGE GLEASON: It's been admitted.
VASHL	11	MS, DREY: Excuse me.
ING, V	12	BY MS. DREY:
BUILD	13	Q Did you, in your work as an inspector, at the
FERS 1	14	Callaway Plant did you ever see any embeds?
LEPOR	15	A Yes.
S.W. , F	16	Q Aside from the one you described in the report that
EET, S	17	you referred to just a few minute@ ago, in 77 was it 11, I
H STR	18	believe?
300 TT	19	A Yes.
	20	Q The one that had the hold tag sort of destroyed.
	21	Did you ever notice whether the heads on the studs
	22	that you saw did you pay any attention to whether they had
	23	an "N" on them or anything other than that?
. *	24	A No, I did not pay particular attention to whether it
	25	had an "N" or any other symbol on it.

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	1	Q Would you please tell me if which weld would you
	2	rather look at on that plate, the one on your right, looking at
	3	it, or the one on the left?
	4	A Either one is fine.
345	5	Q Pick one.
554-2	6	A Okay, I've picked one.
3 (202	7	Q Which one? The one on your right or on your left?
2002	8	A It's the right.
N, D.C	9	Q Okay. Would you please tell me if that has a good
NGTO	10	we_d?
WASHI	11	A I would have to know what the welding requirements
JING,	12	were for that weld. I have no other information other than the
BUILI	13	device sitting before me.
TERS	14	Q Can you look at it real closely and tell me if it
REPOR	15	has any discontinuities? You may have to pick it up. You
S.W. , 1	16	don't think you have to you think you can just do it by
RET,	17	visually looking at it from a distance? Okay.
TH STI	18	A Yeah, I don't have to pick it up. I don't have to
300 7	19	walk around it.
	20	Q Has that been undercut?
	21	A It does not look like it has any visible weld
	22	discontinuities.
	23	Q What about the one on your left?
	24	A That one does seem to have a small gap on the upper
	25	side of the stud.

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	1	Q You mean the weld itself, or the stud?
•	2	. A In the weld.
	3	Q In the weld itself?
•	4	A That's correct.
345	5	Q Do you see any evidence what would you call that
554-2	6	under the AWS code, the discontinuity you have just seen there?
(7.2.)	7	A A gap of some sort, incomplete weld.
10.04	8	Q Would you look at the stud itself and see if you
4, D.C.	9	notice any undercut, or do you see any undercut on the base metal
AOTON	10	on the plate? What is undercut?
VASIES	11	JUDGE GLEASON: Which question do you want answered?
ING, V	12	MS. DREY: Okay, the first one.
	13	THE WITNESS: Well, first, I'd like to describe
TERS	14	that it is severely corroded and it's difficult to distinguish
REPOR	15	whether or not there are any service defects in the weld. There
S.W	16	does appear to be an undercut into the stud on the underside of
EE.7.8	17	the weld on the underside of the stud.
H STR	18	BY MS. DREY:
300 7T	19	Q That would be on which of the two studs? The
	20	one on the right, I think, is the one with the white paper.
	21	A On the left-hand side.
	22	Q On the left-hand side of the stud, do you see
-	23	undercut?
•	24	A That's correct.
	25	Q How long is the undercut?

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	1	А	About halfway around it.
	2	Q	Can you tell me in relationship to an inch?
	3	А	I guess l'd also like to say that the right-hand
	4	stud, upon	closer examination, and removing some of the debris,
2345	5	does have u	ndercut as well as on the underside of the stud.
554-5	6	Q	Do you have any idea how old that plate might be, or
4 (202)	7	why it's so	corroded?
. 2002	8	А	I have no idea of its age, and apparently it was
N, D.C	9	exposed to	the elements and was corroded.
NGTO	10	Q	How much do you think that weighs, that embed you're
WASHI	11	holding?	
OING,	12	А	About a pound and a half or so.
BUILI	13	Q	Would you please set it back on the table.
RTERS	14	А	(Witness complying.)
REPO	15	Q	Can you see the undercut from where you're sitting?
S.W. ,	16	A	Yes.
REET,	17	Q	On which stud?
H STI	18	А	The left-hand stud.
300 71	19	Q	Would you mind standing up, please.
	20	А	(Witness complying.)
	21	Q	Can you see the undercut now?
	22	А	Yes.
	23	Q	Okay, you may sit down.
	24	А	(Witness complying.)
	25	Q	Would you please I put a ruler in front of you.

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	1	Would you please tell me how much the undercut is? What's that
	2	kind of ruler called? It's got a special name. It's got little
	3	tiny increments on it.
345	4	A A calibrated ruler, a graduated ruler. I have no
	5	idea what the name of it is.
554-2	6	Q It's a metal ruler. It's got a fancy name I can't
(202)	7	remember.
20024	8	A That's not a fancy name.
V, D.C.	9	Q I know, but I'm asking you what
NGTON	10	JUDGE GLEASON: Mrs. Drey. Mrs. Drey. Please.
ASHI	11	Let's get on with this cross-examination.
ING. V	12	BY MS. DREY:
BUILD	13	Q Would you please tell me what the size of the
FERS	14	undercut is?
EPOR	15	A On the right-hand side, it's approximately 50 percent
.W. , H	16	of the circumference of the stud. On the left-hand side, it's
EET, S	17	approximately a quarter of the circumference of the stud.
H STR	18	Q And in inches?
JT 008	19	A It's difficult to measure on the circumference on a
	20	circular rod.
	21	Q Are you familiar with the four deviations that
	22	Bechtel exceptions to the AWS code that Bechtel handed down
	23	in some time shortly after thestop-work orders. Revision 9
	24	of the technical specifications to the purchase order to Cives?
	25	I don't know whether I prefaced that with a question.

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	ì	Did I? Did I say are you familiar with them? I should have
	2	said, are you familiar with the four exceptions to the AWS code?
	3	A Yes, I am.
	4	Q Do you have them in your prefiled testimony?
345	3	A On page 7.
) 554-2	6	Q Where does it say undercut?
4 (202	7	A About three-quarters of the way down on the page,
. 2002	8	item 4.
N, D.C	9	Ω Would you please
NGTO	10	MR. LESSY: That's page 5, Mrs. Drey.
WASHI	11	MR. GALEN: Are we speaking of the prefiled testimony
OING,	12	now, Mrs. Drey?
BUILI	13	MS. DREY: I think that's what I asked him. Did I
TERS	14	ask that? Okay.
REPOF	15	BY MS. DREY:
S.W. ,	16	Q Are you on page 5?
REET,	17	A Excuse me. I was looking at page 80-14. It's on
TR STI	18	page 7. In the body of the prefiled testimony, it is on page 5.
300 71	19	Q Okay. Are they expressed the same way on both pages,
	20	roughly, in 80-14 and in
	21	JUDGE GLEASON: Why don't we go to page 5. The
	22	exceptions are listed there, Mrs. Drey.
	23	BY MS. DREY:
	24	Q Okay. On page 5 of the prefiled testimony, do you
	25	"aink that it would be difficult for a man working in the field

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	1	to look at a plate and assess whether if he were to look at
	2	that plate, for instance, whether that plate had an undercut of
	3	up to 1/16th of an inch for 10 percent of the weld length
	4	unless he picked up the plate?
044	5	MR. LESSY: I'm going to object unless she specifies
2 +00	6	who the man is.
(202)	7	MS. DREY: A worker at the Callaway Plant who's
57007	8	told to go get a plate to put into a wall where it might have
N, 11.C.	9	to support some portion of a load of a floor beam. That would
MULUI	10	be my hypothetical question.
THEVA	11	BY MS. DREY:
INU, V	12	Q Do you think it would be difficult for him to know
BUILD	13	whether a particular plate had any undercut of up to a 16th of
CWEI	14	an inch without picking it up?
NELOW	15	A Are you through with your question, please?
M.C	16	First of all, the individual would have to be
1993	17	trained in what an undercut is, as well as general welding
NIC II	18	defects.
11 000	19	Assuming a person is well-trained in welding
Ĩ.,	20	defects, one can visually distinguish a 16th of an inch undercut.
	21	Q Would you have to pick up the plate?
	22	A I don't believe you would.
	23	Q Now the plate you are looking at has an angle, but
	24	if you were walking if you were looking at manually-welded
	25	plates, say out in the field, if you were an inspector or welding

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plates, say out in the field, if you were an inspector or welding

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1 inspector and you wanted to know whether a given batch of plates 2 that were going to be heading toward the construction site 3 area where they were installing such plates -- if you were a 4 welding inspector and you wanted to know whether there was 5 such a defect as this, would you have to walk around the plate, 6 do you think, to know whether more than 10 percent would have 7 an undercut in excess of a 16th of an inch, assuming the plates 8 were on the ground and you're standing up? Would you have to

13 Q How long do you think it would take you if you were 14 a welding inspector and a very highly experienced welding 15 inspector who did nothing but welding inspection, to look at a 16 plate that had four manually-welded studs on it and decide 17 whether that plate was in conformance to the AWS Dl.l code?

18 A Precisely, you know, I have no idea. Approximately,
19 probably less than a half a minute.

Q What if that plate had 20 studs on it?
A A minute or two.

A I'm not sure you'd have to get on your knees. You
can bend. You know, there are a number of physical movements
that you could make to see thoroughly 100 percent of every single

Would you have to get down on your knees?

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1 stud on the plate. 2 What about looking for porosity? 0 3 For porosity, you would have to at least get in A 4 close visual proximity of the plate in order to see any dis-5 continuities. 300 7731 STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 6 Q I believe you said that in order to know whether 7 a manually-welded plate had good welds or not, welds that would 8 conform -- I'm adding this -- to the AMS code, I believe you 9 said you would have to know what the welding requirements are; 10 is that correct? 11 A That's correct. 12 How would you tell if that plate in front of you 0 13 conformed to the undersize requirements of the AWS code, looking 14 at that plate? You are a worker out in the field, let's say 15 now, or a welding inspector. 16 A 17

The AWS code does not dictate the size of the weld. The design drawing and detail would identify the required size of the weld.

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19 Q So the welding inspector is out in the field and 20 he wants to know whether a plate conforms to the AWS code and how would he know whether it does, just with respect to undersize? 21 22 Would he have to know what the weld size is meant to be,

23 according to specifications?

A Yes. He would first have to know what the specified 24 25 weld detail was.

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	1	Q So that when Bechtel decided that it was permissible
	2	for the vertical leg of the weld to be up to 1/16th inch smaller
	3	than that specified on the drawing, he decided that that was an
	4	acceptable deviation from the AWS code?
2345	5	A In what organization?
2) 554	6	Q I'm asking you that.
24 (202	7	A All of those people who reviewed the specification
C. 200	8	change approved the change to the weld size.
0N, D.0	9	Q Do you have any idea, even one name?
INGTO	10	A No, I do not.
WASH	11	Q Do you know do you have any idea that anybody
DING.	12	approved it?
S BUIL	13	A Yes, I'm positive it was prepared, checked and
RTERS	14	approved.
REPO	15	Q How do you know?
. S.W.	16	A By reviewing the specification cover sheet, which
TREET	17	has initials to the effect as to the individual who prepared
S HLL	18	the change, who checked the change, and who approved the change.
300	19	Q Do you have one of those you seem to have one
	20	there. May I ask you to turn to the technical specification?
	22	Would you describe the document you are looking at, please.
	23	A I'm looking at a reproduction of Technical
	24	Specification for the Purchase of Miscellaneous Metal for
	25	the Standard Nuclear Unit Power Plant System, Specification C-131,
		Revision 9.

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	1	Q What's the date on the revision, please?
	2	A 7/21/77.
24 (202) 554-2345	3	Q And it seems to have what, four columns? One
	4	says "by," and then it says "check," and then "approval." The
	5	approval column is divided in half and seems to have two initials,
	6	although I can't read it. On the far left, the initials I see
	7	are AP. Does that mean anything to you?
2002	8	A No, I cannot distinguish the individual.
N, D.C	9	Q But it must be a person at Bechtel, because this is
NGTO	10	a Bechtel specification; is that correct?
NASHI	11	A It is a Bechtel specification.
ING.	12	Q Do you have any idea whether Mr. or Ms. AP has
BUILL	13	what that person's welding knowledge or experience is?
TERS	14	MR. LESSY: Objection, your Honor. It's obvious if
REPOR	15	he
S.W. 1	16	MS. DREY: Okay. Thank you. I'm sorry.
EET,	17	BY MS. DREY:
H STR	18	Q Looking through that, would you please tell me
300 71	19	where the Revision what page in this technical specification
	20	were the revisions indicated.
	21	A From the cover sheet, it refers to paragraph 9.6.
	22	It's on page 6.
	23	Q Would you read that, please.
	24	A There are also other locations in the specification
	22	that refer to Revision 9 as well.

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	1	Q Right. But I just wondered about that one, please.
•	2	A Paragraph 9.6 states:
	3	"Studs welded with automatic welding equipment
•	4	on items which are subject to quality assurance requirements,
2345	5	as defined in paragraph 12.0, shall be inspected in accordance
) 554-2	6	with paragraph 4.30.1 and other applicable provisions of the
4 (202	7	AWS D1.1."
. 2002	8	Q Do you know what that 9 refers to on the right?
N. D.C	9	Do you know what Revision 8 said?
INGTO	10	A As it indicates on the cover of the specification,
WASHI	11	Revision 9 was added.
DING,	12	Q All right.
BUILI	13	A Rather, paragraph 9.6 was added through Revision 9.
TERS	14	Q Now would you please look in there some more and
REPOF	15	see I think you said there was also a revision on page 5;
S.W. ,	16	is that correct?
REET,	17	A I didn't say the page number, but
H STI	18	Q Oh, I'm sorry. Did you say Section 8 paragraph
300 71	19	8.4?
	20	A No, I said throughout the specification there are
	21	other references to Revision 9.
)	22	Q 8.0 refers to welding. Would you please tell me
	23	what revision 8.4 would you please tell me what that says?
)	24	How does it read as of Revision 9?
	25	JUDGE GLEASON: Mrs. Drey?

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NG, WASHINGTON, D.C. 20024 (202) 554-2345							
	1	MS. DREY: Yes, sir.					
	2	JUDGE GLEASON: Is he just reading something that					
	3	you have in front of you?					
	4	MS. DREY: Oh, you want me to read it?					
	5	JUDGE GLEASON: I'd just like you to ask the					
	6	question.					
	7	MS. DREY: I'd like him to read it if you would,					
	8	please, one sentence. Does it say, "Each weld shall be					
	9	uniform in weld and size through its full length unless					
	10	indicated herein?"					
	11	I'd like to read this whole thing.					
	12	"Except as allowed by AWS Dl.l, each layer of					
NILDI	13	welding shall be smooth and free of slag, cracks and pinholes,					
ERS BI	14	and shall be completely fused to the adjacent weld beads and					
EPORT	15	base metal. Undercuts shall not exceed 1/32nd inch, except					
W. , R	16	that undercut up to 1/16th inch may occur for 10 percent of					
SET, S	17	the weld length in manual welding of anchors."					
I STRI	18	BY MS. DREY:					
HTT 00	19	Q Do you know what Revision 8 said in that paragraph?					
60	20	A No, I do not.					
	21	Q Mr. Gallagher, I would like to show you a copy of					
	22	Revision 8 which was produced for Joint Intervenors as					
	23	answer to document request No. 11. Would you please read that?					
	24	A "Each weld shall be uniform in weld and size through					
	25	its full length, except as allowed by AWS Dl.l. Each layer of					

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	1	welding shall be smooth and free of slag, cracks and pinholes,					
	2	and shall be completely fised to the adjacent weld beads					
	3	and base metal. Undercuts shall not exceed 1/32nd inch."					
	4	Q Okay. So comparing the two, it looks as if the					
ON, D.C. 20024 (202) 554-2345	5	last sentence on that says, according to Revision 9, "Undercuts					
	6	shall not exceed 1/32nd of an inch except that undercut up to					
	7	1/16th of an inch may occur for 10 percent of the weld length					
	8	in manual welding of anchors."					
4, D.C.	9	So the other ended after the words "1/32nd inch."					
NGTON	10	What is the difference between the part where					
ASHI	11	Revision 9 is indicated at the first point of 8.4? Would you					
ING, V	12	please just describe briefly the difference between Revision 8					
GUILD	13	and Revision 9?					
FERS 1	14	MR. LESSY: Mr. Chairman, it's obvious.					
EPOR	15	MS. DREY: I don't have it in front of me. It's					
.W., R	16	not obvious to me.					
EET, S	17	BY MS. DREY:					
H STR	18	Q What's the difference between the two, briefly?					
TT 008	19	A You just described the difference quite accurately.					
	20	You said that in Revision 8, the undercut					
	21	Q No, I'm sorry, I meant the first sentence of 8.4.					
	22	What's the difference between 8 and 9?					
	23	A The first sentence?					
	24	Q Right.					
	25	A The only difference is ", unless indicated					

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	1	otherwise herein."					
	2	Q Do you know what that refers to?					
	3	A Any other provisions that are specifically stated					
	4	in the specifications.					
6462	5	Q Would you turn the page, please, in Revision 9 and					
-+cc (6	compare that with Revision 8?					
4 (202	7	A (Witness reading document.)					
2002	8	JUDGE GLEASON: What is the question, Mrs. Drey?					
N, D.C	9	MS. DREY: I wanted to ask him the difference					
INGIO	10	between the two.					
WASH	11	JUDGE GLEASON: Do you know the difference?					
OING.	12	MS. DREY: I don't know the difference. I'd like					
BUIL	13	to hear him describe the difference, whether it's significant or					
CHARLY	14	not. But I'd like the difference for the record, if he would,					
REPUI	15	please.					
S.W.	16	JUDGE GLEASON: Well, I'd like to ask you what					
REEL.	17	relevance this has with respect to these plates. You know, it					
19 11	18	sounds to me that all we are doing is reading changes in codes					
1 000	19	here and documents.					
	20	MS. DREY: I have no indication from anything I've					
	21	heard since I've been sitting in this room the last few days					
	22	that anyone really had the knowledge to know whether a deviation					
	23	from the AWS code was significant or not.					
	24	We're talking about plates in this case, manually					
	25	welded plates, that may hold up a whole floor beam or whole part					

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1	I think we can possibly have some defective manually-					
2	welded plates in the Callaway plant construction project and I'm					
3	concerned about it.					
4	JUDGE GLEASON: Mrs. Drey, that is the heart of your					
5	Contention. My query is directed at you raising questions which					
6	challenge the capability of the witness' credibility or his					
7	testimony without having to read lengthy sections out of changes.					
8	BY MS. DREY: (resuming)					
9	Q Mr. Gallagher, would you please tell me whether you					
10	personally were involved in recommending to anyone at Region III					
11	whether or not these deviations from the AWS code were accpetable					
12	or not?					
13	A Yes, I was.					
14	Q What was your recommendation?					
15	A That they were and my					
16	Q Excuse me. That they were I didn't mean to interrupt					
17	you. On what basis did you make that recommendation?					
18	A The recommendation I made was that these changes to the					
19	bechnical specification were minor in nature and did not affect					
20	the basic weld capacity of the connection, as it stated in my					
21	testimony on page five.					
22	Q What kind of research did you do? You called the AWS					
23	code people, Mr. Moss Davis, right? And he said that he felt,					
24	according to that letter we read earlier, he said that well,					
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24					

maybe you can find it faster than I. What is that? Did you read

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	1	that into the record as yet, by any chance, that response there in
	2	which the person, Moss Davis, is quoted?
	3	MR. LESSY: Mrs. Drey, that's already in the record.
	4	MS. DREY: Yes, but I wanted him to read it, what that
145	5	item 1 says.
554-20	6	MR. LESSY: I object to having him read something that's
(202)	7	already in the record, Mr. Chairman. If there's a question about
200.1	8	that statement I think that's the proper way to proceed.
, D.C.	9	JUDGE GLEASON: I sustain that objection.
NOLD!	10	BY MS. DREY: (resuming)
ASHIN	11	Q You apparently asked these experts whether the AWS
PORTERS BUILDING, W	12	weld profile and undercut and so forth were applicable to manually-
	13	welded studs. I think maybe because the question was that linear
	14	welds is that right? Is that what the debate was? Is that
	15	why you called at least three people, because some people said
W. , KI	16	that the AWS code did not involve manually-welded studs? Is that
SET, 3	17	why you made those three calls or more?
I SI'RI	18	MR. LESSY: I think we need a clearer question here.
111 00	19	JUDGE GLEASON: What is the question, Mrs. Drey?
2	20	BY MS. DREY: (resuming)
	21	Q Why did you call Moss Davis at the American Welding
	22	Society and some people at the NRC headquarters?
	23	A Simply to get other people who are familiar with AWS
	24	code insight into whether or not certain workmanships requirements
	25	are applicable to manually-welding around a circular stud or bar.

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	1	The specific exceptions were not generally discussed in
W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345	2	any detail.
	3	Q You didn't ask any of them specifically about the amount
	4	of undercut or anything? You just said as I see it you asked
	5	them do you have to pay attention to the AWS code. Did you say
	6	would deviations be okay?
24 (202	7	A It was a matter of applicability, not extent. I made
300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345	8	the decision about the extent.
	9	Q In other words, you thought that it was all right that
	10	Bechtel had made do you know who at Bechtel I mean, we
	11	saw some initials, but do you know where this idea to deviate
	12	from the AWS code came from?
	13	MR. LESSY: I object on the grounds of asked and
TERS	14	answered.
REPOF	15	JUDGE GLEASON: Sustained.
S.W	16	BY MS. DREY: (resuming)
REET,	17	Q When did you first learn of the existence of the Daniel
LIS HJ	18	data package on that is in the record as Joint Intervenors
300 7	19	Exhibit Number 12, the 610-page document?
	20	A When I was first assigned to the project of reviewing
	21	Union Electric's submittal, sometime about April of 1980.
	22	Q Did Union Electric give you a package, I mean, a copy
	23	of the 610-page document?
	24	A That was one of the enclosures to their March 10, 1978
	25	submittal.

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	1	Q Is that UL-NRC-238?
•	2	A That's correct.
_	3	Q Would you please tell me when you first learned of the
•	4	existence of the Cives data package packages?
345	5	A At the same time.
554-2	6	Q Did they also give you copies of those?
1 (202)	7	(Pause.)
20024	8	A I believe they were also included, yes.
N, D.C.	9	Q I think you may have are some of those in a part of
NGTON	10	this 80-14 or not? Well, I don't see them, but I know they're
ASHI	11	a part of at least one of the Bechtel reports, I think.
ING, V	12	Let's see
	13	A They're part of
reks 1	14	Q It would be in one of the Union Electric exhibits?
LEPOR	15	A Applicant's Exhibit Number 4.
S.W. , H	16	Q Which is Bechtel report entitled what?
EET, S	17	A Final report of investigation of welded studs, Bechtel
H STR	18	Power Corporation, August 10, 1977.
300 7.F	19	Q 1977. Are you without taking a lot of time, I could
	20	find it, but are you one of the people from the Nuclear Regulatory
	21	Commission who was present when Bechtel learned about the existence
	22	of the 610-page data package?
-	23	A No, I was not.
۲	24	Q Did you were you under the impression that they had
	25	known about the Daniel inspection right along?

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		승규가 잘 잘 들었는 것 같아요. 그는 것 같아요. 그는 것 같아요. 그는 것 같아요. 그는 것 같아요. 가지 않는 것 같아요. 가지 않는 것 같아요. 나는 것 않는 것 같아요. 나는 것 같아요. 나는 것 않는 것 같아요. 나는 것 않는 것					
	1	A Who is "they"?					
	2	Q Bechtel.					
	3	(Pause.)					
	4	A I believe that they were not aware of that at the time					
345	5	of this final report.					
554-2	6	Q Of this first final report of August '77?					
1 (202)	7	A That's correct.					
2002	8	Q What gives you that impression?					
N, D.C.	9	A My discussion with the investigator, Mr. Foster.					
NGTON	10	Q Do you remember when that discussion was? Was it					
NASHI	11	shortly after the August '77 report issuance?					
ING. 1	12	A It was shortly after I was assigned the project and					
BUILD	13	wanted to get some insight into some of the historical background					
TERS	14	of this issue.					
REPOR	15	Q I see. So how did Mr. Foster describe that to you,					
S.W. , 1	16	please?					
CEET.	17	A Much the same way as it's described					
H STF	18	Q Just quickly, just in your own words. Is that not					
300 77	19	permissible to ask in his own words?					
	20	MR. LESSY: You shouldn't interrupt him in the middle					
	21	of an answer.					
	22	MS. DREY: He wants to read it. I want to know what					
	23	he remembers.					
	24	MR. LESSY: He wasn't going to read it.					
	25	THE WITNESS: Very similar to the way it's described in					
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1	Applicant's Exhibit Number 7, under introduction.
2	BY MS. DREY: (resuming)
3	Q Would you read it since you have it in front of you?
4	A Sometime in November of '77 the NRC obtained information
5	regarding non-conformance report 0831.
6	Q I'd appreciate it if you'd read that.
7	MR. LESSY: Just a minute.
8	JUDGE GLEASON: Mrs. Drey
9	MS. DREY: I'm sorry.
10	JUDGE GLEASON: That is in the record. We're not going
11	to have people sitting around reading.
12	MS. DREY: Would you tell me what you are reading from?
13	Did you say?
14	MR. LESSY: The first page after the table of contents,
15	Mrs. Drey.
16	MS. DREY: And you're reading from what's entitled at
17	the top?
18	THE WITNESS: Applicant's Exhibit Number 7.
19	BY MS. DREY: (resuming)
20	Q Prior to your wait. First, may I ask, are you the
21	person at Region II who decided that the exceptions to the AWS
22	code were okay and that the data on which well, that everything
23	that the Applicant had told you was satisfactory enough to close
24	out this embed question?
25	A That's what my testimony concludes, yes.

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1	Q And to whom did you then pass that recommendation?
2	A It was memorialized in NRC report 80-14, which was
3	transmitted to Union Electric under the signature of Mr. James
4	Keppler.
5	Q Did Mr. Keppler approve your have to approve your
6	recommendation that this item be closed out?
7	A He did not approve it. He signed the transmittal letter
8	to Union Electric.
9	O So it's really up to you, to the investigator, the
10	inspector, to make the decision?
11	A Mr. Keppler relies on his technical staff for reviewing
12	tochnical documents, was
13	technical documents, yes.
	Q Did they ever ask did Region III office ever ask
14	Washington to participate in the analysis of the plates?
15	A On April 6, 1978, the Region III office did transmit
16	through a so-called action item, to the NRC headquarters, the
17	entire March 10, '78 submittal of Union Electric for review, yes.
18	Q And what did the headquarters do then with that?
19	A Apparently nothing.
20	Q So then they really weren't reviewing it in Washington
21	as some of us have been lead to believe, is that what you are
22	saying?
23	A No one has led you to believe anything other than what
24	is documented in my report.
25	Q All right.

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	1	A It did not get the attention that we had requested
	2	through the action item back in April of '75. Consequently, after
	3	waiting a long time for that review, the Region III office
	4	requested that the package be returned to Region III and that I
345	5	would be assigned the project of doing the technical review.
554-2	6	Q Would you please look again at inspection report 80-14,
1 (202)	7	the second page of UL-NRC-349, which is dated April 24 and
20024	8	follows page ten, the report, UL-NRC, the letter and
N, D.C	9	A I'm sorry. Can you identify the document?
VASHINGTON	10	Q UL-NRC-349, which is in 80-14, page 13, if you count
	11	them from the front. It's the one that has your questions
ING, 1	12	summarized from the meeting.
REPORTERS BUILD	13	(Pause.)
	14	Do you see the 349? Would you please look at the second
	15	page of that, page two of that April 24, 1980 letter, Item 8?
S.W. , 1	16	This is concerning the Bechtel probability study. Was that the
LEET,	17	August '77 report? Is that the probability study, that Bechtel
H STF	18	report?
300 71	19	(Pause.)
	20	A The probability study was included at attachment number
	21	1 to UL-NRC-238, dated March 10, 1978.
	22	Q UL-NRC-238. So that must be in here also, is that
	23	right, or it would be in 30-14, your exhibit?
	24	A It's referenced in report 30-14. It's not contained in
	25	there.

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	1	0 Is that a separate one of the Union Electric exhibits,
	2	UL-NRC-238? I believe it may be. I think it's in the record.
	3	Isn't that what you were referring to this morning, Mr. Chairman,
	4	when you asked for the exhibits?
345	5	JUDGE GLEASON: Please don't ask me which document I
554-2	6	was referring to this morning.
(202)	7	MR. GALEN: The probability analysis.
20024	8	JUDGE GLEASON: You're talking about Exhibit 7?
4, D.C.	9	MR. GALEN: Part of Exhibit 4, August 1977 Bechtel
NGTON	10	report, Applicant's Exhibit Number 4. Mr. Gallagher is correct.
ASHIP	11	It was also attached to that letter that he referenced as an
ING, W	12	attachment.
SUILD	13	BY MS. DREY: (resuming)
LERS 1	14	Q That is the final report, then, of August '77. Is that
EPORT	15	the probability study?
.W., R	16	MR. GALEN: It is a portion of that August 1977 report.
EET. S	17	That's correct. Engineering
H STR	18	MS. DREY: Oh, it's one page or something? Okay, here's
TT 000	19	Exhibit 4. It's called final report, investigation of welded
, Ĩ	20	studs, Bechtel Power Corporation, August 10, 1977. Is that the
	21	probability study, sir, that you were referring to, Mr. Gallagher?
	22	MR. LESSY: You'll see, Mrs. Drey, that the letter you
	23	are referring to is not Mr. Gallagher's letter. It is a letter
)	24	from Mr. Schnell, I believe.
	25	MS. DREY: I asked him if he was satisfied with the

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description of his participation in that meeting and he said he
 was satisfied.

THE WITNESS: don't believe you asked that question. BY MS. DREY: (resuming)

Q I asked something like that. I wanted to know if that was a fair representation of what you said at the meeting, I thought, or if I haven't asked that, I will ask that.

8 Would you please tell me, I'm just zeroing in on item
9 8, would you please tell me whether item 8, which is three short
10 paragraphs, reflects the questions you raised at the meeting on
11 April 10, 1980.

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(Pause.)

Messrs. Gallagher and Landsman of the NRC are not experts in probability analsis and will not personally support an analysis of this type to defend acceptability of machine-welded embeds. NRC concerned not with probability of stud failure but number of defective studs per embed and probability of embed failure.

19 The third paragraph in that item, do we have evidence
20 of multiple defects per embed? How many plates were involved in
21 the 66 stud defects.

JUDGE GLEASON: Ar. Drey, we can read. What is your question?

BY MS. DREY: (resuming)

Q Is that an accurate description of your concerns raised

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	1	at that meeting?
	2	A I think so, yes.
	3	Q Have you looked carefully at the 610-page Daniel data
) 554-2345	4	package, the Joint Intervenors Exhibit Number 12?
	5	A Yes, I have.
	6	Q Do you have a copy there handy?
4 (202	7	A No, I do not.
. 2002	8	MS. DREY. Would you mind going over where he is? I
N, D.C	9	don't have a copy I don't need a copy. I would appreciate it
NGTO	10	if you would share it with him in the interest of expediting
WASHI	11	this proceeding.
TERS BUILDING, V	12	I'm sorry. I inadvertently left my copy at home.
	13	THE WITNESS: I guess I would like to explain the
	14	first paragraph of that item. As far as I was concerned, after
REPO?	15	doing my view of
S.W. ,	15	JUDGE GLEASON: Excuse me, Mr. Gallagher, which item
REET,	17	on which page?
TH STI	18	THE WITNESS: Question number 8 of the April 24 letter.
300 77	19	After reviewing the data that was supplied to me, as far as I was
	20	personally concerned, I don't believe a probability study was
	21	even necessary, based on the actual failure rate. It was so
	22	infinitesimally small that as far as I was concerned, a proba-
	23	bility study was not necessary and, therefore, did not put too
	24	much weight on that.
	25	BY MS. DREY: (resuming)

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300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1	Q All right, were you going to okay. Now I think I
2	
3	(Pause.)
4	(Ms. Drey distributing documents.)
5	I put before you sort of a card file that has plates
6	and page numbers on the paper. And also a chart, and I think the
7	chart is was submitted and is Joint Intervenors Exhibit Number
8	32, rejected.
9	On that chart there are manual welds and machine welds.
10	I would just appreciate it if you would pick one at random, one
11	that would be a machine-welded plate and reach in the card file
12	and pull out one sample page of a machine-welded plate with its
13	surveillance sheet, 512 or something.
14	A Any one of them?
15	(Witness picking card.)
16	Why don't you pick one?
17	MR. GALEN: Is this off the record, Mr. Chairman?
18	JUDGE GLEASON: Yes.
19	(A discussion was held off the record.)
20	BY MS. DREY: (resuming)
21	Q What plate number is that?
22	A EP-512F.
23	Q Is there a page number?
24	A Page 135 of 610.
25	Q Would you please turn to page 135?

	1	With the surveillance sheet that goes with it, that
	2	would be in front of it, I guess, so you've seen that.
	3	Would you describe what's on that sheet not on the
	4	surveillance sheet, on the non-conformance report.
345	5	MR. LESSY: Are you asking him to describe what's on
554-2	6	page 135?
(202)	7	MS. DREY: That's what I'm asking.
20024	8	JUDGE GLEASON: Certainly.
l, D.C.	9	BY MS. DREY: (resuming)
NGTON	10	Q Just briefly tell me what you see on that plate? Now
ASHI7	11	if you want to cross examine him, I'm doing as well as I can. I'm
NG. W	12	sorry and I don't want to be interrupted all the time.
SUILD	13	JUDGE GLEASON: All right, go ahead, Mrs. Drey.
LERS 1	14	BY MS. DREY: (resuming)
EPORT	15	Q I have a limited amount of time and I would like to do
.W. B	16	with it what I want.
EET, S	17	JUDGE GLEASON: Can you describe what's on the sheet?
H STR	18	THE WITNESS: Yes. There are two plates, I presume,
TT 008	19	and a rad waste tunnel, EP-512F and EP-512E. Ther are a lot of
63	20	markings on the plate. Do you want me to just record what every-
	21	thing on the page?
	22	BY MS. DREY: (resuming)
	23	Q May I stay over here? Do I have to keep walking back?
	24	JUDGE GLEASON: What is the question.
	25	BY MS. DRLY: (resuming)

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	1		Q	Would you please describe the defects or why is that
	2	plate	e on	that non-conformance report?
	3		A	The reason it's in the non-conformance report is that
	4	they	did	a they identified some deficiences.
]	chej	0	What are the deficiencies on the plate on the left?
-2345	2		Q	what are the deficiencies on the plate on the left?
2) 554	6		A	Number six stud was broken off.
4 (202	7		Q	Out of how many studs?
2002	8		A	Twenty.
I, D.C.	9		Q	And the plate on the right?
NGTON	10		А	Stud number eleven and seventeen is missing.
AIHSHI	11		Q	Do you know what the line means under the 17 and 18?
ING, W	12		А	No, I don't.
SUILD	13		Q	If you wanted to find that plate would you be able to
FERS 1	14	find	it :	if you looked at it together with the surveillance sheet?
EPOR	15		A	Find it in the plant?
.W., R	16		Q	Right.
EET, S	17		А	It's possible. I believe so.
H STR	18		Q	Where is the location on the surveillance sheet?
ITT 000	19		А	Rad waste tunnel.
~	20		Q	Is this signed by an inspector?
	21		А	Yes.
	22		Q	And approved?
	23		А	And approved.
	24			MS. DREY: Did you want to talk to him?
	25			MR. LESSY: No.

1305

		THE WITTIESS. Quite franklin I doubt some to have the								
	1	THE WITNESS: Quite Frankly, I don't care to have the								
	2	person cross examining me looking over my shoulder when I'm								
	3	trying to respond directly to the Chair as well as to the person.								
•	4	JUDGE GLEASON: We were just trying to do something. It								
345	5	was a matter of convenience.								
554-2	6	MS. DREY: It's very heavy to carry all these documents.								
1 (202)	7	JUDGE GLEASON: We won't let that happen any more.								
20024	8	BY MS. DREY: (resuming)								
N, D.C.	9	Q What kind of information you've been here while we've								
NGTON	10	been looking at the Cives data package. Doyou hve a feeling that								
VASHI	11	the information provided in the Cives data package about machine								
ING, V	12	welds is more or less inclusive than the Daniel data package?								
BUILD	13	(Pause.)								
LERS 1	14	A Looking at the Daniel data package, certainly it is on								
LEPOR	15	a very specific type of form that has a lot of information such								
S.W. , 1	16	as the person who did the inspection, what the date of the								
EET, S	17	inspection was, where it is located, et cetera, and while Cives								
H STR	18	inspection is not on a very specific type of form, just on a								
300 7T	19	sheet of paper, I'm not exactly sure what you're asking me at								
	20	this point.								
	21									
)	22									
	23									
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1 Q I asked which of the two data packages was more
 2 inclusive, more specific.

A Well, they both have certain things that are specific, whether --

Q Harry you ever before compared the two, before today? A Yes.

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7 Q What was your assessment of them? Did you write
8 that up as a part of your recommendation to -- or I guess
9 the recommendation you wrote up is exactly as it appears in 80-14;
10 is that it?

11 A Yes. I think that both inspections have certain 12 information that is usable and was in fact used and considered 13 throughout Union Electric's review of the issue, as well as my 14 review of the issue, and the extent of the welding deviations 15 has been well understood and well documented and an engineering 16 analysis has been performed to my satisfaction to consider 17 fully both the Cives as well as the Daniel inspection.

18 Q Where did the 81,000 come from, the 81,000 studs 19 that they analyzed? This engineering analysis or whatever it 20 was, where did they gather those data?

A From a reinspection of available plates.
Q Do you have any indication that they ever inspected?
MR. LESSY: Inspected what.
BY MS. DREY:

25 Q You mentioned a reinspection. Have you any

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1	indication	that	they	inspected	those	plates	prior	to	the	reinspec-	
2	tion?										
3	A	I be	elieve	so, ves.							

On what basis do you make that statement? 0

I think the fact of the results of the reinspection A indicate to me that in a quality control process, that after 6 7 being released and then reexamined, that has a reject rate of 8 .08 percent or .11 percent, is in anyone's book an excellent 9 quality control process. When you're dealing with a population 10 of pieces, as we have here.

11 Did you ever ask who put together those data on the 0 12 81,000 studs, where they came from?

Well, the documentation reflects where that came A from; either from Cives or from Daniel's reinspection personnel. We know it came from Cives because Bechtel didn't 0 even know Daniel was doing an inspection, apparently.

16 17 When you do your audit of records for the NRC,

do you look at nonconformance reports? 18

19 We look at selected nonconformance reports, yes. A What about a nonconformance report, Joint Intervenors 20 0 submitted nonconformance report No. 13, which is No. 0831, and 21 on page 1 of that exhibit, it says that by means of these 22 nonconformance reports, Bechtel will be notified of the 23 24 existence of this -- just one moment, lease.

MR. LESSY: Mrs. Drey, do you have a copy of Joint

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1 I 2 3 3 4 5 i 6 7 7 r 8 a 9 10 11 f 12 13 13 i 14 m 15 s 16 17	<pre>Intervenors 13 you could show the witness? (Ms. Drey handing document to the witness.) BY MS. DREY: Q What does that say there? It says I don't have t in front of me now, you have it. A "Cives Corporation Deficiencies. Bechtel shall request by copy of this NCR to take appropriate corrective action to prevent recurrence." Q What's the date of that NCR? A Well, there's a number of dates on it. It was first described on 6/17/77, I believe. Q So you think that might be sort of at least the</pre>
2 3 4 5 i 6 7 r 8 a 9 10 11 f 12 13 i 14 m 15 s 16 17	<pre>(Ms. Drey handing document to the witness.) BY MS. DREY: Q What does that say there? It says I don't have the front of me now, you have it. A "Cives Corporation Deficiencies. Bechtel shall request by copy of this NCR to take appropriate corrective action to prevent recurrence." Q What's the date of that NCR? A Well, there's a number of dates on it. It was first described on 6/17/77, I believe. Q So you think that might be sort of at least the</pre>
3 4 5 1 6 7 7 8 a 9 10 11 11 12 13 13 14 14 15 5 16 17	<pre>BY MS. DREY: Q What does that say there? It says I don't have t in front of me now, you have it. A "Cives Corporation Deficiencies. Bechtel shall request by copy of this NCR to take appropriate corrective action to prevent recurrence." Q What's the date of that NCR? A Well, there's a number of dates on it. It was first described on 6/17/77, I believe. Q So you think that might be sort of at least the</pre>
4 5 i 6 7 r 8 a 9 10 11 f 12 13 i 14 m 15 s 16 17	Q What does that say there? It says I don't have at in front of me now, you have it. A "Cives Corporation Deficiencies. Bechtel shall request by copy of this NCR to take appropriate corrective action to prevent recurrence." Q What's the date of that NCR? A Well, there's a number of dates on it. It was first described on 6/17/77, I believe. Q So you think that might be sort of at least the
5 i 6 7 r 8 a 9 10 11 f 12 13 13 i 14 m 15 s 16 17	<pre>ht in front of me now, you have it. A "Cives Corporation Deficiencies. Bechtel shall request by copy of this NCR to take appropriate corrective action to prevent recurrence." Q What's the date of that NCR? A Well, there's a number of dates on it. It was First described on 6/17/77, I believe. Q So you think that might be sort of at least the</pre>
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8 a 9 10 11 f 12 13 i 14 m 15 s 16 17	Q What's the date of that NCR? A Well, there's a number of dates on it. It was First described on 6/17/77, I believe. Q So you think that might be sort of at least the
9 10 11 f 12 13 i 14 m 15 s 16 17	Q What's the date of that NCR? A Well, there's a number of dates on it. It was First described on 6/17/77, I believe. Q So you think that might be sort of at least the
10 11 f 12 13 i 14 m 15 s 16 17	A Well, there's a number of dates on it. It was first described on 6/17/77, I believe. Q So you think that might be sort of at least the
11 f 12 1 13 i 14 m 15 s 16 17	Q So you think that might be sort of at least the
12 13 i 14 m 15 s 16 17	Q So you think that might be sort of at least the
13 i 14 m 15 s 16 17	
14 m 15 s 16 17	nitiation date, some time around there? Do you see anything
15 s 16 17	such earlier or much later? Roughly a little bit after the
16 17	top-work order; is that correct?
17	A That's correct.
	Q Orders, I should have said.
18	Would you please tell me what's the difference
19 t	to the right there, it says "rework, repair, use as is, reject."
20 W	Which of the four boxes is checked?
21	MR. LESSY: Objection, Mr. Chairman. This is in
22 e	evidence.
23	MS. DREY: I don't have it in front of me. My
24 r	recollection is it says rework. I'm sorry. He doesn't want me
25 r	

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11-4		1311
11-4	1	HUDCE CLEASON: What door it cave
8	-	JUDGE GLEASON: What does it say?
	4	THE WITNESS: It says rework, yes.
	3	BY MS. DREY:
2345	4	Q Do you as an NRC inspector know the difference
	5	between rework and repair, according to Bechtel quality assurance
) 554-	6	manual?
4 (202	7	A I don't recall the distinction that is made in
2002	8	their quality assurance manual. It doesn't seem to be a major
N, D.C	9	difference. It's at face value on the two words.
NGTOR	10	Q In other words, you think they're interchangeable;
IHSAV	11	is that the kind of how would you know who would you ask
ING, W	12	if you wanted to know what's the difference between rework and
	13	repair? They have them separated there.
LERS 1	14	A I presume they have them defined in some manner in
LEPOR	15	their quality assurance manual.
. W. , B	16	Q Yeah. I think rework indicates a greater problem.
EET, S	17	So you would not necessarily have known of this.
H STR	18	Did you ever see this nonconformance report before?
00 TT	19	A Yes.
n	20	Q When was the first time you saw it?
	21	A When I was assigned the project some time in April of
•	22	'80.
	23	Q Going back to that page we started with about the
	24	probability study, did it seem like a gigantic accumulation of
	25	data that I mean a gigantic task that they had accomplished,

	1	to have looked at 81,000 studs in time to have had a probability
	2	study made on the basis of that research? Or do you think it
	3	seemed like not such a big thing? I mean how
2345	4	A You asked me a number of questions in that statement
	5	Q Did it seem like a great big research project?
) 554-2	6	A It was certainly an extensive and exhaustive amount
4 (202	7	of work on their part, yes.
. 2002	8	Q Did you ever ask who collected those data?
N, D.C	9	A The documentation spoke for itself.
INGTO	10	Q It said Cives; right?
WASH	11	A Yes.
DING,	12	Q Would there be any reason that you know of that
BUILI	13	Cives would want to have a successful report and that they might
RTERS	14	want to indicate that their quality assurance efforts back
REPOI	15	at the fabrication shop were good?
S.W. ,	16	MR. LESSY: Mr. Chairman, that
REET,	17	MS. DREY: Is that a leading mestion?
TH ST	18	MR. LESSY: No, I think it requires speculation on
300 7	19	behalf of this witness as to what a vendor's intentions were
	20	to Bechtel.
	21	JUDGE GLEASON: Ask another question.
	22	BY MS. DREY:
	23	Q Would you please tell me if the Nuclear Regulatory
	24	Commission had ever gone to the vendors to inspect what it found
	25	there?

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1	A No, I don't believe that the NRC did any inspection
2	of the vendor's facilities.
3	Q Were you ever aware of any repair activities going
4	on at the Callaway site of embeds?
5	A Obviously when I was assigned to this report, there
6	had been repairs or reworks of some sort, based on the documenta-
7	tion that I reviewed, yes.
8	Q Do you know whether Mr. Foster was he the person
9	responsible at that time, at the time of the stop-work orders
10	and at the time the Cives team was doing its research?
11.	A Mr. Foster is an investigator from the office who
12	was performing an investigation into certain allegations
13	made by craft personnel.
14	Q Craft personnel? When he was doing the Smart
15	allegations; is that what you mean?
16	A That's correct.
17	Q Do you know whether any NRC inspector ever asked
18	Union Electric for the opportunity to look at the laydown yard
19	or anything else where there may have been inspections or
20	repairs going on for these machine-welded and manually-welded
21	plates?
22	A I'm not aware of that.
23	Q Would the NRC inspector then go to a laydown yard,

ever gone to look at repairs on site at a nuclear power plant

or is that considered something -- have you as an inspector

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1 during construction?

A Yes, I have.

Q What kind of repairs have you examined?

JUDGE GLEASON: What's the relevance of that, Mrs. Drey?

MS. DREY: I'm trying to indicate that the Nuclear Regulatory Commission, which has issued 80-14, did so without enough information. They relied on the Applicant, and the Applicant relied on the fabricator. I can't make allegations. I'm trying to find out the facts.

> JUDGE GLEASON: Proceed. Answer the question. THE WITNESS: Could you repeat the question, please.

BY MS. DREY:

Q Do you know whether the Nuclear Regulatory Commission would go to something like a laydown yard to look at repairs?

A I have in fact gone to laydown areas where work was in progress.

Q What were you looking at?

A This is a routine part of our inspection effort. There have been occasions where I have gone to the fabricator's shop where they were doing repairs of Nelson studs or manuallywelded.

Q Which fabricator's shop?

A On-site fabrication shop.

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Oh, I see what you mean. But not at Callaway?

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11-	-8	1315			
	1	A I don't recall going to the Callaway shop.			
	2	Q Did Region III ever issue a PNO on the embed			
	3	problem at Callaway, do you know?			
) 554-2345	4	MR. LESSY: You've got me. I don't know what a PNO is,			
	5	Mrs. Drey.			
	6	BY MS. OPEY:			
4 (202	7	Q Do you know what a PNO is, sir?			
. 2002	8	A Yes. It's a so-called Preliminary Notification.			
N, D.C	9	JUDGE GLEASON: Can you answer the question?			
NGTO	10	THE WITNESS: I don't know for a fact that a			
BUILDING, WASHI	11	so-called PNO was issued on this item. However, routinely			
	12	when a utility reports a 50.55(e) notification, a PNO is issued			
	13	to notify other regional offices of the event.			
TERS	14	BY MS. DREY:			
REPOR	15	Q Do all the regional offices use the same criteria			
S.W. ,	16	for determining did you say always when a 50.55(e) report			
REET.	17	is issued, a PNO is issued, or did I misunderstand you?			
TH ST	18	A I think that's more the routine, yes. It's a			
300 77	19	mechanism by which the NRC uses to disseminate information to			
	20	other NRC offices and our headquarters staff, so that they are			
	21	well informed of certain events that are taking place at sites			
	22	within a region.			
	23	Q Those are significant events; is that right?			
	24	A Generally events that have some form of visibility			
	25	or public interest.			

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	1	MS. DREY: Mr. Chairman, I don't know what the time				
	2	is. By the way, how much time do I have?				
	3	JUDGE GLEASON: Well, I haven't put a time limit.				
	4	We are trying to get through your questions, Mrs. Drey.				
2345	5	MS. DREY: I think I cannot get through my questions				
) 554-5	6	May I ask a question that has nothing to do with				
4 (202	7	embeds? Because when I asked some questions during the				
. 2002	8	honeycomb in the base mat portion of our quality assurance				
N, D.C	9	contention, I was told that it was not appropriate to ask the				
INGTO	10	people on the stand because they were not employed by the				
WASH	11	Nuclear Regulatory Commission. So there is some overlap.				
DING,	12	I would like to ask we regard our contention as				
BUILI	13	one which has to do with quality assurance.				
TERS	14	JUDGE GLEASON: I know, but if it doesn't relate				
REPOI	15	to the embedded plate issue, it is not relevant at this time.				
S.W. ,	16	MS. DREY: So we didn't have an opportunity all				
REET,	17	right, we missed our opportunity then.				
TH ST	18	MR. LESSY: You may ask in my view, she could				
300 7	19	ask a generic t p question of a staff function without relating				
	20	it specifically to a contention we have already passed.				
	21	MS. DREY: This one has to do with piping.				
	22	MR. LESSY: This is not the man to ask about piping.				
	23	MS. DUEY: I really was asking about this form.				
	24	MR LESSY: Why don't we show it to him. I can't				
	25	even see it from over here.				

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	1	MS. DREY: I didn't know whether I could.
	2	MR. LESSY: We can always try.
	3	(Ms. Drey handing document to witness.)
	4	BY MS. DREY:
2345	5	Q I have handed you a document entitled "Preliminary
2) 554-	6	Notification of Event or Unusual Occurrence PNO-III-81-12,"
24 (202	7	dated January 22, 1981, subject, allegations regarding welding
0. 2002	8	problems, Callaway.
N, D.(9	Is this a PNC?
INGTO	10	A Yes, it is.
WASH	11	MS. DREY: Mr. Chairman, I would like to offer this
DING.	12	document into evidence, please.
BUILI	13	MR. BAXTER: At this point, Mr. Chairman, it seems
RTERS	14	to me that there has been no linking up of this document to any
REPOI	15	of the piping issues or this issue. It may well be that it
S.W	16	applies to one of the piping allegations, but one just can't
REET,	17	tell from the face of it.
TH ST	18	MR. LESSY: On its face it doesn't appear relevant.
300 7	19	I was just curious as to how you thought it related to
	20	JUDGE GLEASON: What relevance is it?
	21	MS. DREY: I'm trying to understand who is making
	22	the decisions in the nuclear industry in our country. Is the
	23	NRC overseeing what industry does, or does industry make its
	24	own decisions?
	25	And I see here that a preliminary notification of

1 event or unusual occurrence was issued concerning bad welds 2 and improper weld inspections at Callaway. It happens that 3 the bad welds, or at least the alleged bad welds and improper 4 weld inspections have to do with pipes, but I think it's very 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 relevant. I think that's what we have been talking about here 6 this afternoon. 7 It doesn't seem to me to matter, but we are interested 8 in finding out who is responsible. 9 MR. BAXTER: That question can be asked, Mr. 10 Chairman, without the document going into evidence. 11 JUDGE GLEASON: The objection is sustained, and it 12 will not be admitted into the record at this point. It will 13 be known as Rejected Exhibit -- Joint Intervenors Exhibit No. 33, 4 Rejected. 15 Proceed, Mrs. Drey. 16 (The document referred to was 17 marked Joint Intervenors 18 Exhibit No. 33 for identifica-19 tion, and was rejected.) XXXXX 20 MS. DREY: May I ask you, Mr. Gallagher --21 may I ask him a question about the PNO? 22 JUDGE GLEASON: Certainly. 23 BY MS. DREY: 24 Would you please tell me if you were an inspector 0 25 at Callaway at the time the embed question arose, do you think

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1	you would have likely wanted to issue a PNO? Do you think it's
2	of equal significance to the one you have in front of you?
3	MR. LESSY: Under what circumstances?
4	MS. DREY: I'm asking him if he thinks that the embed
5	problem is as significant as the problem described in that PNO
6	which has to do with bad welds and improper weld inspection.
7	JUDGE GLEASON: Mrs. Drey, this piece of information
8	is not in front of him.
9	MS. DREY: Pardon me?
10	I gave it to him.
11	JUDGE GLEASON: It is not admitted.
12	MS. DREY: Okay, then, I didn't understand.
13	JUDGE GLEASON: You can ask him a question about a
14	PNO as it relates to the embed issue.
15	BY MS. DREY:
16	Q Would you have thought the embed issue was significant
17	enough to have a PNO issued about it?
18	A Yes. As it was, I believe.
19	Q Did you ever see one?
20	A I think I answered parlier that I don't recal!
21	specifically seeing that PNO, but I would probably anticipate
22	one having been issued as a result of the embedded plate issue.
23	Q Are PNOs issued when there might be some media
24	attention, or does it just have to do with the level of
25	significance of the defect?

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	1	A There's a number of different reasons, one of which
	2	may be public interest, media interest; but I think more
	3	importantly it's a mechanism to get information to as many people
	4	within the NRC as possible in an expeditious manner. It's
2345	5	telecopied to each one of the five regional offices, as well as
2) 554-	6	to a number of the principal management staff in the Washington,
24 (20)	7	D.C. office, so that they can be fully aware of what is taking
C. 200	8	place.
N, D.	9	Q Okay. In your work at Region III, had you
INGTO	10	in your region, you were responsible for how many nuclear power
WASH	11	plants, roughly?
DING.	12	A I was responsible for performing inspections in
BUIL	13	the civil engineering area at roughly probably 20 or 30 power
RTERS	14	plants, either during construction or in operation.
REPUS	15	Q Did you ever were you ever notified of any problems
S.W. ,	16	at any other plants related to defective embeds?
REET	17	A I'm sorry. Did you say other problems?
ITH SI	18	Q At other plants, have you ever been were you ever
300	19	notified of defective embeds at any other plant other than
	20	Callaway?
	21	A Yes.
	22	Q May I ask where?
	23	A I believe there was an embedded plate issue at the
	24	Perry Plant in Perry, Ohio. Recently a 50.55(e) was issued at
	25	the Hope Creek project.

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1	Q Which is where?
2	A New Jersey.
3	I believe also there was one at the Washington
4	Public Power Supply System Project at Richland, Washington.
5	MR. LESSY: Mrs. Drey, you are aware that Mr.
6	Gallagher is no longer at Region III, he's now at NRC headquarters?
7	MS. DREY: Right. I guess I asked about Region III,
8	but I'm happy to hear about the others.
9	BY MS. DREY:
10	Q So you mentioned the Perry Plant, Hope Creek, and
11	Richland, Washington.
12	MR. LESSY: Mr. Chairman, could we have a brief
13	break? We haven't had our afternoon recess. Maybe a five-
14	minute break?
15	JUDGE GLEASON: Are you asking for a break, Mr.
16	Lessy?
17	MR. LESSY: Yes, I am.
18	JUDGE GLEASON: All right. We'll take a five-minute
19	break. I just wanted to get it on the record.
20	(Laughter.)
21	(Recess.)
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	1	JUDGE GLEASON: Mrs. Drey, we have to start this
	2	session again, please. If you would prefer it, the Board has
	3	a few questions to ask Mr. Gallagher.
	4	(Mrs. Drey returns to her seat.)
345	5	MS. DREY: I would like to hear the Board's questions
554-2	6	and Mr. Gallagher's answers, so I will sit up here.
(202)	7	BOARD EXAMINATION
20024	8	BY JUDGE GLEASON:
4, D.C.	9	Q This is interrupting things, but we might as well
GTON	10	make use of this time.
ASHIN	11	One of the things that and I kind of don't have
ING, W	12	it in the right sequence exactly but when you came on the
IGHIDI	13	scene? Were you there during the time they had the stop-work
TERS I	14	order on June 9th of '77?
EPORI	15	A At that time, I was not employed by the NRC.
.W. , R	16	Q I may not have a chance to ask someone else about
EET, S	17	this question, so this will be in an opinion area, but I would
H STR	18	like your opinion.
TT 000	19	What transpires that an NRC inspector would pick up
	20	apparent defects and the quality assurance people would not
1	21	pick them up? What kind of an opinion would you have on that?
:	22	Because apparently it was an NRC inspector that at least
:	23	noticed these defects, whatever the nature of the defects were.
:	24	They were the ones that were the precipitating agent, if you
:	25	will, for the stop-work order.

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	1	A Well, that sort of occurrence happens quite					
	2	frequently, especially when an inspection results in an issuance					
345	3	of a noncompliance where an NRC inspector is performing his					
	4	independent inspection of a Licensee's activities and comes					
	5	across an item that was identified as being in noncompliance					
554-2	6	with a procedure or specification.					
1 (202)	7	Q Well, would you consider this a failure of					
2002	8	quality assurance on the part of Daniel?					
N, D.C	9	A Well, by definition an item that is cited by the					
NGTO	10	NRC inspector is a failure of a specific part of an inspection					
NASHI	11	procedure or construction specification.					
ING, V	12	Q And?					
BUILD	13	A And results in the issuance of an item of noncom-					
TERS	14	pliance in accordance with 10 CFR 50, Appendix B, Quality					
EPOR	15	Assurance Requirements.					
S.W	16	In this case it was cited against Criterion 10 of					
EET, 1	17	10 CFR 50, Appendix B, which includes inspection requirements.					
H STH	18	It was the NRC inspector's finding that inadequate inspection					
300 7T	19	had taken place which permitted certain welding defects to					
	20	be received on site.					
	21	Q At any time, to your knowledge, was there any kind					
	22	of a suggestion made by NRC people that the Applicant should					
	23	possibly look at providing additional strength, if you will,					
i	24	shoring up against possible defects for plates that had been					

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previously installed prior to the stop-work order?

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	1	A Are you asking whether or not the NRC recommended any
REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345	2	improvements to the already-installed plates prior to June '79?
	3	Q I guess I am.
	4	A No, we did not. As part of my testimomy we have accepted
	5	as is the installed plates prior to June of '77.
	6	Q Well, that is a different question, whether you accepted
	7	them. That comes a little bit later. My question is, at any
	8	time, to your knowledge, did the NRC recommend to the Applicant
	9	that he do something with respect to shoring up, if you will, of
	10	those plates that had previously been installed prior to the shut-
	11	down order?
	12	A NO.
	13	(Pause.)
	14	Q It may be in your testimony. I think you referred to a
	15	familiarity with the test performed by the Lehigh University
S.W. ,	16	professors and it was done on the site in 1978?
REET,	17	A Yes. I witnessed those tests.
LIS HJ	18	MR. GALEN: Mr. Chairman, did you say the tests in what
300 7	19	year? I'm sorry, I didn't hear.
	20	JUDGE GLEASON: 1978.
	21	THE WITNESS: I would like to make a correction. I
	22	misunderstood. I thought you said 1980. I did not personally
	23	witness those tests that took place in 1978, which dealt with a
	24	completely different issue than we are discussing here today.
	25	BY JUDGE GLEASON: (resuming)

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	1	Q I understand.					
	2	(Pause.)					
UILDING, WASHINGTON, D.C. 20024 (202) 554-2345	3	JUDGE GLEASON · Mrs. Drey, are you ready?					
	4	MS. DREY: Yes.					
	5	JUDGE GLEASON: Go ahead.					
	6	MS. DREY: No, I mean, if you want to go on					
	7	JUDGE GLEASON: No, I think that concludes my questions.					
	8	Did you have some questions? Dr. Kline has a few questions.					
	9	BY JUDGE KLINE:					
	10	Q On the question of inspecting the workmanship of manual					
	11	welds, I wonder if you could give us just a brief description					
	12	on what the inspector's obligations really are vis-a-vis the					
	13	code?					
rers i	14	Now the code has certain numerical indications in it					
EPORT	15	regarding, for example, undercut and equality of weld lengths and					
.W. , R	16	so on. They have a literal interpretation which would mean,					
EET, S	17	for example, if it says a number it means no more and no less.					
H STR	18	That would be a literal interpretation.					
300 7T	19	Another interpretation would mean something different					

19 Another interpretation would mean something different
20 from that, perhaps something less rigorous, and the inspector,
21 when he is in the field, is he obligated to inspect to the letter
22 of the code or does he do a more subjective inspection?
23 A Generally, the quality control inspector's responsibility
24 is to inspect specifically to the letter of the construction
25 specifications, which may endorse completely or in part certain

1 code requirements.

For the quality control inspector's purposes it is 2 3 usually a go-no go situation.

Does this mean, for example, if either a specification 0 or a code says equal length on the weld, does this mean that he must physically measure it and determine whether they are in fact exactly equal or does he do it -- does he do it by estimation?

8 That specific character or property of the weld, I A 9 would think, presuming the quality control control inspector is experienced, as he ought to be, can determine visually witbout any physical tool or measuring device whether or not the weld is precisely, you know, to some plus or minus equal. 12

It is accepted practice in quality control to perform 13 14 visual inspections.

On the question of undercutting with some number 0 attached, in order to determine compliance, must he measure it? A In the --

18 Or should he measure? 0

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If an inspector is certain that it either exceeds or 19 A does not exceed specification or code requirements, then one does 20 21 not need to physically quantify the extent of the undercut. Based on his inspection and training, if he is certain that it 22 is within the code, he need not quantify the extent it's in the 23 code and vice versa, if it exceeds the code requirements. 24 Is the inspector permitted to make safety judgments 25

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1 related to what he sees? That is, for example, he sees a certain undercut. Would he be permitted to judge for himself that the undercut had no safety significance and therefore he would pass 4 it? Or would he flag it as a defect regardless of his thoughts on the significance if it was a literal defect?

Generally, the quality control inspector does not have any authority to make an engineering or safety judgment. His responsibility is to identify and quantify the extent of the item and then report that to the responsible engineer, who is responsible for making those engineering decisions.

Now that's enough on that one. 0

On the question of probability analysis, do you or do you not think of yourself as an expert in probability analysis? I do not. A

Did NRC ultimately accept the probability analysis as 0 it pertains to a safety assessment in the plant?

17 A Yes. We accept the probability analysis to the extent 18 that we are confident that based on the data presented and the 19 reinspections performed, certainly there is a large probability of 20 not having any sort of a failure.

Whether or not it is 10^{-9} or 10^{-6} sort of is immaterial. 21 22 Both are extremely small numbers and while we do not understand 23 those numbers for what they're worth, I specifically did not 24 get into the merits of each individual parameter that was used in 25 the probability analysis.

	1	Q Did somebody else in NRC review the probability analysis
•	2	and then recommend to you that it should be acceptable?
	3	A No.
•	4	Q Some other expert?
	<u>19</u> 5	A No. I did not think it necessitated being presented to
	564-23 9	one of our staff in the statistical branch or probability branch
	202) 5	solely on my engineering judgment that the regults of the guality
	024 (solery on my engineering judgment that the results of the quality
	C. 20	control reinspections exhibited excellent quality control in the
	n y	factory and an extremely low failure rate.
	01.0N	Q Could a finding of safety regarding those plates be
	IHSAV 11	found without consideration of the probability analysis?
	3 12	A In my opinion, yes.
	13	BY JUDGE GLEASON:
	1 SH31	Q When did you indicate how long have you been with
	NO 15	the NRC?
	# 16	A Since December of 1977, December 5 to be exact.
	s (133	JUDGE GLEASON: Mrs. Drey?
XXXX	NIS 18	CROSS EXAMINATION - Resumed
	112 19	BY MS. DREY:
	H 20	Q Are you aware of a problem with a cracked clip angle
	21	at the Callaway plant?
	22	MR. LESSY: Excuse me, does this relate to the embed
•	23	Contention embedded plate Contention?
-	~~~	concention, embedded place concention:
•	24	MS. DREY: Yeah. I'm looking at something called
	25	Final Report, Cracked Clip Angle, Auxiliary Building, UL-NRC-239,

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1 a letter from Union Electric dated September 29, 1978, and it 2 says "prior to the cracking of the slab and the yielding of the 3 embedded plate at wall AE, any tensile loads carried in the slab 4 and the supporting beams" and so forth. So it does have some-5 thing to do with an embed. I was just wondering, when I was putting 6 together some -- when I wanted to be sure the record included all 7 of the NRC's inspection reports concerning embeds, I was reminded 8 of the cracked clip angle problem and I just wanted to ask if that 9 is something Mr. Gallagher had any personal knowledge about. 10 MR. LESSY: I object on the grounds of relevancy. This 11 doesn't appear to be relevant to this Contention, as far as I'm

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12 concerned.

13JUDGE GLEASON: Let's let him answer yes or no. He14doesn't have to continue. Are you familiar with it?

THE WITNESS: Yes, I am familiar with it.

16 JUDGE GLEASON: He answered yes, but it doesn't have any 17 relevance to this Contention, Mrs. Drey.

MS. DREY: I would like to say, as I tried to do earlier, that I wanted to offer some NRC reports into evidence, but I don't have the proper number. I have one copy of each. For instance, NRC report number 78-09 mentions the "Bechtel test" at Callaway and there are other reports that I think indeed, if the purpose of these hearings is to --

JUDGE GLEASON: Are these involving embed plates?
MS. DREY: These are the Bechtel reports about a test

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program to evaluate the strength of embedded plates with bent
 studs. It's the study -- it doesn't mention Lehigh, but it said
 a test program to evaluate the strength of embedded plates with
 bent studs was being conducted by Bechtel Power Corporation at
 the site on August 28 and 29, 1978.

JUDGE GLEASON: Yes. Those are the tests that were testified to yesterday.

MS. DREY: I would think that somebody trying to find
out the facts in this case would want to know what the NRC knows.
JUDGE GLEASON: I'm not saying that they should not be
admitted for the record. I am saying that there is a question
currently of relevance to them. But I'm not suggesting you shouldn'
offer them or suggesting what the Board will do with them.

I just wanted --

MS. DREY: I can't do it tomorrow.

16 JUDGE GLEASON: I just wanted you to indicate to me 17 what those documents were.

MS. DREY: I had brought along with me and Mr. Lessy 18 keeps making comments about my not having 9000 copies of ever . 19 thing I brought along, but I can't always anticipate what the 20 21 witnesses are going to bring up or what I'm going to remember, 22 but I had collected from my files all the NRC inspection reports 23 that relate to embeds. And I did not until lunchtime compare 24 what I brought with what Mr. Gallagher had listed on page two of 25 his prefiled testimony.



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JUDGE GLEASON: Well no. Could I suggest to you,

do you have questions that you want to ask with respect to those in connection with Mr. Gallagher, with respect to those reports?

MS. DREY: I would have, sir, but I think that in the remaining few minutes of my time I would like -- I could ask him a few questions. I would like the second to be very clear on the fact that I have two and a half hours that I have been given in which to ask him questions, and I want to say that I'm not criticizing you. I asked you to make those decisions, and I'm grateful, if you want to know, that you put a limit on me.

But I have, just sitting in the back of the room during our five or 10 or 15-minute break, whatever it was, I wrote down some questions. I think that I would be happier just reading those into the record. I wrote down -- this is a legal pad and I see nine. I would rather spend my time reading those into the record than sking Mr. Gallagher one of them, because I think that's how much time it would take. I could get nine questions submitted, or I could get one submitted with one answer. But I'd rather show you the kinds of guestions that I have in mind.

MR. LESSY: Mr. Chairman -MS. DREY: May J finish, please.
JUDGE GLEASON: Go abead, Ms. Drey.
MS. DREY: over and above that, I have a box of

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questions that says "NRC for Mr. Gallagher." It would take more time than we have for me to count the number of questions in here. And, as you know, for every question I would ask, it would elicit untold additional questions. I'm not asking to read all those into the record. 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345
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	1	JUDGE GLEASON: Why don't you read those questions
	2	into the record right now?
	3	MS. DREY: No. 1, would you please look at UL NRC 349
	4	the same section we have been looking at, page 2, item 8.
2345	5	Would you please tell me if you ever personally
) 554-2	6	decided if it makes a difference if more than one stud is
4 (202	7	defective on one plate.
. 2002	8	A few minutes ago, in the interest of time
N, D.C	9	JUDGE GLEASON: Slow up a little, Mrs. Drey.
NGTO	10	MS. DREY: Okay. A few minutes ago, in the interest

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of time, I asked your attorney, Mr. Lessy, to hand me a few pages at random chosen from the 610-page Daniel nonconformance report.

Would you please tell me if any plate on any of those pages is a manually-welded plate?

Does any one of the plates have more than one defective stud? How many? How many plates that you have in your hand -- I haven't finished writing that -- have more than one defective plate?

If you were deciding whether or not to use that plate in a building to support a floor beam, what would you decide?

I would also have referred to, if I had had time, to the response that Union Electric gave to Mr. Gallagher's question about multiple defects per plate. I thought I had it

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marked.

Their answer is, Mr. Gallagher's questions are phrased in UL NRC 249, which is a part of 80-14, and Union Electric's responses after much correspondence, much of which I have, comes forth in UL NRC 354, which is dated May 23, 1980, and there is a response there about the business of how many plates might have multiple defects.

The second paragraph of that letter says -- the second paragraph of item 8, rather, which is the response to Mr. Gallagher's concern.

Union Electric says, "There is evidence of multiple defects per embed. 10 plates are in this category, and they are shown in Attachment B."

As you may remember from our answer to the Motions for Summary Disposition, Joint Intervenors, in studying the the Daniel data package, as distinguished from the -- as distinct from the Cives data package -- we found hundreds of plates with multiple defects, not 10.

19 The next question I have written down was: 20 Prior to your decision to accept the Bechtel report 21 of August 1977, did you speak with any representatives of 22 Daniel International to ask about how their data package on 23 manual welds was created?

Do you know if they sugmented their craft welding supervisors with any specialists from outside of the plant? For

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	1	instance, from Texas?
	2	No. 3, prior to your decision to accept Bechtel's
	3	August 1977 report on machine-welded plates, did you ever ask
	4	Union Electric if any machine-welded plates were repaired on site?
345	5	Did you ask how many manuallly-welded plates Union
) 554-2	6	Electric had to repair?
4 (202	7	Did you ask how many were shipped back to Gouvernor,
. 2002	8	New York?
N D.C	9	No. 4. Mr. Chairman, since I believe the time
NGTO	10	allotted to me this sounds familiar has been limited to
WASH	11	this present two and a half hour segment, I would like to say
DING.	12	that and then I was going to list the NRC reports that I was
BUILI	13	going to ask to have submitted and entered into the
RTERS	14	JUDGE GLEASON: The record.
REPOI	15	MS. DREY: evidence. Right. And then I was
S.W. ,	16	going to ask what transpires when an NRC inspector would pick
REET,	17	up apparent defects that a quality control person would not. I
TH ST	18	think that was maybe my listening to you. I think that was your
300 7	19	guestion, not mine.
	20	No. 5, did you ever go look at plates that had been
	21	previously installed at Callaway?
	22	6. There is some confusion in my mind about the
	23	exact number of plates at Callaway that were installed prior to
	24	June 1977. I wanted to know if anyone has ever done the kind
	25	of analysis that would be necessary to respond to your question,

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Mr. Chairman, that you have asked, I think Mr. Gallagher and 2 perhaps somebody on the earlier panel, and I am interested --3 which is why I turned in the one page 24 from the Licensee 4 Event Report recently -- I would be interested to know which 5 manually-welded plates at the Callaway Plant which were installed prior to June 1977, are supporting any portion of a floor system.

> I am not only concerned about the floor system --JUDGE GLEASON: Floor or safety-related? MS. DREY: Pardon me?

JUDGE GLEASON: Floor or safety-related?

MS. DREY: I'm particularly interested in the floors. I'm not only interested in so-called safety-related items. I have -- I was going to ask Mr. Gallagher about other things that appear within those inspection reports, because I copied some newspaper articles and I think a letter I wrote to OSHA about the cooling tower problem when 80 ironworkers walked off the site because they poured concrete on top of mud on top of reinforcing bars.

19 These were not anti-nuclear workers. These were 20 workers.

21 I would have asked him about that, because I 22 believe that was during his tenure at the Callaway Plant. 23 That is a non-safety-related structure, I believe. 24 I'm concerned about the cooling tower.

I was planning -- well, okay, now, let's see. Where

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7. Regarding the probability analysis, is it clear in your mind that the fact that the 66 stud test results -- is that fact clear in your mind, that these were based on Cives' investigation? That is an investigation by the company, next to Bechtel, I would say they stood the most to lose financially.

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8. What did Union Electric tell you in answer to your question of on how many plates did those 66 studs appear? And I really am sorry that I failed to ask one of the workers that question, but I am pretty sure that they didn't do any bend-testing.

9. I wrote -- and then you called me to come sit down -- did anyone at the NRC look to see if. . .

(Board conferring.)

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1	JUDGE GLEASON: I would like to suggest a procedure:				
2	Are the Daniel people in attendance?				
3	MR. BAXTER: They are in the building; they are not				
4	in the room, Mr. Chairman.				
SFE 5	JUDGE GLEASON: I would like to suggest, Mr. Lessy,				
554-2	that we excuse Mr. Gallagher now and that you take the transcript				
(202)	as soon as it's finished and let Mr. Gallagher read over the				
2002	questions that Ms. Drey asked, and that we will wind up with				
v, D.C.	Mr. Gallagher tomorrow.				
101.0N	In the meantime, I would like to get the Daniel				
IHSEA	people sworn in. I have a number of questions I'd like to				
'9NI	ask them. We will continue with them in the morning and finish				
01108	up the cross-examination with them, then bring Mr. Gallagher				
SHEER 14	back and have him respond to those questions and finish up with				
NO430	Mr. Gallagher.				
- 16 	How does that strike you?				
17	MR. LESSY: That is certainly acceptable. Just have				
H IS	him respond to those questions since they are already in the				
12 19	record?				
20	JUDGE GLEASON: Right.				
21	MR. LESSY: Fine.				
22	MR. BAXTER: That's fine with the Applicant.				
23	JUDGE GLEASON: Is that all right, Ms. Drey?				
24	MS. DREY: Yes. The only thing I'd like to do I				
25	think these are the only four, but may I just read the numbers				

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	1	into the record?					
)	2	JUDGE GLEASON: You mean the					
	3	MS. DREY: The NRC reports.					
•	4	JUDGE GLEASON: We'd like those offered, but we					
345	5	need copies of them. I meant to add that. Just get copies					
554-2	6	in the morning.					
1 (202)	7	MS. DREY: Do I have to make a copy for the NRC?					
2002	8	MR. LESSY: Yes. We don't have them.					
N, D.C.	9	MS. DREY: I'm not asking to ask questions about					
NGTON	10	them.					
VASHI	11	JUDGE GLEASON: No, just some time before Mr.					
ING, V	12	Gallagher comes back, which will be probably some time in the					
	13	afternoon.					
LERS	14	MS. DREY: May I add one more guestion?					
LEPOR	15	JUDGE GLEASON: To Mr. Gallagher's questions?					
S.W. , F	16	MS. DREY: Well, there are two more questions just					
EET, S	17	for the record. They don't need to answer them. I just					
H STR	18	want them in the record.					
FT 008	19	JUDGE GLEASON: Okay.					
	20	MS. DREY: You can draw your line at where you had					
	21	it, but my other two questions were as follows:					
	22	This one I was going to wing it or something, which					
	23	you told me to do. I was going to ask him to say for the record					
	24	how he made the decision of which documents to include in 80-14.					
	25	I'm particularly interested in information he might					

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1 have about -- well, just for an example, SL 367, which was 2 written on June 10, and information he might have about why 3 an interim report was included in this document, rather than 4 waiting for the final report. 5 My other question was as follows, and I have not 00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 6 reread this since I wrote it, but this next section -- it's not a 7 question -- contains two opening sentences and three questions. 8 I would like to ask you a few questions about Bill 9 Smart in order to establish if you knew him. 10 I also want to establish if you knew that he was 11 an employee at the Callaway Plant during June 1977, that summer 12 when the stop-work orders regarding embeds were issued. 13 JUDGE GLEASON: Thank you, Ms. Drey. 14 Mr. Gallagher, you are excused and we shall see 15 you tomorrow. He'll get the transcript and be prepared. (Witness Gallagher temporarily excused.) 16 17 MR. BAXTER: The Daniel people will be here in just 18 a few minutes. 19 JUDGE GLEASON: All right. 20 3-A fls. 21 22 23 24 25

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and the second		
	1	(Pause.)
•	2	JUDGE GLEASON: Could we go back on the record,
-	3	please.
•	4	Whereupon,
345	5	J. A. HOLLAND
554-2	6	and
(202)	7	HAROLD J. STARR
20024	8	were called as witnesses by and on behalf of the Board and,
4, D.C.	9	having been first duly sworn, were examined and testified as
VGTON	10	follows:
(IHIN)	11	DIRECT EXAMINATION
XXXXXXX	12	BY MR. BAXTER:
	13	Q Gentlemen, would you each state your name, your
TERS P	14	place of employment, and your position.
EPORT	15	A (Witness Starr) I am Hal Starr, employed by the
W R	16	Daniel Construction Company at the Callaway site as project
EET, S	17	manager.
H STRI	18	A (Witness Holland) I am John Holland, employed
ULL 00	19	by Daniel. I am now project piping engineer project piping
3	20	manager at the Callaway site.
	21	Q Mr. Starr, I have distributed to the Board and
•	22	the parties a document which is entitled "Resume, Harold J.
-	23	Starr," and consists of six pages.
•	24	Is that a true and correct copy of your professional
	25	education and experience?

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RESUME

RAROLD J. STARE

PROJECT MANAGER

Occober 16, 1940

EDUCATION:

University of Tennouse, B.S.C.E. 1964

SUMMARY OF EXPERIENCE:

Experience includes total responsibility for the man.gament of a major nuclear power facility utilizing closed shop labor, management of a prime contract for a patrochamical facility in Gentral Europh management of the engineering function for a runlear fuel reprocessing facility, and craft supervisory experience on a project utilizing 2000 direct hire crattanen. Specific technical sesignments include: planning, scheduling, cost functions, procurement and engineering.

SPECIAL TRAINING:

Helding Training - Hobert Welding School NDE Training - Magnaflux Corp. Radiography Training - X-Ray Engineering Regner-Tregoe - Daniel International Corp.

TECHNICAL PROFESSIONAL SOCIETIES:

DEPLOYMENT

JOS TITLE/EMPLOYER

1977 - Present

Project Manager Daniel International Corp. Callaway Plant Folton, HO DUTIES AND RESPONSIBILITIES

Type of Facility - Nuclear power plant.

Project Description - Two unit 1150 MM FWRs; capital value of \$3 billion.

Technical Expertise - Labor relation: project controls, regulatory compliance.

Spacific Emeronsibilities - Accure the total and efficient implementation of the obligations of the general contractor for a two unit nuclear power generation facility. The scowe includes responsibility for project controls, construction, safety, security, quality control, construction engineering, site initiated procurement and material control.

EMPLOYMENT

976 - 1977

JOB TITLE/EMPLOYER

Assistant Project Manager Daniel International Corp. Callaway Plant Fulton, MO

DUTIES AND RESPONSIBILITIES

Type of Facility - Nuclear power plant.

Project Description - Two unit 1150 MW FWRe; capital value of \$3 bf111on.

Technical Expertise - Innovation in addressing production and control problezs.

Specific Responsibilities - Primary efforts were directed towards the development of special programs to aldressadverse trends and problem areas which occured during the construction of a two unit nuclear power plant. Involvement included all arces of a total construction contract.

Type of Facility - Profax I Chemical facility.

Project Description - Grass roote petrochemical facility; capital value of \$100 million.

Technical Expertise - Contract management.

Specific Reoponsibilities - Assure the total and efficient implementation of the obligations of the prime contractor for a facility heing designed and constructed in Central Europe. The scope included project controls, construction material procurement, material contro!, construction, design engineer Lisison, Isbor relations, and governmental lisigon.

Type of Pacility - Nuclear fuel reprocessing facility.

Project Description - Chemical process for recovery of spent nuclear fuel including high level waste storage; capital value of \$400 million.

1972 - 1974

Engineering Manager Daniel Construction Co. Allied General Nuc. Services Barnwell, SC



Project Manager Daniel International Corp. Hercules Project Paal, Belgium





EMPLOYMENT

JOS TITLE/EMPLOYER

1972 · 1974 (Con't)

Engineering Manager (Con't)

1971 - 1972

Design Coordinator Daniel Construction Co. Bechtel Corporation Off. (ACMS Project) San Francisco, CA BUTIES AND RESPONSIBILITIES

Specific Responsibilities -Responsible for the implementation of the construction engineering function for the construction of a nuclear fuel reprocessing facility. The scope of work included procedure preparation, subcontract bid package preparation and eval-uation, distarial requisitioning & constructability reviews, design engineer lisison, and design and construction problem resolution. During the initial portion of the project, the assignment included the quality control function.

Type of Facility - Nuclear fuel reprocessing facility.

Project Description - Chemical process for recovery of spont nuclear fuel turbiding high laval waste storage; capital value of \$400 million.

Technical Expertise - Design and construction integration.

Specific Responsibilities -Design Coordinator for the general contractor in the office of the design engineer during the design development of a nuclear power reprocessing facility. Frins. Thy responsible for constructability of the design, assuring consideration for the future construction operation, and provide interface for constructor/design engineering schedule and estimate activity. Assist in the development of QA/QC programe.

Type of Facility ~ Nuclear power generating facility.

Project Description - Three unit PWR; capitel value of first unit \$500 million.

Technical Expartise - Quality

1970 - 1971

Quality Assurance Engineer Daniel Construction Co. Ocones Nuclear Power Station Ocones, SC

EMPLOYMENT

1970 - 1971

(Con't)

JOB TITLE/FMPLOYER

Quality Assurance Engr. (Con't)

OUTTES AND RESPONSIBILITIES

Specific Responsibilities -Development and training assignment to assure familiarity with the commitments imposed by regulatory agencias on a three unit nuclear power generation facility. Also evaluate the effectiveness of the QA/QC program being utilized on the project.

Type of Facility - Aluminum reduction plant.

 Project Description - Grees roots facility including river unloading and producing sluminum ingets; capital value \$157 million.

Tochnical Expertise - Production

Specific Responsibilities -Responsible to General Superintendent for coordination, planning and direction of manpawer and equipment to assure effective utilization of resources and an efficient construction operation being built on a direct hire basis in northern Kentucky.

Type of Pacility - Alucium reduction plant.

Project Description - Grass roots facility including river unloading and producing aluminum ingots.

Technical Expertise - Civil engineering.

Specific Responsibilities -Responsible for construction enginearing of the civil, structural, and non-process piping portions of the facility and interface with project purchasing, and planning and achiduling. Duties included inspection of work, material takeoffs, and project reports.

1969 - 1970

Assistant General Supt. Daniel Construction Co. National Southwire Plant Raweaville, KY

1968 - 1969

Construction Engineer Daniel Construction Co. National Southwire Plant Havesville, KY





EMPLOYMENT

1966 - 1968

JOB TITLE/EMPLOYER

Design and Procurement Coor. Daniel International Corp. Fibers Industries Int." Cuayana, Puerto Rico

DUTIES AND RESPONSIBILITIES

Type of Facility - Synthetic fibers plant.

Project Description - Chemical process facility producing mylon 66; capital value of \$42 million.

Technical Expertise - Planning and procurement.

Specific Responsibilities -Responsible for coordinating the flow of information to and from client concerning engineering and field construction activities and resolution of problems on a grees roots synthetic fibers facility. Assured that the project was provided with adequate construction plans and specifications and coordinated design engineering activities that interfaced with support departments. purchasing, estimating, and scheduling.

Type of Facility - Synthetic fibers facility.

Froject Description - Chemical process facility producing aylon b' cepital value of \$23 million.

Technical Expertise - Cost analysis and projection.

Specific Responsibilities - Responsible for tracking, projecting and estimation of the cost for a grass roots synthetic fibers facility.

Type of Facility - Papermill

Project Description - Expansion to an existing facility including new boiler plant, chepical processing and paper machine; capital value of \$25 million.

Technical Expertise - Field engineering and procurement."

1964 - 1965

Office Engineer Daniel Construction Co. Champion Paper Co. Canton, NG



1965 - 1966



Cost Engineer

Daniel Construction Co. Beaunic Siners Project ELouah, TN

BMPLOXIENT

(Con't)

2964 - 1965

JOB TITLE/EMPLOYER

Office Engineer (Con't)

DUTIES AND RESPONSIBILITIES

Specific Responsibilities -Responsibilities included laison with design engineer to assure provision of plans and specifications to support construction activities. expediting of equipment purchases and resolution of dusign conflicts on an expansion to an existing papermill.

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BY	MR.	BAXTER:
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2	Q Mr. Holland, I have also provided the Board and
3	the parties with a document entitled "Resume, J. A. Holland,"
4	consisting of six pages. I note that the title given for you
1345	here appears to be different than your current one.
6 554-5	A (Witness Holland) That's correct. About two months
4 (202	I became project piping manager.
. 2002	Q What are your current responsibilities as the
N, D.G	project piping manager?
01.9NI	A I have the responsibility for the crafts and
WASH 11	the ergineering on the piping installation and the instrument
'9NIC	installation.
13	Q With that amendment to your resume, is it true
STERS	and correct, the statement of your education and experience?
IS 15	A Yes, it is.
· 16	MR. BAXTER: Mr. Chairman, I move that Mr. Holland's
,T 12	resume be received into evidence and physically incorporated
18 HL	into the transcript as if read.
300 1	JUDGE GLEASON: Without objection, it will be
20	bound into the transcript.
21	(The statement follows:)
22	2
23	
24	
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RESUME!

J. A. HOLLAND

CONSTRUCTION ENGINEERING MANAGER

DATE OF BIRTH:

April 22, 1940

Born in England. Emigrated to United States in January, 1975. Possess a permanent Work Visa.

COUCATION:

Ordinary National Certificate Math, North Lindsey Technical College (England) 1959 Ordinary National Certificate Engineering Drawing, North Lindsey Fechnical College, (England) 1962

Nigher National Certificate Metallurgy, (Equivalent to B.Sc.), North Lindsey Technical College (England) 1959-1964

Post Graduate Welding Engineering and Inspection (condensed M.Sc. course), Cranfield Aeronautical College (England), 1968

SUMMARY OF EXPERIENCE:

Iwenty-one years of experience in the following fields: steelmaking, nuclear shipbuilding, heavy equipment manufacture and construction of chemical, paper, fossil and nuclear power plants.

Sound working knowledge of ASME, ANS, US Navy and Pritish Codes and Standards. Wide experience in the fabrication of ferrous and non-ferrous metals.

Fifteen years of management experience in the ares of fabrication and installation. Responsibilities included costing, planning, development of fabrication methods, troubleshooting, failure analysis, quality control and quality assurance.

SPECIAL TRAINING:

Non Destructive Examination, School of Applied NDE - England, 1965 Inspection Standards, British Welding Institute, 1966 Significance of Defects, British Welding Institute, 1966 Lamellar Tearing, British Welding Institute, 1967 Welding Dissimilar Metals, British Welding Institute, 1968 Advances in Welding Technology, British Welding Institute, 1968 Submerged Arc Welding, British Welding Institute, 1969 Welding of Low Alloy Steels, British Welding Institute, 1970 Welding of Aluminum, American Welding Society, 1976 Quality Assurance Techniques, Lee Marvin Johnson, 1978 Management Workshop, General Electric, 1973 Executive Problem Analysis, Kepner Tregoe, 1978 Management Practices, General Electric, 1979 Special Labor Relations and Trade Unions, Advanced Management Research, 1979 J. A. HOLLAND Page 2

TECHNICAL/PROFESSIONAL SOCIETIES:

Member of the British Welding Institute (by written examination) Nember of the American Welding Society Professional Engineer - Certificate No. QU004518 - California

EMPLOYMENT JOB TITLE/EMPLOYER

OUTIES AND RESPONSIBILITIES

JJab to ... Present EDNSTRUCTION ENGINEERING MANAGER Daniel International Corporation Callaway Nuclear Power Plant Fulton, MO. 65251 Type of Facility - Nuclear Power Plant.

Project Description - 1150 MM Pressurized Water Reactor. Capital value - \$1.8 Billion.

Technical Expertise -

1.8

Specific Responsibilities -In this position I am directly responsible for the total Construction Engineering effort. I provide interpretation of the intent and requirements of design documents. It is necessary in this position that I maintain continuous liaison with the Area Engineers and Owner in order to resolve any design inconsistencies or deficiencies. 1 am responsible for maintaining the flow of required design documents and assure that they meet code and specification requirements, in order to support the general construction effort and meet the project schedule. It is necessary to lend technical support for design, initiate and approve requisitions for subcontracts, equipment, material and manpower; engineering evaluation of bids; coordination with the Construction and Planning & Scheduling Departments; interpretation of specifications and procedures; initiation of paperwork required in order to resolve problems and deficiencies; to attend meetings and provide input and generally assist the Project Hanager as directed J. A. HOLLAND Page 3

EMPLOYMENT

JOB TITLE / EMPLOYER

1977 to 7/1983

PROJECT QUALITY ASSURANCE MANAGER Daniel International Corporation Callaway Nuclear Power Plant Fulton, MO. 65251

DUTIES A O RESPONSIBILITIES

Type of Facility - Nuclear Power Plant

Project Description - 1150 MW Pressurized Water Reactor. Capital value \$1.8 Billion.

Technical Expertise - Fabrication and installation to ASME Code. Interpretation of Federal Regulations and Design Specifications into working documents.

Specific Responsibilities - Develop and execute a comprehensive program of surveillance and audit in the civil, electrical, mechanical and piping disciplines to assure that the Project Control Program is correctly implemented and documented to satisfy the SNUPPS QA Program

Identify quality related items and initiate management action to provide acceptable solutions. Verify implementation of such solutions.

Type of Facility - Chemical, distillation and paper plants.

Project Description - Plants under construction and maintenance contract up to \$200 million.

Technical Expertise - Fabrication and installation of ASME Boilers and Pressure Vessels.

Specific Responsibilities -Direction of site personnel to establish acceptable ASHE Code programs and the auditing of sites to assure continued compliance with ASME Code requirements.

Participation in National Board Surveys.

1976 - 1977

CORPORATE Q.C. MANAGER (Part time) Davis Constructors-Erectors Greenville, S.C. J. A. HOLLAND Page 4



EMPLOYMENT

JOB TITLE/EMPLOYER

1976-1977 (Con'c.)

Corporate Q.C. Manager (Con't.)

1976-1977

Senior Welding Engineer D.I.C. Corporate Office Greenville, S.C.

1975-1976

Welding Engineer D.I.C. Corporate Office Greenville, S.C.

1970-1974

Chief Welding Engineer International Harvester Co. Doncaster, England DUTIES AND RESPONSIBILITIES

Specific Responsibilities - (Con'c.)

Maintain and distribute ASME Code Manual to Davis sites.

Establish the need for welding procedures and assure ASME Code compliance. -

Type of Facility - Chemical, Paper, Fosail, Nuclear and Hydro Plants.

Technical Expertise - Welding and Installation of ASME Code and non-Code Boilers, Pressure Vessel, etc. Pipe bending development.

Specific Responsibilities - Provide sites and DIC Corporate Office with tochnical direction and assistance in troubleshooting.

Visit sites and establish the elient and ASME Code requirements for both new plant and modifications to existing plants.

Prepare work instructions and develop and qualify welding related procedures. Establish welder training programs and ASME Code programs.

Prepare QC programs and implement these programs on-site.

Develop and qualify pipe bending procedures (hydraulic tight radius).

Audit sites for compliance with ASME -Code programs (Sections 1, 111, V, VIII and IX).

Type of Pacifity - Manufacturing plant for heavy construction and farm equipment.

Technical Expertise - Planning. Costing and development of fabrication procedures. Jr A. NOLLAND Page 9



EMPLOYMENT

JOB TITLE/EMPLOYER

1970-1974 (Con't.)

Chief Welding Engineer (Con't.) DUTIES AND RESPONSIBILITIES

Specific Responsibilities -Determine constructibility and cost of new product designs.

Provide fabrication procedures (build sequence, method, and qualified procedures) for new products.

Determine the tooling and fixture design for all fabrications and develop the use of these fixtures on the shop floor.

Selection of welding equipment and consumables.

Liaise with QC to establish inspection points and acceptance standards.

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Advise Production Department on solution of fabrication design problems.

Establish and implement a cost reduction program.

hudit subcommactors' methods for cost effectiveness and quality control.

Type of Facility - Shipbuilding Construction of Nuclear and Nuclear Polaris Submarines.

Technical Expertise - Fabrication, inspection and metallurgy in Hull fabrication, pipewelding and failure investigations.

Specific Responsibilities - Develop and assure execution of a range of procedures establishing control of incoming materials, components, etc. und the control of in-process materials during fabrication, heat treatment and machining.

Develop a range of welding and allver brazing procedures for hull and pipe fabrication.



Chief QC Metallurgist and Welding Engineer - Vickers Ltd. Barrow in Furness, England J: A. HOLLAND Page 6



EMPLOYMENT

1965-1970 (Con't.) JOB TITLE/EMPLOYER

Chief QC Metallurgist and Welding Engineer (Con't.)

1959-1965

QC Netallurgist Richard Thomas & Baldwin Scunthorpe, England DUTIES AND RESPONSIBILITIES

Specific Responsibilities (Con't.)

Direction of a QG Weld inspection team covering hull and pipe weiding.

Audit subcontractors supplying materials and fabrications.

Direction of a Welding Development Laboratory.

Provide a Consulting Service to Design and Production Departments covering materials selection, welding and corrosion.

Member of the Navy/Shipyard Committee for the preparation and review of Navy Welding and Material Specifications.

B

Type of Facility - Integrated Iron and Steel Works. Production of 15,000 tons of finitshed steel per week.

Technical Expertise - Metallurgical investigations into quality problems and process development.

Specific Responsibilities - Conduct all types of laboratory tests.

Investigate quality problems and liaise with clients in resolving problems.

Investigate means of improving productivity in the Melting Show and Rolling Mill.

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MR. BAXTER: I think the record should reflect that these witnesses were called by the Board.

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JUDGE GLEASON: Yes. We appreciate your coming, gentlemen.

What we have planned to do, if you have not been advised, we have some questions to ask and then we are doing to be going into a recess, and then tomorrow morning we will resume with you and hopefully finish with you in a couple of 9 hours in the morning. It's a little difficult dealing with two people, but I think unless I ask one of you a specific question, I'd like you both to respond to the question, and then if you, Mr. Starr, would go first and Mr. Holland go second, that's the way we could do it.

BOARD EXAMINATION

BY JUDGE GLEASON:

Could you briefly describe your familiarity with 0 what we call the embed plate problem and what your relationship was with that problem?

(Witness Starr) Yes. At the initiation of the A 20 concern, I was the assistant project manager, and during the development of the review of the deviation, I became project 22 manager.

23 In both capacities, my involvement was similar. I had responsibilities in the quality assurance program 24 25 implementation, and also responsibilities for the production

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		다섯 이에는 것 같아요. 그는 것 같아요. 그에서는 다녀가 많은 것 같아요. 그는 것 같아요. 사람이야 하네. 나라면서					
	1	aspects which included the construction.					
	2	So, as such, I was familiar with both the general					
	3	prosecution of the inspections that did take place. I was					
	4	familiar with the reviews and Daniel's involvement that did take					
345	5	place on site.					
554-2	6	I did not directly involve myself in the technical					
(202)	7	aspects and the determination of what the specific inspections					
20024	8	would be, but rather in the management of programs as they were					
N. D.C.	9	identified.					
NGTOP	10	Q Mr. Holland?					
VASHI	11	A (Witness Holland) I moved to the site in September					
ING, V	12	of '77. The stop-work had already been issued at that point.					
BUILD	13	Q You were not quality manager at that point?					
TERS	14	A Not in June '77, no.					
REPOR	15	Q I see. All right.					
S.W	16	All right, go ahead.					
RET.	17	A I started there in September '77, and became					
H STE	18	familiar with the problem after that, and was involved in					
300 71	19	several meetings with Bechtel and Union Electric and ourselves,					
	20	until the problem was resolved.					
	21	I have some knowledge of the technical aspects of					
	22	these activities.					
	23	Q What happened, Mr. Holland, to Mr. Will Van Der Zandt,					
	24	if you know?					
	25	A He became a regional manager in our Greenville					
		[2] 2] 2] 2] 2] 2] 2] 2] 2] 2] 2] 2] 2] 2					

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corporate office. 1

> Greenville, North Carolina? Q

South Carolina. A

What was your opinion or your belief of the 4 0 experience of you -- I guess I would just use the term workmen, 5 in recognizing defects in embedded plates? 6

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(Witness Starr) The experience of our workmen, of A course, varies considerably and also their training. When you 9 say workmen, I presume you would be referring specifically to those who would be involved with the installation.

11 0 Yes. We had some concern before as to what they 12 are called; ironworkers or what, I'm not sure.

There are several different crafts involved in 13 A installation. I'm sure you would find some of the workmen who, 14 15 because of their background, training and experience, would be 16 quite familiar with the details of what the workmansh's should 17 look like.

18 You would have other craftsmen who would not be as 19 familiar and they would be familiar with their specific job, in prosecuting the installation itself, but not in necessarily 20 evaluating the quality of the work which they were looking at. 21 22 Now the workmen I'm speaking of are specifically 23 construction workers, not quality inspectors.

Yes, I understand. I want to get to the quality 24 0 25 inspectors now, but I want to stay with the workmen now.

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	1	Mr. Holland, do you want to respond to that?
	2	A (Witness Holland) I think they have a reasonable
	3	understanding of the quality requirements on the project. We
	4	have a training school, a welder training school, and there is
345	5	indoctrination in the procedures before they go out into the
) 554-2	6	field.
4 (202	7	Q I should have asked this question and perhaps I
. 2002	8	presume one of you know. You don't both have to answer it.
N, D.C	9	But Daniel International is a company that has had prior
NGTO	10	experience in contracts, if you gill, in constructing nuclear
WASHI	11	facilities?
NING,	12	A (Witness Starr) On a number of sites.
BUILI	13	Q Rather extensive sites?
TERS	14	A I believe 11 projects.
REPOR	15	Q 11 projects? All right. Thank you.
S.W. ,	16	Could you describe, not in elaborate detail, but
REET.	17	just kind of hitting highlights, of what the inspection procedure
LH STI	18	was with respect to embedded plates?
300 7	19	A Could you identify which inspection we are talking
	20	about? Are we talking about what the general program would
	21	consist of?
	22	Q I'm talking about you receive a piece of property
	23	from Cives. What happens next?
	24	A Of course, the total SNUPPS concept as a quality
	25	assurance concept, that the different contractors are involved

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with Bechtel or Union Electric or Daniel, and they each have a specific function of the program. At the early stages of the Cives concern, at the point of receipt inspection, Daniel simply inspected for over, short, damage, and it was not specifically not a quality control inspection.

When you're talking about early receipt, what do you 0 mean?

Of course, the period we're talking about relates A to the embed concerns, that spans a time -- I'm not real sure, but it's more than a year. And at the earliest dates I think we are talking about here, there was not a specific inspection by quality control at the point of receipt. Those inspections had been previously performed by Bechtel at the point of 13 manufacture.

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S.W.

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300 7TH

So up to some point, what you're saying is Daniel 0 1 did not provide an inspection procedure other than to count, 2 in effect, what you had ordered; and that the quality control 3 and inspection procedure was done by Bechtel at the Cives 4 site? Is that what you just said? 5 A Yes, that's correct. 6 0 And what was that point in time? 7 I'm afraid I can't identify a specific date. A 8 Approximately? Are we talking '76, '75? 0 9 I believe I would have to say approximately July A 10 of '77 Union Electric, in reviewing their overall concern for 11 the problem that it related to Cives, identified to Daniel 12 that we should start a 100 percent receipt-inspection program. 13 14 And you had none before that? A The procurement responsibilities on the site are 15

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16 split, where Daniel does have some procurement responsibilities.
17 All the items for which Daniel procures, Daniel will receipt18 inspect, including the quality control inspection as
19 specifically specified either by the specifications or by our
20 procedures.

The basic program was that the commodities purchased by Bechtel, such as the equipment, will be shopinspected. There are specific instances where it was handled otherwise, and even after Union Electric gave us specific instructions to do 100-percent inspections, we could identify

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specific commodities that we thought, either because of our 1 experience, or because of the nature of the commodity, and 2 by going through specific rationales, could identify to Union 3 Electric that the inspection should either be reduced cr 4 scaled down in some sense, based on our experience. We would 5 identify this to Union Electric in writing, and they would 6 either concur or not concur with our recommendation. 7 So is it your statement that prior to August of 0 8

'77, or sometime in the summer, or sometime in late '77, I guess, that the inspection procedure with respect to embedded plates was Bechtel's, and not Daniel's?

A Yes, I believe that's correct.

(Pause.)

Q How often did you see the NRC inspectors on site? A I am trying to remember the specifics, when we have a resident inspector. I'm sorry, I can't recall the date when our resident inspector became a fixture at our site. Prior to that, maybe two visits per month on an average.

19 Q Are both of you gentlemen familiar with the actual, 20 I don't know what you want to call it, the actual working 21 procedures of workmen as they work with embedded plates? Are 22 you both familiar with what they do, and how they handle them? 23 A I think in general terms, yes.

24 Q Do they ever accidentally knock off studes off those25 plates, or bend them?

14-3 jwb

•

1	A I think definitely there is a possibility of bending
2	in the handling. Some of these plates, as you are aware, are
3	quite large and in the handling a stud can in fact be bent.
4	Q Would you consider that would be an unusual
5	occurrence? Or is it ordinary?
6	A (Witness Holland) I don't know. I couldn't answer
7	in that detail. I would say that if such an event occurred
8	it would be written up on a nonconformance report, and the
9	appropriate corrective repair action would take place.
10	Q If I recall the date, the NRC inspector noticed
11	what he considered certain deficiencies in the machine-welded
12	plates on June the 7th, 1977. What happened then? Do you
13	recall?
14	A No, I don't.
15	Q You weren't there, but Mr. Starr was.
16	A (Witness Starr) I'm afraid I don't recall that
17	specific instance.
18	Q You don't recall what happened?
19	A Only in very general terms. During the course of
20	his visit
21	Q You were an Assistant Project Manager?
22	A Yes, sir; that's correct.
23	Q Wouldn't that have been a flag coming across your
24	desk rather rapidly?
25	A In fact, I thought when you asked how often did we
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

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14-4 jwb

see NRC inspectors, and I said --1 Certainly he was there, then. 2 0 But the visitation by NRC inspectors was quite 3 A regular. When they came, they were not there for a day, but 4 5 guite often were there in teams of three to four men for 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 three to four days. And it was certainly nothing unusual to 6 have NRC inspectors on site. And when they are there, they 7 have a lot of questions in all types of areas. It is 8 certainly nothing unusual for the NRC to have questions about 9 how something was being handled. That was virtually the 10 normal course of events to have questions --11 0 Well, in this case you had some items that were 12 already installed. Didn't that present a different kind of 13 a possible problem in your mind? 14 Yes. We handled this question the same as we 15 A would any of the NRC's. We immediately pursued this concern 16 as being a serious concern, just the same as any other when 17 it's first identified to us. 18 19

19 Virtually all the materials that are on site are 20 of high concern to us, because we do not want to install any 21 materials that are in question in any respect. Therefore, yes, 22 we --

23 Q All right.

A -- immediately would start the investigation
 relative to the NRC's special concerns, but this would not

14-5 jwb

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	1	be true just for embeds; it would be true on any of our
	2	material.
	3	Q I see. But I'm just concerned with embeds right
	4	now.
45	5	A Yes.
GTON, D.C. 20024 (202) 554-23	6	Q Or we are. Did you have any knowledge that prior
	7	to this occurrence in the first part of June of 1977 that
	8	there was anything wrong with the Cives embedded plates, the
	9	Cives-manufactured embedded plates?
	10	(Pause.)
ASHIN	11	A I'm having a bit of difficulty with specific dates,
NG. W	12	but, yes, I think we have had inspection reports that were
ICITIO	13	identifying concerns over material, and I'm sorry I have
EKS B	14	trouble relative to the date, so I'd best not answer it
PORT	15	specifically.
W. , ICF	16	Q Do you recall whether You indicated there were
ET. 3.	17	defects in "materials." Do you mean defects in welds on studs?
STRE	18	(Pause.)
HIJ 0	19	A During our normal inspection program, whether we're
35	20	talking about concrete pour, to the placement of rebar, what-
	21	ever, all of these items are taken up in writing and are
	22	handled on our NCR receipt. These would be handled during
	23	the for instance, in these embeds, where repair welding
	24	was allowed, if a concern was identified by an inspector, he
	25	would write up his concern. It would be processed for a normal

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disposition to make a repair, and this would be a normal and an approved procedure to utilize material.

Q I'm glad to have that answer, but I don't think it was to a question I asked. The question that I asked was: Whether you had any -- you indicated that you did have some information concerning prior deficiencies, if you will, in connection with Cives' manufactured embedded plates. And you used the word that you weren't sure whether it was pertaining to "material," or what. And I tried to get you to get back your memory to see whether the deficiencies were in connection with studs, with welded studs.

12 When I identified that I had prior information, A 13 I am trying to say that inspections were being made that 14 identified problems which did allow repairs to be made. This 15 was not something that would be called to my unique attention 16 because all these processes were allowed by procedure, and were 17 in fact approved. So there is no reason that it would be 18 specifically called to management's attention as something 19 unique, because all the processes that were in fact being 20 followed were normal and approved processes.

21 Q So are you saying that whatever the deficiencies 22 were, they were routine and they were being taken care of in 23 the normal --

A Yes, sir, as best I understand the situation. And
here again I would point out that I was not directly involved

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	1	in that specific repair, but that's the way the procedures
	2	would hand it would allow it, and that is my understanding
	3	of the way it
	4	Q Weren't you involved in being responsible for
940	5	quality assurance?
2-9-66	6	A Yes, sir.
(202)	7	Q I thought I heard you say that.
2007	8	A Yes, sir.
N. D.C.	9	(Pause.)
1010	10	Q Could you summarize both of you, if you will
NASHI	11	simply because some of these things were taking place after
INC' A	12	you got there, Mr. Holland.
SUILD	13	Could you characterize, what was the involvement
ENE	14	of Daniel International in resolving whatever the problem was
FLUK	15	on embedded plates? Were they very heavily involved? Were
. W II	16	they a full partnership with Bechtel? Or was Bechtel off
EET, S	17	dealing with their consultants, and Cives manufacturing, and
uie u	18	so forth?
I I MAN	19	(Pause.)
	20	You ought to go first, I think, because you were
	21	Project Manager. Somehow a "project manager" is a very high
	22	position to me. You are really in the
	23	A Only on occasion.
	24	Q You're really in the swim of things.
	25	(Laughter.)

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	1	A Our specific involvement, all of the site
	2	activities of course were under our direction, all the Daniel
	3	inspections, the QC inspections going in our direction.
	4	The data which we produced was all under my
145	5	responsibility. As the guidelines for what information was
554-23	6	necessary for Bechtel to resolve their the situation,
(202)	7	Bechtel and Union Electric would identify what information
20024	8	was in fact necessary. We provided that information to the
I, D.C.	9	best of our ability.
NOTON	10	As you're aware, the original information that was
ASHIN	11	provided was not in fact sufficient to provide the engineering
NG. W	12	analysis that Bechtal and Union Electric felt necessary, and
IUILDI	13	therefore reinspections were performed by Daniel people as well
FERS F	14	as Cives, where additional data was gathered. And all of those
EPORI	15	activities were specifically under my direction.
.W. , R	16	Q Were you responsible for the I don't know how
EET, S	17	to refer to this except as Joint Intervenors' Exhibit No. 12,
H STRI	18	the data prepared, the 604 pages. Was that under your
ULL 00	19	A Yes, sir.
8	20	Q How would you characterize that data?
	21	A The original data that was collected was, as is
	22	normal in our inspections, it met the requirements of the
	23	specifications in order for us to accept or reject. As
	24	ultimately developed -
	25	Q This was a reinspection report; right?

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14-9 jwb

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	1	А	You referred to No. 12. I'm not as familiar	
	2	Q	All right, go ahead. I understand. You go ahead.	
	3	A	The original inspection data was not sufficient to	
	4	do an eng	ineering evaluation. From our point of view,	
554-2345	5	initially	, it was adequate to accept or reject these products.	
	6		As Bechtel identified their further needs for data,	
4 (202	7	we provided that data through Union Electric to Bechtel for		
. 2062	8	their further evaluation.		
N. D.C	9	Q	Well, it's this data (indicating Joint Intervenors'	
OLDN	10	Exhibit No	0. 12) that I'm showing to you that is in the record	
WASHI	11	as an Exhi	bit No. 12. That's the reinspection data?	
OING.	12	A	Yes.	
BUILI	13	Q	How would you characterize that data?	
CTERS	14		(Pause.)	
REPOR	15	А	I'm searching for the specific word. It was	
S.W	16	professional, from my point of view, and provided the data as		
REET,	17	we understood it was required.		
TR STI	18	Q	All right. Thank you.	
300 71	19		Are you familiar with Fritz Engineering Company?	
	20	А	Fritz?	
	21	Q	Engineering Company.	
	22	А	I'm sorry; no.	
	23		MR. BAXTER: Do you mean "Laboratories"?	
	24		BY JUDGE GLEASON:	
	25	Q	Fritz Engineering Laboratory? Are you familiar with	

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14-10 jwb

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1 Fritz Engineering Laboratory?

2 A (Witness Starr) Only vaguely. I can't really
3 comment on that specifically at all.

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Q Were you familiar with the -- let me ask -- at some
point the Applicant employed, or Bechtel employed, I forget
which now, two consultants to come on the site to do some
testing in 1978. Were you familiar with those two gentlemen?
Did you work with them?

A I did not specifically work with them. I'm familiar,
and we performed specific services as required where they
needed setups, our construction craftsmen would be made
available as they needed specific manual work performed; but
our involvement other than that, I believe that was the extent.

14 Q At the same time that you were doing your reinspec-15 tion, Daniel was doing whatever Bechtel told you to do. Cives 16 Manufacturing Company was also doing a re-evaluation.

17 A Yes, sir.

18 Q Did you run into each other?

19 A Yes, sir. When Cives was on site? Yes, sir.
20 Q Was there any kind of conflict in that kind of a -21 did you think this was unusual?

A No. In fact, it was -- we were interested in
getting the question resolved. We wanted to proceed with our
work, and we could not proceed with our work until we had
satisfactory results as to --

14-11 jwb

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	1	Q Were you working together with your
	2	A As I recall, we performed the same way with Cives,
	3	where they needed specific typically manual assistance, we
	4	provided that. I don't specifically recall whether we had any
0507-500	5	engineer with them at the time, or not. They were basically
	6	there at the request of Bechtel as a Bechtel vendor. But, yes,
(707)	7	any activity that goes on on the site, we are generally
01.00V 10.0V 200744	8	familiar with and assure that whatever is necessary to carry
	9	out their required duties, that they're in a position to do
	10	that.
THICK	11	(Pause.)
10 VI	12	Q There was a personnel problem of some dimension
	13	involving Daniel International prior to 1977, I believe,
a cura	14	although it may have had some carry-on implications beyond
	15	that. It has been referred to in this hearing as the "Smart
	16	case." Are you familiar with that?
	17	A Yes, sir.
	18	Q Did that have anything to do with this embedded
	19	plate problem that we're talking about?
2	20	A When you say I think the answer is no, that
	21	did not have anything specifically to do with the question
	22	we're dealing with here today. I do believe that one of his
	23	allegations related to embeds, but here again I have problems
	24	with my timing. You may be aware that the Smart case spanned
	25	quite a time frame, and I'm not sure of this relative timing

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14-12 jwb

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to the embed question. But the two cases were not directly involved in what we're talking about here today, I don't believe.

A (Witness Holland) I believe that must have been afterwards, because I think I was on the site when the allegations were made. So I believe it would be sometime after September '77 when the allegations were made.

Q Yes, but the first incident involving Mr. Smart was before '77, wasn't it? Or was it? I'm not sure, myself. A (Witness Starr) Do you remember relative to your being on the site?

12 A (Witness Holland) I am almost -- almost certain 13 that it was after I went to the site.

14 Q It was after? Okay. Well, I wasn't certain of 15 that. But in other words, his allegations involved more than 16 embedded plates, but it did involve embedded plates? Is that 17 true, to your knowledge?

18 A (Witness Starr) As best I recall, I think it was
19 at least a single incident with embeds. I'm sorry, I don't
20 recall exactly what the circumstances of the allegation were.

Q Wasn't that a fairly well publicized incident?A Yes, sir, very well publicized.

Q That's why it's a little surprising that you don't
remember the circumstances.

A Mr. Smart's comments covered quite a range of --

14-13 jwb

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	1	you would have to write a book to cover Mr. Smart's comments.				
.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345	2	Q The embedded plates that were installed prior to				
	3	June 7th, 1977, Daniel knows where these plates are? Right?				
	4	A As best I know, they are identified by type. We				
	5	know where that type is installed. I'm not sure that the				
	6	specific location of every one can be identified. I cannot				
	7	make that statement for certain. You're saying the unique				
	8	location				
	9	Q Yes, yes				
	10	A installed prior to that time?				
	11	Q It was 38 degrees west, or north, or something or				
	12	other, but the specific location would be known. You say				
	13	that is not true?				
	14	A I cannot say for sure that every plate can be				
	15	identified with certainty to its specific location. All of				
	16	that "type" can be identified.				
EET, S	17	Q How about, do you know, Mr. Holland?				
H STR	18	A (Witness Holland) No, I don't.				
300 7T	19	Q Were you ever asked to look at the and when I say				
	20	"you," I mean Daniel International but in your capacity as				
	21	project officer, as I say, I elevate you, and maybe some of				
	22	these things would have been somebody else's responsibility				
	23	but were you ever asked to look at the feasibility of				
	24	assuming a certain weld deficiency in embedded plates that				
	25	had previously been installed, to attempt to develop what I in				

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14-14 jwb

a very nontechnical way would call a "shoring up process," 1 adding strength beyond what that plate would call for so that 2 if there was a deficiency in the plate, there would be an 3 additional strength put in through some mechanism -- I'm not 4 sure of the mechanism -- but were you ever asked to do that, 5 20024 (202) 554-2345 or take a look at it? 6 (Witness Starr) No, I don't remember any such. 7 A Do you tecall anything like that, Mr. Holland? 8 0 D.C. 9 (Witness Holland) I remember one possibility being A 300 7TH STREET, S.W. , REPORTERS BUILDING, WASHINGTON, suggested, I believe, that if it was necessary to shore up 10 11 those plates, additional expansion anchors, anchor bolts, would be put in through the plate. I think that was one 12 possibility that was suggested. 13 14 0 How would you do that? Just drill a hole all 15 through and put another bolt in it? 16 Yes. A 17 (Pause.) 18 Did the stop-work order -- and back to you, I 0 19 guess, Mr. Starr -- were these embedded plates a pacing item 20 as far as construction? Did they put a delay into this 21 construction schedule? 22 (Witness Starr) I can't specifically identify a A 23 delay. Of course any of our activities that are that -- or 24 required for the construction to progress, would in fact delay 25 construction to some extent. I can't identify that these were

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specifically a pacing item. I couldn't confirm that.

Q Well, did they delay the construction of the plant, I guess, is as broadles I can put it, or as suscinctly as I can put it.

A I can't identify a specific delay --

Q I'm trying to get some kind of a feel, obviously, as to how much pressure was on various people to come up with a resolution to this problem. And that's one of the things that puts a lot of pressure on. So was it a delaying item? A I would say, yes, it was a significant item to our scheduled progress, but in this case we were able to work around it. The problems did get resolved, and the stop-work order was resolved satisfactorily.

(Pause.)

15 Q I presume that you can't give any opinion, or if 16 you can I would like to have it, about whether you knew of any 17 greater defects in embedded plates with manually welded anchors 18 versus machine-welded studs. Did one group of plates have 19 more deficiency in them than others?

A (Witness Holland) No. I did look at some of the manually welded plates. I couldn't give you any idea as to whether there were more in the automatic, or more in the manual. I have no feel at all for that.

Q Did either of you ever visit the Cives Manufacturingfacility where they manufactured those plates?

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	1	A	No.
	2	А	(Witness Starr) No.
	3		JUDGE GLEASON: I think that kind of lays the
	4	groundwork	for the kind of thing I wanted to at least lay a
115	5	groundwork	for with these gentlemen, and we will pick it up
554-23	6	in the morn	ning. Is that all right?
(202)	7		MR. GALEN: 9:00 o'clock, Mr. Chairman?
20024	8		JUDGE GLEASON: 9:00 o'clock.
t, D.C.	9		MR. LESSY: Does the Board have more questions of
NOT 1	10	these gent	lemen? I'm trying to
(IHSA)	11		JUDGE GLEASON: Yes, we do.
1 NG. N	2		MR. LESSY: The Board does?
IGTION 1	3		JUDGE GLEASON: Yes.
LERS I	14		(Discussion off the record.)
LHOA3	5		JUDGE GLEASON: I want to go back on the record for
.W. I	16	a moment.	
SET, S	7		Mrs. Drey, there was something that I wanted to
I STR	8	discuss on	the record. You have indicated several times, once
117 00	9	maybe on	- well, it doesn't make really much difference whether
2	20	it was on o	or off the record, you indicated the possibility, or
2	1	the probabi	ility, I guess, of your not pursuing Contention 2.
2	22		The Board needs to know, like tomorrow if we can,
2	23	what you in	ntend to do. And we need to have something, if you
2	4	are not goi	ing to pursue it, something in the record to indicate
2	25	that. Beca	ause we have scheduling problems, and a lot of people



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300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

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the question of concrete imperfections in the reactor building dome, which is subpart (1)(c)(2) of Contention No. 1, the testimony in response to which has already been filed by both parties.

I would appreciate it if, over the Thanksgiving recess or some other appropriate time, the Board could look at that testimony and indicate to the parties whether or not they desire the appearances of the witnesses for any questions. If they do not, then I would propose that we obtain affidavits from those witnesses swearing to the testimony, and offer it into the record without the appearance of the witnesses.

JUDGE GLEASON: All right. We'll be happy to accommodate that request. I mean, we would be happy to look at it to indicate to you what we intend to do.

MR. BAXTER: Thank you.

JUDGE GLEASON: Thank you all.

(Whereupon, at 5:58 p.m., the hearing was recessed, to reconvene at 9:00 a.m., Wednesday, November 24, 1981.)

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NUCLEAR REGULATORY COMMISSION

his is to certify that the attached proceedings before the

Atomic Safety & Licensing Board

in the matter of: UNION ELECTRIC COMPANY - CALLOWAY UNIT 1

· Date of Freceeding: November 23, 1981

Docket Number: STN-50-483-0L

Place of Proceeding: St. Louis, Missouri

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

Ann Riley

Official Reporter (Typed)

Official Reporter (Signature)

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Official Reporter (Typed)

Jane Beach

ficial Reporter (Signature)