

# Transcript of Proceedings

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION



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In the Matter of: :

CONSUMERS POWER COMPANY : :

(Midland Units 1 and 2) : :

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Docket Nos.: 50-329 OM  
50-330 OM  
50-329 OL  
50-330 OL

DEPOSITION OF JOHN BRAMMER

Bethesda, Maryland

Thursday, 22 January 1981

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Bethesda, Maryland,

Thursday, 22 January 1981

Deposition of JOHN BRAMMER, called for examination  
by agreement of counsel, in Room 5607, Maryland National Bank  
Building, 7735 Old Georgetown Road, Bethesda, Maryland,  
at 9:00 a.m., before William R. Bloom, a notary public in  
and for the District of Columbia, when were present on behalf  
of the respective parties:

On behalf of the Applicant, Consumers Power Company:

MICHAEL I. MILLER, Esq.,  
JOANNE G. BLOOM, Esq.,  
Isham, Lincoln and Beale,  
One First National Plaza,  
Chicago, Illinois

On behalf of the Regulatory Staff:

BRADLEY W. JONES, Esq.,  
Office of Executive Legal Director,  
United States Nuclear Regulatory Commission,  
Washington, D. C.

# C O N T E N T S

## Witness

## Examination

John Brammer

4

## Brammer Deposition Exhibits

## For Identification

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58



P R O C E E D I N G S

Whereupon,

JOHN BRAMMER

was called as a witness and, having been first duly sworn,  
was examined and testified as follows:

EXAMINATION.

BY MR. MILLER:

Q State your name for the record, please.

A John Brammer.

Q What is your business address, Mr. Brammer?

A Santa Suzanna Field Laboratories, Chatsworth,  
California.

Q And by whom are you employed?

A Rockwell, International.

Q And I take it that's in the Energy Technology  
Engineering Center?

A Yes, ETEC. It's a division, a subdivision.

MR. MILLER: I would like the Reporter to mark as  
Brammer Deposition Exhibit 1 for identification a two-page  
resume.

Whereupon, the document  
referred to was marked as  
Brammer Deposition Exhibit  
1 for identification.)

BY MR. MILLER:

Q Mr. Brammer, I show you a document that has been  
marked as Brammer Deposition Exhibit 1 for identification,  
which purports to be a resume of your professional experience.

(Handing document to the witness.)

I ask you whether it is true and correct to the  
best of your knowledge.

A Yes, it is.

Q Did you prepare it?

A Yes.

Q Are you a member of any ASME code committees or  
any other professional societies?

A No. I'm a Registered Professional Engineer, but  
I'm not a member of the society.

Q In what state are you registered?

A California.

Q And in what specialties?

A Mechanical engineering.

Q Have you published any papers in professional journals?

A No, I haven't.

Q Since your graduation from the University of New Mexico, have you taken any courses?

A Yes, quite a few. I completed all the work, the academic work for a Master's degree, and I was working on my thesis when I moved to California, and I never did finish it.

Q What year was that, sir?

A That I moved to California?

Q Yes, sir.

A '54, 1954.

Q What was the subject of your thesis going to be?

A Stress concentration factors.

Q Is that the same thing as stress intensification factors?

A Not exactly.

Q You report to Dr. Chen, I take it,--

A Yes.

Q -- at ETTC.

Dr. Chen I believe has been there since 1974. Have you always reported to him at ETTC?

1 A No. There were two other people in his position  
2 before he was made supervisor.

3 Q That is, for the period July 1973 up until now  
4 there have been two supervisors--

5 A -- other than Dr. Chen.

6 Q Right.

7 Was he a colleague of yours at one time before he  
8 became supervisor of the division?

9 A We worked in the same group, yes.

10 Q I'd like to ask you about your work for Arthur D.  
11 Little from December 1960 to May of 1964.

12 I take it that the cryogenic piping systems that  
13 are referred to on Exhibit 1 under the heading "Arthur D.  
14 Little" were buried piping systems. Is that correct?

15 A They were underground but they were not buried.  
16 It was a big underground complex so the piping ran through  
17 tunnels and this sort of thing.

18 Q So the pipe itself was exposed--

19 A Correct.

20 Q -- and readily observable?

21 A Yes.

22 Q It indicates you were in charge of the field

1 installation. Was that the field installation of the cryo-  
2 genic piping systems or was that the field installation of  
3 the fluid-bearing test stand?

4 A The fluid-bearing test stand.

5 Q Is that the only experience that you've had with  
6 the actual field installation of a project on which you have  
7 worked?

8 A Well, we're pretty much involved in it at ETEC,  
9 too, because we build the facilities right there.

10 Q see.

11 A They are test facilities, so as problems in the  
12 field come up, we're required to solve them.

13 Q In your work at ETEC have you been involved in the  
14 installation of any buried piping system?

15 A No, I've never been involved in buried piping  
16 systems until this.

17 Q Well, when did you begin in your professional  
18 career doing what we refer to as stress analysis?

19 A Well, when I worked at Sandia it was a kind of a  
20 project organization and we did everything there. I did  
21 stress analysis and load analysis at that point.

22 And at Douglas I was a stress engineer.

eb6

1 At Arthur D. Little I was in the Applied Mechanics  
2 Section which involved stress analysis, load analysis, among  
3 other things.

4 Q Throughout your entire career?

5 A Throughout my entire career I've been involved in  
6 it, yes, maybe not as a full-time function but I was involved  
7 with it.

8 Q In your work for ETEC it says you've done stress  
9 analysis of piping systems and components for the applicable  
10 ASME and ANSI codes. Forgive me if I've already asked this.

11 Were any of those piping systems buried piping  
12 systems? I think you said they were not.

13 A No, they weren't.

14 Q And did any of the ASME codes involve what we have  
15 been referring to as the  $3S_c$  criterion?

16 A No.

17 Q Are these piping runs, even though they're not  
18 buried, are they enclosed in structures or are they exposed  
19 outdoors?

20 A There are some out-of-doors; it's mainly inside,  
21 enclosed.

22 Q In doing the stress analyses for these piping

eb7

1 systems, what ASME codes were you analyzing against?

2 A B31.1 and Section 3 of the Boiler and Pressure  
3 Vessel Code. A lot of it was high temperature liquid sodium  
4 systems, Code Case 15.92.

5 Q Have you personally developed the computer  
6 programs that are used in the stress analysis of these piping  
7 systems?

8 A No, I haven't.

9 Q Are they proprietary ETEC?

10 A I'm not sure. The one we use was developed at  
11 ETEC but....

12 Q Is there a differentiation in your mind between a  
13 plastic analysis and an elastic analysis?

14 A Oh, yes.

15 Q The stress analysis that you conducted for these  
16 piping systems and components at ETEC, were they involved  
17 with a plastic or an elastic analysis?

18 A I've done both.

19 Q Focusing on the plastic analysis, under what  
20 circumstances were you required to do a plastic analysis of  
21 piping systems?

22 A Well, most of our piping is high temperature

eb8

1 piping, and we have a lot of thermal transients and this  
2 sort of thing, so we get quite a few load oscillations. So  
3 when we couldn't meet the elastic criteria we go to the  
4 plastic criteria as specified in the code case applicable to  
5 high temperature piping.

6 Q That's code case 15.92?

7 A 15.92.

8 I think there's a later version now but that was  
9 the one that was applicable when I was doing that.

10 Q In your professional judgment, Mr. Brammer, is  
11 that code case applicable to -- to any plastic analysis that  
12 would be done for the buried piping at Midland?

13 A This problem just came up Tuesday so I really  
14 haven't thought about it, but off-hand it may be. I would  
15 hate to say yes, it is, but conceivably it could be. I can't  
16 think of any reason right now that it wouldn't be.

17 Q Well, do you know the service for which these  
18 lines that are involved in the buried piping at Midland are  
19 designed for?

20 A Roughly 250 psi, low pressure.

21 Q And without any temperature transient; isn't that  
22 right?



eb9

1 A Right.

2 Q Other than this code case that we've been dis-  
3 cussing, are there other acceptable plastic analysis methods  
4 that would be applicable to the buried piping at Midland?

5 A You mean a code type method or—

6 Q Yes, sir.

7 A -- or an allowable type thing?

8 Q To start with, something that would be acceptable  
9 under a code.

10 A I can't think of any right off.

11 Q What about with respect to simply an analytical  
12 technique that you know of but which may not be embodied in  
13 any code or standard?

14 A I guess I don't quite understand your question.

15 Q Well, are there methods of plastic analysis or  
16 approaches to plastic analysis that are known to you but  
17 which may not be embodied in any code case or other, say,  
18 published industry or professional standard?

19 Q The only one that I'm really familiar with is the  
20 one that was in the code case. I'm sure there are such  
21 methods. The only one I've used is the code case.

22 Q Were there separate systems that were subject to

eb10

1 this plastic analysis at ETEC or were there just sections of  
2 certain runs of pipe where stresses on an elastic basis were  
3 exceeded and therefore -- I'm sorry, allowable stresses on  
4 an elastic basis were exceeded and therefore plastic analysis  
5 was gone to?

6 A Well, the one I specifically worked on was one  
7 facility and there were different systems within that facility,  
8 if I understand your question correctly.

9 Q And each of these different systems was subject to--

10 A Not all of them, no.

11 We did this on piping, elbows, and also valves  
12 and pressure reducers, and some tees.

13 Q How long did it take you to do the plastic analysis  
14 for these piping systems as was required?

15 A Well, if you're talking about the whole system,  
16 you know, including the valves and everything in the system--

17 Q No, sir, just the piping runs.

18 A If I just had a piece of pipe and I wanted to do  
19 a plastic analysis on?

20 Q Yes, sir.

21 A Well, our situation is a little different than  
22 your situation because we had to do the thermal analysis and

eb11

1 everything with it, so it would probably take us, for a piece  
2 of pipe, maybe two months.

3 Q And how much of that time was consumed in doing  
4 the thermal analysis that you refer to?

5 A Half of it.

6 Q You have reviewed the calculations made by  
7 Bechtel with respect to buried piping at Midland, have you  
8 not?

9 A Yes, I have.

10 Q In your judgment, is there sufficient information  
11 available now so that a plastic analysis in accordance with  
12 that code case 15.92 could be run for buried piping at Midland?

13 A When you do a plastic analysis, fatigue becomes  
14 important, so you would probably -- in the piping we've done  
15 anyway you would need a histogram of the service that the  
16 piping would see over its expected lifetime.

17 I guess mainly you'd need to, you know, to have a  
18 loading cycle for the entire life of the pipe.

19 Q Well, do you understand that there will be cyclical  
20 loading on the buried piping at Midland?

21 A Not due to settlement, no, but I don't know what  
22 the loading will be otherwise. I'm sure there must be pressure

eb12

1 fluctuations and that sort of thing.

2 Q If those loadings are known, I take it the plastic  
3 analysis that we have been talking about could be done?

4 A If we are convinced we know the stresses due to  
5 the settlement accurately enough.

6 Q Well, does it seem to you to be a reasonable  
7 assumption to assume that the pipe was originally installed  
8 at its design elevation and that any alteration from that  
9 design elevation is due to settlement at the Midland site?

10 A Well, at this point that's about the only assump-  
11 tion you can make, I would imagine.

12 Q So it seems to be a reasonable assumption then.  
13 for purposes of analysis?

14 A For purposes of analysis. I don't know what else  
15 you can do.

16 Q Okay.

17 Am I correct that if a plastic analysis is done  
18 for what is identified as the worst case, that is, the area  
19 of the buried piping at Midland that has -- that indicates  
20 the highest calculated stresses and the plastic analysis  
21 indicates that the pipe is adequate for the service it will see  
22 over the life of the plant, then further plastic analysis of

eb13

1 pipes that show lower stress levels would not be necessary.  
2 Is that correct?

3 A I'd say in general it would be correct. It may  
4 depend somewhat on how you do your plastic analysis, what  
5 analytical methods you use.

6 Q Forgive me. I'm really, as you can tell, pretty  
7 uninformed about this matter.

8 A Would it be proper to refer to something that was  
9 said yesterday?

10 Q Certainly.

11 A All right.

12 Well, I got the impression that maybe you were  
13 trying to say yesterday if the stresses were less than what  
14 it took to bend a pipe for instance it would be okay.

15 Q Yes.

16 A But the stresses to bend a 36-inch pipe are some-  
17 what different than to bend an eight-inch pipe, and so if you  
18 are trying to write it off on a comparison that way basis,  
19 this may not be true, what you're saying.

20 Q I see.

21 So it depends on the wall thickness and the dia-  
22 meter and the material of the pipe?

eb14

1 A Yes. I would just hate to make a general state-  
2 ment that way.

3 Q But for all pipe that had identical characteris-  
4 tics in terms of material, diameter and wall thickness,  
5 analyzing for the worst case in terms of highest stress would  
6 be appropriate; that is, you wouldn't have to measure and  
7 analyze -- excuse me; you wouldn't have to analyze every  
8 point at which the pipe did not meet the  $3S_c$  criterion, other  
9 than elastic analysis?

10 A Oh, for a given pipe, if it has the same service  
11 conditions, the same histogram, as you put it, no, in my  
12 opinion you wouldn't have to analyze every point on that  
13 particular pipe.

14 Q All right.

15 A You may have a point where you have an elbow or a  
16 tee or something that you might have to, but if everything  
17 else was the same, no.

18 Q Do you agree that the ASME code that's applicable  
19 to the buried piping at Midland contemplates that forming  
20 of the pipe is permissible?

21 A Forming? In what way?

22 Q Bending the pipe, if you will, into 90-degree

eb15

1 elbows or even 180-degree return loops.

2 A Oh, you mean in the manufacturing?

3 Q Yes, sir.

4 A I'm not really a manufacturing engineer, and I'm  
5 not sure how that is done. I know there's codes on it but  
6 whether a 26-inch pipe elbow is made just by cold bending it  
7 or not I'm not sure.

8 Q Okay.

9 A It may be heated and bent and annealed afterward,  
10 or some of them are forged I believe. So....

11 Q Now have you been-- Well, since ETEC was retained  
12 with respect to the Midland project, how much of your time  
13 has been spent on it?

14 A Oh, 25 percent.

15 Q And how much of your time is spent on the other  
16 work for the Nuclear Regulatory Commission with respect to the  
17 other power plants that ETEC is consulting for?

18 A Well, over the period that we've been working on  
19 this, I would estimate the total time has probably been 60 to  
20 70 percent.

21 Q Has any of your other work on the other power plants  
22 involved an analysis of underground piping?



eb16

1 A No, it hasn't.

2 Q Have you and Dr. Chen been together at each of the  
3 meetings that have taken place with the applicant on the  
4 Midland project?

5 A Well, to my recollection we have only been in-  
6 volved in two meetings with the applicant, the one in February  
7 1980 and the one Tuesday.

8 Q And both of you were present?

9 A We were both present at those two meetings.

10 Q All right, sir.

11 Have you had any direct contact with the Nuclear  
12 Regulatory Commission in which Dr. Chen was not involved?

13 A Well, I talked to Tony on the telephone, Cappucci,  
14 several times without him being involved.

15 Q Was that just to inquire on the status of the pro-  
16 ject, or what was the subject of those telephone calls?

17 A Usually he wanted us to do something for him, get  
18 the SER in, or this sort of thing. I don't recall anything  
19 very technical. It was mostly scheduling and this sort of  
20 thing.

21 Q Have you prepared or has ETEC prepared a Draft  
22 Safety Evaluation Report with respect to mechanical engineering



abl7

1 functions at the Midland facility?

2 A When we came on board on this project, the NRC had  
3 a finished rough draft of the SER with several open items in  
4 it, so all that we have done as far as Midland is concerned  
5 is make our comments on the open items.

6 Q Is one of the open items the settlement effects  
7 on the underground piping?

8 A Yes, I believe it is. We haven't done anything on  
9 the SER for eight months, so I'm not really sure.

10 Q Were there any words drafted on the settlement  
11 effects on the underground piping for use in the SER?

12 A I don't believe so because I believe at that time  
13 there was no change-- I think our comments were there was no  
14 change from what NRC had written on the SER. That's the way  
15 I recall.

16 Q Had the Nuclear Regulatory staff itself done any  
17 work analyzing the underground piping at Midland with respect  
18 to settlement effects prior to the time that you began your  
19 work?

20 A Not that I'm aware of.

21 You mean a detailed type stress analysis?

22 Q Yes, or anything else to indicate they were looking

eb18

B2

1 at the underground piping and the effects of settlement on  
2 that piping?  
3 A They, as far as I know, as far as I can recall,  
4 have never given us any information on work they've done.  
5 Q Since you've been involved in this project with  
6 respect to Midland, has the NRC done any analysis itself?  
7 A Not that I'm aware of.  
8 Q Have you ever met a man named Joe Kane?  
9 A I may have. I've heard the name battered around.  
10 Q But I take it that your contact in terms of work  
11 assignments and everything else is through Mr. Cappucci. Is  
12 that right?  
13 A Cappucci, and then Brammer, both of them, that  
14 chain of command, strictly the MEB.  
15 Q Would you just describe-- You're familiar with the  
16 3S<sub>C</sub> standard and the manner in which calculations are made  
17 to show compliance with that standard, are you not?  
18 A I believe so.  
19 Q Okay. I'm sure you are.  
20 Would you just describe for the record how the  
21 intensification factor is applied in the 3S<sub>C</sub> calculation?  
22 A It's applied the same way it's applied in any

eb19

1 stress calculations for the code analysis. If that's enough  
2 of an answer for you?

3 Q Well, let me ask the question this way:

4 What is the phenomenon that the stress intensifica-  
5 tion factor is supposed to take account of in the calculation?

6 A Well, what it is supposed to take account of is  
7 irregularities caused by some sort of a fitting or something  
8 other than straight pipe.

9 Q Isn't it also supposed to take account of cyclical  
10 effects on those areas of greater stress?

11 A Yes.

12 Q All right, sir.

13 And to the extent that the particular piping  
14 analyzed is not going to be subjected to cyclical effects,  
15 the use of a stress intensification factor introduces an  
16 element of conservatism into the calculation, doesn't it?

17 A That's true. I think we all know that the inten-  
18 sification factor is basically a fatigue factor, but I'm not  
19 sure the code specifies it as such. So if you are building  
20 it to the code, strictly by the code, I would imagine you would  
21 have to use that factor if you wanted to meet the code allow-  
22 able.

eb20

1 Q Well, let's talk a little bit about that. I'm  
2 sorry I didn't take it up with Dr. Chen.

3 The code is not a rigid document -- isn't that  
4 right -- in terms of its requirements; that is, it doesn't  
5 have the force of law. Let's start with that.

6 A I believe that's right.

7 Q And there is room for engineering judgment in the  
8 application of the code to certain specified situations, isn't  
9 there? Doesn't the code say that?

10 A I'm not sure that it does, to tell you the truth.  
11 I don't recall.

12 Q In your own judgment?

13 A Well, in my own judgment, the code is conservative  
14 I'm sure. If you meet the code limits you know you're safe.

15 Q Okay.

16 And of course I think you testified a little  
17 earlier that in certain situations when you don't meet the  
18 code requirements under a certain method of analysis, you go  
19 to another method of analysis.

20 A But this other method is covered by a code case  
21 so it does meet the code, the high temperature code.

C2

22 Q And for piping such as that buried at Midland, the

ab21

1 high temperature code would again be conservative since we're  
2 not talking about high temperature piping, are we?

3 A Before I made a definite statement I would really  
4 like to go back and go over that code case to make sure that  
5 it is only applicable to high temperature.

6 Q Okay.

7 But if we assume it is, though, would you agree  
8 with me that the use of that code case is again conservative,  
9 a conservative analysis for the piping that's buried at Midland?

2.060

10 A Yes.

11 Q Okay.

12 A Or it's at least an applicable analysis.

13 Q As presented to ETEC,  $3S_0$  was identified as the  
14 criterion against which the stresses would be measured on  
15 buried piping at Midland. Based on your professional ex-  
16 perience, are there other codes which — or standards which  
17 would be applicable to the stress analysis of the buried piping  
18 at Midland?

19 A You mean due just to the bending stresses?

20 Q Yes, sir.

21 A Not that I'm aware of.

22 Q If we put to one side published codes and standards,

eb22

1 are there other-- And we've talked about the  $3S_c$  criterion  
2 and we have talked about this code case 15.92. Putting those  
3 to one side, are there other acceptable methods of analysis,  
4 whether they are embodied in a standard or code, which would  
5 permit one to reach some conclusions about acceptable stress  
6 levels for the buried piping at Midland?

7 A Not that I know of, no. This is our first crack  
8 at buried piping.

9 Q Have you surveyed the literature on this before  
10 you began your work?

11 A No, we haven't.

12 Q In other words, the applicant and Bechtel said that  
13 they were going to analyze to  $3S_c$  and that seemed appropriate  
14 to you so you didn't look any further. Is that right?

15 A Yes. Until Tuesday we always-- As far as I know,  
16 they always said they would meet the  $3S_c$ . We doubted that but  
17 they said it.

18 Q Why did you doubt it?

19 A Well, just the analysis that we did.

20 Q When you say the analysis you mean an analysis you  
21 did that would indicate that at certain points the  $3S_c$   
22 criterion was not met?

eb23

1 A Right.

2 Q Other than analysis, is physical observation of  
3 points at which stress is calculated to be in excess of code  
4 allowables an acceptable method of verifying the soundness  
5 of the pipe for its intended use?

6 A Well, if a pipe was grossly deformed, obviously  
7 that would be okay. I'm not sure if you could-- It seems  
8 like you could be in excess of the code allowables and without  
9 extensive instrumentation or something, you may have a hard  
10 time determining. Just by going out and casually looking at  
11 it I'm not sure you could figure it out.

2.120

12 Q The code speaks of wall thinning as a condition  
13 to be avoided for pipe, and you'd be able to measure that,  
14 wouldn't you?

15 A Yes, you can measure it. But just by looking at  
16 it I mean you couldn't tell.

17 Q I see.

18 But if you were able to measure the actual amount  
19 of deflection?

20 A If you measured accurately enough you could tell  
21 whether the pipe has exceeded the yield stress.

2.130

22 Q I think you implied this in some of your answers.



eb24

1 I just want to make certain I understand it:

2 The fact that analysis indicates that stresses at  
3 a certain point in pipe are in excess of the  $3S_c$  criterion  
4 does not, in and of itself, indicate that the pipe is no  
5 longer safe for its intended use, does it?

6 A That's true.

7 Q And for the  $3S_c$  criterion we're talking about  
8 stresses that are experienced by the pipe at various points  
9 along its length. Is that correct? -- that we're determining  
10 whether there are any points at which local stresses exceed  
11 the  $3S_c$  criterion?

12 A I'm not sure I understand you.

13 Any place on the pipe theoretically shouldn't  
14 exceed the  $3S_c$  limit.

15 Q And we are only measuring, are we not, the effect  
16 of settlement?

17 A Per the  $3S_c$  criterion?

18 Q I want to make sure I understand -- as opposed to  
19 the buckling criterion which is essentially a load combina-  
20 tion analysis. Is that correct?

21 A Yes.

22 Q Okay.



eb25

1 Have I oversimplified the distinction between the  
2 two?

3 A Well, the buckling that I was worried about  
4 originally was the first time we did the analysis we came up  
5 with very high stresses. In looking at the profile you  
6 could see some pretty sharp rises and dips in it, and these  
7 are fairly good-sized pipes, some of them, with thin walls.

8 And what I was worried about is the crippling  
9 stress if there were a sharp change in radius and this type  
10 of thing, the local crippling if you will.

11 Q And is crippling the same thing as buckling, or  
12 is that what happens after buckling?

13 A Well, crippling depends a lot on the-- Crippling  
14 can be a local thing, just due to a thin wall with a high  
15 stress in the area, or something.

16 Buckling, column buckling is the whole pipe would  
17 tend to deform.

18 Q Well, you say when you first looked at it you  
19 were concerned about these local buckling stresses.

20 A Local stresses, yes, crippling stresses.

21 Q And has that concern continued, or has there been  
22 information provided to you that indicates that it's unlikely

ab26

1 that there are any buckling stresses?

2 A Well, we still have some high stresses but I  
3 guess I would like to see somewhere what the crippling allow-  
4 able is of the pipe.

5 Q How would one determine the crippling allowable  
6 in a particular pipe?

7 A Well, it's very simple. There are equations for  
8 doing it.

9 Q Are they found in an ASME standard or--

10 A They're found in most textbooks.

11 Q Okay.

12 Is the buckling criterion based on an elastic or  
13 a plastic analysis of the pipe?

14 A Well, if you're talking about column buckling,  
15 you know, that sort of buckling-- Well, any time essentially  
16 if you go past the yield point or a certain point, then you're  
17 just going to buckle.

18 Q Well, of course the  $3S_c$  criterion has stresses  
19 that are in excess of the yield point.

20 A That's really true. I shouldn't....It depends  
21 on the section. There are classic column curves and-- Well,  
22 I hesitate to say what they're based on right now, but usually

ab27  
1 there are column buckling curves and this type of thing, or  
2 equations.

3 Q Okay.

4 But what I'm reaching for, we are really into the  
5 plastic range of the pipe once you are at the— Let's focus  
6 on the local buckling—

7 A Okay.

8 Q — effect. Isn't that right?

9 A The crippling?

10 Q Yes.

11 A Yes.

12 Q Your answer was yes, I take it?

13 A I don't know what the question was.

14 Q All right, let's start over.

15 The question is: When you get these local crippling  
16 effects on piping, the stresses are well into the plastic  
17 range, are they not?

18 A Yes.

19 Q Okay.

20 MR. MILLER: Let's take a brief recess at this time.

21 (Whereupon, a brief recess was taken, after  
22 which the deposition again resumed.)

eb28

1 MR. MILLER: Back on the record.

2 BY MR. MILLER:

3 Q Mr. Brammer, earlier you said that 60 to 70 per-  
4 cent of your time you spent on NRC projects. Are those on  
5 light water reactors?

6 A Strictly, yes, just the five plants we're doing  
7 for NRC.

8 Q Okay.

9 I can't quite figure out the fraction but it  
10 appears that most of your time then is spent on Midland. Is  
11 that correct -- of the time that is spent on NRC work?

12 A It has been lately.

13 Q Okay.

14 Is there any person who works for you with respect  
15 to the Midland project?

16 A Well, it varies. At times there are, yes. Right  
17 now there's a fellow that's doing a confirmatory analysis as  
18 part of our work for the SER that's working for me, and that's  
19 not related to buried piping.

20 On some of the analysis I did, I didn't do all of  
21 the work myself. Somebody else did it.

22 Q Did you check the work that was done by this other

eb29

1 individual?

2 A Yes. He did it under my direction.

3 Q Okay.

4 Was there any attempt made to survey the litera-  
5 ture on analogous situations of buried piping subjected to  
6 settlement, differential settlement?

7 A No, not to this time there hasn't been.

8 Q So in many senses, as far as you're concerned,  
9 this Midland analysis is really unique. Is that correct?

10 A Yes.

11 Q Okay.

12 MR. MILLER: I would like the Reporter to mark as  
13 Bremmer Deposition Exhibit 2 a 12-page document which bears  
14 the initials JB in the upper left-hand corner. It's dated  
15 January 16th, 1981.

16 (Whereupon, the document  
17 referred to was marked as  
18 Bremmer Deposition Exhibit  
19 2 for identification.)

20 BY MR. MILLER:

21 Q Mr. Bremmer, I show you a document that has been  
22 marked Bremmer Deposition Exhibit 2 for identification and I

eb30

1 ask you if you wrote that document?

2 (Handing document to the witness.)

3 A Yes, I did.

4 Q And for what purpose was it prepared?

5 A As background for this meeting we had on Tuesday.  
6 We were trying to see what the basic -- if there were any  
7 basic differences between our analysis and Bechtel's analysis.

8 Q And what did you conclude?

9 A Our method of doing it is the same. We used more  
10 points and got some different results. We made different  
11 assumptions for the end conditions for the piping and got  
12 some rather high stresses at the ends, at the anchor points.

13 Q All right, sir.

14 In terms of corrective action I take it that  
15 dealing with high stresses at the anchor points is a much  
16 more manageable problem than if the stresses are shown in  
17 the middle of the yard, if you will. Is that correct?

18 A I would assume they are more accessible, yes.

19 Q And you know from the meeting on Tuesday, do you  
20 not, that the applicant and Bechtel plan to take account of  
21 these end conditions as necessary when the piping is fitted  
22 up? Isn't that right?

ab31

1 A That's what they stated.

2 Q And I take it that would be the sensible way to  
3 deal with these local stresses at the end points. Isn't that  
4 right?

5 A Yes. When we did this we didn't know what they  
6 were doing and we were concerned that they were ignoring it.

7 Q Let's talk just a little bit about the number of  
8 deflection input points.

9 Numbered paragraph 1 in the middle of page 1 of  
10 Exhibit 2 says:

11 "The main points of difference appear  
12 to be (1), the number of deflection input points  
13 required to define the stresses in the line."

14 The use of the word "required" is what I want to  
15 ask you about.

16 Is there a certain number of points that are re-  
17 quired in order to do this analysis?

18 A Well, you want to match the profile of the pipe  
19 as closely as you can with your analysis. And if your points  
20 were exactly correct, the more points you had, I would think--  
21 I mean if your measured data was exactly the way the pipe is,  
22 the more points you use in your analysis, the more accurate

eb32

1 your analysis would be.

2 Q Well, we know, do we not, that the measurement  
3 is not precise?

4 A As of Tuesday.

5 Q With that as a condition of the analysis, do you  
6 believe that the more points that are used the more accurate  
7 the analysis will be?

8 A It appears that maybe what should be done is some  
9 sort of a curve plotting, you know, take the best average  
10 curve through it if you have a scatter band of points.

11 Q That's a recognized technique for dealing with  
12 data of this nature, isn't it?

13 A Yes, some method of doing that.

14 Q Okay.

15 Have you discussed that with Dr. Chen?

16 A Not to any extent.

17 Q All right.

18 Numbered paragraph 2-- You have a copy of it in  
19 front of you, do you not?

20 A Yes.

21 Q Numbered paragraph 2 talks about the conditions  
22 at the ends of the line, and we've already discussed that point,



eb33

1 I take it. Is that right? That's what we were talking about,  
2 as to whether they were fixed or--

3 A Yes. We were concerned with that area and we are  
4 interested in what the fix will be and this sort of thing.

5 Q Then the reliability of measured deflections,  
6 the fact that the revision of figures indicates that there  
7 has been -- that there was a change in the profile lines.  
8 Has that matter been resolved to your satisfaction as a  
9 result of Tuesday's meeting?

10 A Yes, we understand now what was done with respect  
11 to the reliability and....

12 Q Are you finished?

13 A Yes. Did I answer your question?

14 Q I think so.

15 There was some concern about the size of the draw-  
16 ings from which you were working.

17 A Okay. The initial analysis that we did that we  
18 sent Bechtel, our analysis and the computer output, the whole  
19 bag of worms--

20 Q That was in October 1980?

21 A Somewhere in that area, yes.

22 Q Yes, sir.

eb34

1           A       We didn't have the Bechtel itemized deflections  
2 at that time. All we had was the figures 19-1 and 17-2,  
3 so we got our deflection data from that by scaling it, these  
4 figures. We scaled them as best we could but, you know,  
5 they're pretty small figures.

6           Q       Do you now have the actual deflection data from  
7 Bechtel?

8           A       They sent us their stress report, and we have the  
9 data that was in that report, if that's the latest data.

10          Q       And is that adequate for your use in terms of--

11          A       That's what we used for this analysis here, except  
12 in areas where they didn't cover it in their report, then we  
13 went back to our scale.

14          Q       I see.

15                    Would it be useful to you to have larger size  
16 drawings or all the data deflection points for your analysis?

439

17          A       Yes, it would. And also in our analysis we didn't  
18 have the detailed configuration of the pipe. We had to make  
19 some assumptions.

20          Q       Okay.

21                    There were drawings that purported to show those  
22 details that were shown to you at the Tuesday meeting, were

eb35

1 there not,--

2 A Yes.

3 Q -- those sepias?

4 A Yes. I believe they're going to send us a copy.

5 Q Okay.

B3

6 Now on page 2, the first sentence states:

7 "The ETEC analysis is not a rigid analy-  
8 sis by any means but was done to see if we are in  
9 the same ballpark."

10 What did you mean by the words "rigid analysis"?

11 A Well, it's not the kind of analysis you would do  
12 to make a good comparison because, like I say, we didn't  
13 have the detailed drawings, the detailed deflections and  
14 this sort of thing. We were just trying to compare methods  
15 mainly.

16 Q The next to the last sentence on that page says:

17 "In some areas the geometry did not  
18 seem compatible so assumptions were made."

19 Does that mean that it appeared that the pipe didn't  
20 fit or--

21 A Well, especially around at the ends of the pipe  
22 we tried to get the geometry from the Bechtel stress report

eb36

1 and some numbers didn't seem to agree with the dimensions  
2 they had written on the line.

3 Q I see.

4 A So what I'm implying is that maybe the stresses  
5 at the ends are not exactly right, and maybe the stress  
6 indices that we used are not exactly right because we assumed  
7 what bend radiuses they had and this sort of thing.

8 Q On page 3 it's a summary table of settlement  
9 stresses and profiled systems, and there were three lines  
10 that you used for your comparison. Is that correct?

11 A That's right. We have not analyzed all your lines  
12 because looking at it, we took what we thought would give us  
13 the worst stresses.

14 Q Okay.

15 A Some of them are obviously probably okay.

16 Q All right.

17 Just so the record is clear, the first column on  
18 the left is the line identified by first the-- The first  
19 number is 26 inches, and I take it that's the diameter of the  
20 line.

21 A Right.

22 Q And then OHBC - 54 is the specific line

eb37

1 identification for that diameter line. Is that right?

2 A Yes, this is identification on the profiled lines  
3 on Figures 17-2 and 19-1.

4 Q All right.

5 The next four columns say "Simply supported lines."  
6 Does that mean that that purports to calculate the stresses  
7 as if the lines were simply supported?

8 A Yes, at the ends.

9 Q What do the words "Simply supported" mean?

10 A No moment restraint at the end. They are free to  
11 rotate. They are not free to move in a vertical direction.

12 Q And I take it that the last three columns which  
13 have the heading "Fixed ends" are where the pipe is--

14 A -- anchored rigidly.

15 Q -- rigidly, so it cannot rotate, that that was the  
16 assumption that was used.

17 A Right.

18 Q All right.

19 Under the "Simply supported lines" column, the  
20 first column under that is "Bechtel report." What is that,  
21 maximum psi?

22 A In the Bechtel report they gave us one stress

eb38

1 which I assume is the maximum stress they counted on that  
2 line.

3 Q All right.

4 And what is the next column? What do the words--

5 A Okay. This is the equivalent ETEC stress. This  
6 is the stress that we calculated using the exact same de-  
7 flections and the exact same points, input points that they  
8 did.

9 Q All right.

10 There are two numbers in each of those columns  
11 for the 26-inch OHBC 54. Under the equivalent ETEC calcula-  
12 tion there are two numbers. What does the first number repre-  
13 sent?

14 A Okay. I have footnotes here but I can explain it  
15 to you very quickly.

16 The first number, the upper number is the stress  
17 that we calculated at the location that the Bechtel report  
18 said they had their maximum stress, so what I'm doing is  
19 comparing our calculated stress with their calculated stress,  
20 and you can see that they are very close.

21 Q 21,665 and 21,648. Is that right?

22 A Yes.

eb39

1 Now the stress below that is the maximum stress  
2 that we encountered in the line. And this is the stress, the  
3 dip that we were talking about in the Tuesday meeting, if  
4 you remember,--

5 Q Yes, sir.

6 A -- which Bechtel says is now straightened out, so  
7 that's no longer a problem.

8 Q Okay.

9 Then the next column is-- What is that column  
10 heading?

11 A That's where I put the deflections in at 20-foot  
12 intervals instead of the same intervals that Bechtel used.

13 Q Okay.

14 Was 20-foot intervals the shortest interval at  
15 which measurements were taken?

16 A I believe as I recall-- I don't know what they  
17 were taken at, but there was a table in the Bechtel stress  
18 report I believe had them at 20-foot intervals.

19 Q And that of course changes the values, does it not?

20 A Yes.

21 Q And of course using the Bechtel method, you're at  
22 31,176 pounds per square inch, which is probably still within



eb40

1 the code allowables, isn't it?

2 A Yes. As long as you're within the code allowables,  
3 no matter whether we agree on the stress, it would be okay  
4 with us.

5 Q And I take it that your calculation of 260,000 psi  
6 would probably be in excess of the code allowables?

7 A Somewhat, yes.

8 Q Then the last column under the "Simply supported  
9 lines" is the March/April '79 deflection. Is this to show  
10 the difference in profiles from the March/April '79 to the  
11 September '79 profile?

12 A Yes.

13 Q I take it then that the first three columns under  
14 "Simply supported lines" are based on the September 1979  
15 profiles. Is that correct?

16 A They are based on the data that was in the Bechtel  
17 report,--

18 Q Okay.

19 A -- whatever that is.

20 Q Okay.

21 And then I take it that the same-- Well, for the  
22 fixed ends there are only three subsidiary columns. You



eb41

1 don't have the equivalent ETEC—

2 A Bechtel didn't run it in that condition.

3 Q I see.

4 A So we're on our own there.

5 Q Okay.

6 Let's drop down to the 26-inch OHBC-55 line item.

7 Under the equivalent ETEC confirmation and deflec-  
8 tion at 20-foot intervals columns there are -- instead of two  
9 numbers there are three numbers and then there's an explana-  
10 tory foot note.

11 A Okay. Bechtel had two numbers in their report.

12 Q Okay.

13 And you were just unable to tell?

14 A Yes. This was the area we discussed a little bit  
15 in that meeting, that I was unclear where the 36-inch line  
16 and the 26-inch line joined.

17 Q Ah, I see.

18 A So I didn't use any indices there. I'm not real  
19 sure of the geometry even in that area.

20 Q But there are drawings that are going to be pro-  
21 vided that will clear that up?

22 A Supposedly, yes.

eb42 C3

1 The rest of it is just our profile, and a little  
2 more explanation of where the stresses occurred.

3 Q When you say "the rest of it" you're referring to  
4 the rest of Exhibit 2?

5 A Right.

6 Q From your evaluation of the data, Mr. Brammer,  
7 are you able to tell whether or not the preloading of the  
8 diesel generator building had any effect on the buried piping  
9 that was in the area under the preload?

10 A Well, it changed the profiles of the lines. From  
11 the original set of profiles we got to the latter it was  
12 changed so presumably it did.

13 Q Okay.

14 Do you recall whether or not any of the stresses  
15 that were induced by the change in profile are in excess of  
16 code allowables?

17 A There are some areas where the stress is in excess  
18 of code allowables. Whether it was due to this or not I  
19 can't say right off-hand.

20 Q In other words it might just be due to differential  
21 settlement?

22 A Originally.

eb43

1 Q Originally?

2 A Yes.

3 Q I'd like to show you a document that has been

4 marked as Chen Deposition Exhibit 3 for identification.

5 (Handing document to the witness.)

6 I ask you first whether you have seen that document

7 before?

8 A Yes, I have.

9 Q Did you draft that document?

10 A Yes, most of it anyway. I think Dr. Chen had some

11 inputs, but it's basically mine.

12 Q I would like to also show you a document that has

13 been marked as Chen Deposition Exhibit 13 for identification.

14 As we received it the pages after the first page are in

15 reverse order. In other words they are numbered 10, 9, 8.

16 But can we agree that Chen Deposition Exhibit 3--

17 Well, first let me ask you, looking from back to front so

18 you get it in the right sequence of Exhibit 13, do you recall

19 having seen this document before?

20 (Handing document to the witness.)

21 A This was based on something similar to this. I'm

22 not sure this is the same one. For some reason it looks

eb44

different, maybe because it's backwards.

Q Are you saying that Exhibit 3 was a response to Exhibit 13?

I represent to you that Exhibit 13, the last three pages of it, are excerpts from a Corps of Engineers Draft Report on their examination of the soil conditions at Midland.

Do you recall being asked for ETEC's comments on the Corps report?

A Yes, we did that, and that's what this is based on. (Indicating.)

Q Exhibit 3 is in response to that request; is that correct?

A Yes.

Q Okay.

A But this doesn't look like that, but....

Q Exhibit 13 doesn't look like the Corps report?

A What I remember of it.

Q Well, was it a multi-page document?

A No, we just saw a few pages, or I just saw a few pages. That's all. Tony sent just the part that concerned us, more or less.

Q That's Tony Cappucci?

ab45

1           A       Yes

2           Q       Well, I would like you to look specifically at

3 the response -- well, the paragraphs that are under Item

4 g(c) on the first page of Exhibit 3, and then look at g(1)(c)

5 on numbered page 8 of Chen Deposition Exhibit 13.

6           A       I'm sorry, what is it you want me to look at here?

7           Q       I want you to look at g(1)(c) on page 8.

8                   (Handing document to the witness.)

9           Q       All right, having looked at that, would you look

10 at comment g(c) of Chen Deposition Exhibit 3 and see if you

11 can agree that it is in response to that page 8 of Exhibit 13?

12           A       Yes, it is.

13           Q       Okay. Good.

14           Q       Now on page 2 of Chen Deposition Exhibit 3, just

15 before this table, the exhibit states:

16                   "The results of this analysis are shown

17 below."

18 -- referring to the table.

19                   "The stresses shown are based on an elastic

20 analysis and are not true stresses as in some cases

21 they far exceed the yield stress of the piping material."

22           Q       Did you write those words originally? Are those

ab46

1 your words?

2 A Yes, they are.

3 Q Okay.

4 What did you mean by the words "true stresses"?

5 A Well, obviously since the element of the material  
6 is around 90,000 you are not going to get 212,000 without it  
7 rupturing and the pipe didn't rupture. These are just based  
8 on an elastic analysis where you're on the straight portion  
9 of the stress-strain curve.

10 Once you get past the yield point the curve bends  
11 over. You get the strain. The stress doesn't go up at the  
12 same ratio as--

13 Q This is the picture that Dr. Chen drew for us  
14 yesterday as Chen Deposition Exhibit 11.

15 (Handing document to the witness.)

16 A The stresses I calculated were based on the fact  
17 that the stress-strain relationship would follow this line.

18 Q A to C; is that right?

19 A Yes, or A to wherever it goes.

20 Q Okay.

21 But in order to do an analysis to indicate what  
22 the true stresses were, one would have to do the plastic

eb47

1 analysis that we were talking about earlier. Is that correct?

2 A Right. And it would fall roughly on this line  
3 rather than this line. (Indicating.)

4 Q You indicated that rupture or failure took place  
5 at about 90,000 psi.

6 A Well, as I recall, that's the ultimate tensile  
7 stress they give in the tables for the material.

8 Q Okay.

9 Which tables are we referring to, just so we have  
10 them on the record?

11 A The code allowable B31.1 if you will.

12 Q Okay.

13 Again just so the record is clear, when you're  
14 talking about the actual stresses we're talking about A to C'  
15 as identified on Chen Deposition Exhibit 21. Isn't that  
16 right?

17 A The deflection would tend to follow this curve  
18 more than that curve, yes. (Indicating.)

19 Q You say "this curve" and "that curve," and that's  
20 what he takes down. It would tend to follow the A to C'  
21 curve rather than the A to C curve. Is that right?

22 A Right.



1 Q Okay.

2 Were you surprised when you got this document  
3 from the Corps of Engineers commenting on piping analysis?

4 A Well, I didn't realize they were involved in the  
5 piping, if that's what you're asking me.

6 Q Did you ask Mr. Cappucci the reason for it?

7 A I didn't, no. Dr. Chen gave it to me and said to  
8 look at it.

9 Q Okay.

10 Now you visited the Midland site just once. Is  
11 that correct?

12 A Right.

13 Q Do you recall the nature of any presentations that  
14 were made with respect to buried piping?

15 A I don't recall the detail. The buried piping  
16 presentation was such a small part of the overall picture  
17 that-- I just don't really recall what they did say.

18 Q Do you recall that anybody expressed any concern  
19 over the penetration of the service water pipes through the  
20 wall of the service water structure?

21 A I'm not sure that they did at that meeting. There  
22 has been concern expressed since then.



eb49

1 Q By whom, sir? ETEC or the Corps of Engineers?

2 A The Corps of Engineers. And that document—

3 Q Exhibit 13?

4 A Yes.

5 (Continuing) -- is one.

6 And we have some concern just due to the deflection  
7 at all the penetrations really, due to the deflection and  
8 the slope of the pipe as they appear to go into the building.

9 Q That is that the pipe is so close to the pene-  
10 tration that a small amount of differential settlement could  
11 bring the pipe into contact with the building?

12 A Right.

13 And also it appears from the profiles that the  
14 ends at the penetration area, some of the piping has a pretty  
15 severe slope, relatively speaking, that you may have clearance  
16 on one side and not on the other type of thing.

17 MR. MILLER: I would like the Reporter to mark  
18 as Brammer Deposition Exhibit 3 an undated, unsigned docu-  
19 ment which bears the initials TCC in the upper right-hand  
20 corner. It says "Response to service water pipe concern."  
21  
22

eb50

1 (Whereupon, the document  
2 referred to was marked as  
3 Brammer Deposition Exhibit  
4 3 for identification.)  
5  
6 BY MR. MILLER:  
7 Q Mr. Brammer, I show you a document which has been  
8 marked as Brammer Deposition Exhibit 3 for identification,  
9 and I ask you if you have ever seen that before.  
10 (Handing document to the witness.)  
11 A I don't recall seeing this, no.  
12 Some of what is in here is in this Corps report,  
13 I believe.  
14 Q Yes, sir.  
15 I show you a document that has been marked as Good  
16 Deposition Exhibit 9, November 8th, 1980. I apologize for  
17 the quality of the copying of the first page. I will repre-  
18 sent to you it purports to be Mr. Hood's notes of the  
19 February 27th-28th meeting.  
20 (Handing document to the witness.)  
21 Would you turn, please, to page 3 of that document?  
22 There's a specific paragraph that deals with the Corps of  
Engineers' concern about service water pipes. Do you see that?

eb51

1 A It starts with "During the tour...."

2 Q Yes.

3 Would you just read that paragraph over?

4 (Witness reviewing document.)

5 A Okay.

6 Q Does that refresh your recollection that there  
7 were specific questions raised by the Corps during this site  
8 tour with respect to the service water pipes?

9 A At the meeting itself, I still don't remember that  
10 point being brought up. From this data and their report,  
11 they actually toured that area and after the tour was over,  
12 I don't recall whether they said anything at that meeting or  
13 not.

14 Q Having looked over Brammer Deposition Exhibit 3,  
15 does that indicate that at least with respect to those specific  
16 service water pipes, the question of differential settlement  
17 causing an impact between the pipe and the penetrations was  
18 not a concern?

3.430

19 A Well, not necessarily. This plant is supposed to  
20 be designed for 40 years or somewhat, and you're going to have  
21 additional settlement.

22 Also, it's to be designed for seismic conditions

eb52

1 where you may get some differential movement.

2 So there is some clearance but it is probably less  
3 than the design specification required to cover these other  
4 contingencies.

5 So no, it wouldn't solve all my problems.

6 MR. MILLER: I would like the Reporter to mark as  
7 Brammer Deposition Exhibit 4 a letter from Mr. Tedesco to  
8 Mr. Cook of Consumers Power Company dated October 20, 1980.

9 (Whereupon, the document  
10 referred to was marked as  
11 Brammer Deposition Exhibit  
12 4 for identification.)

13 BY MR. MILLER:

14 Q Mr. Brammer, I show you a document that has been  
15 marked Brammer Deposition Exhibit 4 for identification and ask  
16 you if you have ever seen that document before?

17 (Handing document to the witness.)

B4

18 A Yes, I'm sure I've seen it.

19 Q Would you look at the last page of that document,  
20 please?

21 The last page is a table and on the far right-hand  
22 side of the table there are two handwritten columns.

eb53

1 Is that your handwriting, sir?

2 A No, that's not in my handwriting.

3 Q Do you recognize it?

4 A We didn't write this letter. I suspect these  
5 stresses are based on that original October stress analysis  
6 that we sent to NRC.

7 Q Are you now referring to Chen Deposition Exhibit 9  
8 for identification?

9 (Handing document to the witness.)

10 A Yes.

11 Q Well, it's a fact, is it not, that the stresses  
12 that are shown in that handwriting are the same as the stresses  
13 that are shown on page 2 of Chen Deposition Exhibit 3?

14 A Yes. Well, we answered this based on that original...  
15 That's why we did the original calculation, really, the  
16 comments on this.

17 Q Referring to Chen Deposition Exhibit 3?

18 A Yes.

19 Q Let me see if I can recapitulate:

20 You made the stress calculations to respond to the  
21 Corps of Engineers' report in July. Is that right?

22 A That's....Yes, more or less.

eb54

1 Q Well, what's inaccurate about it?

2 A Well, we did both of them at about the same period  
3 of time when we made our calculations, about the time this  
4 came in, so we included these in the reply.

5 Q I see.

6 So some time in July, in the normal course of your  
7 work, you've been making calculations with respect to stress,  
8 and you were able to respond to the Corps of Engineers' in-  
9 quiry and prepare your stress report from the same calculations.  
10 Is that correct?

11 A Yes.

12 Q Okay.

13 Was the transmittal of this information to  
14 Mr. Cappucci on July 30th, 1980, the first time that he was  
15 informed by you or, to your knowledge, any other person at  
16 ETEC that calculated stresses exceeded code allowables for  
17 underground piping?

18 A I don't recall. I would assume that we probably had  
19 telephone conversations about it before then.

20 Q Did you discuss how, if at all, this information  
21 should be made available to Bechtel and the applicant?

22 A Well, it was made available to Bechtel and the

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1 applicant because we sent them the stress report, this,  
2 (indicating), whatever exhibit it is.

3 Q That's Chen Deposition Exhibit 9.

4 That was some time in September?

5 A I suspect so.

6 We had a conference call between ourselves,  
7 Bechtel, and NRC where we discussed these matters. And at  
8 that time we decided, or it was decided that it would be  
9 beneficial if we exchanged stress reports.

10 And through the process of the mails and one  
11 thing and another, it takes a while to get this sort of thing  
12 done.

13 Q Is this the conference call that you're referring  
14 to, the one described in Chen Deposition Exhibit 7 for iden-  
15 tification?

16 (Handing document to the witness.)

17 A It may have been.

18 It seems like we sent this to NRC before September.  
19 (Indicating.)

20 Q When you say "this," you're referring to the stress  
21 report, Exhibit 9?

22 A Yes. But I really don't recall.

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1 Q Were you the person who actually did the calcula-  
2 tions which indicated that in some instance code allowables  
3 had been exceeded using the rigid 3S<sub>c</sub> approach to the calcula-  
4 tions?

5 A Exhibit 9?

6 Q Yes, sir.

7 A These calculations?

8 Q Yes, sir.

9 A I didn't do the actual work on those. I directed  
10 how it was to be done.

11 Q Okay.

12 But you knew fairly soon after the results were  
13 complete that there was an apparent excess over code allow-  
14 ables in some of the--

15 A Per our calculations.

16 Q Right.

17 And in fact it was transmitted to the Nuclear  
18 Regulatory Commission as early as July 30th of 1980 when you  
19 commented on the Corps of Engineers' report?

20 A Well, it was obviously transmitted then. It may  
21 have been--

22 Q Even earlier?



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1 A I don't know.

2 Q Did you suggest that this information ought to be  
3 brought to the attention of the applicant immediately so  
4 that these differences could be resolved?

5 A Well, I don't know as I said it that way. We knew  
6 that something should be done about it, had to be done about  
7 it.

8 Q Did Mr. Cappucci say anything to you about inform-  
9 ing the applicant of your results and getting together with  
10 him in July and August of 1980?

11 A Not to my knowledge, but there's a lot of talk  
12 between Dr. Chen and Cappucci that I'm completely unaware of.

13 Q Okay.

14 MR. MILLER: Why don't we take a short break? I  
15 think I'm close to being finished.

16 (Whereupon, a brief recess was taken, after  
17 which the deposition again resumed.)

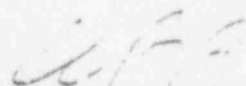
18 MR. MILLER: I have no further questions,  
19 Mr. Brammer.

20 MR. JONES: I have nothing for him.

21 (Whereupon, at 11:05 a.m., the taking of the  
22 deposition was concluded.)

CERTIFICATE OF NOTARY PUBLIC AND REPORTER

I, William R. Bloom, the officer before whom the foregoing deposition was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken in Stenomask and thereafter reduced to typewriting by me or under my direction; that said deposition is a true record of the testimony given by said witness; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken; and, further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of the action.

  
\_\_\_\_\_  
Notary Public in and for the  
District of Columbia

My commission expires 14 August 1985