

NUCLEAR REGULATORY COMMISSION

ORIGINAL

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of: CONSUMERS POWER COMPANY : DOCKET NOS:

50-329 OM&OL  
50-330 OM&OL

Deposition of: BIMALENDU DHAR

DATE: December 17, 1980 PAGES: 1 - 160

AT: Ann Arbor, Michigan

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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In the Matter of:

Docket Nos. 50-329OM&OL

CONSUMERS POWER COMPANY

50-330OM&OL

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Conference Room, 7th Floor  
777 East Eisenhower Parkway  
Ann Arbor, Michigan

Wednesday, December 17, 1980

Deposition of

BIMALENDU DHAR

the deponent, called for examination by the staff of the  
Nuclear Regulatory Commission, pursuant to notice, at 9:00 a.m.,  
when were present on behalf of the respective parties:

For the Nuclear Regulatory Commission

WILLIAM D. PATON, Esq.

JOSEPH D. KANE, Geotechnical Engineer

FRANK RINALDI

On behalf of Consumers Power Company

ALAN S. FARNELL, Esq.

JAMES BRUNNER, Esq.

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C O N T E N T S

WITNESS

PAGE

BIMALENDU DHAR

Examination by Mr. Paton

3

EXHIBITS

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Staff Exhibit No. 1

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Staff Exhibit No. 2

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Staff Exhibit No. 4

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P R O C E E D I N G S

1  
2 Whereupon,

3 BIMALENDU DHAR

4 was thereupon called as a witness herein, and after having been  
5 first duly sworn, was examined and testified as follows:

6 EXAMINATION

7 BY MR. PATON:

8 Q Will you state your full name and business address  
9 for the record?

10 A My full name is Bimalendu Dhar. My business address  
11 is 777 East Eisenhower Parkway, Ann Arbor, Michigan.

12 Q It is not Dr. Dhar; it is Mr. Dhar?

13 A Yes, sir.

14 Q Mr. Dhar, I notice on the resume which I will mark  
15 Staff Exhibit No. 1, under a heading called Organization and  
16 Location, you have the letters SFPD?

17 A That is the San Francisco Power Division.

(The document referred to was  
marked Staff Exhibit No. 1,  
December 17, 1980, for identifica-  
tion.)

22 BY MR. PATON: (Resuming)

23 Q You now work for the San Francisco Power Division?

24 A No, I work for the Ann Arbor Power Division.

25 Q Your resume is dated August of '79. As of that time

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1 it was the San Francisco Power Division?

2 A That is correct.

3 Q What is your job at Bechtel?

4 A Would you please clarify that question?

5 MR. FARNELL: Do you mean his position?

6 BY MR. PATON: (Resuming)

7 Q What is your title at Bechtel?

8 A I am an Engineering Supervisor.

9 Q How many people do you supervise?

10 A In my present capacity, approximately -- under my  
11 direct supervision here in Ann Arbor, approximately 85 people  
12 and 30 at the job site where I have technical responsibility.

13 Q You mean here at the Ann Arbor office that 85 people  
14 report to you?

15 A Yes.

16 Q Do all 85 report directly to you, or do they report  
17 to other intermediate supervisors?

18 A Other intermediate supervisors who in turn report to  
19 me.

20 Q Are you the head of some section? In other words, is  
21 there a section that you are the head of?

22 A I am Group Supervisor, Civil Structural Group, for the  
23 Midland Project.

24 Q How much of your time do you spend on the Midland  
25 Project?

1 A I spend all of my time on the Midland Project.

2 Q How long has it been since you spent all of your time  
3 on Midland? In other words, have you spent all your time on  
4 Midland in the year 1980?

5 A Yes, I have.

6 Q How about 1979?

7 A Yes, I have.

8 Q How about 1978?

9 A Yes.

10 Q '77?

11 A Yes.

12 Q How many years have you spent full time on Midland?

13 A From '76.

14 Q I stopped one short. That is unusual. That is why I  
15 asked him by year.

16 A '76 -- almost entire '76. I came back from vacation  
17 in the middle of January to the best of my recollection.

18 Q Since January of '76 you have spent full time on  
19 Midland; is that correct?

20 A That is correct.

21 Q Now, you indicated that you are the Group Supervisor,  
22 Civil Structural Group for Midland. Is there a Group Supervisor,  
23 Civil Structural Group, for other nuclear facilities that  
24 Bechtel is working on in the Ann Arbor office?

25 A Yes.

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Q What nuclear facility is that?

A We are doing some work for Palisades, and to the best of my knowledge, we are also doing some work for Duane Arnold.

Q Tell me what your job is? In other words, what do you do as Group Supervisor of Civil Structural Group, Midland?

A That is currently?

Q Right.

A I am responsible for analysis, design of all structures, preparation of engineering drawings, specifications, and licensing documents for Midland for the Civil Structural Group.

Q I want to make sure that I have that. You are responsible for analysis and design of structures; is that correct?

A Analysis and design of structures.

Q Engineering drawings?

A Engineering drawings.

Q And specifications?

A Specifications.

Q And licensing documents; is that correct?

A Yes, sir.

Q Do you know a Bechtel consultant by the name of Dr. Davisson?

A Yes, I do.

Q With respect to the Midland site, has Bechtel retained Dr. Davisson to do some work in Midland?

1 A To the best of my knowledge, yes.

2 Q What work has he been retained to do for Bechtel?

3 A As I know, he has been providing us input for the  
4 design of piles for remedial actions for the service water pump  
5 structure.

6 Q Is he also providing input for the caissons in the  
7 electrical penetration area?

8 A My understanding is that he would review the caisson  
9 documents.

10 Q You say "that he would review." Do you know whether  
11 or not in fact he is doing any study of the caissons in the  
12 electrical penetration area?

13 A I do not have any direct knowledge of that.

14 Q Who in Bechtel would know that?

15 A Dr. Davisson is consultant to the Geotechnical Group,  
16 and I would refer you to Dr. Afifi.

17 Q Now you indicated you don't have any direct knowledge,  
18 I want to ask you about direct, indirect, or any kind of knowledge?

19 MR. FARNELL: As opposed to speculation, of course.

20 BY MR. PATON: (Resuming)

21 Q As opposed to speculation as your attorney says. What,  
22 to your knowledge, is Dr. Davisson doing with respect to  
23 caissons in the electrical penetration area?

24 A May I talk with my counsel for a minute?

25 MR. PATON: Sure.



1 (Deponent conferred with counsel.)

2 A The substance of what I have heard is that Dr. Davisson  
3 is reviewing the carrying capacity of the caissons.

4 Q Reviewing the carrying capacity; is that correct?

5 A Load carrying capacity.

6 Q If I said load bearing capacity, would you agree with  
7 that? Is that what he is doing?

8 A That is what I have heard.

9 Q As far as you know, that is the same thing?

10 A Yes.

11 Q Now, you say he is reviewing the carrying capacity.  
12 Is he reviewing work that was done by Bechtel, or is he supplying  
13 the initial input to that work?

14 A Would you please repeat the question?

15 Q You say that he is reviewing the work. Is he reviewing  
16 somebody else's work, or is he supplying the initial work himself?

17 A He is reviewing somebody else's work.

18 Q Whose work is he reviewing?

19 A We had a consultant for caisson design by the name of  
20 Chuck Gould, and he is reviewing his work.

21 Q Chuck Gould, G-o-u-l-d?

22 A Yes, sir.

23 Q He is reviewing the work by Chuck Gould; is that  
24 correct?

25 A That is my understanding; yes.

1 Q What work is it that Mr. Gould supplied that -- I guess  
2 it is Dr. Gould?

3 A No, to the best of my understanding it is Mr. Gould.

4 Q What work did Mr. Gould supply that Dr. Davisson is  
5 reviewing?

6 A Mr. Gould supplied the input to the design of the  
7 caisson supports for the auxiliary building wing area.

8 Q Can you give me any particulars of that input?

9 A Will you be a little more specific about it?

10 Q You said "input" to the design; what did you mean by  
11 that?

12 A He supplied the basic scheme, and also supplied the  
13 details for the caissons.

14 Q What do you mean by "basic scheme"?

15 A What kind of caissons to be used, and what would be the  
16 approximate length, and what can be considered to be the load  
17 carrying capacity of the caissons.

18 Q What was the approximate length?

19 A I do not remember the exact length.

20 Q Do you remember the approximate length?

21 A No, I do not.

22 Q Do you remember the load bearing capacity?

23 A What I recall is 13 caissons per 4000 kips.

24 Q You said 13 caissons?

25 A Approximately, yes, sir.

1 Q And 4000 kips?

2 A Yes, sir.

3 Q Did anyone in Bechtel review the input supplied by  
4 Mr. Gould other than Dr. Davisson?

5 A This was coordinated with the Geotechnical Group.

6 Q Okay, my question was did anybody in Bechtel review  
7 the work supplied by Mr. Gould?

8 A What does "review" mean?

9 Q The same way that you have been using it.

10 A Geotechnical Group reviewed it to the best of my  
11 knowledge.

12 Q Who within the Geotechnical Group reviewed it?

13 A This was done by Dr. Afifi's group, and I do not  
14 recall the name of the one engineer that came from the  
15 Gaithersburg office to review it.

16 Q Do you have a report from Mr. Gould that came with his  
17 recommendations or his input?

18 A To the best of my recollection we have gotten written  
19 summary of the presentations he made on the subject.

20 Q Do you have a copy of that?

21 A It would be available in the Civil files.

22 Q Are these your files, or are they Dr. Afifi's files?  
23 Are they under your supervision, or are they under his super-  
24 vision?

25 A Civil files would be under my supervision.

1 Q What is the date of that? Is that a report? You said  
2 a summary?

3 A A written summary.

4 Q What is the approximate date of that?

5 A To the best of my recollection Dr. Gould made two  
6 presentations to NRC, one in July of '79 and one during February  
7 '80.

8 Q Excuse me. You just said "Dr."

9 A Mr. Gould.

10 Q So the written summary would be sometime after  
11 February of '80; is that what you are indicating?

12 A Yes, sir.

13 MR. PATON: Al, could we get a copy of that?

14 MR. FARNELL: I would like to note for the record that  
15 we have produced the Civil Group's files.

16 (Discussion off the record.)

17 MR. PATON: Off the record there was an agreement that  
18 the summary that Mr. Dhar has referred to has been supplied to  
19 the NRC.

20 BY MR. PATON: (Resuming)

21 Q Mr. Dhar, other than the meeting summary that you have  
22 just referred to, Mr. Gould did supply to Bechtel other documents  
23 indicating his recommendations; is that correct?

24 A To the best of my recollection he did not submit anything  
25 else.

1 Q Do you mean his recommendations to you were all oral?

2 MR. FARNELL: I don't believe he said that.

3 BY MR. PATON: (Resuming)

4 Q I am asking you did his recommendations come to you  
5 in --

6 MR. FARNELL: Also, I don't think he said "recommenda-  
7 tions."

8 BY MR. PATON: (Resuming)

9 Q All right, Mr. Gould's input, can you tell me the  
10 form in which it came to Bechtel?

11 A It was in the form of input to the specification for  
12 the underpinning work in review of that specification.

13 Q Okay, was it in writing?

14 A To the best of my recollection Dr. Gould worked on  
15 that specification with my group.

16 Q Is that your answer? My question was: Was it in  
17 writing?

18 MR. FARNELL: It is unclear as to what -- there are  
19 two things -- specification and review of specification -- I don't  
20 think he understands.

21 BY MR. PATON: (Resuming)

22 Q His input was specifications for underpinning; is that  
23 correct?

24 A Yes, sir.

25 Q Now, it is taking a long time for me to find out from

1 you if that was in writing?

2 MR. FARNELL: I think that is your fault.

3 MR. PATON: Let's say it is my fault, but I think the  
4 witness can handle that kind of problem considering his position.

5 BY MR. PATON: (Resuming)

6 Q Was it in writing, and since counsel has gone out of  
7 the way to indicate that he thinks that is my fault, I would  
8 like to indicate on the record that we are getting pauses between  
9 answers. It is hard for me to perceive the difficulty with this  
10 questioning.

11 MR. FARNELL: If you want to start in this way --

12 MR. PATON: Not particularly.

13 MR. FARNELL: It is totally inappropriate in that  
14 regard. He is answering your questions, and any problems with  
15 the questions are yours.

16 MR. PATON: The problems are not mine, and the  
17 questions are straightforward. Is the input in writing? And we  
18 are now about ten minutes finding out whether the input was in  
19 writing.

20 MR. FARNELL: Your clock is a lot faster than mine.

21 MR. PATON: I think I would agree with that, too.

22 BY MR. PATON: (Resuming)

23 Q Was it in writing?

24 A I want to talk to my counsel.

25 (Deponent conferred with counsel.)

- 1 A To the best of my recollection it was not in writing.
- 2 Q The specifications for underpinning were not in writing?
- 3 MR. FARNELL: That is not what he said.
- 4 BY MR. PATON: (Resuming)
- 5 Q Is that what you said?
- 6 A No.
- 7 MR. FARNELL: That is not what you asked.
- 8 BY MR. PATON: (Resuming)
- 9 Q The question I am asking you about is the specifications
- 10 for underpinning.
- 11 A Whether the input was in writing, and my answer to that
- 12 question is to the best of my recollection it was not.
- 13 Q Did he give you specifications for the underpinning?
- 14 A He provided us input.
- 15 Q Is there some difference in your mind between input
- 16 and specifications?
- 17 A Yes, sir.
- 18 Q Tell me what that difference is?
- 19 A Input is -- I would have to consider the input to be
- 20 the technical details for the specifications and is to be written
- 21 in a form where it could be called formally a specification.
- 22 Q Do that one again slowly? Say that one again? The
- 23 input is what?
- 24 A The input is the technical details that goes into the
- 25 specification for particular work, and a specification would be

1 to incorporate all that input in a form which can formally be  
2 issued as a specification to control a piece of work.

3 Q The second one again -- specifications are what?

4 A Specifications are documents which can be used for  
5 construction of a particular item of work or a particular  
6 structure.

7 Q Specifications are documents that can be used for  
8 constructions?

9 A For construction.

10 Q Okay, did Mr. Gould provide you any specifications?

11 A He provided input to the specifications.

12 Q He provided the input, and then Bechtel made the  
13 specifications; is that correct?

14 A We put it together -- the specification -- yes, sir.

15 Q In what form did he supply you the input?

16 A It could be informal, written on a piece of paper;  
17 he could come here and discuss with us and give it to us verbally.

18 Q I would ask you not to tell us what could be; what  
19 in fact happened?

20 A It was in the form of written on a piece of paper,  
21 informally given to us, or to the Civil Group; it was given  
22 verbally in the course of meetings we had with him to develop  
23 the specifications.

24 Q Is it in fact that some of the input came in writing  
25 and some came orally; is that correct?



- 1 A Writing informally; yes, sir.
- 2 Q Now my question is: Some of it came in writing and  
3 some came orally; is that correct?
- 4 A The writing was informal. That is what I want to add.
- 5 Q What do you mean by "informal"?
- 6 A Just on a piece of paper and given to us -- not  
7 consummated through any letter.
- 8 Q Was any of this information given to you orally and  
9 not any other way?
- 10 A I do not recall how much. Some part could have been  
11 given orally.
- 12 Q You don't know?
- 13 A I don't recall.
- 14 Q Who did he give this information to?
- 15 A The person who was working on the specification at  
16 the time.
- 17 Q Does that person have a name?
- 18 A Yes, sir.
- 19 Q Who is that?
- 20 A To my recollection he is John Hook.
- 21 Q Does he work for Dr. Afifi?
- 22 A No, sir, he worked for Civil Group.
- 23 Q Does he work for you?
- 24 A He worked for me.
- 25 Q Does he still work for you?

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A No, sir.

Q Now, you equated input with technical details that go into specifications; is that correct?

A Yes.

Q Did that include calculations?

A Whether there is input into the calculations?

Q Yes.

A To the best of my recollection, no.

Q Did it include drawings?

A My recollection is no.

Q Okay, when was this input from Mr. Gould supplied to Bechtel?

A To my recollection it was during sometime in '79.

Q Is it your testimony that the input that you have stated was given to Bechtel by Mr. Gould has been supplied to Dr. Davisson?

A My recollection is yes.

Q You indicated that Bechtel used the input that was supplied by Mr. Gould and made specifications; is that correct?

A That is correct.

Q When did Bechtel do that?

A During '79.

Q Can you help me a little bit? Can you be more specific than '79?

A My recollection is during the middle of '79 sometime.

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1 Q Have you -- and Dr. Davisson is reviewing that work by  
2 Mr. Gould; is that correct?

3 MR. FARNELL: Would you read that back?

4 (Record read.)

5 BY MR. PATON: (Resuming)

6 Q Mr. Gould gave some work to Bechtel -- some input to  
7 Bechtel; is that correct?

8 A To the best of my knowledge Dr. Davisson reviewed the  
9 specifications.

10 Q Reviewed the specifications -- in other words, Bechtel  
11 got some input from Mr. Gould, and from that they made  
12 specifications, and these relate to the caissons at the electrical  
13 penetration area, and these specifications have been given to  
14 Dr. Davisson for review; is that correct?

15 A I cannot say that from my personal knowledge.

16 Q Well, I want you to say it from any knowledge that you  
17 may have -- whether you heard it from anybody, or spoke directly  
18 to anybody. Do you know whether those specifications have been  
19 given, or have you heard whether those specifications have been  
20 given to Dr. Davisson, or have you seen a paper that would indicate  
21 that? Do you know from any source?

22 A My recollection is that I heard -- I am not sure  
23 whether I heard it or read it that it was given to Dr. Davisson.

24 Q Now, you say that "it was given" -- the specifications  
25 were given?

1 A That's correct.

2 Q Was the input that you received from Mr. Gould given  
3 to him?

4 A No, sir.

5 Q Why didn't you give him the input?

6 A Because the specification contains the input.

7 Q Then you did give him the input?

8 MR. FARNELL: That's not -- he made a distinction  
9 between input and specification.

10 MR. PATON: And I just asked him -- he said --

11 BY MR. PATON: (Resuming)

12 Q Let me ask you this: Did you give him the input or not?

13 MR. FARNELL: That has been asked and answered.

14 MR. PATON: I would love to know the answer.

15 MR. FARNELL: I will give you the answer.

16 MR. PATON: First he said yes, and then he said no, or  
17 the other way around. I will try again.

18 BY MR. PATON: (Resuming)

19 Q You gave him the specifications that were made by  
20 Bechtel; is that correct?

21 A I didn't give him the specifications.

22 Q Did Bechtel give him the specifications?

23 A That is what I heard.

24 Q That is what you think?

25 A Yes.

1 Q Did Bechtel provide him the input that was received  
2 from Mr. Gould?

3 A To the best of my recollection, no.

4 Q But the specifications include the input; is that  
5 correct?

6 A The specification is based on the input.

7 Q Based on the input. Okay. Do you ever talk to  
8 Dr. Davisson?

9 A In meetings; yes.

10 Q Do you ever talk to him other than meetings?

11 A No, sir.

12 Q How often have you talked to Dr. Davisson in the year  
13 1980?

14 A Maybe one time.

15 Q What work has Dr. Davisson been asked to do by Bechtel  
16 with respect to the design of the piles at the service water  
17 structure?

18 A Can I talk to my counsel?

19 MR. PATON: Certainly.

20 (Deponent conferred with his counsel.)

21 A What I have heard is that Dr. Davisson is going to  
22 provide us input regarding the type of piles, the factor of  
23 safety to be used, and review the pile specification and design.

24 BY MR. PATON: (Resuming)

25 Q Now, I want to go back to the question about the

1 specifications that Bechtel has made for the caissons resulting  
2 from information that you got from Mr. Gould. Have those  
3 specifications been supplied to the NRC?

4 A To the best of my recollection, a paraphrased version  
5 has been supplied.

6 Q A what?

7 A A paraphrased version.

8 Q Is that a summary? I am not sure I know what you mean  
9 by "paraphrased."

10 A I mean not the exact -- the spec has not been submitted.  
11 Let me call it a summary of the details.

12 Q Okay, when was that supplied; do you know?

13 A My recollection is that it has been supplied very  
14 recently in response to Question.

15 Q Do you know which Question?

16 A I do not remember the Question.

17 Q Do you know why the precise details were not supplied  
18 as opposed to a summary?

19 A It is my understanding that is the way the Question was  
20 requested.

21 Q With respect to the piles at the service water structure,  
22 who is responsible for the design? Would you say it is Bechtel,  
23 or is it Dr. Davisson?

24 A My understanding is that Bechtel is responsible for the  
25 design.

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1 Q Who within Bechtel would have that responsibility?

2 A In my opinion the Geotechnical Group would provide the  
3 Civil Group the capacity of the pile, and the Civil Group will  
4 make calculations to measure that those capacities are not  
5 exceeded.

6 Q Do you know what the status of that work is right now?

7 A What do you mean?

8 Q The work that you just described.

9 A It is in the process of being finalized.

10 Q You said that the Civil Group would supply the capacity  
11 of the pile; is that correct?

12 A No, the Geotechnical Group.

13 Q The Geotechnical Group would supply the capacity.  
14 Have they in fact supplied the capacity of the pile?

15 A The Geotechnical Group has given to Civil Group based  
16 on their assessment of the pile capacity.

17 Q Say that again?

18 A Geotechnical Group has given to Civil Group their  
19 assessment of pile capacity.

20 Q What is that capacity?

21 A I do not recall the exact number, but my recollection is  
22 280 tons ultimate capacity.

23 Q How many piles do you expect to use for the remedy at  
24 the service water structure?

25 A As per present scheme, 16 piles.

1 Q Now, did you say that Dr. Davisson -- I thought you  
2 said that Dr. Davisson will determine the type of pile?

3 A Would recommend the type of pile; yes.

4 Q Would recommend the type of pile. What different types  
5 of piles are there? Have you received a recommendation from him  
6 in this regard?

7 A Yes, sir.

8 Q - What is that recommendation?

9 A Pipe pile -- closed in pipe pile.

10 Q Closed in pipe pile?

11 A Filled with concrete.

12 Q When did you receive that recommendation?

13 A The recommendation was received in '79.

14 Q Has Dr. Davisson given you any recommendation with  
15 respect to the factor of safety?

16 A Yes, sir.

17 Q For the piles at the service water structure, what is  
18 that information?

19 A For the best of my recollection, it is for dead load  
20 2.5 and for a normal SSE -- safe shutdown earthquake -- or  
21 extreme wind, 1.5.

22 Q You also said he will supply you information with  
23 respect to pile specifications; right? Dr. Davisson?

24 A He would review pile specifications.

25 Q He is reviewing that?



1 A He has reviewed it once presently.

2 Q Do you know who in Bechtel has the responsibility of  
3 dealing with Dr. Davisson, or coordinating with Dr. Davisson?

4 A Geotechnical Group.

5 Q Dr. Afifi specifically?

6 A That would be my understanding.

7 Q Has Dr. Davisson completed his work for Bechtel with  
8 respect to Midland and the remedy of the soils problem at Midland?

9 A No.

10 Q What does he have remaining?

11 A We are in the process of doing the final checking.  
12 We have not completed the checking.

13 Q Checking on what?

14 A Checking the piles.

15 Q Tell me specifically, he is going to check the piles?

16 A No, sir.

17 Q Is that what you said?

18 A We will check the piles. Bechtel will check the piles.  
19 Until that checking is completed we cannot finish the pile design.  
20 Therefore he cannot do his final review.

21 Q Tell me what Dr. Davisson has left to do with respect  
22 to the piles?

23 A My understanding is he would be involved with the pile  
24 testing. He would do the review of the specification on  
25 completion of the design, and he would review the pile drawings.

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1 Q Is that it with respect to the piles?

2 A That is my understanding.

3 Q What work does Dr. Davisson have left to do for Bechtel  
4 with respect to the caissons?

5 A It is my understanding that once we finalize the design  
6 and check the caisson capacity and go with the specification, he  
7 will review the specification from the point of view of load  
8 bearing capacity.

9 Q Does that complete your answer?

10 A That is my understanding. Because I am not responsible  
11 for the interfacing with Dr. Davisson, I don't know the exact  
12 details.

13 Q All right, is there any other work that Dr. Davisson  
14 is responsible for in this future with respect to the remedy at  
15 Midland that you have not mentioned so far?

16 MR. FARNELL: Remedies? Are you talking about anything  
17 else besides the pile?

18 MR. PATON: Any of the remedies at Midland with respect  
19 to the soil settlement problem. Anything besides these piles  
20 and caissons? That's right.

21 MR. FARNELL: Any remedies.

22 A It was my understanding he would be involved with pile  
23 and caissons.

24 BY MR. PATON: (Resuming)

25 Q Do I correctly construe your answer that that is all

1 you know about is the piles and caissons? You are not aware of  
2 any other work that he is going to do with respect to the soils  
3 problem at Midland in the future?

4 A That is correct.

5 MR. PATON: Would you provide the NRC with the  
6 specifications and drawings for the underpinning at the auxiliary  
7 building and at the service water structure?

8 MR. FARNELL: I assume you are addressing that to me?

9 MR. PATON: Yes. Let's go off the record. Let's take  
10 a break.

11 (Break.)

12 BY MR. PATON: (Resuming)

13 Q Mr. Dahr, before the break I asked you to provide, or  
14 asked counsel to provide to the NRC specifications and drawings  
15 for the underpinning of the auxiliary building for the electrical  
16 penetration area and the underpinning for the service water  
17 structure. Is it your testimony that those specifications and  
18 drawings are not final?

19 A At the present time I would consider them not final;  
20 yes, sir.

21 Q Are you familiar with the material that has been  
22 supplied to the NRC with respect to the caissons in the electrical  
23 penetration area?

24 A No, sir, I delegated that part of the work by  
25 Deputy Group Supervisor Shing Lo.

1 Q Would you please spell his name?

2 A S-h-i-n-g L-o.

3 Q Is it your testimony that you do not know what material  
4 has been supplied to the NRC with respect to caissons?

5 A I do not know the exact details.

6 Q Do you have an opinion as to whether the material that  
7 you have supplied to the NRC -- and I am asking you for your  
8 opinion -- is sufficient for their review?

9 MR. FARNELL: First of all, he said that he doesn't  
10 know the exact details. I don't know if he can testify to what  
11 is sufficient for the NRC's review.

12 MR. PATON: Okay.

13 BY MR. PATON: (Resuming)

14 Q Do you know whether Consumers has asked the NRC to  
15 approve the remedial action they have suggested at the electrical  
16 penetration area?

17 A Can I talk to my counsel?

18 MR. PATON: Sure.

19 (Deponent conferred with his counsel.)

20 MR. FARNELL: Would you read the question back for me?

21 (Record read.)

22 A My opinion is that that is a legal question between  
23 Consumers and the NRC.

24 BY MR. PATON: (Resuming)

25 Q Okay, would you please answer the question?

1 A To the best of my knowledge they would have based on  
2 what I know.

3 Q Yes, based on whatever you know. Every question I ask  
4 you, you can assume I am asking you for what you know.

5 A Some of them could be based on what I heard.

6 Q Fine. What you have heard, what you have seen, your  
7 direct knowledge, your indirect knowledge -- I just want to know  
8 what you know from any source.

9 A Yes, sir.

10 Q Did you consider that question a difficult question?

11 MR. FARNELL: What type of question is that? I think  
12 that is totally uncalled for.

13 MR. PATON: I will withdraw that question.

14 BY MR. PATON: (Resuming)

15 Q To your knowledge Consumers has asked the NRC to  
16 approve the remedial actions they have suggested in the electrical  
17 penetration area. Now what has Consumers asked Bechtel to do  
18 with respect to the caissons in the electrical penetration area?

19 MR. FARNELL: Will you read that back?

20 (Record read.)

21 MR. FARNELL: I don't know whether you are talking  
22 about construction, or design, or implementation.

23 MR. PATON: That is what I am asking him. What has  
24 Consumers asked him to do?

25 MR. FARNELL: Asked him to do with respect to what?

1 MR. PATON: That's right. That is exactly what the  
2 question is. What has Consumers asked Bechtel to do with respect  
3 to the caissons in the electrical penetration area. I don't  
4 want to answer his question for him.

5 MR. FARNELL: It is vague, but answer the question if  
6 you know what he is talking about.

7 MR. PATON: If he doesn't know what they are asking  
8 him to do, that is a perfectly acceptable answer.

9 MR. FARNELL: If he doesn't understand your question,  
10 that is a perfectly acceptable answer also.

11 A To the best of my understanding Consumers has asked  
12 Bechtel to complete the design and do the analysis which has been  
13 committed in response to various questions to make sure that the  
14 remedial action results in a safe structure and then issue the  
15 necessary documents for construction.

16 BY MR. PATON: (Resuming)

17 Q Do you have an opinion as to whether or not the  
18 information that has been supplied to the NRC with respect to  
19 these caissons is sufficient for them to conduct a review of your  
20 work?

21 MR. FARNELL: For what? By "them" I assume you must  
22 be referring to NRC. For what purpose?

23 MR. PATON: I am not asking him any legal questions;  
24 I am asking him an engineering question. If whether in his  
25 judgment the information that Bechtel and Consumers -- the

1 information that has been supplied to NRC -- is sufficient for  
2 them to review the work that they have done, and I am asking his  
3 opinion.

4 MR. FARNELL: First of all, there is no foundation here  
5 because he said that he doesn't know all of the details. There-  
6 fore, any question is totally -- if I understand the question --

7 MR. PATON: If he has no opinion because he doesn't know  
8 the answer, then that is his answer.

9 MR. FARNELL: I think it is inappropriate, and I don't  
10 understand -- to review the work -- I just don't understand the  
11 last part of your question.

12 MR. PATON: Let me ask the witness if he understands it.

13 MR. FARNELL: Why don't we read it back first.

14 (Record read.)

15 MR. FARNELL: My objection is to review of what. Are  
16 we talking operating license; are we talking construction permits?  
17 It is vague and highly objectionable.

18 MR. PATON: I will attempt to clarify the question and  
19 review the safety aspects of the work. I think the witness  
20 indicated that he was doing this work for the purpose of making  
21 sure that the facility would be safe. I will amend my question if  
22 it helps to ask the witness whether he has an opinion as to whether  
23 or not the information that has been supplied to the NRC is  
24 sufficient in his judgment for them to do a safety review of this  
25 work with respect to safety.

1 MR. FARNELL: I will still object to it. It is still  
2 the same objection as to no foundation. He doesn't know the  
3 details, and by safety review I have no idea what you are  
4 getting at. It still doesn't say whether it is OM or OL.

5 MR. PATON: I am talking clearly about the remedial  
6 actions with respect to the soil problem at Midland, and I think  
7 I limited this before the exchange to the caissons.

8 MR. FARNELL: Right. The caissons are fine, but I am  
9 talking about the safety review. I don't think he used that  
10 exact term, and you still haven't made it clear.

11 MR. PATON: I am not going to answer the question for  
12 the supervisor.

13 MR. FARNELL: You are here to ask clear questions.

14 MR. PATON: It would be nice to hear from the witness.

15 BY MR. PATON: (Resuming)

16 Q Let me ask you this: Can you answer my question?

17 MR. FARNELL: Let's have the question read back. In  
18 fact, you changed it so many times, why don't you ask a new  
19 question. I have no idea what your question is.

20 MR. PATON: I will be glad to. I will be glad to try  
21 it one more time. But I think this is the end of it. If the  
22 witness is not going to be allowed to answer it, then I guess I  
23 will -- I will ask him to answer it, and then see where we go  
24 from there.

25



1 BY MR. PATON: (Resuming)

2 Q Do you have an opinion as to whether the information  
3 that has been supplied to the NRC with respect to the caissons  
4 in the electrical penetration area is sufficient for them to  
5 conduct a review of your work for conclusions with respect to the  
6 safety of this facility?

7 MR. FARNELL: I still have the same objection as to  
8 the foundation. He said that he doesn't know the details, and  
9 also, safety is vague, but if he can answer it, fine.

10 BY MR. PATON: (Resuming)

11 Q Would you answer the question?

12 MR. FARNELL: If he can answer it.

13 A It is my opinion that the information which Consumers  
14 has provided is adequate to make a determination of the concept  
15 and the criteria which are provided.

16 BY MR. PATON: (Resuming)

17 Q You said "make a determination as to the concept"?

18 A The acceptability of the concept.

19 Q Make a determination as to the acceptability of the  
20 concept?

21 A Of the concept.

22 Q Concept of what?

23 A Concept of the remedial action.

24 Q With respect to the caissons, what is that concept?

25 A The concept is to provide the caissons at the extreme

1 end of the electrical penetration area.

2 Q Okay, supply caissons at the extreme ends. Now,  
3 complete your answer as to the concept. Is there anything else  
4 involved in the concept?

5 A Yes, sir. Also to provide a pier under the parapet  
6 which is located adjacent to the electrical penetration area  
7 and tie it to the caissons to take lateral loads.

8 Q Okay, does that complete your answer as to the concept  
9 with respect to the caissons?

10 A I used the strength of the structure to stand between  
11 the caissons and the control tower.

12 Q Sir, does that complete your answer with respect to the  
13 concept of the remedial action?

14 A As far as I can see it at this time, yes, sir, without  
15 going into too much detail.

16 Q Bearing in mind those thoughts, you said that the  
17 information supplied to the NRC is sufficient for them to make a  
18 determination as to the acceptability of the concept. Have you  
19 supplied them sufficient information for them to determine the  
20 acceptability of anything more than the concept, and by that I  
21 mean, for example, the design of the caissons?

22 A We have provided -- to the best of my knowledge, we  
23 have provided to NRC the criteria we would use to check different  
24 parts of the structure.

25 Q Do you have an opinion as to whether NRC has sufficient

1 information to review the design of the caissons?

2 A My opinion is that NRC has adequate information to  
3 examine the concept and criteria which should be utilized to  
4 check the structure.

5 MR. PATON: Would you read that question back, please?

6 (Record read.)

7 MR. FARNELL: From his answer, I believe there might  
8 be some misunderstanding or lack of clarity as to what you mean  
9 by design. Therefore, I am going to object to it on that regard.

10 BY MR. PATON: (Resuming)

11 Q Would you answer the question?

12 A Please read the question back.

13 (Record read.)

14 A I would like clarification of the word "design."

15 BY MR. PATON: (Resuming)

16 Q Would you tell me what you understand by the word  
17 "design"?

18 MR. FARNELL: Are we talking in general now?

19 MR. PATON: We are talking about the caissons.

20 A Installing the caissons at that particular location and  
21 the loads on it. That is what I think right now.

22 BY MR. PATON: (Resuming)

23 Q How about settlement?

24 A Settlement would be an important consideration.

25 Q In the design?

1 A In the design; yes, sir.

2 Q How about bearing capacity?

3 A Load bearing capacity.

4 Q You said loads; that is correct.

5 Bearing in mind your understanding of the use of the  
6 word "design," do you have an opinion as to whether or not the  
7 NRC has sufficient information to review the design of the  
8 caissons?

9 MR. FARNELL: You are talking about the final designs?  
10 I think he has testified they don't have the final designs.

11 MR. PATON: I am aware of that.

12 MR. FARNELL: Also, on the same objection as to whether  
13 we are talking CP or OL review.

14 BY MR. PATON: (Resuming)

15 Q Mr. Dhar, do you have an opinion, bearing in mind your  
16 understanding of the word "design," as to whether the NRC has  
17 sufficient information to review the design of the caissons with  
18 respect to the remedial action that has been proposed by Consumers  
19 for the soils problem at the Midland site?

20 MR. FARNELL: Same objection as to the foundation, and  
21 lack of knowledge as to the details, and vagueness as to whether  
22 it is OL or CP review. If you can understand his question, you  
23 can answer it.

24 A I believe I answered the question before. I repeat the  
25 same answer. The material which has been submitted represents

1 concepts of the remedial action and also the criteria which would  
2 be used to evaluate the adequacy. That part is adequate  
3 information to make determination of that part of the design.

4 BY MR. PATON: (Resuming)

5 Q "That part of the design" -- what part is that?

6 A The adequacy of the concept and the criteria that would  
7 be utilized to establish adequacy of the structure.

8 Q You do not now have a final design --

9 A Yes, sir.

10 Q -- of the caissons; is that correct?

11 A Yes, sir.

12 Q Do you have anything that you call a preliminary design  
13 or interim design? Do you consider that you have any kind of  
14 design of the caissons at this point?

15 A Yes, what we would consider to be a better than  
16 preliminary but less than final.

17 Q Did you state that you don't know exactly what  
18 information has been supplied to the NRC with respect to the  
19 design of the caissons?

20 A Yes, sir, the details of the answers I am not familiar  
21 with.

22 Q Who would have the responsibility within Bechtel to  
23 know that information?

24 A I delegated that part of my work to my Deputy Group  
25 Supervisor, Shing Lo.

1 Q Do you know as a matter of fact whether he knows what  
2 information has been supplied to the NRC?

3 MR. FARNELL: I don't think that is a totally  
4 appropriate question. I don't see how he can get into somebody  
5 else's mind.

6 MR. PATON: Mr. Lo works for him.

7 BY MR. PATON: (Resuming)

8 Q Do you know whether Mr. Lo knows what information has  
9 been sent to the NRC?

10 A Can I talk to my counsel, please?

11 MR. PATON: Certainly.

12 (Deponent conferred with his counsel.)

13 BY MR. PATON: (Resuming)

14 Q Can you answer the question?

15 A I do not know the exact details.

16 Q Have you ever discussed it with Mr. Lo?

17 A Yes, sir.

18 Q Tell me what that conversation was, or those  
19 conversations?

20 A To the best of my recollection I talked to Mr. Lo  
21 regarding the progress, whether he has any problem areas that he  
22 sees, and whether he has answered the question. He reports the  
23 progress to me occasionally and frequently, and any problem areas  
24 he encounters, he advises me of it.

25 Q Okay, you said he reports to you occasionally and

1 frequently. Can you give me some idea of what that means -- once  
2 a week or once a month or what?

3 A That would depend on the particular nature. I would  
4 believe it to be at least once a week.

5 Q Have you discussed with him specifically what informa-  
6 tion has been supplied to the NRC with respect to the proposed  
7 remedial actions at Midland generally?

8 MR. FARNELL: Are we talking all?

9 MR. PATON: I am asking him generally.

10 BY MR. PATON: (Resuming)

11 Q I am sure you communicate with Mr. Lo on many subjects.  
12 My question is, do you recall any conversations where he  
13 specifically addressed what information is being supplied to NRC?

14 A Yes, he reported to me the information supplied in  
15 response to specific NRC requests.

16 Q Did you discuss with him specifically what information  
17 is being supplied to the NRC with respect to the caissons?

18 A No, except that I recall that he told me that some of  
19 these particular specifications were to be submitted to NRC.

20 Q Do you have any idea when?

21 MR. FARNELL: I don't think that implies that it wasn't  
22 submitted.

23 BY MR. PATON: (Resuming)

24 Q When did he tell you that it was to be submitted  
25 approximately?

1 A Approximately. I don't think -- four or five months  
2 maybe.

3 Q Do you know whether or not in fact that has been  
4 submitted?

5 MR. FARNELL: I think that has been asked and answered.

6 BY MR. PATON: (Resuming)

7 Q Did you say that has been submitted?

8 A I said that has been submitted.

9 Q I'm sorry -- do you recall your answer? Do you know  
10 whether or not in fact that summary has been submitted?

11 A I did not know from my personal knowledge.

12 Q Within your responsibilities, do you have any duty or  
13 obligation to sign off, to concur in writing with respect to any  
14 information that is sent to the NRC?

15 MR. FARNELL: Sign off -- what do you mean by sign off?

16 BY MR. PATON: (Resuming)

17 Q Do you understand what I mean by signing off?

18 A No, sir.

19 Q All right, that will be another question.

20 With respect to the concept of the use of caissons, do  
21 you know when that concept was provided the NRC?

22 A To the best of my recollection it was provided in '79  
23 sometime.

24 Q In what form?

25 A In response to NRC Questions.



1 Q Was it conveyed at a meeting in February of 1980?

2 A To the best of my recollection it was presented at a  
3 February 1980 meeting.

4 Q Mr. Dhar, with respect to the concept of the use of  
5 caissons, do you know in response to which NRC Question those  
6 concepts were conveyed?

7 A My recollection is that the first time the concept was  
8 provided in response to Question 12.

9 Q Do you have any disagreement with any information you  
10 have received, Bechtel has received from Dr. Davisson with  
11 respect to the piles or caissons?

12 MR. FARNELL: Read that back, please.

13 (Record read.)

14 MR. FARNELL: I object to it being vague. You are  
15 talking about information, and I don't understand that. It could  
16 comprise many different things.

17 MR. PATON: It could. The basis for the question is  
18 that I am making an unfounded assumption that if he disagrees  
19 with Dr. Davisson on anything, the areas are very narrow, and I  
20 thought that this was the quickest way to get to that subject.  
21 I would like for him to answer the question.

22 MR. FARNELL: I still object. If you can answer it --

23 BY MR. PATON: (Resuming)

24 Q Can you answer the question?

25 A Would you repeat the question?

1 MR. FARNELL: Lec's do them one at a time -- the piles  
2 and caissons. I think if you want to get at it, you might ask  
3 whether he is talking about facts, opinions, or conclusions. It  
4 is just so broad.

5 BY MR. PATON: (Resuming)

6 Q All right, give me facts, opinions, or conclusions with  
7 respect to piles; do you have any disagreement with the facts,  
8 opinions, or conclusions that have been supplied by Dr. Davisson?

9 A We have comments from Dr. Davisson on our specs, and we  
10 got them resolved after talking with him.

11 Q You got comments about specs, and you got them resolved.  
12 What were those comments?

13 A I do not know. As I said before, I am not familiar with  
14 the details.

15 Q Who within Bechtel has the responsibility to be familiar  
16 with those details?

17 A I would consider Geotechnical Group to be knowledgeable  
18 in that.

19 Q Is that Dr. Afifi's group?

20 A Yes, and my Deputy Group Supervisor, Shing Lo, would  
21 know.

22 Q You used the word "resolved." I gather at some point  
23 you have knowledge that there was some comment by Dr. Davisson  
24 that was not in complete accord with Bechtel's thinking; is that  
25 correct?

1 A That is correct, sir.

2 Q Do you remember any of the details?

3 A One I remember regarding the procedure for pouring  
4 concrete in the pipe piles.

5 Q Tell us the facts of that? Tell us what was Dr.  
6 Davisson's comment?

7 A I do not recall the detailed one, but my recollection  
8 of that is that the way we had in the spec the concrete would be  
9 poured, Dr. Davisson had some comment on it, and it was worked out  
10 between Dr. Davisson and our contacts.

11 Q What was his comment?

12 A I do not recall the details.

13 Q Do you recall any of the details of any of these  
14 matters that were resolved?

15 A I do not recall the details.

16 Q Approximately when did Dr. Davisson make these comments?

17 A It would be during 1979.

18 Q Now, have you told us everything you know about any  
19 disagreement you may have had with any facts, opinions, or  
20 conclusions given by Dr. Davisson with respect to the piles?

21 A All that I recall, yes.

22 Q Do you have any recollection of any differences you may  
23 have had with Dr. Davisson's facts, opinions, or conclusions with  
24 respect to the caissons?

25 A I do not, sir.

1 Q Did you have any input into retaining Dr. Davisson?

2 A No, sir.

3 Q Mr. Dhar, I want to show you a table -- 12-1 -- which  
4 is attached to your response to Question 12, and I direct your  
5 attention specifically to Items A2 and 3 on Table 12-1, Items 2  
6 and 3 being electrical penetration areas for Unit 1 and 2, and  
7 under a column headed "Planned Remedial Measures," I see the words  
8 "Underpin With Caissons." I ask you is that what you meant when  
9 you said that the concepts and criteria for caissons were in your  
10 Answer to Question 12?

11 MR. FARNELL: I note for the record that you had given  
12 him Revision 3 dated 9/19, Table 12-1.

13 MR. PATON: Okay, to my knowledge that is the latest  
14 revision.

15 MR. FARNELL: My comment was that I think you were  
16 talking about the first time that the concept was provided to the  
17 NRC, and this table probably does not reflect the first time it  
18 was provided since there apparently were two earlier ones.

19 MR. PATON: I will ask him if it is his testimony that  
20 the concepts were in the earlier versions.

21 BY MR. PATON: (Resuming)

22 Q Let me ask you a slightly different question. Have you  
23 read the portions of Table 12-1 that I have referred you to?

24 A Yes, sir.

25 Q Is it your testimony that that is the concept and

1 criteria that you previously referred to in your testimony for  
2 the caissons?

3 MR. FARNELL: That is too broad.

4 MR. PATON: All right, I will go back and ask him what  
5 I asked before.

6 BY MR. PATON: (Resuming)

7 Q What is your recollection of your prior testimony with  
8 respect to the first time you had advised the NRC concerning your  
9 concepts and criteria for the use of caissons on the auxiliary  
10 building?

11 MR. FARNELL: The question you asked in that regard was  
12 only in regard to concepts; it did not deal with criteria. That  
13 was my understanding.

14 MR. PATON: All right, we will stick with concepts.

15 BY MR. PATON: (Resuming)

16 Q Did you not tell me that it was in response to Question  
17 12?

18 A Yes, I said that my recollection was that it was  
19 Question 12.

20 Q Fine. Is that what you referred to -- those words  
21 there that said "Underpin With Caissons"? Is that your  
22 recollection, or are there other places in your answer to No. 12  
23 where that concept is set forth?

24 A It could be in response to other questions, but it has  
25 been quite some time.

1 MR. FARNELL: What is in Question 12 will speak for  
4 itself.

3 MR. PATON: I am asking for his knowledge of what is  
4 in Question 12. If he would prefer to read that over the lunch  
5 hour, that would save some time.

6 MR. FARNELL: My comment is that Question 12 speaks for  
7 itself, and we don't have the first -- the original -- as opposed  
8 to revisions.

9 MR. PATON: I am asking his knowledge. I understand  
10 there are certain words printed in that answer.

11 A The response to the Question also refers to Interim  
12 Reports 6 and 7, MCAR 24 for the detailed description, and without  
13 having that, I cannot make a judgment.

14 B MR. PATON: (Resuming)

15 Q Mr. Dhar, we asked that you bring with you today any  
16 documents that you have in your files under your control and  
17 supervision with respect to the remedial actions at Midland. Do  
18 you have any such documents?

19 MR. FARNELL: I note for the record that several weeks  
20 ago Consumers produced a massive amount of documents from the  
21 Bechtel files, and included among those documents were documents  
22 from the Civil Group, and those documents were produced at the  
23 request of the NRC. So the answer would be in part that we have  
24 produced these documents. Mr. Dhar did not bring those documents  
25 with him today because they have been produced to you, and you

1 have selected the documents that you wanted, and copies have been  
2 sent and received by the NRC prior to today.

3 BY MR. PATON: (Resuming)

4 Q My question, Mr. Dhar, is other than the documents that  
5 are kept in the files of the Civil Group, do you have any files  
6 of your own other than those?

7 A No, sir.

8 Q Not at all?

9 A I will rely on the Civil Group files.

10 Q Are the Civil Group files in your office?

11 A It is under my -- I am responsible for the files. They  
12 are in the Civil working area.

13 Q What I mean is how far is it from your desk? Is it on  
14 the same floor?

15 A Yes. Right across the aisle.

16 Q So every time you work on the Midland case you get up  
17 from your desk and go over there and get a file and come back;  
18 is that it?

19 A If I need a reference.

20 Q So, in fact, you have no files whatsoever of your own?

21 MR. FARNELL: You asked him only about the Midland case.  
22 It has been asked and answered.

23 BY MR. PATON: (Resuming)

24 Q On the Midland case you have nothing in your desk that  
25 are your own files with respect to the Midland remedial action?

1 A I do not keep a file, but I have papers as they come in.

2 Q You have papers on it as they come in?

3 A Before they go to the file.

4 Q You mean this is only temporary? They are on your desk  
5 for a week or two, or something, and then they go, but you don't  
6 have any other information in your desk as distinguished from the  
7 Civil Group files?

8 MR. FARNELL: With regard to Midland.

9 BY MR. PATON: (Resuming)

10 Q With regard to Midland?

11 MR. FARNELL: That has been asked and answered.

12 BY MR. PATON: (Resuming)

13 Q What is your answer?

14 A Occasionally I make copies for working sometir , and  
15 then I have to work on some reference I need, I make a copy for  
16 working, and when I am done I throw it away because I have the  
17 material already in the file.

18 Q Is there a problem with the soil or the fill at the  
19 service water structure?

20 A To my knowledge, yes, sir.

21 Q What is that problem?

22 A As determined by the Geotechnical engineers, the fill  
23 under the north part of the structure, some part of it, is not  
24 adequately compacted.

25 Q Is there any observed excess settlement at the service



1 water structure?

2 A To my knowledge, no, sir.

3 Q What is the proposed remedy at the service water  
4 structure?

5 A The proposed remedy is to drive piles near the north  
6 end of the structure and construct corbels from the north wall of  
7 the structure and jack the pile against the corbel and lock it off  
8 at predetermined load.

9 Q That last expression you used -- lock it off -- is that  
10 what you said -- l-o-c-k it off?

11 A Yes.

12 Q And complete that -- lock it off --

13 A At predetermined load.

14 Q How many piles do you anticipate using? I know I asked  
15 you that question before?

16 A The present scheme calls for 16 piles.

17 Q Have they been ordered?

18 A Not right now.

19 Q Is that within Bechtel's responsibility to order those  
20 piles, or does Consumers do that?

21 A Bechtel would do that.

22 Q What is the diameter of these piles to be?

23 A As they are presently -- as it stands presently, it is  
24 14 inch diameter pile.

25 Q You say "as it stands presently"; by that do you mean

1 that it may change?

2 A Since we have not completed all of our calculations and  
3 testing of pile, it may.

4 Q Bearing in mind the fact that this diameter may change  
5 as you do additional calculations, for what purpose do you now use  
6 the 14 inches?

7 A We use 14 inches -- it is my understanding that Geotech  
8 will calculate spring constant of the pile based on 14 inches,  
9 and we would prepare our preliminary design based on that 14 inch  
10 diameter.

11 Q What does spring constant mean?

12 A Spring constant means the deflection of the pile for  
13 a given load.

14 Q By "deflection," do you mean lateral?

15 A No, sir, vertical, but it could mean lateral in general  
16 spring constant.

17 Q You said vertical deflection? It includes the concept  
18 of vertical deflection?

19 A For this application; yes.

20 Q And the vertical flection could be caused by what?

21 A Vertical load.

22 Q Does this relate to the length of the pile?

23 MR. FARNELL: What is "this"?

24 BY MR. PATON: (Resuming)

25 Q Spring constant?

1 A I would think so.

2 Q Have you made a preliminary estimate of pile length?

3 A It is my understanding that Geotech has made a  
4 preliminary estimate of pile length.

5 Q Geotech does that, not you?

6 A Yes, sir.

7 Q What is that preliminary estimate?

8 A I do not recall the exact length.

9 Q Do they get any input from you in order to determine  
10 what the length of the pile is going to be?

11 A They would get the input of the top elevation of the  
12 pile.

13 Q From you?

14 A From the structure, yes, sir.

15 Q Is that all they get from you?

16 A And the location.

17 Q Do they get from you the load to be imposed?

18 A This is an iteration process. They would give us the  
19 capacity, and we would run the calculations and see whether they  
20 can work with that capacity. If not, then go back and learn what  
21 the actual loads are.

22 Q They tell you the capacity of the pile before you tell  
23 them what the loads are going to be?

24 A We would give them an approximate idea of the loads, and  
25 that would determine what is to be the diameter of the pile.

1 Q You say an "iteration process"; I gather it goes back  
2 and forth?

3 A Back and forth.

4 Q The first thing you do is give them a rough estimate of  
5 the load to be imposed?

6 A Yes, sir.

7 Q Do you know what that was?

8 A Approximately 100 tons.

9 Q Who made that determination?

10 A Civil Group made that determination.

11 Q And you send that to the Geotechnical Group. What is  
12 it that they determine with that information?

13 A They determine the size of the pile -- the approximate  
14 size of the pile -- and that would give us the ultimate capacity  
15 of the pile and the spring constant.

16 Q How was the spring constant determined?

17 A I wouldn't know the details.

18 Q They determine the size and capacity of the piles, and  
19 then they send that information back to you?

20 A Yes, sir.

21 Q What kind of calculations do you make at that point?

22 A We would go through and establish any jacking load, and  
23 we would go through and determine the seismic analysis and  
24 determine the loads on the pile, and check to determine load  
25 determination and see if we are meeting the required safety factors.

1 Q Do you know how far the piles will be driven into the  
2 glacial till?

3 A I do not remember.

4 Q Do you know if that has been determined?

5 A I believe that will be determined based on the actual  
6 driving records.

7 Q Has any preliminary determination been made in that  
8 regard as to how far they will be driven into the till?

9 A It is my understanding that Geotech has made some  
10 preliminary determination.

11 Q But you don't recall now what it is?

12 A I do not recall.

13 Q Do you know how they make that determination?

14 A I am not familiar with the details.

15 Q Do you have any idea of the information they used to  
16 make that determination?

17 A It is my understanding that they use the boring records.

18 Q What kind of information do they get from the boring  
19 records to make that determination?

20 A As I said before, I am not familiar with the details.

21 Q Do you know when the Geotech Group made the preliminary  
22 estimate of how far they will drive into the till?

23 A My recollection is that was sometime in '79.

24 Q Can you do any better than that? Can you be more  
25 specific than that?

1 A I would think sometime in the summer or fall of '79.

2 Q Did Dr. Davisson supply any information to Bechtel to  
3 your knowledge with respect to the calculation of how far you  
4 expected to drive the pile into the till?

5 MR. FARNELL: Are you talking about the preliminary?

6 MR. PATON: Any information -- file, preliminary,  
7 anything.

8 MR. FARNELL: Preliminary estimate of how far they are  
9 going to drive into the till?

10 MR. PATON: Yes.

11 A As the interface between Dr. Davisson is conducted  
12 through Geotech, I do not recall.

13 BY MR. PATON: (Resuming)

14 Q Did you ever hear any discussion of it? What I want is  
15 your knowledge. Have you ever heard it, or saw it, or from  
16 whatever source?

17 A My recollection is that it was discussed in a meeting,  
18 but I do not recall the exact details.

19 Q Do you know whether the NRC has been supplied any  
20 information with respect to how far you estimate you will drive  
21 the piles into the till?

22 A I do not know the details; no.

23 Q Do you know whether or not in fact you expect to drive  
24 the piles into the till?

25 A My understanding is, yes, we expect to drive it into

1 the till.

2 Q What is the maximum vertical static load to be imposed  
3 on the piles at the service water structure?

4 A I would have to know a little bit more detail before I  
5 can answer the question.

6 Q Is there some part of that question that is confusing?

7 A It is not specific.

8 Q Do you have any difficulty with the word "static," for  
9 example? I understand it to mean dead and live loads, and I would  
10 amend my question to read that way. Does that clarify the  
11 question for you?

12 A Would you please repeat the question?

13 Q Sure. My question should be understood to include --  
14 now, let me ask you. Would you include within the word "static  
15 load," dead load and live load?

16 A Generally speaking, yes.

17 Q Let me ask you that question again. With that under-  
18 standing, what is the maximum vertical static load to be imposed  
19 on piles at the service water structure?

20 A As I recall what I have reviewed so far -- understanding  
21 that the calculations are not yet final -- my recollection is  
22 that they would be jacked to about 100 tons initial jacking.

23 Q Would you expect the final load to be something less  
24 than that -- you said the initial jacking -- is the final load  
25 something less than that?

1 A Yes, I would expect it to be less than that.

2 Q What is the maximum dynamic load to be imposed on the  
3 piles at the service water structure?

4 A I do not recall the exact number, but my recollection  
5 is based on what we have done so far, and remember that is not  
6 finalized yet. But maximum load in any pile or in any particular  
7 pile would be in the order of 180 tons.

8 Q Do you know when you expect to complete these  
9 calculations so that you will have your final figures as opposed  
10 to preliminary figures?

11 A We are in the process of checking the structure, and  
12 my best estimate -- remember I have not discussed it with the  
13 Project regarding the schedule requirements -- it will take us  
14 maybe another two months.

15 Q Have you arrived at any preliminary conclusions with  
16 respect to the margin of safety for dynamic loads?

17 MR. FARNELL: Are you talking based on these  
18 preliminary figures?

19 MR. PATON: Yes.

20 A We have not completed our calculations, so I am not  
21 in a position to answer that question.

22 BY MR. PATON: (Resuming)

23 Q And as to preliminary estimates, you have not completed  
24 those?

25 A We have not a set of numbers that are available to us.



1 Q Have you estimated the long-term settlement of these  
2 piles?

3 A We in Civil Group do not estimate settlement.

4 Q Who does that?

5 A Geotechnical Group.

6 Q Do you know whether Geotechnical has estimated long-  
7 term settlement of the piles?

8 A As I recall in response to recent NRC questions,  
9 Geotechnical Group has done some calculations as to settlement  
10 of piles.

11 Q Is it your statement that you do not remember what  
12 those figures are?

13 A Yes, sir.

14 Q Does the word "acceptance criteria" have any meaning  
15 for you?

16 A I have some understanding of what I understand myself  
17 to be an acceptance criteria.

18 Q Would you tell us what your understanding is of that  
19 word?

20 A For a structure to be acceptable I would consider that  
21 the calculated stresses due to the imposed load should be less  
22 than the allowable stresses.

23 Q Would you include within the concept of your under-  
24 standing of acceptance criteria the margin of safety for dynamic  
25 loads on the piles at the service water structure?

1 MR. FARNELL: Wait a minute. You asked him generally  
2 what he meant by acceptance criteria, and he answered you in a  
3 general sense. Are you moving this into acceptance criteria as  
4 it relates to the OM order or as it relates to 10 CFR, whatever  
5 portion? I think we need much more specific definition of what  
6 is going on here. We are going to have a very confused record.

7 BY MR. PATON: (Resuming)

8 Q Would you answer the question?

9 MR. FARNELL: Would you please repeat the question?

10 (Record read.)

11 MR. FARNELL: My objection still stands.

12 A I need some more clarification of the word "dynamic  
13 load." And what was the other word? What do you mean by "the  
14 factor of safety on dynamic load"? I am not very clear on that.

15 BY MR. PATON: (Resuming)

16 Q Does that expression have any meaning for you?

17 A No, it is not clear to me.

18 Q You don't know what that means? Don't worry about my  
19 meaning of it. You don't understand that expression?

20 A The way it is worded, no.

21 Q My recollection is that you have testified prior to  
22 today that the factor of safety for dynamic loads with respect  
23 to piles at the service water structure was 1.5, I believe, and  
24 you said that Dr. Davisson was going to review that information.  
25 Please correct that if that is wrong.

1           A     My recollection of what I said before was that when  
2 the combined SSE load with other loads, the factor of safety was  
3 1.5.

4           Q     Is that a factor of safety for dynamic loads?

5           A     I still cannot understand that word. It is not a  
6 factor of safety for the dynamic load; no. I thought I was  
7 clear what I said.

8           Q     What is your understanding of the expression "factor  
9 of safety" with respect to pile design?

10          A     I would consider factor of safety to be the ultimate  
11 capacity of the pile divided by the load on the pile under a  
12 particular condition.

13          Q     Okay. Is that factor of safety in your opinion within  
14 the concept of acceptance criteria for the piles at the service  
15 water structure?

16               MR. FARNELL: As I recall his acceptance criteria deals  
17 with buildings, not piles.

18               MR. PATON: Maybe I have made a mistake. I will ask  
19 him that question.

20               BY MR. PATON: (Resuming)

21          Q     Is your concept of acceptance criteria such that it  
22 cannot be applied to piles at the service water structure?

23          A     The concept of stress, allowable stress versus actual  
24 stress may not be applicable to the piles. That is applicable  
25 to the structure.

1 Q But you indicated with respect to the piles there is  
2 a concept which you have called the factor of safety that has  
3 to do with capacity versus expected load?

4 A Yes, sir.

5 Q Considering your understanding of the word "acceptance  
6 criteria," could it have any application to your proposal for the  
7 use of piles for the service water structure?

8 A I don't understand your question.

9 Q Considering your concept of the expression "acceptance  
10 criteria," could that apply to the piles proposed by you at the  
11 service water structure?

12 MR. FARNELL: Again, we are referring to his definition,  
13 and we are not relating it to my objection of acceptance criteria  
14 CT, OL, or any part of 10 CFR which hasn't been defined.

15 BY MR. PATON: (Resuming)

16 Q Can you answer the question?

17 A Please repeat the question.

18 (Record read.)

19 MR. FARNELL: In order to save time I will put a  
20 continuing objection on the record as to acceptance criteria if  
21 it is not defined as to what it relates to, and acceptance criteria  
22 may also in a certain sense be a legal term, and Mr. Dhar is not  
23 qualified to answer those types of questions.

24 BY MR. PATON: (Resuming)

25 Q Can you answer the question?

1 A In my personal opinion?

2 Q Yes.

3 A As a structural engineer, the acceptance criteria of  
4 the pile -- the concept of the factor of safety could be used as  
5 an acceptance criteria of the pile.

6 Q Thank you. Will the piles proposed to underpin the  
7 service water structure have lateral loads imposed?

8 MR. FARNELL: At any time during?

9 BY MR. PATON: (Resuming)

10 Q At any time.

11 A No credit has been taken in the analysis done so far.  
12 No credit has been taken for the lateral capacity of the pile.

13 Q Okay, my question was will the piles under the service  
14 water structure have lateral loads imposed?

15 A My answer stands.

16 Q I understand that you have not taken credit for lateral  
17 capacity. My question is will there be any lateral loads  
18 imposed?

19 A I will have to talk to my counsel before I answer your  
20 question.

21 (Deponent conferred with his counsel.)

22 A My answer to your question is that I do not know.

23 BY MR. PATON: (Resuming)

24 Q Do you know whether in the event of an earthquake if  
25 any lateral loads would be imposed on the piles of the service

1 water structure?

2 MR. FARNELL: I think that is assumed by what he said  
3 previously.

4 BY MR. PATON: (Resuming)

5 Q Is that correct? Your answer is that you don't know?

6 A My answer is that I do not know.

7 Q Do you know whether Bechtel ever gave any consideration  
8 to whether lateral loads would be imposed on the piles?

9 A We didn't consider it a lateral load to be carried by  
10 the piles.

11 MR. PATON: Would you read that last answer back,  
12 please?

13 (Record read.)

14 BY MR. PATON: (Resuming)

15 Q Okay, Mr. Dhar, I want to ask you about that answer  
16 which I heard to be: We didn't consider it a lateral load to  
17 be imposed on the piles. I will ask you a question. I am not  
18 sure I understand that. Did you address the subject of lateral  
19 loads to be imposed on the piles, if any? Did you consider that  
20 at all?

21 MR. FARNELL: He said that he didn't know if there was  
22 going to be any lateral load.

23 BY MR. PATON: (Resuming)

24 Q My question is, did you make any investigation of that  
25 subject?

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MR. FARNELL: What subject?

MR. PATON: Come on -- what subject.

MR. FARNELL: There has been 80 different concepts bandied about here.

MR. PATON: I am talking about lateral loads on the piles which I have been talking about for five straight minutes, and then you ask me what subject -- I don't understand that. During any lateral load at any time caused by any force.

MR. FARNELL: Sure. Beautiful.

BY MR. PATON: (Resuming)

Q Did you ever consider that?

A Would you please repeat your question?

Q Yes, sir. Did Bechtel ever consider whether lateral loads would be imposed on the piles?

A Bechtel did not consider lateral loads to be imposed on the pile.

Q Can you tell me why Bechtel did not consider lateral loads to be imposed on the pile?

A Because it is considered that the piles are laterally very flexible compared to the structure which is founded on original soil, and therefore does not carry any part of the lateral load.

Q Your conclusion is that there will be no lateral load imposed on the pile; is that correct?

MR. FARNELL: That has been asked and answered.

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MR. PATON: If he did, I missed it.

BY MR. PATON: (Resuming)

Q Is that correct, or don't you know? I hear conflicting things. Either you don't know, or you concluded that it will not be imposed? Which is the answer?

A I already answered your question whether there will be lateral loads on the pile.

Q And your answer is that you do not know?

A I do not know, and then your question was whether the pile has been considered to carry lateral load, and to that question I would answer that the pile will not carry lateral load.

Q I construed your answer to be that you investigated this matter, and you have concluded that there will be no lateral load on the pile; is that correct?

A We have concluded that the piles would not resist any lateral load.

Q Okay, please explain your answer that you didn't know. You said that you didn't know whether there would be any lateral loads. I don't understand that.

A I think I answered -- To the best of my recollection your question was whether a lateral load would be imposed on the pile.

Q Yes.

A And to that I said I didn't know. When the question of resistance came in I said they would not resist any lateral



1 load.

2 Q They would not resist any lateral load?

3 A Yes, sir.

4 Q How was the pile connected with the corbel?

5 A To the best of my recollection, the pile will be  
6 shimmed against the corbel.

7 Q Okay, would you explain what you mean by shimmed?

8 A Shims will be provided between the pile and the corbel.

9 Q Shims -- what is a shim?

10 A A shim is a piece of metal.

11 Q The corbel rests on top of the pile; is that correct?

12 A To the best of my recollection of the details, the  
13 corbel does not rest on top of the pile but is of the pile.

14 Q Is there a connection between the corbel and the pile?

15 A When they are constructed?

16 Q Yes.

17 A No, sir.

18 Q How far above the pile is the corbel?

19 A I do not remember that kind of intricate details.

20 Q Is the pile directly below the corbel?

21 A What do you mean by "directly"?

22 Q Is the purpose of the pile to support the corbel?

23 A I would consider it the other way around.

24 Q You mean the corbel is to support the pile?

25 A The corbel is to transfer the load from the pile.

1 Q In normal static conditions, can you tell me the  
2 distance between the corbel and the pile?

3 A Those are the details that are to be worked out. I  
4 believe we have some preliminary details, but I do not recall the  
5 exact distance.

6 Q Do you know now whether it would be more or less than  
7 six inches?

8 A I think it would be more than six inches.

9 Q How wide is a shim, or how wide are the shims that you  
10 would expect to use?

11 A As I said, I do not recall the details. These are to  
12 be worked out, and I do not know if they have been worked out to  
13 that extent to give dimensions at this time.

14 Q Is it possible that they would use a wedge rather than  
15 a shim?

16 A It is possible.

17 Q Do you know for sure which they are going to use?

18 A No, I do not remember the details.

19 Q Who within your section is responsible to know that  
20 kind of detail?

21 A If a details has already been developed to that extent  
22 that the shim sizes has been worked out and all gaps have been  
23 finalized, then I think that Shing Lo would know.

24 Q In the event of a safe shutdown earthquake, do you think  
25 there would be any connection between the top of the pile and the

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1 corbel?

2 MR. FARNELL: Any connection?

3 MR. PATON: Yes.

4 MR. FARNELL: What do you mean by "connection"?

5 BY MR. PATON: (Resuming)

6 Q Do you understand what I mean by that?

7 A Do you mean contact?

8 Q Yes, during a safe shutdown earthquake?

9 A That will depend on our final analysis and the loads  
10 which are on it whether there is any separation or not.

11 Q Do you expect a safe shutdown earthquake would impose  
12 any lateral loads on the structure itself?

13 A Yes, sir.

14 Q Would these lateral loads be imposed on the corbel?

15 MR. FARNELL: Lateral loads developed during the  
16 earthquake?

17 MR. PATON: Yes.

18 A There would be a small initial effect on the corbel  
19 itself, but since the piles are not carrying any lateral load and  
20 are not resisting any lateral load, I do not expect a great deal  
21 of load to be transferred to the corbel.

22 BY MR. PATON: (Resuming)

23 Q You say that the pile will not resist any lateral load  
24 because there is no connection between the pile and the corbel?

25 A No, sir, because of the stiffness.

1 Q The stiffness of the pile?

2 A Stiffness in relation to the bottom of the foundation.

3 Q The bottom of the foundation of the structure?

4 A Of the structure, yes.

5 Q Has anyone in Bechtel, to your knowledge, ever given  
6 an opinion that the piles will resist some lateral load?

7 A To my knowledge nobody has given an opinion that the  
8 pile will resist a lateral load.

9 Q How many people within Bechtel have addressed this  
10 subject?

11 A To my knowledge it has been addressed by myself, Shing  
12 Lo, and the people who work on the detailed design, and the Chief  
13 Engineer's office -- the Chief Engineer and his staff.

14 Q And it is your judgment that the pile will not resist  
15 any lateral load?

16 MR. FARNELL: Asked and answered. Go ahead.

17 A That is my judgment; yes, sir.

18 BY MR. PATON: (Resuming)

19 Q Do you know what material you have on your desk right  
20 now with respect to the Midland soils settlement problem?

21 A I do not. That is hard for me to answer.

22 Q Do you have any preliminary specifications on your desk?  
23 Do you know that?

24 A For what?

25 Q For the underpinning at the electrical penetration area

1 or the service water structure?

2 A To the best of my -- I will have to guess if I answer.

3 Q I don't think your lawyer would want you to guess.

4 MR. FARNELL: Don't guess.

5 A I don't know.

6 BY MR. PATON: (Resuming)

7 Q I will ask your attorney if you would on your lunch  
8 hour take a look at what is sitting on your desk with respect to  
9 the Midland soil problem and provide that information after  
10 lunch?

11 MR. FARNELL: In the spirit of Christmas I will.

12 (Off the record -- lunch break at 11:42 a.m.;  
13 proceedings reconvened at 1:00 p.m.)

14 BY MR. PATON: (Resuming)

15 Q Mr. Dhar, prior to the discovery of the settlement  
16 problem at the Midland site, did Bechtel perform seismic  
17 structural analysis for the service water structure?

18 A Yes, sir.

19 Q After the discovery of the settlement problem at the  
20 site, did Bechtel perform another seismic structural analysis  
21 that related to the proposed remedy?

22 A Yes.

23 Q When did you complete that second analysis?

24 A What do you mean by "completed"?

25 Q When did you finish it? Let me ask you this: Have you

1 finished it?

2 A We have got an analysis which is based on some spring  
3 constants which was done by Geotech, and until these spring  
4 constants are verified, the analysis is not complete.

5 Q Who verifies those spring constants? Is that done in  
6 your section?

7 A No, sir. Geotechnical.

8 Q Do you consider in your own judgment that the second  
9 analysis is completed?

10 MR. FARNELL: That has been asked and answered.

11 MR. PATON: It is specifically what he didn't answer.

12 A Based on the assumed properties, the second analysis  
13 has been completed.

14 BY MR. PATON: (Resuming)

15 Q Based on the assumed --

16 A Not the assumed. I will correct that. Based on the  
17 stiffness we got from Geotech, it has been completed.

18 Q Do you know how Geotech established those values?

19 A No, sir, I do not. I do not know the details.

20 Q You attended a meeting in Bethesda either last Friday  
21 or the Friday before that; is that correct?

22 A Yes, the 5th of December.

23 Q Did that concern seismic information?

24 A Yes.

25 Q What was the purpose of your attending the December 5

1 meeting?

8-1 2 A My purpose was to listen to the presentation made by  
3 Western Geophysical in support of the site specific response  
4 spectra.

5 Q You said in support of the site specific response  
6 spectra. I am not sure that I understand in what context you  
7 made that statement?

8 A In that meeting Western Geophysical presented site  
9 specific response spectra for Midland and the justification and  
10 data base for that.

11 Q Is someone suggesting that you use site specific  
12 response spectra at Midland?

13 A That is my understanding.

14 Q Who is suggesting that? Bechtel or the staff?

15 A It is my understanding that the staff wrote a letter  
16 to Consumers suggesting site specific response spectra.

17 Q And you are now considering whether you think that is  
18 the appropriate way to go?

19 A That consideration is being made by Consumers Power.

20 Q And to your knowledge have they decided whether that  
21 is appropriate or not?

22 A We have not received any specific directions from  
23 Consumers Power.

24 Q Has the staff within the last two years indicated to  
25 Bechtel that there is any change in their thinking with respect

1 to seismic requirements at the Midland site?

2 A To my recollection, yes.

3 Q Tell me what your understanding is of that change in  
4 thinking?

5 A My understanding that the staff does not consider  
6 Michigan tectonic province to be an acceptable criteria for the  
7 finding of seismic motion.

8 Q I didn't hear the last couple of words you said.

9 A The Michigan tectonic province concept to be an  
10 acceptable concept. Therefore, staff -- I am not an expert on  
11 seismology so I may not interpret the staff's concern in this  
12 regard, but I will give you my understanding.

13 Q That is what I am asking for.

14 A Therefore, staff believes that some modification is  
15 to be done to the seismological input to the Midland design,  
16 and in their last letter staff defined the criteria that would  
17 be acceptable to the staff for this purpose.

18 Q Is that to your knowledge a letter from Robert Desco  
19 to Vice-President Cooke dated October 14, 1980?

20 A That is my understanding.

21 Q Do you plan to incorporate the new seismic information  
22 from the staff into a future seismic structural analysis?

23 A I do not know.

24 Q Is that under consideration at the present time?

25 A Yes.



1 Q In the seismic structural analysis that you performed  
2 after you discovered this soil settlement problem at Midland,  
3 was the floor response spectra for the diesel generator building  
4 generated on the assumption that the shear wave velocity would  
5 not be lower than 500 feet per second?

6 MR. FARNELL: Would you repeat that one, please?

7 (Record read.)

8 A The answer to that question is yes.

9 BY MR. PATON: (Resuming)

10 Q Have you assured yourself that the soil shear wave  
11 velocity will not be less than 500 feet per second for the life  
12 of the plant?

13 MR. FARNELL: For the diesel generator that we are  
14 talking about?

15 MR. PATON: I will accept that amendment.

16 A I do not know.

17 BY MR. PATON: (Resuming)

18 Q You have described generally the proposed remedy at  
19 the service water pump structure. My question is, did Bechtel  
20 consider any alternative corrective actions?

21 A Based on my best recollection, we did consider other  
22 alternatives. One of them was to remove and replace the fill  
23 under that part of the building, and the other one was to  
24 strengthen the structure.

25 Q You said strengthen the structure?

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A Yes.

Q In your consideration of removal and replacement of the fill, did you consider the cost of that alternative?

A To my recollection we didn't go that far.

Q Why was that alternative rejected?

A My recollection is that based on the expert opinion that the problem of dewatering the area with the high pond level, the investigation of that was not pursued.

Q You now plan permanent dewatering of that area, don't you?

A Around that area, yes, sir.

Q Did you know at the time you rejected the alternative to remove and replace the fill, did you know at that time that you were going to have permanent dewatering in the area?

A My recollection is no.

Q Did you perform any structural analysis for the alternative of removing and replacing the fill?

A No.

Q Did you perform any structural analysis for the alternative of strengthening the building?

A To the best of my recollection, no.

Q On what did you base your judgment to go with the remedy that you have described?

A My recollection is that this was based on preliminary analysis of that particular fix, feasibility of the scheme, and

1 the practicality of construction.

2 Q Okay, feasibility of the scheme and practicality of  
3 construction. Practicality would indicate to me dollars. Did  
4 you consider dollars?

5 A My recollection is a little bit not clear at this time  
6 what are the factors we considered, but these are the ones that  
7 I remember now.

8 Q Who made the decision to proceed with the remedy that  
9 you have stated was proposed for the service water structure?

10 A The decision was made by the task force.

11 Q There was a task force created for this purpose?

12 A For resolving this problem -- a plan for the problem.

13 Q Does that task force still exist?

14 A To my understanding it does not exist any more.

15 Q Was that just Bechtel, or was that a joint task force  
16 with Consumers?

17 A It is my recollection that there was a Consumer member  
18 on the task force.

19 As I remember it it was Mr. Widener, myself, Dr. Afifi,  
20 Jim Wanzeck, from Construction, Al Boos, and from Consumers it  
21 is my recollection that it was Mr. Tom Cooke who attended the  
22 meetings of this task force.

23 Q How about Gil Keely? Was he on this task force?

24 A I do not recall whether he was a formal member of the  
25 task force. He might have attended some of the meetings.

1 Q Do you have an opinion now that the knowledge that a  
2 permanent dewatering system is planned for the site, do you have  
3 any opinion as to whether the alternative of the removing and  
4 replacing the fill would be a better alternative?

5 MR. FARNELL: Better from what point of view?

6 MR. PATON: Better from the point of view that Bechtel  
7 approaches it.

8 MR. FARNELL: Objection. Vague.

9 A My knowledge of the dewatering problems is very limited;  
10 therefore, I cannot comment on the feasibility of that scheme  
11 from that particular aspect.

12 BY MR. PATON: (Resuming)

13 Q Let me ask you to assume that the dewatering system works?

14 MR. FARNELL: It still doesn't take care of his  
15 problems, and there is an objection to the foundation regarding  
16 his knowledge of dewatering.

17 BY MR. PATON: (Resuming)

18 Q Bechtel made that judgment in the first place. If you  
19 are unable to tell me assuming with the permanent dewatering  
20 system that would affect your judgment, I will not press it.

21 MR. FARNELL: Bechtel made the decision; he didn't say  
22 he made the decision. There is no foundation for that question.

23 BY MR. PATON: (Resuming)

24 Q Do you have any opinion as to whether with the knowledge  
25 of the permanent dewatering system that Bechtel proposes -- and I

1 asking you to assume that that permanent dewatering system would  
2 function -- whether the removing and replacing alternative would  
3 now be favored by you?

4 MR. FARNELL: It is still a hypothetical question. I  
5 will also object because of lack of foundation.

6 BY MR. PATON: (Resuming)

7 Q Could you answer the question?

8 A My understanding is that a permanent dewatering system  
9 will draw water to an elevation of 595. At this time I do not  
10 recall up to what level we have to dewater to remove and replace  
11 the fill. Therefore, I still do not know whether it is feasible  
12 or not.

13 Q With respect to the service water structure, did you  
14 perform any analysis to determine whether the longitudinal bolts  
15 that will be used at the service water structure will withstand  
16 the forces produced in the bending mode?

17 A May I ask "bending mode" of which one?

18 Q Let me ask you this: Do you plan to use longitudinal  
19 bolts at the service water structure?

20 A The present scheme calls for it.

21 Q Are they longitudinal bolts?

22 A They are long.

23 Q Approximately how long?

24 A I don't remember, but by standard of bolts, they are  
25 long.

1 Q Will there be any bending stress on these bolts at all?

2 MR. FARNELL: At any time?

3 MR. PATON: Yes, any time. Normal use, earthquake,  
4 any other time, will there be any bending force on those bolts?

5 A Bending stress on the bolt itself?

6 BY MR. PATON: (Resuming)

7 Q Yes.

8 A At this time I do not see how there will be bending in  
9 the bolt itself.

10 Q Then I would assume from your answer that you perform  
11 no analysis of any possible bending stress on the bolt itself?

12 A That is my recollection, yes.

13 Q Have you told us all of the alternatives that were  
14 considered at the service water structure?

15 A My recollection is we considered those three.

16 Q Now, you have just answered the question, but --

17 A Let me add on to that answer that my recollection is  
18 that we sometimes consider the alternative of underpinning --  
19 putting the pile under the building also. I would consider  
20 that to be a variation of a pile scheme.

21 Q Did you consider any alternative that would involve  
22 a foundation under the north section supported by the tail other  
23 than piles?

24 A My recollection is at that time, no.

25 Q You say "at that time," have you considered that since

1 then?

2 A Since then we have.

3 Q You have? When did you consider that?

4 A Very recently in the scheme.

5 Q Was that rejected?

6 A That has not been examined in any detail.

7 Q Who proposed that?

8 A That proposal came in from one of the staff members --  
9 Civil staff.

10 Q You don't recall who?

11 A Yes, Gordon Tuveson.

12 Q Is he with Bechtel?

13 A Yes, sir.

14 Q Do you have any plans to consider that alternative?

15 MR. FARNELL: You mean make an analysis on it?

16 BY MR. PATON: (Resuming)

17 Q Do you have any plans to do anything with that  
18 alternative? You have got it.

19 Let's go off the record.

20 (Off the record.)

21 THE WITNESS: I remembered one more name. Gary  
22 Richardson was on the task force.

23 MR. PATON: And you are all set on these names. Before  
24 we read back the question, let me --

25 Let the record show that as a result of our request that

1 Mr. Dhar checked his desk over the lunch hour and provided us any  
2 information in his possession or in his desk that relates to  
3 Midland. We have just been provided a stack of material which I  
4 will estimate is approximately six inches high, and we are just  
5 beginning to look through that material.

6 MR. FARNELL: From what I understand, these were  
7 documents that were on his desk and not in his desk, and were  
8 the type of documents that he testified previously that he would  
9 use until he finished with them, and then they would go into the  
10 files. They have already been produced as far as we know.

11 MR. PATON: We had better read that last question  
12 because I want to ask him something about the documents. Read  
13 that last question back, if you will.

14 (Read record.)

15 BY MR. PATON: (Resuming)

16 Q Do you understand the question? I will be glad to  
17 repeat it. Before we took the break we were discussing an  
18 alternative that I believe you indicated was suggested by NRC.

19 A No, Civil staff.

20 Q I'm sorry -- Mr. Tuveson.

21 A Of Bechtel Civil staff.

22 Q Would you state briefly what that was?

23 A The alternative was to investigate what the origin of  
24 the ground surface is in relation to the so-called cantilevered  
25 part of the building and what it would take to extend the



1 foundation of that building into the original sun.

2 Q And have you seriously considered that alternative?

3 A No, we just started. It was a suggestion that needed  
4 to be looked at so we went through and made a preliminary sketch  
5 of that.

6 Q Generally what are your plans at this point. You have  
7 taken a preliminary look at it. What do you plan to do next?

8 A It was suggested as a contingency plan in case we  
9 have got a problem with another scheme available.

10 Q I assume that you have not performed any structural  
11 analysis with respect to that suggestion?

12 A That's correct.

13 Q Do you have any plan for preservice inspection of the  
14 bolts that you propose to use at the service water structure?

15 A At this time, no.

16 Q Do you have any plans for in-service inspection of the  
17 bolt during the life of the plant?

18 A At this time, no.

19 Q You know whether you plan to have such inspection at  
20 any time in the future?

21 A We will have to look at the situation and evaluate and  
22 determine whether such a plan will be necessary.

23 Q As far as you know right now you can't conclude that  
24 it will be necessary or not. At least you have not made that  
25 decision at this point?

1 A We have not made a detailed examination; no.

2 Q Have you performed any analysis to assure yourself that  
3 the piles underpinning the service water pump structure will  
4 provide adequate vertical support after the occurrence of an  
5 operating basis earthquake?

6 A We are in the process of doing those calculations.

7 Q Can you tell me approximately when you started doing  
8 those calculations?

9 A Approximately -- it would be in '79. My best estimate  
10 would be in the spring of '79.

11 Q And you are indicating that you are still doing those  
12 calculations?

13 A Yes.

14 Q That is approximately a year and a half -- is that  
15 correct -- from the spring of '79 to the present time?

16 A Yes, sir.

17 Q Is there anything unusual about that length of time?  
18 Is that usually the length of time that it would take to make a  
19 calculation like that?

20 A I would consider it to be longer than the usual time.

21 Q Do you know the reason that it is taking longer than  
22 usual?

23 A We did some part of the calculations. Then during the  
24 meeting of February 1980, NRC indicated that we have to do a  
25 biometric study, and then we went back and did the biometric

1 study, and then the loads are changed, and then we go back and  
2 redo the calculations. And since that time we have not completed  
3 all the evaluations.

4 Q Now, I will ask you all of those same questions about  
5 the safe shutdown earthquake unless you tell me that the answers  
6 would be the same. I just asked you about the operating basis  
7 earthquake. Would the answers be generally the same?

8 A The answers would be generally the same, but if you  
9 want to ask me one more time --

10 Q No, I don't mind asking you. As far as you know your  
11 answers would be the same?

12 A Yes.

13 Q With respect to the long longitudinal bolts that will  
14 be used at the service water structure, will they be pre-tensioned?

15 A The present scheme calls for pre-tensioning.

16 Q Okay, what does that mean?

17 A That means that the scheme that we have got right now  
18 does require pre-tensioning.

19 Q That is my question: What is pre-tensioning?

20 A Pre-tensioning means you stretch the bolt before you  
21 put it in service so that when there is a tension load in the  
22 bolt, the bolt still has got some compression left -- the  
23 interface has some compression left in it. Pre-tensioning means  
24 stretching the bolt to some predetermined value before putting it  
25 in service by some predetermined force.

1 Q Does the word "friction fit" have any meaning for you?

2 A It is not very clear to me.

3 Q Does that concept of friction fit, does that have any  
4 meaning with respect to the proposed service water structure?

5 A I do not understand your word.

6 Q Do you have any understanding of the word?

7 A I can only guess what it means, but I would not like  
8 to do that.

9 Q Have you assured yourself that the concrete at the  
10 interface between the corbels and the service water pump  
11 structure can adequately resist bearing pressures developed as a  
12 result of pre-tensioning of the bolts?

13 A In the analysis that we have done so far, yes.

14 Q Do you know whether the permanent dewatering system  
15 will be designed to withstand a safe shutdown earthquake?

16 A My understanding is, yes, that it will be designed to  
17 withstand the safe shutdown earthquake. I will have to change  
18 the answer. Do you mean the system itself?

19 Q The permanent dewatering?

20 A The system itself?

21 Q Yes.

22 A My understanding is that it will not. I misunderstood  
23 the question.

24 Q The first time I asked you that question you answered  
25 "yes." What were you responding to?

1           A     I was responding to the aspect of the design where the  
2 sand when subjected to the safe shutdown earthquake would liquify,  
3 and that earthquake aspect was considered SSE.

4           Q     I want to ask you about that statement. I will say  
5 what I think you said, and please tell me whether I am right or  
6 wrong? I think you said that in considering the permanent  
7 dewatering system, you were considering its impact on sand, and  
8 the question was will the sand undergo liquefaction, and the  
9 force that you put into that computation to say whether the sand  
10 would undergo liquefaction was the force to be expected from a  
11 safe shutdown earthquake; is that correct?

12          A     Yes, that is correct.

13          Q     You say that slightly grudgingly. Is there any part  
14 of that that is wrong?

15          A     I would say that I do not agree with the way that you  
16 have worded it. The wording may not be technical in all respects,  
17 but I said, yes, because the general idea is correct.

18          Q     Are there any seismic category 1 valve pits located in  
19 the fill adjacent to the east and west sides of the generator  
20 building?

21          A     Yes, sir.

22          Q     Did any changes occur to these pits during the diesel  
23 generator surcharge program?

24               MR. FARNELL: What do you mean by "change"?

25               MR. PATON: If the witness doesn't understand the

1 word I will abandon the question.

2 A I don't understand the question.

3 BY MR. PATON: (Resuming)

4 Q You don't understand the word "changes"?

5 A Yes, sir.

6 Q All right, that is fine.

7 Do any cracks exist in these pits?

8 A My recollection is not very clear on whether we have  
9 looked for cracks in there or not. If we have looked for cracks  
10 or not, I do not recall.

11 Q Do you know during the diesel generator building  
12 surcharge program were there any changes in the rattle space for  
13 piping?

14 A I do not know how much changes there were, but my  
15 recollection is that it was measured.

16 Q Is it your recollection that there was in fact some  
17 change?

18 A I do not recall it.

19 Q You are saying you are not sure whether there was any  
20 change?

21 A Yes, sir, I am not sure.

22 Q I am not sure I can reconcile that with your previous  
23 answer. I thought you said that it was measured?

24 A The gap before and after was measured.

25 Q It was measured, but there may or may not have been

1 change?

2 A There may or may not have been change; yes.

3 Q Are you aware that the diesel generator building walls  
4 show cracking?

5 A Yes, sir.

6 Q What was the reason for the cracks?

7 A The cracks could have been caused by shrinkage; they  
8 could have been caused by settlement compounded by the fact that  
9 the concrete did not gain enough strength. At that time there  
10 may have been some settlement and the concrete cracked.

11 Q All right, your answer was that it could have been this  
12 or it could have been that. Have you determined what the cause  
13 of the cracks was?

14 A My recollection is that a detailed study was done in  
15 response to a NRC question, and the results have been submitted  
16 to the NRC.

17 Q I am asking you your recollection. Do you remember the  
18 cause? Do you remember from any source whatsoever the cause of  
19 the cracks?

20 A As I said before, the causes of the cracks -- it could  
21 be either shrinkage or due to settlement.

22 Q Were there any cracks that you have determined that were  
23 caused by settlement?

24 A My recollection is that, yes, there were some cracks  
25 that have been determined to be caused by settlement.

1 Q When did you first become aware of cracks that were  
2 caused by settlement?

3 A When I joined the task force for the diesel generator  
4 building and the cracks were shown to me to be existing in the  
5 building.

6 Q When was that?

7 A November of '78.

8 Q Which walls have cracks that have resulted from  
9 settlement?

10 A My recollection is that the east wall has cracks where  
11 the building was being held up by the duct bank.

12 Q How about the north wall?

13 A There was some cracks, not many.

14 Q My question is settlement cracks -- were there any  
15 settlement cracks in the north wall?

16 A I do not remember the details.

17 Q How about the south wall?

18 A There are some cracks on the south wall. I do not  
19 recall what they were caused by.

20 Q How about the west wall?

21 A My recollection is that there were not many cracks in  
22 the west wall.

23 Q Are there any cracks in the west wall?

24 A I do not recall.

25 Q Do you know whether these cracks were any different



1 after the surcharge program than they were before the surcharge  
2 program?

3 A My recollection is that they are essentially the same.

4 Q If I asked you to sketch on a piece of paper the  
5 pattern of any of these cracks, could you do it?

6 A No, sir, I wouldn't think so.

7 Q Do you know the condition of the cracks now?

8 A My recollection is that the cracks have stabilized  
9 so that there is no significant change.

10 Q When did you last see the cracks?

11 A Maybe a few months ago when I went to the job site.

12 Q Maybe is a little bit indefinite. I want you to tell  
13 me do you know in fact whether you saw the cracks a couple of  
14 months ago when you went to the job site?

15 A I cannot be absolutely certain.

16 Q When was the last time you can be certain that you saw  
17 the cracks?

18 A That would be after the surcharge was removed.

19 Q That is sometime in 1979?

20 A Yes, sir.

21 Q How many times in your life can you tell me that you are  
22 certain that you have seen these cracks?

23 A I don't know how to answer that question.

24 Q Can you tell me positively that you have seen them at  
25 least once in your life?

1 A Yes.

2 Q Twice?

3 A Yes.

4 Q Three times?

5 A I would say so.

6 Q You are certain of three?

7 A Yes.

8 Q How about four?

9 A I would say yes.

10 Q Seven?

11 A I would not be able to say with any confidence.

12 Q Is it within the scope of your responsibility to go  
13 to the site and observe these cracks?

14 THE WITNESS: Can I talk with my counsel?

15 MR. PATON: Certainly.

16 (Deponent conferred with his counsel.)

17 A I have delegated that responsibility for the soil  
18 settlement problem to Shing Lo, and I am not aware of what he  
19 has done about a crack monitor.

20 BY MR. PATON: (Resuming)

21 Q Let me understand that. You say that you have delegated  
22 your responsibility for the soil settlement problem to Mr. Lo?

23 A Yes, sir.

24 Q All the responsibility? You said that you have  
25 delegated the responsibility to Mr. Lo. Is it just that

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1 straightforward? You have delegated all your responsibility?

2 MR. FARNELL: That is in response to your question.

3 MR. PATON: I am asking him to explain it.

4 A Yes, I have delegated the responsibility.

5 BY MR. PATON: (Resuming)

6 Q All your responsibility with respect to the settlement  
7 problem?

8 MR. FARNELL: The term "delegation" --

9 MR. PATON: That is his word.

10 THE WITNESS: What do you mean by "all"?

11 MR. PATON: If you don't know the meaning of "all," I  
12 will abandon the question and go on. I am not going to  
13 participate in that kind of discussion. If he doesn't understand  
14 the meaning of the word "all," I will abandon the question.

15 MR. FARNELL: I am not sure what you are getting at.

16 MR. PATON: If he doesn't understand the word "all,"  
17 I will proceed with my interrogation.

18 MR. FARNELL: That was in regard to this question.

19 MR. PATON: Fine. He just said he didn't understand  
20 the word "all." If that is his testimony that is fine; I will  
21 abandon the question.

22 MR. FARNELL: He said what he said.

23 MR. PATON: Fine.

24 BY MR. PATON: (Resuming)

25 Q Are any of the cracks that you have observed at the

1 site see-through cracks?

2 A Not that I recall. No, they are not.

3 Q Does your observation and knowledge of these cracks  
4 indicate to you that any reanalysis of the structures is  
5 required?

6 MR. FARNELL: Will you read that back?

7 (Record read.)

8 MR. FARNELL: Objection for vagueness. Reanalysis for  
9 what purpose?

10 MR. PATON: That is all right. Can he answer the  
11 question, please?

12 A I would consider that re-evaluation is required.

13 BY MR. PATON: (Resuming)

14 Q What kind of re-evaluation?

15 A To determine the cause of the cracks, whether they are  
16 detrimental to the structure, and the width of the crack --  
17 whether there is any exposure to damages to the rebar.

18 Q Have you started that reanalysis?

19 A Some reanalysis was done in response to the NRC  
20 Question.

21 Q Do you plan any more reanalysis other than what was  
22 done as a result of answering NRC's Question?

23 A I do not know.

24 Q Did you plan any such analysis prior to receiving the  
25 NRC Questions?

1 A Do you mean the type of analysis which we have done?

2 Q The type of analysis which you did as a result of the  
3 NRC Question?

4 A Yes.

5 Q You had planned to do it before you received the  
6 NRC Questions?

7 A Yes.

8 Q Had you done any of it before you received the NRC  
9 Questions?

10 A We had done some. We didn't do any detailed analysis,  
11 but we did consider the effects.

12 Q Have you come to any conclusions as to the effects on  
13 the rebar?

14 A Effect of what, sir?

15 Q You said you did some reanalysis. I may not be  
16 correctly remembering your testimony, but I believe you said you  
17 were going to do some reanalysis to determine whether there was  
18 any effect on the rebar; am I wrong?

19 A Whether the width of the crack will cause any effect  
20 on the rebar; yes.

21 Q My question is, had you come to any conclusions in that  
22 regard?

23 A I believe so that we have got a width of crack beyond  
24 which we consider the cracks to be repaired.

25 MR. PATON: Would you read his answer back, please?

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(Record read.)

BY MR. PATON: (Resuming)

Q Would you listen to your answer and tell me if that is what you intend to have on the record?

(Record read.)

A That we consider it necessary that the cracks be repaired.

BY MR. PATON: (Resuming)

Q Now, what was the width of the crack that you just mentioned?

A I do not remember the exact width.

Q What did that width indicate to you?

A I would consider that if the crack exceeds certain width that the rebar is exposed, or the rebar may be exposed to the weather conditions and, therefore, would corrode.

Q Are you concerned with anything other than the weather impact on the rebar?

A In this context weather is the only thing that you consider.

Q Weather is what?

A Weather is the only thing, aspect, that you consider.

Q Ignoring the possible adverse effects of the weather, is there any other damage, possible damage, to the rebar indicated by the cracks?

MR. FARNELL: I believe we were talking previously

1 about damage from the cracks, not indicated by the cracks.

2 MR. PATON: That is not my question now.

3 MR. FARNELL: The question was stated wrong.

4 MR. PATON: I think I stated my question correctly.

5 MR. FARNELL: Why don't you read back the question.

6 (Record read.)

7 MR. FARNELL: That is two different questions.

8 MR. PATON: Sure, maybe I have changed the subject, but  
9 the question is a correct question. You may not like the fact  
10 that I have now slightly changed the subject, but the question is  
11 accurate.

12 MR. FARNELL: Your question as worded starts one way  
13 and ends up another way, and supposedly they tie together, but  
14 they don't. That is my comment on your question. I think your  
15 question is vague.

16 BY MR. PATON: (Resuming)

17 Q Can you answer the question?

18 A The crack might indicate the state of stress of the  
19 rebar.

20 Q Exactly what I was looking for.

21 Does the rebar have an elastic limit?

22 A Yes.

23 Q Is that what you were referring to when you talked about  
24 stress on the rebar?

25 A I was not referring to the elastic limit; I was talking

1 about the stress on the rebar.

2 Q When you observe the crack, what is it that is cracked--  
3 concrete?

4 A Yes, sir.

5 Q Does the concrete and the rebar work together?

6 A In reinforced concrete?

7 Q Yes.

8 A Yes.

9 Q What is the distance between the rebar and the outside  
10 of the concrete that you are looking at when you observe the  
11 crack?

12 A In this particular case?

13 Q Yes.

14 A I don't know.

15 Q For any crack you don't know?

16 A Not unless I enlarge the crack, I don't know where the  
17 rebar was.

18 Q Have you conducted any kind of investigation to  
19 determine whether there was any stress on any of the rebars  
20 adjacent to any of the cracks that you have observed?

21 A Please repeat the question?

22 (Record read.)

23 A We have not done any tests to find rebar stress.

24 BY MR. PATON: (Resuming)

25 Q Do you plan any?



1 A At this time, not that I know of.

2 Q Have you concluded that there is no possible stress  
3 to any of the rebars?

4 MR. FARNELL: For what?

5 BY MR. PATON: (Resuming)

6 Q That is adjacent to any of the cracks that you have  
7 observed?

8 A I would consider there is some stress on the rebar.

9 Q Do you plan any kind of investigation to determine  
10 how much stress that is?

11 A I do not know.

12 Q Who in Bechtel would know that?

13 A I would have to refer that to the Chief Engineer.

14 Q Who is that?

15 A Mr. Ted Johnson.

16 Q Do you have any reason to believe that he would know  
17 that?

18 A Yes.

19 Q On what do you base your conclusion that he would know  
20 that?

21 A I get my technical direction from my Chief Engineer,  
22 and therefore in case of a problem I cannot answer, I go to him  
23 for direction.

24 Q Have you ever discussed with him the extent of the  
25 stress to the rebar adjacent to the cracks?

1 A Yes, I have.

2 Q Tell me what that conversation, or conversations  
3 consisted of?

4 A The conversation was what kind of stress could be with  
5 the crack, and his answer was that it is extremely difficult to  
6 determine stress based on the crack width.

7 Q Have you told us the entire conversation?

8 A As best I can recall. This is obviously a summary of  
9 the conversation as I recall it today.

10 Q I want to know as much detail of that conversation as  
11 you can remember. Can you remember any more of the details of  
12 that conversation?

13 A I cannot recall any more of the conversation that I had  
14 with him.

15 Q Now, correct me if I am wrong, but your recollection  
16 of the conversation is that Mr. Johnson indicated that it is very  
17 difficult to determine the amount of stress in the rebar that  
18 was adjacent to the crack; is that accurate?

19 A That is what I recall.

20 Q Do you recall whether anybody said anything about what  
21 your planned reaction to that was to be?

22 MR.FARNELL: Planned reaction to the comment, or what?

23 BY MR. PATON: (Resuming)

24 Q Will you answer the question?

25 A His staff helped us to prepare the response to the NRC

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1 Question of cracks, and his staff's input is included in that  
2 response.

3 Q All right, sir, I want your recollection. Let me ask  
4 you this question: Do you know of any plans that Bechtel has --  
5 and I am asking you from any source of information -- to  
6 investigate the extent of the stress to the rebar adjacent to  
7 the cracks?

8 MR. FARNELL: It has been asked and answered.

9 A I do not.

10 BY MR. PATON: (Resuming)

11 Q In your professional judgment, is it appropriate to  
12 make some investigation of the stress on the rebar adjacent to  
13 the cracks?

14 A In my professional judgment, considering that the  
15 crack widths are no larger than only 30 mils and the cracks  
16 have been caused by settlement stresses which are secondary in  
17 nature and therefore self-limiting, I do not consider them to be  
18 detrimental.

19 Q All right, do I understand your answer to be that in  
20 your professional judgment that it is not appropriate to conduct  
21 any further investigation into the stress in the rebar adjacent  
22 to the cracks?

23 A Yes, given the conditions.

24 Q Do you know whether Mr. Johnson agrees with that?

25 A My understanding is that he agrees with that position.

1 Q We are pretty close to the area of responsibility of  
2 you and Mr. Johnson. Is there anybody else in Bechtel that would  
3 initiate such an investigation?

4 A Other than?

5 Q Other than you and Mr. Johnson?

6 A I wouldn't think so.

7 Q Then you are fairly certain that as a matter of fact  
8 there is no plan to conduct any further investigation of the  
9 stress in the rebar adjacent to the cracks?

10 A I did not know of it as I said before.

11 Q Mr. Dhar, do you know if the response to the Staff's  
12 Questions with respect to cracks has been supplied to the NRC?

13 A My understanding is yes.

14 Q Did that response address the condition of the rebar?

15 A My recollection is not very clear about the contents  
16 of that response.

17 Q Do you have any recollection of what that response said  
18 about the condition of the rebar?

19 A My recollection whatever I can recall is that response  
20 said that the stresses on the rebar is low because the cracks were  
21 caused in the concrete when it didn't gain enough strength, and  
22 it also made the point regarding the self-limiting nature of the  
23 load. That is all I remember.

24 Q You say that the stresses in the rebar were low?

25 A Yes, sir.

1 Q What did you base that conclusion on?

2 A That response if I remember it right said that the  
3 cracks were formed in the concrete when the concrete didn't gain  
4 its complete strength, so therefore the stresses were low in the  
5 concrete to crack it, and therefore, the stresses in the rebar  
6 were low also.

7 Q You have used the expression "self-limiting" on two  
8 occasions. What does that mean?

9 A Self-limiting is that the stresses due to a self-  
10 limiting load will not go beyond a certain limit. The strength  
11 in the member will not go beyond a certain limit.

12 Q Does that apply to the service water structure?

13 A With the fix we are talking about, it would not apply  
14 to the service water structure.

15 Q Does it apply to any of the remedies that you proposed,  
16 or does it apply to the problem before you get to the remedy?

17 A It applies to cases where the stresses are caused due  
18 to deformation only, and not by mechanical load.

19 Q Did you say -- you said caused by something?

20 A Deformation. The stresses are caused by deformation  
21 and not by mechanical loads.

22 (Discussion off the record.)

23 BY MR. PATON: (Resuming)

24 Q Mr. Dhar, I want to show you a one-page scheme that  
25 appears to show the fix of the service water structure, and I

1 will mark it Staff Exhibit No. 2, December 17, 1980 -- I will  
2 also put your name on it -- and I will ask you the source of that  
3 document? Where did you get that from?

4 A I do not recall where it is from.

5 Q Do you agree it appears to represent some kind of  
6 scheme of the remedy at the service water structure?

7 A Yes, sir, it does.

8 Q And on that scheme, is there any space between the top  
9 of the pile and the bottom of the corbel?

10 A No.

11 Q If there is any, it is occupied by the shim; is that  
12 correct?

13 A Yes.

14 Q Do you have any idea how wide that shim is, or how deep  
15 it is?

16 A I do not. I am not sure whether it is drawn to scale  
17 in detail or not.

18 Q Did you indicate to me in your prior testimony in this  
19 deposition that the top of the pile did not come in contact with  
20 the bottom of the corbel?

21 A That is my recollection.

22 Q Do you have any explanation for this schematic which  
23 would appear to have the top of the pile --

24 A This may be an analogous detail. Of course, there is  
25 a shim shown there without any damage.

1 Q I'm sorry?

2 A There is a shim without any damage.

3 Q Without any dimension?

4 A Yes, without dimension. This may be analogous; I am  
5 not sure.

6 Q You are not sure whether that is current or not?

7 A Yes.

8 MR. PATON: Off the record.

9 (Discussion off the record.)

10 BY MR. PATON: (Resuming)

11 Q Mr. Dhar, do you know whether an analysis was made to  
12 evaluate the impact of the settlement of the surcharge of the  
13 diesel generator building structure before surcharge was imposed?

14 A Yes.

15 Q That analysis was to determine what?

16 A That analysis was to determine the capacity of the  
17 internal walls to resist lateral load.

18 Q Was any prediction made of settlement?

19 A At what time?

20 Q Prior to the imposition of the surcharge?

21 A To the best of my recollection it was estimated that  
22 the settlement would be between 6 and 18 inches.

23 Q Do you know who made that prediction?

24 MR. FARNELL: I don't think he said it was a prediction.

25 MR. PATON: Would you read that back? What his answer

1 was? As a matter of fact, read my question and then his answer.

2 (Record read.)

3 BY MR. PATON: (Resuming)

4 Q Do you know who made that estimation?

5 A Can I ask my counsel a question?

6 MR. PATON: Certainly.

7 (Deponent conferred with his counsel.)

8 A As I recall, what I heard was that the estimation was  
9 made by Dr. Peck.

10 BY MR. PATON: (Resuming)

11 Q Did Consumers ever ask Bechtel to establish tolerable  
12 limits of settlement for the diesel generator building as a  
13 result of the surcharge?

14 MR. FARNELL: What do you mean by tolerable limits?  
15 My objection is that the question is vague.

16 MR. PATON: Fine. If the witness doesn't understand  
17 that expression, then we will move on.

18 A I do not recall.

19 BY MR. PATON: (Resuming)

20 Q I don't think I asked you this question. For the  
21 design of the diesel generator building, what values of modulus  
22 of subgrade reaction were used?

23 A For what purpose?

24 Q Designing the structure.

25 A For the design of the structure, no particular modulus



1 of subgrade reaction was used for structural analysis purpose  
2 before the settlement.

3 Q Did you assume a value?

4 A My recollection is that the analysis was done using  
5 the conventional method where you do not require a subgrade  
6 modulus.

7 Q Your testimony is that you didn't assume a value, one  
8 wasn't required? You didn't need a value?

9 A For the structural analysis.

10 Q You indicated that after the surcharge was removed at  
11 the diesel generator building you did another structural analysis?

12 A That is correct.

13 Q For the design of the structure on the second analysis,  
14 what values of modulus of subgrade reaction was used?

15 A I do not know.

16 Q Do you know whether any value was used as opposed to  
17 the first instance in which you said it wasn't necessary?

18 A I believe so.

19 Q Whose responsibility is that? Who would know that  
20 answer?

21 A Shing Lo would know that answer.

22 Q Is it fair to say that with respect to the Midland  
23 soil settlement you have delegated most of your responsibilities  
24 to Mr. Lo?

25 A Yes.

1 Q Now, do you know if Mr. Lo has delegated any of those  
2 responsibilities to someone else?

3 A Mr. Lo has got engineers working for him who do the  
4 detail analysis.

5 Q You told me once that you have spent the last four  
6 years working full time on the Midland project; is that correct?

7 A Yes, sir.

8 Q And you just told me that you have delegated most of  
9 the responsibility with regard to the settlement problem to Mr.  
10 Lo?

11 A Now, yes, sir.

12 Q Now, during 1980, what have you been spending 100 per-  
13 cent of your time on with respect to the Midland site? Maybe it  
14 is with respect to those responsibilities that you didn't  
15 delegate to Mr. Lo -- I don't know. In the last year, what have  
16 you been spending 100 percent of your time with respect to Midland?

17 A I have got other areas like reactor building,  
18 auxiliary building, seismic analysis, and supporting construction.  
19 These are some of the areas on which I spent my time.

20 Q Supporting construction -- do you mean providing  
21 construction with information in response to requests from them?

22 A Yes, sir.

23 Q On areas other than the remedial actions?

24 A Yes, sir.

25 Q Now seismic -- you indicated you spent some time on

1 seismic. Isn't a lot of that work in fact related to the proposed  
2 remedy?

3 A Some of it relates to the proposed remedy; yes, sir.

4 Q Tell me the purpose of the surcharge program at the  
5 diesel generator building?

6 A As I understand it?

7 Q Yes, sir, my questions are all to your knowledge and  
8 your understanding.

9 A Okay, as I understand it, the purpose of the surcharge  
10 was to load the sod with a certain amount of predetermined load  
11 so that some part of the sod settlement takes place during the  
12 time the surcharge has been applied, and therefore the balance of  
13 the settlement would be small and can be considered to be  
14 acceptable.

15 Q Is it a fair summary of your statement that the purpose  
16 was to accelerate the rate of settlement?

17 A That would be one way of looking at it; yes.

18 Q Is there anything wrong with looking at it that way?  
19 I am trying to fairly summarize what you said.

20 A Not that I can think of; no.

21 Q What effect did the surcharge program have on the  
22 cracks?

23 A My recollection is that the cracks didn't go through  
24 any significant change during the surcharge process.

25 Q You said they didn't undergo any significant change;

1 did they undergo any change?

2 A My recollection is that there was some change.

3 Q Did the cracks become worse or better?

4 A By that do you mean did they become larger or smaller?

5 Q I will accept that; yes.

6 A My recollection is that some cracks were smaller. I do  
7 not know if any were larger or not. I do not recall if some  
8 were larger or not.

9 Q You have a distinct recollection that some were  
10 smaller?

11 A Yes.

12 Q But you don't know whether others were larger?

13 A Yes.

14 Q Do you know where the cracks were that became smaller?

15 A My recollection is that it is on the east wall.

16 Q Did the surcharge program aggravate differential  
17 settlement?

18 A I do not recall.

19 Q Did you ever know?

20 A At one time I looked at that data, yes, but right now  
21 I do not recall.

22 Q Did the surcharge increase or decrease the amount of  
23 stress on the pipes and conduits under the diesel generator  
24 building?

25 A Pipes and conduits are not my area of responsibility.

1 Q All right, sir, please answer the question based on  
2 any information you may have heard, or seen, or you got from any  
3 source?

4 A I do not recall hearing anything about the increase of  
5 stress due to the surcharge.

6 Q Do you have any opinion as to whether the surcharge  
7 program would increase or decrease the amount of stress on the  
8 pipes and conduits under the diesel generator building?

9 MR. FARNELL: Objection to the foundation. He said  
10 that is not his responsibility.

11 BY MR. PATON: (Resuming)

12 Q Didn't you at one time express an opinion that the  
13 bends and elbows in the pipes under the ground had already been  
14 overstressed?

15 MR. FARNELL: That is not necessarily connected with  
16 your previous question.

17 MR. PATON: I am very sorry about that. He said that  
18 he didn't have any expertise, and he has got it on the record  
19 that they are already overstressed.

20 BY MR. PATON: (Resuming)

21 Q Did you make such a statement?

22 A I recall in a meeting that I said that; yes.

23 Q Okay, now do you have any opinion as to whether or not  
24 the surcharge would tend to increase or decrease the amount of  
25 stress on the pipes and conduits under the diesel generator

1 building?

2 MR. FARNELL: Same objection. My objection is to  
3 foundation.

4 A Do you want me to answer the question?

5 BY MR. PATON: (Resuming)

6 Q Please?

7 A If the pipe is restrained and the surcharge will deflect  
8 the pipe more, then it could increase the stress on the pipe.

9 Q Do you agree that the cracking in the diesel generator  
10 building indicated overstressing?

11 A What stressing? Stressing of what, may I ask?

12 Q The structure?

13 A Not necessarily. I do not recall.

14 Q Do you know whether any portions of the structures  
15 that have exhibited cracks have exceeded elastic limits?

16 A I do not know.

17 Q Have you conducted any investigations to determine  
18 that?

19 A To determine whether --

20 Q To determine whether any portion of the structures  
21 have exceeded elastic limits?

22 A As I said before, we have done an evaluation of the  
23 cracks which was presented to NRC. Other than that, we have not  
24 done any analysis.

25 Q Now, you supplied some information which I think you

1 have referred to as the crack study to NRC; is that correct?

2 A Yes, sir.

3 Q Did that include crack mapping?

4 A Yes, it does.

5 Q Now, in that study, is it correct that you nowhere  
6 address any elastic -- no elastic analysis was made?

7 A To my recollection that is correct.

8 Q And in fact you have made no elastic analysis?

9 A We have made no elastic analysis; no.

10 Q Do you have any plans to make such an analysis?

11 A At this time I do not know of any plan.

12 Q Do you know the present estimate of the range of  
13 differential settlement which the diesel generator building can  
14 safely withstand?

15 A I do not.

16 Q Do you know whether anyone at Bechtel has that  
17 information?

18 A To the best of my recollection we have done an analysis  
19 which will simulate future differential settlement of the  
20 building and calculated stresses.

21 Q You say you had done that analysis?

22 A To the best of my knowledge. I am not familiar with  
23 the details, but that is my understanding.

24 Q Who would have performed that analysis?

25 A It would have been done by Shing Lo -- by one of his

1 engineers.

2 Q Do you know if you have provided any of the results of  
3 that analysis to the NRC?

4 A My understanding is no, we have not.

5 Q Do you know why you have not?

6 A Because the analysis is not complete yet.

7 Q Do you know when that analysis will be complete?

8 A My estimate would be in the course of the next couple  
9 of months.

10 Q Do you know whether part of the input for that analysis  
11 was the fact that the building was cracked?

12 A As for my understanding, the cracking was not an input  
13 into that analysis.

14 Q Do you have an index of computer runs performed to  
15 analyze the diesel generator building stresses?

16 A Does it include all computer runs?

17 Q I limited this to the diesel generator building.

18 A Does that mean all computer runs that we have done  
19 from the beginning?

20 Q And are you bearing in mind that the question said to  
21 analyze stresses?

22 A The answer to your question is no.

23 Q Are they listed, or are they in any way -- is there  
24 any kind of record of computer runs made to analyze stresses in  
25 the diesel generator building?



1 A We would probably have a lot of computer runs; it may  
2 not be all.

3 Q If you wanted to find those computer runs, how would  
4 you go about trying to find out where there was a record of such  
5 computer runs?

6 A There will be a record of computer runs which have been  
7 done, checked, and approved.

8 Q Where is that?

9 A I do not know how many of them has been completely  
10 checked.

11 Q Where would you find that record?

12 A Of the calculations which are done, checked, and  
13 approved?

14 Q Yes.

15 A That will be in the Civil calculation index.

16 Q In the Civil calculation index -- that includes the  
17 computer runs?

18 A Yes, the computer runs are part of the calculations.

19 Q Mr. Dhar, I am going to ask you a question which may  
20 be unfair. If it is unfair and you do not want to answer it,  
21 that is perfectly fine, but we were provided an index to  
22 calculations from the Civil Group's files. Dr. Afifi provided  
23 that. Would the computer runs that I have been asking you about  
24 as far as you know be included in that index?

25 A As I said before, these computer runs, once they are

1 done, checked and approved, only then will they be included in  
2 the index. As I said before, also, these calculations are in the  
3 process of being checked and finalized.

4 Q You are indicating to me that the computer runs that  
5 we are talking about, a lot of them are not indexed in this file?

6 A That is right. Only the final ones would be indexed.  
7 We might have done a lot of runs in this process.

8 Q How far back in time would we have to go before we got  
9 to those that were done, checked and completed, and indexed? Do  
10 we have to go back two years for that, or three years for that?

11 A During the process of work, as we finalize calculations,  
12 we will get them checked. We will get them approved. Once they  
13 are approved, we will have an index, microfilmed, and go through  
14 the usual process. So it is a continuous process as we go along  
15 once they are finalized.

16 Q Can you give me a rough estimate of how far behind you  
17 are? In other words, when you talk about those that have been  
18 finalized and indexed, are we talking about six months ago, a  
19 year ago, two years ago?

20 MR. FARNELL: I don't think the term "behind" should be  
21 used.

22 MR. PATON: Strike the word "behind."

23 BY MR. PATON: (Resuming)

24 Q In the normal course of business, what amount of time  
25 is there between the present time --

1 A Are you asking how often the index is updated?

2 Q That is a good question. Yes. How often, and are the  
3 indexes up-to-date?

4 A I couldn't answer that.

5 Q You led me right down the path. Okay. That was a  
6 better question than I thought.

7 Mr. Dhar, let me try my unfair question again. We have  
8 an indexed of what I believe was designated as an index to  
9 calculations from Dr. Afifi's group. Now with respect to the  
10 computer runs that you have been talking about that have been  
11 completed, approved and filed, do you think those computer runs  
12 would be listed in that index?

13 A I wouldn't think so.

14 Q All right, with respect to those computer runs that  
15 are completed and approved and filed, where is the information  
16 that would tell me what that record is and where those computer  
17 runs are filed, or how I could obtain access to those?

18 A Those computer runs will be in the Civil Group  
19 calculation files once they are finalized and approved.

20 Q Okay, is that something different? Is that something  
21 different from the index that I have indicated that we have  
22 already been given?

23 A I would definitely think so.

24 Q Okay, does this Civil Group calculation file have an  
25 index?

1 A Yes, sir.

2 Q Now, with respect to the computer runs that have not  
3 been approved, indexed, and filed, etc., is there any record that  
4 would enable you to have access to those computer runs, or are  
5 they just laying around the building somewhere?

6 A If they are not finalized, they would probably be with  
7 the originator.

8 Q There would be no piece of paper anywhere that would  
9 lead you to all of those unapproved computer runs; is that  
10 correct?

11 A That is correct.

12 MR. PATON: How about a five minute break?

13 (Break.)

14 BY MR. PATON: (Resuming)

15 Q Mr. Dhar, what soil parameters do you need to perform  
16 a seismic analysis as per example at the diesel generator  
17 building?

18 A We need to know the effective shear wave velocity of  
19 the foundation material to do a seismic analysis. Other  
20 parameters are available with us in the Civil Group.

21 Q What other parameters would you have to know besides  
22 shear wave velocity?

23 A We need to know the building configuration.

24 Q These are soil parameters?

25 A Soil parameters, yes. We would have to know the shear

1 wave velocity and possibly also the poisson's ratio.

2 Q Is that all?

3 A Effective shear wave velocity and poisson's ratio.

4 Q How about shear modulus?

5 A We can calculate shear modulus from shear wave velocity.

6 - Of course, we would have to know the mass density of this.

7 Q Damping ratio?

8 A We would calculate the damping ratio.

9 Q How do you calculate the damping ratio?

10 A I do not remember the formula for that.

11 Q Whose responsibility is that?

12 A This is done by the Seismic Group Leader in my Group.

13 Q Who is that?

14 A Chuck McConnell.

15 Q He works for you?

16 A Yes.

17 Q Do you need to know the shear wave velocity profile for  
18 different soils at different depths?

19 A Either we have to know that or the effective shear  
20 wave velocity.

21 Q By effective shear wave velocity, do you mean you would  
22 take an average as opposed to knowing what the shear wave velocity  
23 was at the various depths of the soil?

24 A If that is supplied, yes, that would be one way of doing  
25 it.

1 Q Do you need the soil stratification profile?

2 A That would be calculated from the effective shear wave  
3 velocity.

4 Q Do you need that information in order to do a seismic  
5 analysis of the diesel generator building?

6 A The way we have performed this analysis, I would need  
7 to know the effective shear wave velocity of the foundation  
8 medium or the shear wave velocity for different layers.

9 Q Which way did you do it?

10 A My recollection is for the diesel generator building  
11 we have the shear wave velocity for different layers, and the  
12 Civil Group calculated the effective shear wave velocity.

13 Q Do you need to know the strain dependent modulus and  
14 damping?

15 A The shear modulus which is given to us, we consider  
16 that effect.

17 Q Do you get that from Dr. Afifi?

18 A Dr. Afifi, yes, sir.

19 Q The value of shear modulus varies with strain, does it  
20 not?

21 A Yes, sir.

22 Q How do you take that into account in the design -- the  
23 fact that the value of shear modulus varies with strain?

24 A This input is provided to us by Geotech.

25 Q Do they give you a plot of shear modulus versus strain?

1 A For this shear wave analysis which we have performed,  
2 we got one shear wave velocity from them from Geotech.

3 Q Say that again.

4 A We got one shear wave velocity for different layers.

5 Q One for each layer?

6 A One for each layer.

7 Q You said that you had one value of shear modulus per  
8 layer?

9 A That is my understanding, yes.

10 Q Each layer has different amounts of strain, does it not?

11 A I do not know.

12 Q Do you know whether the seismic analysis you did on the  
13 reanalysis of the diesel generator building takes into account  
14 the variation of shear modulus with strain?

15 A I do not know.

16 Q Who would know that? Whose responsibility would  
17 include that?

18 A I would consider that either Chuck McConnell would know,  
19 or he would know the person who would know.

20 Q And he works for you?

21 A He works for me.

22 Q Can you tell me how the soils in the diesel generator  
23 building -- how were the soil parameters to be used in that seismic  
24 analysis obtained?

25 MR. FARNELL: Which seismic analysis?

1 BY MR. PATON: (Resuming)

2 Q We have been talking about a reanalysis of the diesel  
3 generator building subsequent to the removal of the surcharge.  
4 How did you determine the soil parameters to be used in that  
5 analysis, and please address the fill and the till?

6 A I do not know the complete details.

7 Q Tell me any details you do know?

8 A My understanding is that some insitu shear wave  
9 velocity measurement was done by Professor Woods. It is my  
10 understanding that was the basis for the shear wave velocity  
11 being utilized in our analysis.

12 Q Did the seismic survey which was completed to  
13 establish shear wave velocity in the soil under the diesel  
14 generator building show shear wave velocity as low as 350 feet  
15 per second?

16 MR. FARNELL: Would you read that back?

17 (Record read.)

18 A I recall hearing something like that.

19 BY MR. PATON: (Resuming)

20 Q What is it that you recall hearing?

21 A In one case shear wave velocity was lower than 500.

22 Q In one case only? To your recollection was there only  
23 one case where shear wave velocity was lower than 500?

24 A That is my recollection; yes.

25 Q In your opinion does shear wave velocities in soils



1 depend on how stiff or dense the soil is?

2 A I cannot answer that question.

3 Q Do you know if Bechtel had adopted shear wave velocities  
4 of 1350 feet per second before surcharge?

5 A Please clarify your question.

6 Q Okay, I will clarify it by repeating it.

7 A What do you mean by before surcharge?

8 Q Before the surcharge program at the diesel generator  
9 building?

10 A Do you mean by that the initial analysis?

11 Q Yes.

12 A That is my understanding. It might not be exactly 350;  
13 it may be somewhere around that.

14 Q Do you know that after the surcharge was removed, you  
15 obtained measured ranges of shear wave velocities substantially  
16 lower than 1350 feet per second?

17 A That is my understanding; yes.

18 Q From that information -- from the comparison that we  
19 have just discussed, can you make any conclusion about the  
20 effectiveness of the surcharge in making the soil more resistant  
21 to additional settlement?

22 A No, I cannot.

23 Q Is that because that is not within your area of  
24 expertise?

25 A That is one part of it; yes.

1 Q What is the other part?

2 A The other part is that before we measured the shear  
3 wave velocity, Bechtel assumed a lower limit shear wave velocity  
4 of 500 feet per second as written in response to a NRC Question.

5 Q You say Bechtel assumed a shear wave velocity?

6 A A lower limit of shear wave velocity of 500 feet per  
7 second.

8 Q When did you do that?

9 A That response was submitted, I think sometime in '79.

10 Q You said that you assumed a lower limit of --

11 A Five hundred.

12 Q What was your upper limit?

13 A In that response we said that we would consider the  
14 upper limit the same as it was used in the original analysis.

15 Q Which is what?

16 A Around 1350 or 1360.

17 Q Can you perform a seismic analysis of the diesel  
18 generator building according to the state of the art requirement  
19 without knowing the relationship of strain with shear modulus?

20 MR. FARNELL: Will you repeat that, please?

21 (Record read.)

22 MR. FARNELL: I make an objection to the state of the  
23 art requirement. That is very vague, and therefore, I object as  
24 to the form.

25

1 BY MR. PATON: (Resuming)

2 Q Okay, will you answer the question?

3 A I do not know the answer to that question.

4 Q I am going to ask you a similar question. Can you  
5 perform a seismic analysis of the diesel generator building  
6 according to the state of the art requirement without knowing  
7 the relationship of strain with damping values?

8 MR. FARNELL: Same objection.

9 A My answer is that I cannot answer that question.

10 BY MR. PATON: (Resuming)

11 Q Is that because you don't know the answer, or you  
12 don't understand the question?

13 A I do not think I have enough background in soil strain  
14 to answer that question.

15 Q Are you aware that there are pipes, ducts, and conduits  
16 in the foundation of the diesel generator building?

17 A Yes, I am.

18 Q How many pipes are there in the foundation of the  
19 diesel generator building?

20 A I do not know the exact number.

21 Q How many ducts are there in the foundation of the  
22 diesel generator building?

23 A Would you please clarify the word "ducts"? What do  
24 you mean by that?

25 Q Do you understand the word "duct"?

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1 A A duct can be there for many reasons.

2 Q Are there any ducts -- whatever you mean by ducts --  
3 do you know whether there are any ducts in the foundation  
4 of the diesel generator building?

5 A There are ducts for electrical conduit if that is what  
6 you are referring to.

7 Q Are there any other conduits in the foundation of the  
8 diesel generator building other than the pipes and ducts that you  
9 have just referenced?

10 A None that I recall.

11 Q Do you know where these pipes and ducts are located in  
12 the foundation, and by that I mean at what depth?

13 A I do not recall the exact depth.

14 Q Have you been involved in any analysis of stress on  
15 buried pipes?

16 A My recollection is that some analysis was done for the  
17 circulating paper pipes.

18 Q My question was what involvement did you have? Were you  
19 involved in that analysis?

20 A I don't recall. I might have reviewed some parts of  
21 the analysis.

22 Q Is Mr. Lo in charge of that subject?

23 A My recollection is that this analysis was done sometime  
24 ago, and it would have been -- Mr. McConnell might have knowledge  
25 of that analysis.

1 Q Okay, you say he might have; do you know whether or not  
2 he does have?

3 A I cannot be 100 percent sure.

4 Q Is there still to your knowledge some dispute between  
5 the NRC and Bechtel with respect to the stress on the pipes under  
6 the diesel generator building?

7 A I recall there may be a question on the duct banks in  
8 the latest round of questions we have gotten from NRC.

9 Q Referring to your previous statement at some meeting  
10 that you attended where you expressed the view that the bends  
11 and elbows of some pipes may be already overstressed, do you  
12 still have that opinion?

13 A I was merely reporting what I was told regarding the  
14 state of stress of these pipes.

15 Q You were told by whom?

16 A By the Plan Design Group.

17 Q Who is that?

18 A I do not recall who exactly told me, but it could be  
19 Mr. Tulloch.

20 Q Do you have any reason to believe that statement is no  
21 longer true?

22 A No.

23 Q Would you call the analysis of stress on the pipes, is  
24 that the responsibility of a mechanical engineer?

25 A Yes, except the seismic stress in the buried piping is

1 the responsibility of the Civil Group.

2 Q Is the seismic input your responsibility?

3 A The seismic stress in the buried piping is the  
4 responsibility of the Civil Group; yes.

5 Q Are any of the pipes, ducts, or conduits under the  
6 diesel generator building Category 1 pipes, ducts, or conduits?

7 A Under the building?

8 Q In the foundation of the diesel generator building?

9 A I recall that some duct banks are classified Category 1.  
10 Regarding piping, I do not recall where the break is between  
11 Class 1 and Class 2, but there may be some Class 1 in the  
12 vicinity.

13 Q Do you know at what depth any Class 1 piping or ducts  
14 or conduit are in the foundation under the diesel generator  
15 building?

16 A I do not remember exactly; no.

17 Q In the excavations for placing any of the pipes, ducts,  
18 and conduits in the foundation of the diesel generator building,  
19 do you know any of the bedding and backfill details of those  
20 excavations?

21 A I do not.

22 Q Within the scope of the responsibility of the section --  
23 are you the head of a section or group?

24 A I am the head of a group.

25 Q Civil Group?

1 A Civil Group.

2 Q Within the responsibilities of the Civil Group, would  
3 anyone in your group know those bedding and backfill details?

4 A Yes.

5 Q Who is that?

6 A Mr. Rao, R-a-o.

7 Q Have you ever discussed the bedding and backfill  
8 details with Mr. Rao?

9 A At one time I have.

10 Q Do you remember any of those details?

11 A What I remember is that there is sand backfill in and  
12 around the piping, but I do not remember any other details.

13 Q Is your present responsibility with respect to any  
14 pipes, conduits, and ducts in the foundation of the diesel  
15 generator building limited to seismic stress?

16 A Seismic stress for the buried piping.

17 Q And that is the extent of your responsibility -- this  
18 input with respect to seismic stress?

19 A Seismic stress with respect to buried piping is part  
20 of Civil responsibility; yes.

21 Q My question is: Is that the extent of your  
22 responsibility, or do you have any other responsibilities with  
23 respect to pipes that are under stress?

24 A For which category of pipe?

25 Q All categories?

1 A For the piping like sewer piping, storm drains --

2 Q I am talking about buried pipes?

3 A Storm drains would be buried. For concrete piping,  
4 that would be Civil Group's responsibility. If it is steel  
5 piping and they belong to an ASME class, then it would be Plan  
6 Design Group's responsibility.

7 Q Without telling me the responsibility of other groups,  
8 tell me the responsibility of your group with respect to buried  
9 pipes, ducts, and conduits other than seismic stress? What is  
10 the responsibility of your group?

11 A The responsibility of our group would be -- I believe  
12 that some of these pipes should have been our drawing -- I mean  
13 Civil drawing. I do not recall which one of them. Even some of  
14 the Category 1 may show up on the Civil drawing, and we would  
15 provide the burying details. For pipes which are not the  
16 responsibility of Plan Design, we will route them and we will  
17 procure them.

18 Q Procure them?

19 A Write specifications for them.

20 Q Okay.

21 A And for those pipes we will be responsible for the  
22 installation also and providing construction support and  
23 installation.

24 Q When you provide construction support for installation,  
25 do you tell them at what elevation to install the pipes?



1 A I do not know whether this information is in the Civil  
2 drawing or the Plan Design drawing. Are you asking about the  
3 Category 1 piping?

4 Q I am asking you about pipes in which you provide  
5 construction information. You indicated that there are pipes  
6 which you provide constructional information on the installation  
7 of the pipes, and I asked you did that include intended elevation?  
8

9 A If it is our responsibility to provide the elevation,  
10 the elevation will be given on the drawings.

11 Q Do you know whether the pipes that were in the  
12 foundation under the diesel generator building were installed  
13 initially at the intended elevation?

14 A I do not know.

15 Q Do you know in fact that some of the pipes were  
16 installed at elevations other than the intended elevations?

17 A No, I do not know that.

18 Q Mr. Dhar, I show you a three-paged document that has  
19 the words "Teletype Message" at the top, and I will mark this  
20 Staff Exhibit 3, Dhar, December 17, 1980, and I will direct your  
21 attention -- you can read all of the document you want -- but I  
22 will direct your attention to the paragraph numbered 1 below the  
23 middle of Page 1. I will read that paragraph. It says:

24 "THE RESULTS OF THE YARD PIPE ANALYSIS HAVE NOT  
25 BEEN FINALIZED, BUT BECAUSE THE EXCAVATION WILL BE  
MADE, THE LARGE (21-Inch) DEVIATION FROM DESIGN

1 ELEVATION SHOULD BE CORRECTED. THE FOLLOWING PIPES  
2 SHALL BE REBEDDED."

3 Then it lists the pipes. I ask you to look at that  
4 document. My question when you have had a chance to review the  
5 document is does that refresh your recollection as to any  
6 deviation in the installation of the pipes?

7 A To some extent it does. I cannot recall the whole of  
8 the incident, but some part I can.

9 Q What part can you recall?

10 A That this was for the condenser line, and then there  
11 was an apparent discrepancy between the elevations, and this was  
12 the instructions to correct that.

13 Q Do you recall whether there was any other deviation in  
14 the elevation of installing the pipes other than the one mentioned  
15 there?

16 A I do not recall.

17 Q In your opinion is there any significance to the fact  
18 that the pipe was installed 21 inches from the elevation from  
19 which it was intended to be installed?

20 MR. FARNELL: Significance for what would be my  
21 question.

22 MR. PATON: It is not my question.

23 A I consider an error has been made.

24 BY MR. PATON: (Resuming)

25 Q I didn't hear that.

1 A I would consider that an error had been made.

2 Q Does that complete your answer?

3 A Any other thing would be guessing on my part.

4 Q The significance to you of the fact that a pipe was  
5 installed 21 inches from the elevation that it was intended to  
6 be installed is that an error was made?

7 A Yes.

8 Q Does the fact that a pipe was installed 21 inches  
9 from where it was intended to be installed introduce any  
10 uncertainty in your present determination of pipe stress?

11 MR. FARNELL: I don't believe he said he makes  
12 determination of pipe stress.

13 A I am not responsible for pipe stress other than the  
14 seismic stress.

15 Q Would the fact that a pipe was installed 21 inches  
16 from its intended elevation affect in any way your seismic  
17 stress analysis of the pipe in the foundation?

18 A Depending on where the pipe is located, it may or may  
19 not affect it.

20 Q Tell me how it could affect it?

21 A If we are using the soil modulus and the pipe is  
22 located in a particular layer, and we use the corresponding  
23 soil modulus, and there is a 21-inch error or a similar error  
24 made and the pipe gets located into a different layer with a  
25 different modulus, then of course the modulus would not be

1 correct.

2 Q Do you know whether the pipes that are mentioned on that  
3 document there -- Staff Exhibit 6 -- were affected -- whether  
4 that installation affected your seismic stress analysis of those  
5 pipes?

6 A I cannot say.

7 Q Do you know who installed the pipes in the foundation  
8 under the diesel generator building?

9 A I would think Bechtel installed the pipes under the  
10 diesel generator building.

11 Q Do you think Canonie might have installed some of those  
12 pipes?

13 A I wouldn't know for sure.

14 May I talk to my counsel for a minute?

15 MR. PATON: Sure.

16 (Deponent conferred with his counsel.)

17 A You asked me in a previous question whether there was  
18 an analysis done for piping. I now remember that some analysis  
19 was done for the condenser line before the surcharge was applied.

20 BY MR. PATON: (Resuming)

21 Q You mean by your group?

22 A By our group; yes.

23 Q Was that a seismic analysis?

24 A No.

25 Q What kind of analysis was it?

1 A It was an analysis to determine the effect on the  
2 condenser line because of the possible settlement of the ground.

3 Q In other words, that was to determine what stress the  
4 condensate line was under up to that point?

5 A No, that was to determine what stress the condenser line  
6 would have if there was an expected settlement.

7 Q Because of the surcharge?

8 A Because of the surcharge, yes.

9 Q It was analyzed with the surcharge in mind; is that  
10 correct?

11 A Yes, sir.

12 Q What was the result of that analysis?

13 A It showed that this line would be overstressed.

14 Q What action has Bechtel taken as a result of that  
15 conclusion?

16 A As a result the pipes were cut at the end of the  
17 turbine building.

18 Q Has it been reconnected?

19 A TWIX. The field was instructed to reconnect it, and it  
20 is my understanding that they have been reconnected.

21 Q Have you conducted any later analysis of the stress  
22 of the condensate pipe?

23 A No, we have not.

24 Q Now, you conducted one analysis which told you that  
25 the pipe would be overstressed, and then you disconnected it at

1 the turbine building?

2 A Yes.

3 Q And later you connected it up again to the turbine  
4 building?

5 A When the surcharge was over.

6 Q What is your conclusion now as to whether or not the  
7 pipe is overstressed?

8 A Since there is no significant movement of the ground  
9 since that time after the surcharge has been removed, we do not  
10 believe this pipe is overstressed.

11 Q All right, you indicated before that the pipe was  
12 overstressed. Do you mean that it would have been overstressed  
13 if it hadn't been disconnected from the turbine building?  
14 Is that what you meant?

15 A That is correct.

16 Q It was not in fact overstressed at the time when you  
17 did your analysis; it was your prediction for the future that  
18 said it would have been overstressed?

19 A That is correct.

20 Q And you think by disconnecting it from the turbine  
21 building and then connecting it up again later, you precluded  
22 the possibility of overstressing that pipe?

23 A Yes.

24 Q In your initial analysis of the condensate line which  
25 led to the conclusion that the surcharge would have resulted in

1 overstressing the line, did you predict an expected settlement  
2 of that condensate line?

3 A We based the calculation on the estimate of settlement.

4 Q How did you do that? How did you estimate the  
5 settlement?

6 A We took the estimated settlement which I told you  
7 before as the base.

8 Q If you told me before, I have forgotten. How did you  
9 estimate that settlement?

10 A We didn't estimate the settlement; this settlement  
11 as we understood was estimated by Professor Peck to be between  
12 6 and 18 inches.

13 Q Do you have any idea how Dr. Peck arrived at the  
14 figure of 6 to 18 inches?

15 A No, sir.

16 Q Mr. Dhar, I show you a page which is designated  
17 Fig. 19-1 from Vol. 1 of the 50.54(f) Responses dated April 24,  
18 1979 and ask you if you can tell me what that is?

19 MR. FARNELL: Let's go off the record.

20 (Discussion off the record.)

21 A My recollection is that this is a survey pipeline  
22 profile by GZD.

23 Q Tell us very slowly again what it is?

24 A GZD, Goldberg, Zoino & Dunnicliff.

25 Q That is a survey. Okay. Can you read the numbers on

1 that? I have some difficulty reading that. Can you read those  
2 numbers?

3 A Any particular number?

4 MR. PATON: Off the record.

5 (Discussion was held off the record.)

6 BY MR. PATON: (Resuming)

7 Q That you indicate is a survey of pipes. Are those  
8 pipes under the diesel generator building?

9 A As seen in the key diagram here, there is one line  
10 under the building. The others are around the building.

11 Q How many different pipes are shown on that figure?

12 A A total of nine figures are shown.

13 Q Can you tell from looking at that figure whether any  
14 of those pipes are overstressed?

15 A No, sir, I cannot.

16 Q Do you know from any source of information whether any  
17 of the pipes represented on 19-1 were in fact overstressed?

18 MR. FARNELL: During the time of the surcharge, or now?

19 BY MR. PATON: (Resuming)

20 Q Let me ask you this: The date on that is April '79?

21 A Yes, sir.

22 Q So that is before surcharge; is that correct? Before  
23 the full surcharge was applied?

24 A I don't think so. My recollection is that that would  
25 not be correct.



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Q When was the full surcharge applied?

A I do not recall, but I would think the end of '78 or early '79.

Q Does that figure -- what is the date on that figure? April what?

A April 24.

Q Would you understand that figure to indicate that was the condition of those pipes on April 24, or can you tell from that figure?

A No, I cannot tell from this figure. I would assume that it is no later than April 24.

Q I think we can all agree on that. Okay, does that figure give you any indication as to the time element it is supposed to represent? In other words, that is the condition of those pipes on what date? Can you tell from looking at that figure?

A No, I cannot without looking at the text.

MR. PATON: Let's go off the record.

(Discussion held off the record.)

BY MR. PATON: (Resuming)

Q Describe the procedure and the instruments used to establish the profiles shown on Fig. 19-1?

A I do not know the complete details.

Q I am not asking you for the complete details; I am asking you in your expert knowledge can you tell me how you go

1 about establishing such profiles?

2 MR. FARNELL: You asked for his expert knowledge, and  
3 he told you that he is not an expert, but if you want his opinion,  
4 fine.

5 MR. PATON: He is also responsible for seismic stress.

6 A The first thing I would like to say is that I am not  
7 an expert in this sort of measurement. That is why we hire GZD  
8 to do the work.

9 BY MR. PATON: (Resuming)

10 Q Okay, you say "this sort of measurement"; what do you  
11 mean by that?

12 A Underground pipe profiles.

13 Q Do you have any idea how that is done -- how they get  
14 those profiles?

15 A I have some idea how it is done.

16 Q Tell me what your idea is?

17 A I understood that GZD have a bug --

18 Q A bug?

19 A A bug which travels along the invert off the pipe, and  
20 they have instrumentation which records the difference of  
21 elevations between the bug and the reference elevation.

22 Q You say it travels along the invert off the pipe? Is  
23 that what you said? What does that mean?

24 A That means the bottom of the pipe.

25 Q Does the bug travel on the inside of the pipe or outside?

1 A The inside.

2 Q The bug travels along the bottom of the pipe inside the  
3 pipe. Does it transmit something?

4 A I do not know the complete details, but my understanding  
5 is that they can record the elevation between the two points.

6 Q Does it transmit a radio signal? Do you have any idea  
7 what it transmits?

8 A I understand that it is transmitted through fluid.

9 Q Through fluid?

10 A Yes.

11 Q Do the profiles that you are looking at on Fig. 19-1  
12 indicate that those pipes are under any degree of stress?

13 A Yes, there would be some stress in the pipe.

14 Q Do you know what caused that stress?

15 A Due to the curvature of the pipe.

16 Q What caused the curvature of the pipes?

17 A I do not know for sure.

18 Q Were they installed that way?

19 A I cannot answer that question.

20 Q Do you have any opinion as to whether that curvature  
21 of the pipes was caused by settlement?

22 A It could be.

23 Q But you don't have any opinion as to whether or not  
24 it was?

25 A I cannot say for sure.

1 Q You don't know that. Do you know whether the pipes  
2 were designed to be installed at the elevation which they are  
3 shown there?

4 A My understanding would be those are the design elevations  
5 where the pipe are to be laid.

6 Q In other words, you think those pipes are now at the  
7 elevations at which they were designed to be installed?

8 A No, the dotted line on the this figure shows the  
9 design elevation.

10 Q Do you know whether GZD profiled all of the pipes in  
11 the vicinity of the diesel generator building?

12 A That is my understanding; yes. I am not sure though  
13 whether any of them were done by optical means.

14 Q Profiled the pipe by optical means?

15 A Yes, sir.

16 Q Did you ever hear anyone say that less than all of the  
17 pipes in the power block area were profiled?

18 A Yes.

19 Q Do you know what criteria was used to determine which  
20 pipes would be profiled and which would not be profiled?

21 A My recollection is if there were pipes which has the  
22 same bearing condition which are adjacent to each other, then  
23 those pipes are not -- if there are two like that, only one would  
24 be profiled.

25 Q By "the same bearing condition," I assume you mean they

1 were close to each other?

2 A Close to each other; yes.

3 Q How close would a pipe be to another pipe before you  
4 would decide not to profile it?

5 A I do not recall what the number was established for  
6 that distance.

7 Q Do you know whether at this time all the pipes have  
8 been profiled?

9 A I do not know for sure.

10 Q Do you know whether all of the pipes have been surveyed  
11 or measured for settlement?

12 A Are you referring to all the Category 1 piping?

13 Q I will limit my question to that; yes?

14 A I do not know whether all of them have been done or  
15 not.

16 Q In your opinion have the stresses in any of the  
17 profiled pipes exceeded total allowables?

18 MR. FARNELL: Objection. Lack of foundation.

19 BY MR. PATON: (Resuming)

20 Q Will you answer it, please?

21 A I have not done any calculations for these pipes. I  
22 have not done any calculations for the deformed shapes of these  
23 pipes, and therefore I am not in any position to answer that  
24 question.

25 Q Have you heard from any source, or do you know from any

1 source whether any of the pipes that have been profiled have been  
2 found to exceed code allowables?

3 A As I reported in that meeting at that time, I was told  
4 some pipes and elbows and fittings have exceeded allowables.

5 Q Do you know from any source of knowledge whether any  
6 other pipes or portions of pipes other than what you referenced  
7 just then have exceeded code allowables?

8 A I am only aware that some additional analysis was  
9 being done; I do not know the results.

10 Q Have you reviewed computations of pipe stress  
11 submitted by E-Tech within the last two months?

12 A Along with the NRC Question?

13 Q No.

14 A Then I have not seen it.

15 Q Have you reviewed any computations made by Bechtel on  
16 pipe stresses that have been submitted to the NRC within the  
17 last month?

18 A I don't review any computations.

19 Q Has your group, do you know, been involved in any  
20 computations of pipe stresses within the last month?

21 A We have been involved in the stresses due to seismic  
22 event on buried piping.

23 Q Who in your section has responsibility for that?

24 A Mr. McConnell.

25 Q Have you discussed any computations that he may have

1 been working on within the last month with him?

2 A His group has originated a procedure for doing this  
3 computation, and that is currently in before me for review.

4 Q You have before you some work that his group has done  
5 very recently, and you are to review that work; is that correct?

6 A No, his group has originated a method for computing  
7 seismic stresses in buried piping, and he has given it to me for  
8 review.

9 Q You said a method for determining seismic stress; is  
10 that correct?

11 A Yes, sir.

12 Q Is that a new method?

13 A Compared to which one?

14 Q Compared to whatever. You say a method; I would have  
15 thought you would have determined the method a long time ago?

16 A You are referring to the calculations done before?

17 Q I am referring to your statement a minute ago that  
18 Mr. McConnell presented to you a method for reviewing seismic  
19 stresses?

20 A For calculating seismic stresses.

21 Q Is that method different from any that you have used  
22 before?

23 A I cannot answer that question what was done before.  
24 I do not recall it. I would assume they were different or he  
25 would not have sent it to me for review.

1 Q This method that you have that Mr. McDonnell has  
2 submitted to you, you now have it before you for consideration?

3 A Yes.

4 Q Is it in the documents that were on your desk?

5 A It was one of the recent ones so I would expect it  
6 to be on my desk.

7 Q Would you look at those documents that you have  
8 presented to us and identify which one that is?

9 MR. PATON: Let the record show that Mr. Dhar has just  
10 handed to me six pieces of paper. The first one has printed at  
11 the top "Calculation Coversheet." The second page is entitled  
12 Calculation Sheet No. 1, and continues through Calculation Sheet  
13 No. 5. I will mark these sheets -- you have no objection to  
14 that, Mr. Dhar?

15 THE WITNESS: No.

16 MR. PATON: I will mark these Staff Exhibit 4, Dhar,  
17 December 17, 1980.

18 BY MR. PATON: (Resuming)

19 Q Do you know prior to the application of the surcharge  
20 whether there was an evaluation of the consequences on buried  
21 pipe? Did anyone evaluate what the effect of the surcharge  
22 would be on the buried pipe?

23 A Except for the one that I mentioned for the condenser  
24 line. Except for the one I mentioned for the condenser line, I  
25 do not recall that any other analysis was done.



1 Q Do you know why there was no analysis done on expected  
2 impact on other pipes other than the condensate line?

3 MR. FARNELL: Read that back, please.

4 (Record read.)

5 MR. PATON: Is your point that he said he didn't know  
6 it was done?

7 MR. FARNELL: Right.

8 MR. PATON: I will withdraw the question.

9 BY MR. PATON: (Resuming)

10 Q Do you believe an analysis of the possible impact of  
11 the surcharge program should have been performed on the pipes  
12 other than the condensate pipe?

13 A In my opinion, unless there is a constraint in the  
14 pipe as in the condensate line existing -- pipe being made of  
15 stainless steel and being very ductile in nature -- there is no  
16 great danger of any significant damage to the pipe due to  
17 settlement.

18 Q Did your answer contemplate that before the surcharge  
19 was imposed, the pipes were already under some degree of stress?

20 A If that profile was done before the surcharge as it  
21 looks like it was, there was some degree of stress in it.

22 Q Regardless of Fig. 19-1, do you know whether the pipes  
23 were under some degree of stress prior to the surcharge?

24 A If I didn't have that information with me in 19-1?

25 Q No, I am asking you to ignore whatever you have learned

1 from looking at your Fig. 19-1, and ask you independent of what-  
2 ever information you get from 19-1, didn't you know prior to the  
3 surcharge that the pipes under the diesel generator building  
4 were undergoing some degree of stress?

5 A My recollection now is that this profile was done  
6 before surcharge to compare before surcharge and after, and  
7 looking at the profile, it is apparently there was some stress  
8 in the pipe.

9 Q Has there been differential settlement of some of  
10 these pipes that are reflected by Fig. 19-1?

11 A Is there some --

12 Q Does Fig. 19-1 illustrate differential settlement with  
13 some of these pipes?

14 A Yes, it does.

15 Q Does differential settlement cause overstressing of  
16 the pipes?

17 A If the differential settlement causes curvature in the  
18 pipe, then the stresses are introduced in it.

19 Q Are there examples on Fig. 19-1 where differential  
20 settlement has caused curvature of the pipes?

21 A Yes, there are.

22 Q Have you conducted any investigation to determine the  
23 amount of stress in those curvatures?

24 A No, I have not. It is not my area of responsibility.

25 Q Do you know whether anyone at Bechtel has conducted

1 such an investigation?

2 A It is my understanding that Plan Design Group with  
3 their staff are performing an analysis.

4 Q They are doing it now?

5 A It is my understanding that they have been doing it  
6 '79 also.

7 Q Do you know whether Bechtel or Consumers submitted to  
8 the NRC any evaluations of Category 1 pipes in the vicinity of  
9 the diesel generator building before the surcharge?

10 A I do not know for sure.

11 Q Do you know if any more recent profiles have been taken  
12 of the pipes in the vicinity of the diesel generator building,  
13 and by that I mean more recent than Fig. 19-1?

14 A My recollection would be that some profiles were taken  
15 after this.

16 Q Tell us what you know about that? When, how many, etc.?

17 A After removal of surcharge, some of these pipes are  
18 profiled to compare the effects of surcharge on them.

19 Q Who did that work?

20 A That was done by GZD.

21 Q Did you review the profiles that they made subsequent  
22 to the removal of the surcharge?

23 A I have looked at some of them. I recall looking at  
24 some of them.

25 Q Did you reach any conclusions?

1 A My recollection is that there was no great significant  
2 difference between the two.

3 Q No great significant difference?

4 A Yes.

5 Q Was there any difference?

6 A I do not know. There may be.

7 Q Tell me what you know. Was there any difference?

8 And please don't -- it doesn't help to say there may have been.

9 Do you remember whether there was in fact any difference?

10 A I don't recall the exact details.

11 Q No. I didn't ask you about the exact details.

12 MR. FARNELL: I think he is saying he doesn't.

13 MR. PATON: Fine. If he doesn't know, he doesn't know.

14 I want to know whether he knows or not.

15 BY MR. PATON: (Resuming)

16 Q Do you in fact know whether there was any difference  
17 in the profiles before and after the surcharge?

18 A I do not recall the degree of difference between the  
19 two.

20 Q You recall the degree of difference. That tells me  
21 there was some difference. Was there some difference?

22 A I cannot be absolutely sure of that.

23 Q Do you know if the profiles that we made after the  
24 surcharge was removed has been submitted to the NRC?

25 A I do not know for sure.

1 Q On Fig. 19-1 I direct your attention to Pipe Profile  
2 26-OHBC-54 which is the one at the bottom of the page, and ask  
3 you whether you would agree that that profile indicates  
4 approximately 9 inches of settlement before the full surcharge  
5 was placed?

6 MR. FARNELL: Read it back, and I think this poor  
7 little chart will speak for itself if left alone. This chart  
8 which is difficult to read which came from your client would, if  
9 it could speak for itself, but I am asking Mr. Dhar his knowledge  
10 of the chart.

11 A It is so difficult to read I can't be sure. I can't  
12 tell you.

13 MR. PATON: I want to make sure that is on the record.  
14 Will you read back his answer, please?

15 (Record read.)

16 MR. FARNELL: Just for the record, was this the  
17 original document that we submitted to the NRC?

18 MR. PATON: Yes. My response is to my knowledge  
19 of the many copies supplied to the NRC, to my knowledge this is  
20 one of them. I have no reason to know that this has been  
21 reproduced or reduced.

22 All right, sir, may I see that again?

23 BY MR. PATON: (Resuming)

24 Q Your answer is that you are not able to determine that  
25 from the chart?

1 A I didn't complete my answer.

2 Q Fine. Please do. Do you want to see it again?

3 A I cannot read this so I cannot tell from that.

4 Therefore, since I cannot read it I cannot determine between  
5 what point that 9 inches in the Question is applicable.

6 Q Mr. Dhar, do you have any knowledge as to the extent  
7 of the pipes in the vicinity of the diesel generator building  
8 had settled prior to the imposition of the surcharge on the  
9 diesel generator building?

10 MR. FARNELL: I think that has been asked and answered.

11 BY MR. PATON: (Resuming)

12 Q Would you answer my question?

13 A If this chart represents a profile done before the  
14 surcharge, this chart wouldn't give the information.

15 Q What is your conclusion with respect to the chart?  
16 Can you tell whether that is a profile of the pipes before  
17 surcharge or after the surcharge?

18 MR. FARNELL: You are asking for his understanding?

19 MR. PATON: Certainly. I have been sticking to his  
20 understanding -- nobody else's understanding.

21 A My understanding would be -- I would have to guess,  
22 and my guess is that it would be before the surcharge.

23 BY MR. PATON: (Resuming)

24 Q Independent of Fig. 19-1, do you have any knowledge of  
25 the extent of the settlement of the pipes prior to surcharge?

1 A To the best of my recollection, the condenser line  
2 showed some settlement.

3 Q Other than the condensate line?

4 A Other than -- to the best of my recollection, if this  
5 figure represents the data before the surcharge --

6 Q Do you know why GZD was asked to make these profiles?

7 A So that Bechtel can evaluate the condition of the  
8 underground piping.

9 Q I may have asked you this, but I will ask it again.  
10 With the exception of the condensate line that you have discussed,  
11 did Bechtel conduct any analysis of the pipes in the vicinity of  
12 the diesel generator building to determine what effect the  
13 surcharge load would have on those pipes?

14 A To the best of my recollection, no analysis was done.

15 Q Do you expect additional settlement of the pipes in  
16 the vicinity of the diesel generator building?

17 MR. FARNELL: During what period?

18 MR. PATON: In the future.

19 A I do not know.

20 BY MR. PATON: (Resuming)

21 Q You don't have any opinion as to whether the pipes in  
22 the foundation of the diesel generator building over the next  
23 four years will undergo any additional settling?

24 A If you want to know my opinion --

25 Q Yes.

1 A -- I would think there would be some settlement.

2 Q Do you have any opinion what effect that settlement  
3 will have on the stresses that are now in the pipes?

4 A Without analyzing the condition of the pipes as they  
5 exist now, I cannot answer that question.

6 Q Can you say positively that additional settlement will  
7 aggravate to some extent the stresses that are now in the pipes?

8 MR. FARNELL: I think he said he would need an analysis.

9 MR. PATON: My question was can he come to any conclu-  
10 sion. Would you read the question back.

11 (Record read.)

12 MR. FARNELL: I object to that question. Mr. Dhar  
13 said that he needed to make an analysis which he hasn't done,  
14 and therefore, there is no foundation for the question. Also,  
15 my continuing objection is to his lack of expertise in the pipe  
16 area. Also, there is the word "positively" in the question.

17 A I cannot positively say that.

18 BY MR. PATON: (Resuming)

19 Q Can you state that it is possible that additional  
20 settlement would decrease the stress that is now in the pipes,  
21 my question being is that possible?

22 MR. FARNELL: Objection. Speculation.

23 BY MR. PATON: (Resuming)

24 Q If you would have to guess, just say so, but my  
25 question is can't you conclude that there is no possibility that



1 the additional settlement would decrease the stress now in the  
2 pipes?

3 A I cannot answer the question without knowing what the  
4 pipe looks like and what the future settlements are now.

5 Q Does Bechtel have any plans to monitor the profiles  
6 of the pipes in the future?

7 A I do not recall.

8 Q Would the responsibility for that be within your  
9 group?

10 A I want to add something to my previous answer.

11 Q Sure.

12 A Except for the borated waterline. Please repeat your  
13 question.

14 Q Mr. Dhar, I asked you a question about whether you  
15 had any plans to monitor the profiles of pipes. Do you recall  
16 that question?

17 A Yes, I do.

18 Q Now you indicated to me that you wanted to amend your  
19 answer. Will you give me a complete answer to that question  
20 now?

21 A I do not recall any plans to monitor the pipes in the  
22 future except for the borated waterlines.

23 Q Why do you plan to monitor -- are these borated  
24 waterlines in the ground? They are underground?

25 A They are underground; yes.

1 Q Why do you plan to monitor these lines and not other  
2 lines?

3 MR. FARNELL: He said he didn't recall whether any  
4 other ones would be monitored, but he did recall this one would  
5 be.

6 BY MR. PATON: (Resuming)

7 Q Let me ask a different question. Do you know any reason  
8 why borated waterlines would be monitored? For example, do they  
9 have special safety significance?

10 A To my best recollection NRC has expressed concern about  
11 borated waterlines, and they have indicated that additional  
12 monitoring -- they would recommend additional monitoring.

13 Q They would recommend it?

14 A That they recommend it. That is my recollection.

15 Q Your recollection is that the NRC recommended the  
16 monitoring of borated waterlines, but you don't recall that they  
17 recommended monitoring other lines; is that your recollection?

18 MR. FARNELL: That is not what he said.

19 MR. PATON: I am not trying to mischaracterize what he  
20 said.

21 A What I said in my answer to the question about whether  
22 the borated waterline has any special significance, I was  
23 answering that question, and my answer was that NRC has indicated  
24 that borated waterlines are to be of great significance as to  
25 plant safety.

1 BY MR. PATON: (Resuming)

2 Q Mr. Dhar, this may possibly be repetitive, but do you  
3 have any plans to monitor any other lines or pipes other than  
4 the borated waterlines just discussed?

5 A I don't know.

6 Q Mr. Dhar, I will show you a document that is from  
7 Vol. 4, Tab 93. There is a cover note signed by S.S. Afifi  
8 dated November 26, 1979, and it has attached to it two pages of  
9 meeting notes. The date at the top is October 25, 1979, and I  
10 direct your attention to a sentence in Paragraph No. 3 on Page 2  
11 of the meeting notes, and the sentence reads: "K. Weidner  
12 said that he had already suggested that the Project request the  
13 Field to cut the pipe at certain points to check stresses."

14 That sentence is underlined in pencil there, and after  
15 you have had a chance to review that document, I want to ask you  
16 if you agree with Mr. Weidner's recommendation in that sentence?

17 MR. FARNELL: I just want noted for the record that  
18 this document has numbers stamped on it SB either 5 or S02095.

19 BY MR. PATON: (Resuming)

20 Q Do you agree with the recommendation in that sentence?

21 MR. FARNELL: I am going to object to this again as  
22 being outside his area of expertise.

23 BY MR. PATON: (Resuming)

24 Q Would you answer the question?

25 A Recognizing that I am not expert in piping stresses --

1 Q Except for seismic.

2 A -- my answer to the question would be if the  
3 calculations show that the pipes are overstressed, this would be  
4 one method of checking their stress.

5 Q Do you know whether the pipes were ever cut to check  
6 stresses?

7 A Other than the condenser line.

8 Q Other than the condenser line?

9 A No, I do not recall them being cut.

10 Q Did you attend a meeting in Bethesda on January 16,  
11 1980 at the NRC?

12 A I don't think so.

13 Q No?

14 A In 1980 you said?

15 Q Right.

16 A I don't think so.

17 Q Do you have any knowledge of cracking of the ring beam  
18 foundation for the borated water storage tank?

19 A There are some cracks in that beam; yes.

20 Q Are the cracks confined to the ring beam, or have they  
21 extended into the shell of the tank?

22 A Do you mean by the shell the metal of the tank itself?

23 Q Yes.

24 A I do not recall any cracking of the tank itself.

25 Q To your knowledge has there been any analysis to

1 evaluate the effects of the cracks in the ring beam during a  
2 seismic event?

3 A I would like to have some clarification on that  
4 question. Analysis for what?

5 Q The structural integrity of the borated water storage  
6 tank.

7 A Are you referring to an analysis specifically for this  
8 crack?

9 Q Yes.

10 A No analysis has been done specifically for this crack.

11 Q Has there been some other kind of analysis done other  
12 than specifically for this crack?

13 A Yes, sir.

14 Q For what purpose was the other analysis done?

15 A The analysis is being done to evaluate the effect of  
16 settlement on the ring foundation.

17 Q Has that analysis been completed?

18 A That analysis is still under progress.

19 Q When did that analysis start?

20 A That analysis was started sometime in '79.

21 Q And that is continuing?

22 A Yes, sir.

23 MR. PATON: Give us five minutes, and I think we are  
24 done.

25 (Recess.)

1 BY MR. PATON: (Resuming)

2 Q Are you aware of gaps in the foundations of any  
3 Category 1 structures at Midland?

4 MR. FARNELL: Currently?

5 BY MR. PATON: (Resuming)

6 Q Currently?

7 A Currently I am not aware of gaps.

8 Q Have there been gaps that you have been aware of that  
9 have been grouted?

10 A Yes, sir.

11 Q Have there been voids that you are aware of in  
12 Category 1 buildings that have been grouted?

13 A In the building itself?

14 Q In the foundation.

15 A And it has been grouted already?

16 Q Yes.

17 A I am not aware of that.

18 Q Are you aware of any that have not already been grouted?

19 A Yes, sir.

20 Q You are aware of voids, and you said they have been  
21 grouted?

22 A Voids under the foundation which have not been grouted.

23 Q Voids not grouted and gaps have been grouted?

24 A Yes, to the best of my knowledge the gaps have been  
25 grouted.