

ORIGINAL

OFFICIAL TRANSCRIPT PROCEEDINGS BEFORE

NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

DKT/CASE NO. 50-329 OL & OM
50-330 OL & OM

TITLE CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)

PLACE Midland, Michigan

DATE February 17, 1983

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1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION
3 ATOMIC SAFETY AND LICENSING BOARD

4 -----x
5 In the Matter of: :
6 CONSUMERS POWER COMPANY : Docket Nos. 50-329 OM
7 (Midland Plant, Units 1 & 2) : 50-330 OM
8 -----x : Docket Nos. 50-329 OL
: 50-330 OL

9 Quality Inn Central
10 1815 South Saginaw Road
11 Midland, Michigan 48640

12 Thursday, February 17, 1983

13 Evidentiary hearing in the above-entitled matter
14 was resumed pursuant to adjournment, at 9:45 a.m.

15 BEFORE:

16 CHARLES BECHHOEFER, Esq., Chairman
17 Administrative Judge
Atomic Safety and Licensing Board

18 DR. FREDERICK P. COWAN, Esq., Member
19 Administrative Judge
Atomic Safety and Licensing Board

20 DR. JERRY HARBOUR, Esq., Member
21 Administrative Judge
Atomic Safety and Licensing Board

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18 MS. MARY SINCLAIR

19 5711 Summerset Street

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I N D E X

<u>WITNESS</u>	<u>DX</u>	<u>CX</u>	<u>BD</u>	<u>RDX</u>	<u>RCX</u>
PALANICHAMY SHUNMUGAVEL					
By Mr. Steptoe	11995				
By Ms. Wright		12004			
By Chr. Bechhoefer			12008		
By Ms. Wright		12010			
By Mr. Steptoe	12011				
By Ms. Wright		12020			
By Judge Harbour			12023		
By Mr. Steptoe				12031	
By Mr. Marshall					12033
By Ms. Wright					12033
FRANK RINALDI					
By Ms. Wright	12040				
By Chr. Bechhoefer			12043		
By Ms. Stamiris		12101			
By Judge Harbour			12126		
By Chr. Bechhoefer			12128		
By Ms. Stamiris		12134			
By Mr. Marshall		12140			
JOSEPH KANE					
By Ms. Wright	12065				
By Ms. Stamiris		12083			
By Ms. Sinclair		12119			
By Judge Harbour			12125		
By Chr. Bechhoefer			12128		
By Ms. Stamiris		12134			
By Mr. Marshall		12142			
By Ms. Stamiris		12161			
DARL HOOD					
By Ms. Wright	12081				
By Ms. Stamiris		12087			
By Ms. Sinclair		12119			
By Judge Harbour			12126		
By Mr. Paton	12143				
By Ms. Stamiris		12147			
Afternoon Session					
		12049			
Testimony of: Palanichamy Shunmugavel				11997	
Testimony of: Palanichamy Shunmugavel				12016	
Testimony of: Frank Rinaldi				12080	
Testimony of: Darl Hood				12144	

P R O C E E D I N G S

1
2 CHAIRMAN BECHHOEFER: Good morning, ladies and
3 gentlemen. Are there any preliminary matters before we start
4 this morning?

5 MS. SINCLAIR: Judge Bechhoefer.

6 CHAIRMAN BECHHOEFER: Mrs. Sinclair?

7 MS. SINCLAIR: Yes, I quite inadvertently discovered
8 that of the three contentions that somebody thought -- that
9 the Board thought we might take up, that were my contentions,
10 that it's the steam generator problems that they thought they
11 might get to this week, but I'd like to bring out a couple
12 of things with regard to that.

13 First of all, I was not informed of that, to begin
14 with; and, second, I want to make -- bring out to you the
15 fact that I did not get under discovery the kinds of
16 documents I should have gotten.

17 I didn't get the order until the middle of January
18 and even before I received the order defining the contentions
19 that were accepted, I was told that these were the contentions
20 we were going to deal with in February.

21 After I got the order, I began checking the
22 information base that I would need, and I realized that I
23 didn't begin to get the discovery that I should have
24 gotten in order to deal with this issue.

25 For example, I did have in my files this letter

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1 from Eisenhut which was served on all parties. The NRC
 2 has recently identified steam generator degradation as an
 3 unresolved safety issue deserving the highest priority for
 4 resolution, and then went on to say it should be noted that a
 5 number of research efforts are currently under way which will
 6 improve our knowledge of steam generator degradation
 7 mechanisms.

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mechanisms,

1 The research that I was looking for I didn't get.
2 This research, indeed, has been done, a good deal of it. I
3 haven't got it under the discovery, although I think I was
4 entitled to it.

5 I have begun to finally acquire it and some of
6 it has come in the mail this week. There is, for example,
7 a NUREG 0886 --

8 MR. PATON: Could I have one minute, please? Mr.
9 Wilcove's got to hear this and he stepped out of the room.
10 I just want to get him in here. He can respond to this and
11 I have got to get him in the room.

12 Could I have one minute?

13 (Recess taken)

14 MR. PATON: Thank you, Mr. Chairman.

15 CHAIRMAN BECHHOEFER: Okay.

16 MS. SINCLAIR: In addition to this report, NUREG
17 0886, which the title of it is Steam Generator Tube Experience,
18 which was dated February, 1982, which would give us some
19 recent information, there is also a larger report which I
20 don't have, but I have it under order through the superintendent
21 of documents. It's NUREG 0571, Steam Generator Tube Integrity
22 at 1 2 steam generators which is, of course, important, it
23 being that they're reactors.

24 So the information that I should have been able to
25 get under discovery, I did not have, I am acquiring it.

1 I also discovered at the February 8th public meeting
2 that there is a corrosion expert who is very interested in the
3 steam tube generator problem here in Midland. He has been a
4 corrosion expert at the Dow Chemical Company for some time
5 and I finally convinced -- found him and convinced him last
6 night that -- to act as a consultant to me for questions.

7 He's not, as yet, ready to say he'd come forward as
8 an expert witness, but he will help me with questions and he
9 needs the time to read the testimony and so on and all this
10 information that I am acquiring.

11 Since this -- the steam tube degradation problem
12 is one of the most serious problems that we have to face,
13 as the letter from Eisenhut clearly tells us, it is responsible
14 for at least 25 percent of all unplanned outages in nuclear
15 power plants.

16 It is responsible for the highest amount of radiation
17 dose to workers and the surrounding territory and population
18 that's exposed. And so I think it should be gone at very
19 carefully with as much assistance from all sides that we can
20 get.

21 When I read the expert testimony that was provided,
22 it read like a PR statement compared to the information that
23 I have already acquired. So I don't think we can use that
24 as the sole basis for what we're going to consider here.

25 So I also have more recent information on the kind

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1 of toxic wastes that have been pumped underground on the plant
 2 site under pressure in the past, which I think would have a
 3 great deal of bearing on what the corrosion problems would be
 4 here, so that I think that all of this kind of information
 5 should be assembled before we get into that contention and I
 6 don't think an adequate time or adequate information has been
 7 provided as is required really by the rules.

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rules

1 Knowing how inadequate my discovery has been now that
2 I am going into these contentions, I would like to have the
3 Board ask the Applicant and the NRC Staff to review the
4 contentions and to make sure that the best available information
5 that they have, which I request, is, indeed, made available
6 to me.

7 I'd be glad to provide an inventory of what I did
8 get and what I did get amounts to reports that are five and
9 six years old.

10 There is a whole carton of ASME code which is
11 impossible for me to decipher, and that is not the kind of
12 information that is going to be helpful for establishing a
13 record in this hearing.

14 That is all I have to say.

15 MR. STEPTOE: May I respond?

16 CHAIRMAN BECHHOEFER: Yes. I was just going to
17 comment that I can understand why you didn't receive a
18 February NUREG --

19 MS. SINCLAIR: Well, it's 1982.

20 CHAIRMAN BECHHOEFER: Oh, I'm sorry. Okay.

21 MR. STEPTOE: Judge Bechhoefer, this motion for a
22 delay is about the third one that we've received with respect
23 to these contentions and this one is no better grounded than
24 the other ones we've received.

25

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received 1

2 For example, Mrs. Sinclair says that she didn't
3 receive the Board's -- presumably the Board's December 30th,
4 1982, order until mid January. But the fact of the matter is
5 that this contention was admitted long before that time.

6 I believe Applicant and Staff didn't even object
7 to it and it was admitted in August or September, perhaps
8 even before that. It was certainly admitted last fall.

9 It was admitted for purpose of discovery more than
10 four years ago and Mrs. Stamiris -- I mean, Mrs. Sinclair
11 had the opportunity to craft this contention and it should
12 be taken at face value.

13 The NUREG 0886, which she refers to, is actually
14 referenced in her own contention as it appears in the December
15 30th, 1982, order.

16 So I just cannot believe that she tried to get
17 it if she doesn't have it. It can't be a surprise to her
18 if it's listed in her own contention as a basis for
19 the contention. That's an outrageous claim at this point.

20 I don't have Applicant's and the Staff's response
21 to Mrs. Sinclair's discovery request, but she certainly had
22 ample opportunity to make discovery requests. And I reject
23 the notion that if she didn't get what information she wanted,
24 it's Applicant or the Staff's fault.

25 We tried very hard to give complete answers there
and I think she has to do more than just assert something

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like that. She has to show that we somehow did not provide her information to which she was entitled.

It's her obligation in discovery to ask for specific documents and ask for specific questions and it's our obligation to give complete answers. I have no basis at this time to believe for a moment that she -- that we did not provide complete answers.

Finally, she now has discovered a corrosion expert who she has finally persuaded to help her. She didn't quite say when she first became aware of this man from Dow, but I'll bet you it was not last night.

MS. SINCLAIR: No, --

MR. STEPTOE: When?

MS. SINCLAIR: At the February 8th meeting he was one of the people that talked at the meeting and he made it known that he was a corrosion expert from Dow Chemical and he had several things to say about the importance of the steam tube degradation problem.

And at that point Mr. Paton said that there would be a contention coming up in the operator's license where that can be discussed and so I finally tracked him down and as of last night I was able to persuade him to at least read the testimony and perhaps sit in and assist me with questions on cross examination.

There is nothing in the testimony that has been

1 supplied, either by the NRC Staff for the Applicant, that
2 begins to appreciate or indicate that there is the knowledge
3 that is necessary about the extent of corrosion in the Midland
4 area.

5 Dow has good corrosion experts. They do clean up
6 of corrosion, but they also understand the corrosion problem
7 in this area.

8 And I think that has to be understood and a part
9 of the -- it has to be a part of the record on this. I'm
10 trying to get the best information together.

11 As far as NUREG 0886 being referenced, I did reference
12 things out of articles that I read on steam tube experience.
13 I didn't have -- I didn't believe that I could presume what
14 the Board would finally accept in the way of contentions.

15 CHAIRMAN BECHHOEFER: That contention we already accep-
16 ted, though, last August, I think it was, or September.
17 All we did is put a repeat here of these, but we didn't rule
18 on it at all. I just copied the same contention and put a
19 different number on it.

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1 MR. STEPTOE: Chairman Bechhoefer, at this late
2 date, assuming that Mrs. Sinclair has an expert who might
3 provide testimony, the proper way to proceed is to proceed
4 with the testimony today and, if Mrs. Sinclair's expert reads
5 that testimony and finds that it's some way incomplete or
6 incorrect, she can always provide an affidavit and move to
7 reopen the record on the subject. That's the proper way to
8 proceed.

9 We have our witnesses here; so does the Staff.
10 It's just outrageous, after the contention was introduced in
11 preliminary form in 1978 or early 1979 for us to come to the
12 very day on which testimony is to be delivered and get a
13 motion for a delay like this. There just is no basis for it.

14 MS. SINCLAIR: I have new information, however,
15 that was not available in '78 or '79.

16 MR. STEPTOE: Well, it's her burden to show that
17 by proper written motion, Judge Bechhoefer, not by
18 assertions which, as far as I can tell -- I haven't heard
19 any new information. I've heard claims that she has new
20 information, and that can't be resolved right now.

21 MR. MARSHALL: Judge Bechhoefer, I'd just like to
22 speak for the record for a moment and state that Counselor
23 Steptoe admits that they tried, and I think the rules imposes
24 a duty upon them to do better than try.

25 And, moreover, that in question -- you wasn't here,

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1 Judge, at the time at which they speaked. Mr. Steptoe was
2 just informed by Mary Sinclair that the gentlemen that she's
3 talking about was in this room. I, too, was here. But I
4 would like to say that Mr. Steptoe's principal was adequately
5 represented at that meeting by his boss, Mr. Miller.

6 So I think they could get together and iron this
7 matter out. They had constructive notice, and I'm now giving
8 the Court judicial notice of those facts.

9 CHAIRMAN BECHHOEFER: Well, does the Staff have
10 any comments?

11 MR. PATON: Yes, Mr. Chairman.

12 First, Mr. Wilcove advises me that our response to
13 discovery on this issue was sent to Mrs. Sinclair more than
14 six months ago, and if she had some dissatisfaction with the
15 discovery, of course, the rules would indicate that she
16 should advise the Board and the parties about that promptly.

17 I don't think she can just not respond to that
18 discovery and then come in at the day or the day before this
19 testimony is to be presented and complain about that.

20 So I think that's very untimely.

21 What concerns me is that our witness is here and
22 we are prepared to go ahead.

23 Now, as a practical matter, I really think we could
24 turn this situation around so that it doesn't act to anybody's
25 disadvantage and there is some advantage to Mrs. Sinclair.

1 And, by that, I mean this.

2 Our expert witness, Mr. Conrad McCracken, is a
3 professional corrosion engineer. He has 20 years experience
4 in steam generator corrosion in that area. Fifty percent
5 of his time has been spent in this area in the last ten
6 years.

7 In all modesty, I would submit that there are not
8 too many people in the world that know much more about this
9 subject than Mr. McCracken. And what I'm saying is, to the
10 extent that Mrs. Sinclair cross examines this witness within
11 the scope of the contention that she has alleged, it seems
12 to me like a very real opportunity for her to get to the
13 heart of this issue and then -- I don't think it's appropriate
14 to interrupt and for us to send Mr. McCracken back home.

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home

1 I think we should proceed with the contention and
2 then, based on the information she obtains from her cross
3 examination of this witness plus whatever she is able to
4 develop with her newly discovered expert, if there is some
5 reason to reopen this issue, then she can make the appropriate
6 motion.

7 But I really think that we should proceed today,
8 and I think Mrs. Sinclair should look at it as an opportunity
9 to really get some very, very valuable information from a man
10 who is very experienced and very knowledgeable in this field.

11 I really think that she should agree to proceed with
12 that opportunity before her.

13 CHAIRMAN BECHHOEFER: Could your expert or person
14 who is assisting you help you ask questions today?

15 MS. SINCLAIR: Not today. Are you getting to this
16 today? You still have quite a bit to cover.

17 CHAIRMAN BECHHOEFER: I would assume we would, yes.

18 MR. PATON: Mr. Chairman, my schedule would indicate
19 we would not get to it today, as I see it. I don't think we
20 could get to it today.

21 We have a number of things to address this morning,
22 and then, as soon as Mrs. Stamiris gets here, we have
23 Contention 4.

24 CHAIRMAN BECHHOEFER: My reaction is that the
25 testimony on seismic shakedown and that type of thing will not

1 take very long.

2 MR. PATON: That's correct, I agree. But I think
3 you indicated --

4 CHAIRMAN BECHHOEFER: I think it should take about
5 as long as Dr. Woods' testimony the other day.

6 MR. PATON: Well, what I'm thinking about is I
7 think you indicated that you wanted us to not proceed with
8 the testimony of Mr. Kane and Mr. Rinaldi until Mrs. Stamiris
9 arrived, so, if we don't start that until she arrives at
10 1:00, that will -- depending on the cross examination --

11 CHAIRMAN BECHHOEFER: We might take a slightly
12 earlier-than-usual lunch hour so that we can get through what
13 we have to do.

14 I just thought we might get to the steam generator
15 tube question today, but I would guess that it would certainly
16 carry over until tomorrow.

17 Could your person be here to help you tomorrow?

18 MS. SINCLAIR: Well, I could try.

19 CHAIRMAN BECHHOEFER: I don't mean to participate
20 as a witness, because we could very well have him come back as
21 a witness. And I'm not even sure that we at that stage would
22 apply the same standards for reopening the record that you
23 normally apply.

24 MR. STEPTOE: Judge Bechhoefer, we would have an
25 opportunity to depose any person that was identified as a

1 witness by Mrs. Sinclair.

2 CHAIRMAN BECHHOEFER: Right.

3 MR. STEPTOE: Mrs. Sinclair is under an obligation
4 to do that.

5 CHAIRMAN BECHHOEFER: That is certainly correct,
6 but I was thinking he might want to testify like in March
7 and the parties could have a chance to take his deposition
8 first and --

9 MR. PATON: Mr. Chairman, the Staff offers to meet
10 with Mrs. Sinclair and her expert tonight for an hour if --
11 it would seem if we could get the two experts together for an
12 hour we could cut through a lot of issues and get to the heart
13 of the matter. I mean, we could get to whatever the issue is
14 that she wants to address.

15 CHAIRMAN BECHHOEFER: Right, if he has specific
16 problems with the analysis of corrosion that we've received --

17 MS. SINCLAIR: Well, I'm getting the papers to him
18 today to read.

19 I'll just give you an example. In the testimony
20 it said that there is no unusual corrosion problem in the
21 Lake Michigan area that needs to be particularly addressed
22 as far as this is concerned, and my whole point is that there
23 is some -- there are really unique corrosion potentials in
24 this area.

25 As I mentioned, there are toxic wastes that have

1 been pumped under pressure into -- right on the plant site,
 2 and that's some information that I was just given.

3 The knowledge of the special corrosion problems in
 4 this area is unique to this area and it was not reflected in
 5 the testimony, and this is the reason I thought we should get
 6 this additional information and this additional help.

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1 CHAIRMAN BECHHOEFER: Certainly, the types of things
2 you're talking about would be appropriate cross examination
3 of the people who are here on the subject, and it may well
4 be appropriate for direct testimony on your own. So that it
5 just is a little late to tell these people who have come from
6 probably several different parts of the country that that was
7 useless.

8 If we had known that last week, it might have been
9 easier, but --

10 MS. SINCLAIR: Yes. Well, this other --

11 CHAIRMAN BECHHOEFER: I do think we should proceed
12 with the testimony of the people who are here.

13 Now, as I say, we're not necessarily saying you
14 can't present your person who is an expert at a later date
15 to testify. He would be subject to the discovery provisions,
16 meaning depositions or interrogatories, as the case may be.

17 MR. PATON: Mr. Chairman, I'd like to request a
18 response from Mrs. Sinclair.

19 The Staff, in the interest of getting to the real
20 issues in this case and the interest of moving the case along,
21 we happen to have a man with 20 years experience in this very
22 limited field. I have offered to meet with Mrs. Sinclair
23 and her expert tonight to get to the heart of the matter, and
24 I'd like her response on the record.

25 I don't know what more we can do. We're trying to

1 move this proceeding and get to the issues in the case. I'd
2 like her response.

3 CHAIRMAN BECHHOEFER: That could be a useful way
4 of proceeding. I would like her response.

5 MS. SINCLAIR: I cannot speak for this gentleman.
6 I can't say that he's willing to meet without having studied
7 the testimony, and I only became aware of his special
8 knowledge, as I say, within the past week. And, therefore,
9 I really can't speak for him until I have a chance to talk
10 to him.

11 CHAIRMAN BECHHOEFER: Could you call him on the
12 telephone today and ask him?

13 MS. SINCLAIR: Well, I'll reach him today, and I
14 will ask him if he's willing to meet, yes.

15 We can move ahead, as far as you mentioned, with
16 the information that we have so far.

17 And there is this whole other aspect. How close
18 to the completion of the plant should you be finishing your
19 operating license?

20 I mean, there's so much to be completed there now.
21 We don't have a construction schedule and yet you're pushing
22 ahead with operating license contentions even as information
23 is being developed. And my question is: Is there anything
24 in the rules that tells us how close to the completion of
25 construction does this operating license have to be?

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MR. STEPTOE: Judge Bechhoefer, do we really have to go on into this discussion?

CHAIRMAN BECHHOEFER: Well, there's nothing in the rules except that we're under an obligation to render a decision prior to whatever date is scheduled for fuel loading.

MS. SINCLAIR: Well, we're not getting that date from the Applicant. All we know is that the dates that they had given us in the past have all eroded. And Mr. Selby, the chief executive officer, was on the radio yesterday and said it would be at least two years before construction was completed here, and I think that's the minimum side when you read what Mergentime is -- in Mergentime's own words what they're planning in the way of underpinning out there. They call it the world's largest underpinning contract in history. And if anybody is under any delusion that that's going to be completed in 18 months or two years it's really a delusion.

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delusion 1

2 So I'm saying that I think in the interest of having
3 the contentions heard properly and these issues explored
4 properly we are not under that much of a time pressure. But
5 I will go ahead, along with what Mr. Paton suggested, to
6 see if this gentleman is willing to meet with Mr. McCracken
7 this evening and if we can go ahead on that basis.

8 CHAIRMAN BECHHOEFER: This would not, as I say,
9 necessarily preclude him, if we took up the issue tomorrow
10 or -- I assume it would be tomorrow, or possibly late today,
11 but probably tomorrow. It wouldn't preclude him from
12 testifying on his own at a later date if he -- now we would
13 have to consider all the circumstances.

(Discussion had off the record.)

14 CHAIRMAN BECHHOEFER: Well, why don't we -- we think
15 that would be a good way to approach it. We will take our
16 morning break, which may be a fairly short one, but we're
17 going to have a fairly early lunch, as well, so that Mrs.
18 Stamiris could take advantage of the rest of the day, so that
19 she would take advantage of as much of the hearing as she
20 could.

21 Why don't you contact this person and --

22 MS. SINCLAIR: I'll do that.

23

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1 MR. MARSHALL: Judge Bechhoefer, again, I would at
2 this point like to state for the record, just for the record,
3 that the Applicant's office from Jackson, Michigan -- officers
4 from Jackson, Michigan, gave notice by public action on
5 the front page of the Midland Daily News -- or, no, wait a
6 minute, strike that, the Saginaw News last week to the effect
7 that they will not be able to meet either one of their
8 contracts with The Dow Chemical Company on schedule because
9 of this excavating and whatever problems they have got down
10 there.

11 It's just an impossibility of performance, that is
12 what they're saying. So what I am saying is that Mrs.
13 Sinclair is not -- actually she's not at fault in requesting
14 a little further time.

15 I was here when this man from Dow Chemical Company
16 stated his expertise here, and this is Midland, and I'm sure
17 that the man she has is pretty well qualified by the soils
18 around here and also what we have in the chemical erosions
19 and so forth.

20 This may not be so well grounded that -- other
21 people may not be so well grounded on it as you would get
22 from this man she has.

23 CHAIRMAN BECHHOEFER: I think the point we were
24 raising is that the witnesses are here, they can testify, and
25 I think they probably do come from other parts of the country

1 and they have difficult schedules.

2 MR. MARSHALL: That part is right, but what I am
3 saying is you can defer -- they can hear them and still
4 bring that man in at her leisure at some other time between
5 now and April. They can still bring this man in. We've got
6 quite a schedule in April, I understand, expertise, so if --

7 CHAIRMAN BECHHOEFER: I believe April will be on a
8 different subject, but --

9 MR. MARSHALL: And what I am saying is you can
10 arrange this. It could be arranged.

11 CHAIRMAN BECHHOEFER: We're not saying that we
12 can't. I mean, --

13 MR. MARSHALL: We have time.

14 CHAIRMAN BECHPOEFER: We have clearly left that
15 open. Is there anything further before we --

16 MR. PATON: Yes, Mr. Chairman, I have another
17 preliminary matter.

18 Mr. Chairman, this is by way of providing information
19 to the Board. The Staff was advised yesterday by the Applicant
20 that there is a crack on the roof of the feed water isolation
21 valve pit structure, and that the width of this crack is ten
22 mills, which is the previously established alert level.

23 The Applicant is employing a four-point jacking
24 procedure at the feed water isolation valve pit and the
25 Applicant advised us that they believe that the crack was

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3-1, dn3

1 caused by their failure to unlock a spring that is attached
 2 to the roof of the structure and that is used to support a
 3 feed water pipe.

4 The Staff cannot represent to the Board now the
 5 significance of the crack. The Applicant is going to
 6 investigate it and to file a report and we will, of course,
 7 review that report. And if the matter is of significance,
 8 we'll report to the Board.

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I frankly don't think any further discussion or much lengthy discussion of this on the record this morning would be very fruitful because I think I have told you about all the Staff knows at this point and I think we will be receiving a report from the Applicant sometime in the near future.

CHAIRMAN BECHHOEFER: The Applicants have any comments or --

MR. STEPTOE: No.

CHAIRMAN BECHHOEFER: Any further preliminary matters?

MR. STEPTOE: We'd like to call Dr. Palanichamy Shunmugavel to the stand to give his testimony on seismic shakedown settlement of the Auxiliary Building. This witness has previously been sworn in this proceeding and he remains under oath, of course.

Whereupon,

PALANICHAMY SHUNMUGAVEL,
called as a witness by counsel for the Applicant, having previously been duly sworn by the Chairman, was further examined and testified as follows:

DIRECT EXAMINATION

BY MR. STEPTOE:

Q Dr. Shunmugavel, state your name for the record.

A. My name is Palanichamy Shunmugavel.

Q By whom are you employed and in what capacity?

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1 A I'm employed by Bechtel Power Corporation. My title
2 is engineering specialist.

3 Q Are you familiar with the document entitled Testimony
4 of Dr. Palanichamy Shunmugavel on behalf of the Applicant
5 regarding structural evaluation of Auxiliary Building for
6 seismic shakedown settlement at the Midland site?

7 A Yes, I am.

8 Q Are you the author of that document?

9 A Yes.

10 Q Do you have any corrections or additions to make
11 to this testimony?

12 A Yeah, I have some. On page three of the testimony.
13 third line from the top, the statement starts: It has a roof
14 slab. I want to scratch the word roof so it will read: It
15 has a slab.

16 The next word is one foot. I want to change that
17 to two feet, so it will read: Has a slab two feet thick at
18 elevation 659.

19 Q Why are you deleting the word roof in describing
20 this slab?

21 A This portion of the structure, this is the 659,
22 is the top of the concrete portion of the building, but there
23 is a steel portion on the top. So theoretically this wouldn't
24 be the roof. There is something on the top, some steel
25 structure on top.

1 Similarly there is about -- on nine lines below,
2 there is the word roof, roof slab of one feet thick. I want
3 to remove the word, also, roof there.

4 Q Does not remain one foot or recharge that to two
5 feet?

6 A No, that is one feet. No, that is one foot thick.
7 That is all the corrections on that page.

8 Then I have on page eight, the second reference has
9 two docket numbers. The second one is 50-350. That has to
10 be changed to 50-330. That is all the corrections I have on
11 this testimony.

12 Q With these corrections, is your testimony true and
13 correct to the best of your knowledge and belief?

14 A Yes.

15 MR. STEPTOE: Chief Judge Bechhoefer, I move that
16 the testimony of Dr. Palanichamy Shunmugavel on behalf of the
17 Applicant regarding structural evaluation of Auxiliary Building
18 for seismic shakedown settlement at the Midland site be
19 accepted into evidence and bound into the record as if read.

20 JUDGE BECHHOEFER: Any objections?

21 MR. MARSHALL: No objections.

22 CHAIRMAN BECHHOEFER: The testimony will be admitted
23 into evidence and bound into the report at this point.

24 (The document referred to, the testimony of
25 Palanichamy Shunmugavel, follows):

SS: STATE OF MICHIGAN
COUNTY OF WASHTENAW

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-329 OM
CONSUMERS POWER COMPANY	)	50-330 OM
(Midland Plant, Units 1 & 2))		50-329 OL
		50-330 OL

AFFIDAVIT OF PALANICHAMY SHUNMUGAVEL

My name is Palanichamy Shunmugavel. I am an Engineering Specialist in the civil/structural department of Bechtel Power Corporation in Ann Arbor. In this capacity I am responsible for providing consultation to civil/structural engineers working for Bechtel and for reviewing their work. I have a B.E. in Civil Engineering, M. Tech. in Structural Engineering, and a Ph.D. in Civil Engineering. I am a registered professional engineer in the state of California.

In connection with my role as Engineering Specialist, I have been assigned the responsibility for the Testimony concerning structural evaluation of the auxiliary building for seismic shakedown settlement. I have reviewed in detail the related structural evaluations.

I swear that the statements contained in this affidavit, and the Testimony are true and correct to the best of my knowledge and belief.

Palanichamy Shunmugavel
PALANICHAMY SHUNMUGAVEL

SIGNED AND SWORN TO BEFORE
me this 21 day of
January, 1983.

Vera G. Allum
NOTARY PUBLIC

VERA G. ALLUM
Notary Public, Washtenaw County, Michigan
My Commission Expires November 13, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos.	50-329 OM
			50-330 OM
CONSUMERS POWER COMPANY	)		50-329 OL
			50-330 OL
(Midland Plant, Units 1 & 2))			

TESTIMONY

OF

DR. PALANICHAMY SHUNMUGAVEL

ON BEHALF OF THE APPLICANT

REGARDING STRUCTURAL EVALUATION OF

AUXILIARY BUILDING FOR

SEISMIC SHAKEDOWN SETTLEMENT AT

THE MIDLAND SITE

STRUCTURAL EVALUATION OF AUXILIARY BUILDING
FOR SEISMIC SHAKEDOWN SETTLEMENT

1.0 BACKGROUND

1.1 SCOPE OF TESTIMONY

This testimony presents an adequate and reasonable basis for assurance that upon completion of the remedial action, the auxiliary building will be fully capable of withstanding the effects of shakedown settlement under the railroad bay and the liquid radwaste area.

1.2 FUNCTION AND DESCRIPTION

The auxiliary building is a large (approximately 230 feet along the north-south direction, 150 feet along the east-west direction, and 140 feet high) mainly reinforced concrete structure located north of the turbine building and between the two containment buildings (Figure 1). The liquid radwaste area and the adjacent railroad bay are appendages to the auxiliary building and are located at the northern end of the auxiliary building. The liquid radwaste area is

approximately 50 feet long in the east-west direction, 28 feet wide in the north-south direction, and 45'-0" high. It has a roof slab 1'-0" thick at elevation 659' and foundation slabs 4'-0" thick at elevations 634.5' and 614.0'. The railroad bay is approximately 80 feet long in the east-west direction, 28 feet wide in the north-south direction, and 25 feet high. It has a roof slab of 1'-0" thick at elevation 659 and a foundation slab of 4'-0" thick at elevation 634.5'. The foundation slabs rest on cohesionless granular backfill material. There are reinforced concrete walls on all four sides with a common wall on line A between the main auxiliary building and the railroad bay/liquid radwaste area (Figure 2). The liquid radwaste area contains tanks and other equipment used for processing radwaste materials. The railroad bay provide access for loading and unloading equipment and fuel assemblies.

1.3 SHAKEDOWN SETTLEMENT

It is anticipated that the granular soil will be affected by seismic shaking. The shaking will result in a densification of the granular soil that will cause approximately 0.12 inch of

settlement under the railroad bay and the liquid radwaste area following a safe shutdown FSAR earthquake of 0.12 g. For a larger earthquake of 0.19 g, the shaking will produce approximately 0.25 inch of settlement (Reference 3).

2.0 ACCEPTANCE CRITERIA

The auxiliary building is designated as a Seismic Category I structure. As such, the underpinned structure is evaluated in accordance with the design criteria and applicable loads and load combinations described in FSAR Subsection 3.8.6.3, Revision 44 and in the previously submitted testimony of Burke, Corley, Gould, Johnson, and Sozen for the Midland Plant auxiliary building (Reference 1).

3.0 STRUCTURAL ANALYSIS

The seismic shakedown settlement under the railroad bay and liquid radwaste area can mainly cause local effects with a potential for affecting the stress distribution in these areas and in the portions of the auxiliary building near them because the railroad bay and the liquid radwaste area are small appendages to the auxiliary building. The shakedown settlement occurs because of seismic cyclic shear strain in the granular

material. The seismic shakedown settlement at the railroad bay and the liquid radwaste area will have minimal effect on the overall seismic behavior of the auxiliary building because the building will have translational and rocking excitations about its main foundation at elevation 562.0'. The analysis of the auxiliary building has revealed that the railroad bay and the liquid radwaste areas will not separate from the soil during an earthquake. Therefore, the seismic shakedown settlement effects will be pronounced for the loading condition following a large earthquake. The underpinned auxiliary building is analyzed for the following load combination using a detailed finite-element model described in Reference 1.

$$U = 1.4 (D + S_H) + 1.7 (L + S_H) + P_L$$

where

U = Required strength to resist design loads

D = dead load

L = live load

P_L = jacking preload effect

S_H = shakedown settlement effects

This corresponds to the first load combination specified both in ACI 318 and ACI 349 codes modified to include the effects of seismic shakedown settlement and jacking preload. The shakedown settlement effect is included in the analysis by softening the soil springs under the railroad bay and the liquid radwaste area.

4.0 STRUCTURAL EVALUATION

From the results of the above analysis, it is confirmed that the seismic shakedown settlement at the railroad bay and liquid radwaste areas has mainly local effect near column line A. Therefore, the portions of the auxiliary building between column lines AA and C and between elevations 614'-0" and 659'-0" are evaluated in detail for seismic shakedown effects.

In addition to the finite-element analysis using the BSAP computer program, hand analyses of various slabs and walls are made to determine out-of-plane shears and bending moments wherever applicable. The effects of out-of-plane shears and moments are combined with the effects of in-plane shears and normal forces.

In the evaluation of a typical slab or wall, the amount of reinforcing steel required for in-plane and out-of-plane forces is determined and compared to the existing reinforcement. For all walls and slabs, the amount of existing reinforcement is greater than the reinforcement required to satisfy the acceptance criteria.

5.0 CONCLUSION

It is concluded that the auxiliary building, including the railroad bay and liquid radwaste area, is safe for the effects of shakedown settlement.

REFERENCES

1. Testimony of Edmund M. Burke, W. Gene Corley, James P. Gould, Theodore E. Johnson, and Mete Sozen on Behalf of the Applicant Regarding Remedial Measures for the Midland Plant Auxiliary Building and Isolation Valve Pits
2. Consumers Power Company, Midland Plant Units 1 and 2, Final Safety Analysis Report, Docket 50-329, 50-350
3. Testimony of Richard D. Woods on Behalf of the Applicant Regarding Seismic Shakedown Settlement at the Midland Site

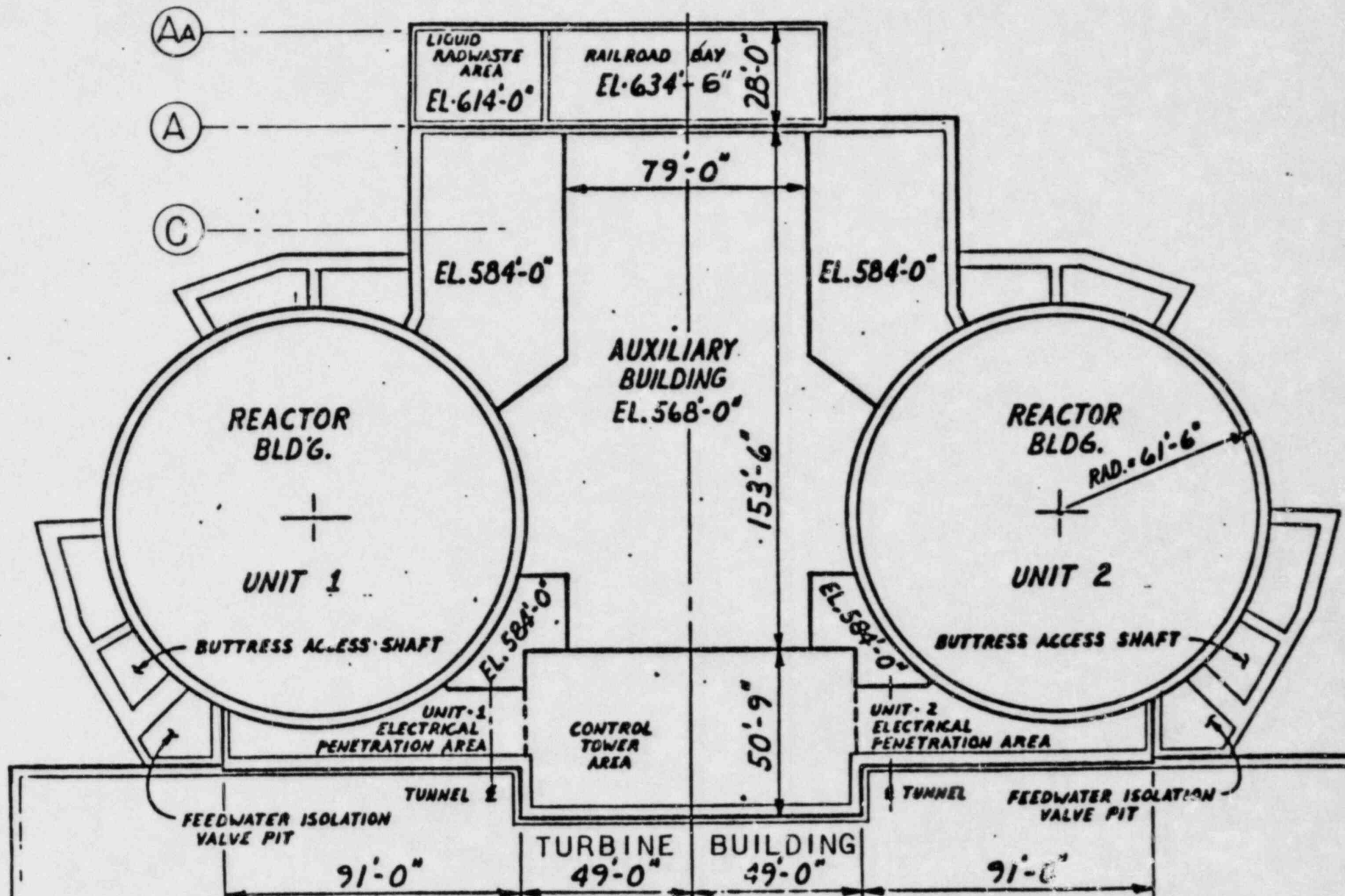


FIGURE - 1

FOUNDATION PLAN SHOWING ELEVATIONS

AUXILIARY BUILDING TYPICAL SECTION (Looking East)

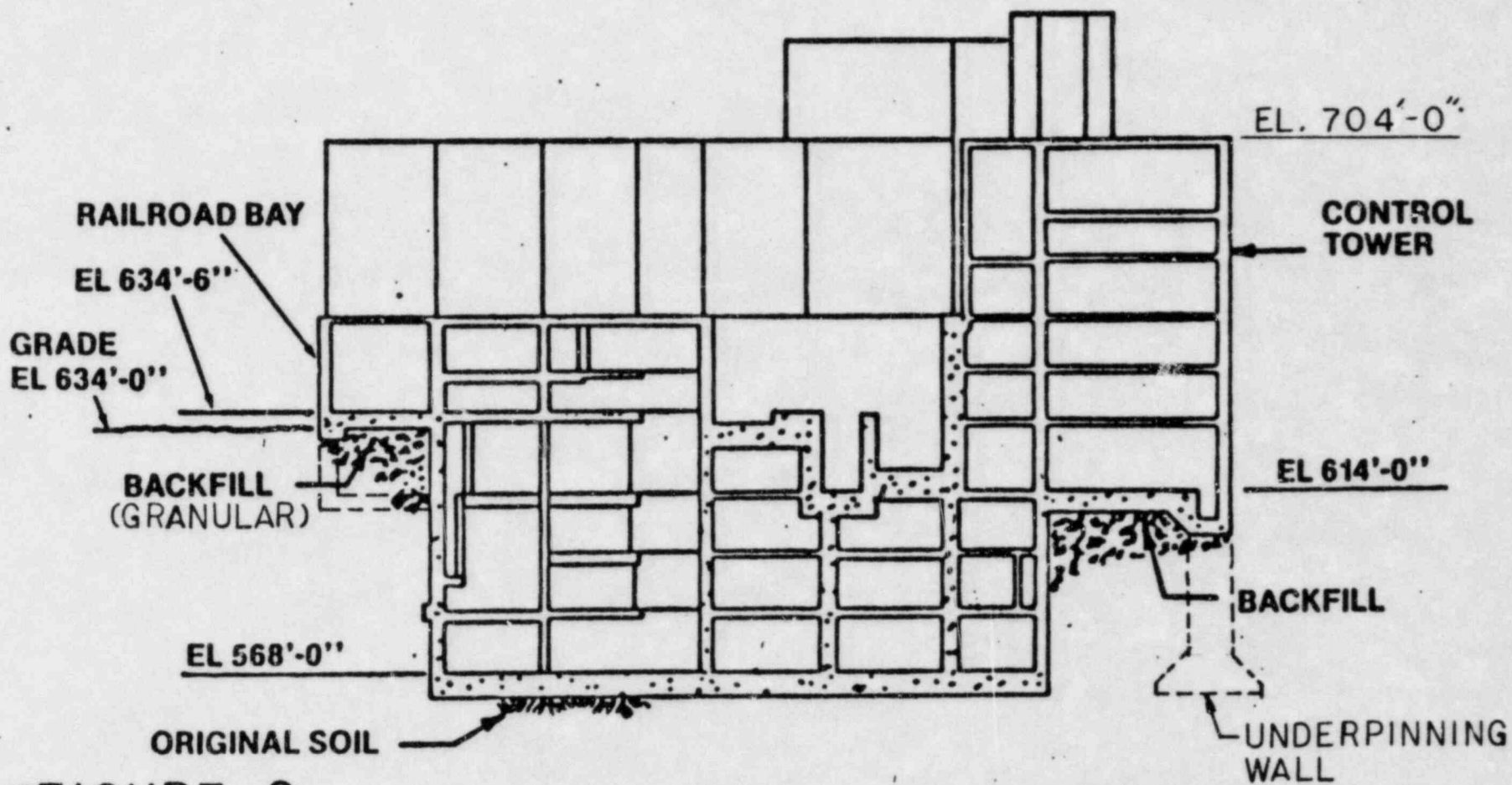


FIGURE - 2

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MR. PATON: Are you finished? Do you have a problem?

MR. STEPTOE: I wish --

MR. PATON: I have a matter I have to bring to the Board's attention. If you have a problem, let's hear it.

MR. STEPTOE: Chief Judge Bechhoefer, I'm just disappointed that we have to have these continual interruptions. That's all.

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all

1 MR. PATON: Maybe Mr. Steptoe would like to pay our
2 witnesses here. I have a matter I have to discuss with the
3 Board.

4 CHAIRMAN BECHHOEFER: Well, why don't we have an
5 interruption for a moment while Mr. Paton tells us.

6 MR. PATON: Mr. Chairman, we are at the point where
7 our water hammer witnesses are in their offices in Washington
8 and we have to tell them now to either come here or not come
9 here.

10 And we have studied this schedule very carefully
11 and it's my view that it's going to be -- obviously, it's
12 very difficult for anybody to guess whether or not we'll reach
13 them. I think based on what I have seen so far, there is
14 very, very little chance that we're going to get to that.

15 We have a number of issues to address today. I
16 think Intervenors have already indicated a lot of interest
17 in cross examining the witness on Mr. McCracken on the steam
18 tube generator. But I don't want to -- if I am going to tell
19 them not to come here, I certainly wanted to discuss that
20 with the Board and the parties.

21 You know, Mr. Steptoe apparently is extremely
22 disappointed that I'm raising this issue, but if I sit here
23 and do nothing, I either bring them or I either tell them to
24 stay home without the Board's knowledge or I bring them here
25 for a wasted trip and I'm not going to do either one of those.

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I don't think we're going to reach those witnesses,
but I'd like to see what the Board's judgment is.

MR. STEPTOE: Judge Bechhoefer, I'm not as
pessimistic as Mr. Paton about the possibility of reaching
the water hammer issues. My disappointment is that I don't
see why this couldn't have been brought up an hour and a half
ago, before we went on the record, or last night at some point.
These continual scheduling discussions seem -- on the record
just seem to delay things inordinately. But for what it's
worth, Applicant believes that we can reach the water hammer
issues and we ought to try and reach the water hammer issues
even if -- I don't believe it will be necessary to stay beyond
2:00 tomorrow, but if it should be necessary, we'd like to
proceed and stay.

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1 CHAIRMAN BECHHOEFER: I don't think the Board would
2 be willing to do that. In fact, we were considering 1:00 so
3 that the Staff could get an early plane, they couldn't get
4 on the later one.

5 MR. STEPTOE: We still believe, even with that,
6 that we -- that we could move forward and complete all these
7 issues by 1:00 on Friday. And we certainly would make more
8 progress if we could cut some of these discussions shorter.

9 MR. PATON: Mr. Chairman, I serious object to Mr.
10 Steptoe's comments on my discussing the schedule. I'm not
11 sure of what he would have me do.

12 It's very difficult, obviously, to everyone, to
13 determine whether or not we're going to meet these -- we're
14 going to be able to reach these witnesses. I don't think we
15 will. But it's obviously difficult to determine.

16 And I do not understand his objections to my bringing
17 this to the Board's attention, to the parties' attention,
18 it's just totally unrealistic.

19 We try to cooperate with the Applicant and their
20 witnesses and we have on many, many occasions. It's still --
21 if you look at the schedule realistically, we're not going
22 to reach these witnesses, but we'll call them and tell them
23 to be here. But, you know, at 1:00 tomorrow -- we were here
24 last night until well after 8:00, I believe. Staff is certainly willin
25 to stay here tonight, but, as I see it, I can read over the

1 list of issues that we're going to address, of course it all
2 depends on -- I think it all depends on Mrs. Stamiris.

3 But we are going to look at her contention this
4 afternoon and when we -- and on the other contention Mrs.
5 Sinclair has already indicated a great interest.

6 We will bring them. You know, I don't want to
7 put the Board on the spot, it's a very difficult thing to
8 decide.

9 CHAIRMAN BECHHOEFER: Well, the Board is aware that
10 at least your Washington witnesses can leave as late as, I
11 think, 6:15 and still get here.

12 MR. PATON: We would like to -- yes. That is
13 possible, yes.

14 CHAIRMAN BECHHOEFER: That makes it rough but
15 it's theoretically possible. What I don't know right now
16 is -- I'm sure that if Mrs. Sinclair has her expert with her
17 tomorrow and examining the witnesses on the steam generator,
18 I would be very doubtful whether we would get too much beyond
19 that.

20 MR. PATON: That may be the answer. Let me delay
21 a couple of hours and see if Mrs. Sinclair can get that answer
22 and then we can go from there.

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there

1 CHAIRMAN BECHHOEFER: Right, because I think that
2 otherwise the Intervenor's cross examination may be considerably
3 shorter. I just don't know.

4 MR. PATON: Okay. Thank you.

5 CHAIRMAN BECHHOEFER: Perhaps it could be longer
6 if they go through every word without really understanding.
7 I mean, it could -- a lot of things could happen.

8 MR. PATON: Okay. I will delay this until the
9 lunch hour and then I will discuss with the Board off the
10 record so that I don't interfere with the Applicant unduly.

11 CHAIRMAN BECHHOEFER: All right. Actually, if they
12 get the 5:30 flight, they can get here by about 8:00 or
13 8:30.

14 MR. PATON: Thank you.

15 MR. MARSHALL: I'd just like to say, Judge, that
16 we in Michigan object to Air Force One travel for no reason
17 at all to California and we certainly --

18 CHAIRMAN BECHHOEFER: They don't have to get them
19 here that way.

20 MR. MARSHALL: We are vocal on that. Very vocal.

21 CHAIRMAN BECHHOEFER: Why don't we proceed --

22 MR. STEPTOE: We extend the witness for cross
23 examination. I can't recall whether the Board has accepted
24 the testimony into evidence.

25 CHAIRMAN BECHHOEFER: I think I did, but if I didn't,

1 I didn't hear any objections, so -- I thought I did accept it.

2 I guess, Mr. Marshall, you are first with this
3 witness.

4 MR. MARSHALL: I have no quarrel with this man
5 whatsoever.

6 MR. STEPTOE: He has no quarrel with you, Mr.
7 Marshall.

8 MR. MARSHALL: I have no questions.

9 CROSS EXAMINATION

10 BY MS. WRIGHT:

11 Q Doctor Shunmugavel, are the settlement values in
12 this testimony due only to seismic shakedown?

13 A Any particular page you are referring to?

14 Q Just the one-quarter inch settlement.

15 A Yeah, it is -- it is only due to seismic shakedown
16 settlement.

17 Q Should any settlement values due to normal settlement
18 be considered in an evaluation of this structure?

19 A Yes, they have been considered already. And I guess
20 they have been discussed in different testimony but by a
21 different set of panel. That is a static settlement. That
22 mainly affects the control to your area on the main part of
23 the building. What we're talking about is on the end of
24 the building which is the north end of the building where
25 we have some sand backfill material. That is the one I am

1 addressing here.

2 Q In reference to the equation on page five of your
3 testimony, is this load combination controlling in the
4 determination of maximum stress for this portion of the
5 Auxiliary Building?

6 A Yes.

7 Q It is. Okay. Has a structural analysis been
8 completed for the railroad bay area where a differential
9 settlement of one-quarter inch has been allowed?

10 A It has been completed.

11 Q Could you explain how the future differential
12 settlement was assumed between the Auxiliary Building and
13 the railroad bay area?

14 A I guess I didn't understand the question.

15 Q I will repeat the question. Could you explain how
16 the future differential settlement was assumed between the
17 Auxiliary Building and the railroad bay area?

18 MR. STEPTOE: Excuse me, Judge Bechhoefer, are we --
19 when counsel refers to future differential settlement, is she
20 talking about seismic --

21 MS. WRIGHT: Seismic, yes.

22 MR. STEPTOE: Thank you.

23 THE WITNESS: Well, it has already been considered
24 in the analysis. The way we considered it, like I said in
25 the testimony, we soften the soil spring in the railroad bay

1 area and that's one way of assimilating the shakedown settlement
2 and the effects of it on the structure. That's how we
3 analyzed and considered this settlement effect.

4 BY MS. WRIGHT:

5 Q In that event, will there be a void under the
6 railroad bay area when the seismic induced settlements occur
7 since the Auxiliary Building is founded on a tilt.

8 A There won't be any void. That is a good concern,
9 I'm sure. That is maybe a question I didn't understand. I
10 have an analysis for the regular dead load only. Under dead
11 load, this portion of the building, this is a railroad bay
12 area, settles or deflects by three-tenths of an inch at the
13 northernmost end.

14 So the seismic shakedown settlement of quarter inch
15 will not clear the void because the building can deflect
16 three-tenths of an inch. The soil is going to only go down
17 a quarter of an inch, so it's always in touch with the soil.
18 There won't be any gap created by earthquake.

19 Q Will cracking at the connection with the Auxiliary
20 Building and the railroad bay occur because of seismic
21 shakedown?

22 A Let me answer it this way, it can crack, because
23 any concrete structure will crack when it is stressed. And
24 this is one of the highly stressed event. When you have a
25 large earthquake and a shakedown settlement combined with that,

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it is possible some of this -- portions of the building is
 stressed high in the sense 30 KSI in the steel. If that is
 the case, concrete has to crack so that the stress goes to
 the steel.

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1 However, a general practice after a large earthquake,
2 the buildings are always inspected before start-up or continue
3 to operate the plant. So this is one area I'm sure people
4 would inspect.

5 Q Does your analysis indicate what the extent of
6 cracking will be in the event of seismic shakedown?

7 A Just -- I don't know the exact number, but I told --
8 the steel, the reinforcing steel stress will be stressed to
9 30 KSI, on that order, and that would translate into roughly
10 about 30 mil.

11 Q Over what area?

12 A This is on the 659 feet elevation slab near the
13 column line A. That's the area where the railroad bay
14 connects to the main part of the building.

15 MS. WRIGHT: Thank you. Staff has no further
16 questions.

17 BOARD EXAMINATION

18 BY CHAIRMAN BECHHOEFER:

19 Q When I'm asking these questions, please consider
20 me a layman. But I can't figure out why you would add
21 together a quarter-inch settlement from the seismic shakedown,
22 this is in the railroad bay area, particularly, and the
23 three-tenths of an inch settlement from deal load, and why
24 you wouldn't -- that wouldn't be five -- wouldn't be .55
25 maximum settlement.

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A. Let's try that. The question asked, if I have a building on a -- and the regular dead load settle by three-tenths of an inch, deflects.

Now, the question is, as the soil below it tends to go away from it during shakedown settlement, it wants to settle down. And the question was whether that will create a void between the structure and the soil. And I said that it cannot happen.

However, when the soil tends to go down, the building will deflect more, so it could possibly -- it will deflect more than three-tenths of an inch if you add the effects of seismic shakedown settlement.

Q. Well, then, now, do we know that the building is constructed to withstand whatever the amount would be?

A. Right. The load combination that I considered is given on page five, which is 1.4 times the dead load, plus the 1.7 times live load. Under that condition -- plus the softened soil to account for the shakedown settlement.

The deflection gets as high as .5 inches and .47 inches, in that order. So we know the building can stand -- at least withstand that much of deflections.

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1 Q What are the sources of 1.4 and 1.7 in your load
2 combination formula on page five?

3 A That's explained on the next page, the paragraph.
4 That corresponds to the load combinations given in the ACI 349
5 and the ACI 318 codes. That's load factors. One way of
6 accounting for factor of safety.

7 CHAIRMAN BECHHOEFER: I believe that's all the Board
8 has at this time. Mr. Steptoe?

9 MR. STEPTOE: We have no redirect.

10 MS. WRIGHT: Staff has one more question.

11 CROSS EXAMINATION

12 BY MS. WRIGHT:

13 Q In regard to your last answer to the Board, would
14 you find out where you state that you have evaluated for a
15 half-inch deflection due to shakedown in other loads?

16 A Well, I didn't say I have allowed for half-inch
17 shakedown settlement.

18 Q Deflection.

19 A Deflection is total. Dead load plus live load and
20 the effect of shakedown. Everything added to it gives me
21 the total deflection of that number I gave to the Board which
22 is 1.5 inches.

23 Q Doesn't your equation on page five take care of
24 dead load and live load?

25 A Right, it does. In corresponding to that load

1 combinations, I get deflections as high as .5 inches.

2 MS. WRIGHT: Thank you.

3 CHAIRMAN BECHHOEFER: To just repeat, you -- or the
4 building has been analyzed to determine whether it will with-
5 stand the deflection?

6 THE WITNESS: Right, it is been completed.

7 CHAIRMAN BECHHOEFER: Thank you.

8 MR. MARSHALL: No questions.

9 CHAIRMAN BECHHOEFER: Mr. Steptoe, if you don't
10 have anything further, I believe for this purpose, at least,
11 this witness can be excused.

12 MR. STEPTOE: All right. Thank you, Chief Judge
13 Bechhoefer. We'd like to move on to Dr. Shunmugavel's other
14 piece of testimony which is on duct banks.

15 DIRECT EXAMINATION

16 BY MR. STEPTOE:

17 Q Dr. Shunmugavel, are you familiar with a document
18 entitled Testimony of Dr. Palanichamy Shunmugavel on behalf
19 of the Applicant regarding seismic Catetory 1 duct banks
20 at the Midland site?

21 A. Yes, I am.

22 Q. Are you the author of this document?

23 A. Yes.

24 Q. Do you have any corrections or additions to make
25 at this time?

1 A. Yes, I have some corrections, starting at page seven.

2 Q Before you start with the textural changes, it's
3 my understanding that these changes are to update the testimony?

4 A That is correct. At the time I filed the testimony
5 there were two analyses in progress. Now, those analyses were --
6 analyses were completed so the corrections will reflect that.

7 On page seven, the last big paragraph, the first
8 word "only" has to be eliminated. So the sentence starts:
9 The evaluation for the differential interface settlement
10 effects to the north of the service water pump structure --
11 the next three words, "remains to be", to remove those three
12 words and substitute "has been", so it will read "has been
13 completed".

14 Then number -- six lines down, the new sentence
15 starts "if the evaluation". So instead of "if", I want to
16 put the word "since", S-I-N-C-E, "since the evaluation shows
17 that the cables cannot accommodate the concentrated shear
18 deformation from the differential interface settlement at
19 the north wall of the service water pump structure or at
20 the interface between the fill and the fly ash cement mixture,
21 the duct banks" -- the next words -- instead of "can" has to
22 be changed "will", W-I-L-L, "will be isolated".

23 The next three words I want to put the words "using
24 ethafoam", E-T-H-A-F-O-A-M, "ethafoam". So the sentence will
25 read, the portion of it, "the duct banks will be isolated

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

1 using ethafoam completely from the concentrated shear
2 deformation." That is the changes on page seven.

3 Then I have some on page nine, last paragraph, about
4 five lines from the bottom, the sentence starts, "The
5 significance of such seismic interaction effects," and
6 remove the next four words, "if any, is being," remove
7 those four words and substitute "has been".

8 So the sentence will read, "The significance of such
9 seismic interaction effects has been evaluated." Then add
10 a phrase before the period, "to insure the integrity of
11 buildings and the cables." And delete the last sentence,
12 the next three lines or so.

13 MS. WRIGHT: Excuse me, I'm sorry, could you repeat
14 that last -- the sentence as you changed it, beginning with
15 "significance of such"?

16 THE WITNESS: Right. The significance of such
17 seismic interaction effects has been evaluated to insure
18 the integrity of buildings on the cables, period.

19 MS. WRIGHT: I'm not sure that our client understands
20 the change.

21 Could you repeat it for me just one more time?

22 THE WITNESS: All right. The sentence is, "The
23 significance of such seismic interaction effects has been
24 evaluated to insure the integrity of the building and the
25 cables."

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MS. WRIGHT: You mean the electrical cables?

THE WITNESS: Right, and the duct banks.

MS. WRIGHT: And the duct banks?

THE WITNESS: Cables in the duct banks.

MS. WRIGHT: Okay. Thank you. Sorry.

JUDGE HARBOUR: Does your correction now include the words "in the duct banks" at the end of the sentence?

THE WITNESS: Yes, sir, I would add that to clear the matters. I have one more correction on page ten. The first sentence starts, "It is concluded that the seismic Category 1 duct banks, upon the completion of", then add the words "the isolation north of SWPS".

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t4

1 JUDGE HARBOUR: Will you say that again, please?

2 The completion --

3 WITNESS SHUNMUGAVEL: The completion of the
4 isolation.

5 JUDGE HARBOUR: Yes, the next word?

6 WITNESS SHUNMUGAVEL: Not SWPS.

7 JUDGE HARBOUR: All right.

8 BY THE WITNESS:

9 A (Continuing) And delete the words "remaining
10 elevations and modifications, if necessary." Delete all
11 those words. So that's a correction.

12 BY MR. STEPTOE:

13 Q Does that complete your corrections, Dr. Shun-
14 mugavel?

15 A Yes.

16 MR. STEPTOE: Judge Bechhoefer -- well, first
17 of all --

18 BY MR. STEPTOE:

19 Q Dr. Shunmugavel, as corrected, is this testimony
20 true to the best of your knowledge and belief?

21 A Yes.

22 MR. STEPTOE: Judge Bechhoefer, I move that
23 this testimony be accepted into evidence and bound into
24 the record as if read.

25 CHAIRMAN BECHHOEFER: Any objection?

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MR. MARSHALL: No objection.

MS. WRIGHT: No objection.

CHAIRMAN BECHHOEFER: The testimony is accepted into evidence. It will be bound at this point into the record as if read.

(The document referred to, the testimony of Dr. Palanichamy Shunmugavel, follows:)

SS: STATE OF MICHIGAN
COUNTY OF WASHTENAW

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos.	50-329 OM
			50-330 OM
CONSUMERS POWER COMPANY	)		50-329 OL
		-	50-330 OL
(Midland Plant, Units 1 & 2))			

AFFIDAVIT OF PALANICHAMY SHUNMUGAVEL

My name is Palanichamy Shunmugavel. I am an Engineering Specialist in the civil/structural department of Bechtel Power Corporation in Ann Arbor. In this capacity I am responsible for providing consultation to civil/structural engineers working for Bechtel and for reviewing their work. I have a B.E. in Civil Engineering, M. Tech. in Structural Engineering, and a Ph.D. in Civil Engineering. I am a registered professional engineer in the state of California.

In connection with my role as Engineering Specialist, I have been assigned the responsibility for the Testimony concerning Seismic Category I duct banks. I have reviewed in detail the related evaluations.

I swear that the statements contained in this affidavit and the Testimony are true and correct to the best of my knowledge and belief.

Palanichamy Shunmugavel

PALANICHAMY SHUNMUGAVEL

SIGNED AND SWORN TO BEFORE
me this 24th day of
Jan, 1983.

Bernadette A. Wilke
NOTARY PUBLIC

BERNADETTE A. WILKE
Notary Public, Washtenaw County, MI
My Commission Expires April 16, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos.	50-329 OM
			50-330 OM
CONSUMERS POWER COMPANY	)		50-329 OL
			50-330 OL
(Midland Plant, Units 1 & 2))			

TESTIMONY

OF

DR. PALANICHAMY SHUNMUGAVEL

ON BEHALF OF THE APPLICANT

REGARDING SEISMIC CATEGORY I DUCT BANKS AT

THE MIDLAND SITE

SEISMIC CATEGORY I DUCT BANKS

1.0 BACKGROUND

1.1 Scope of Testimony

This testimony presents an adequate and reasonable basis for assurance that the Seismic Category I duct banks in Midland plant are fully capable of performing their intended safety function under all postulated conditions. This testimony also addresses references to "conduit" in Warren's contention 3 and Stamiris's contention 4.

1.2 Function and Description

The function of the duct banks is to ensure, under all postulated conditions, the integrity of buried safety-related electrical cables by providing a casing around the cables.

The duct banks are rectangular in cross-section. Their dimensions generally vary from 18" x 19" to 74" x 20". They are buried at various depths from 3' to 40' below the grade level at the site. They

are constructed of concrete with a minimum compressive strength of 3,000 psi. A red dye is added to the concrete to identify the duct banks during future excavations. A nominal amount of grade 60 reinforcement is provided in the duct banks. Two to four inches in diameter plastic or steel conduits are placed inside a duct bank with a minimum concrete cover of 6 inches. Electrical cables are pulled through and placed inside the conduits. The layout of Seismic Category I duct banks at the Midland site and a typical cross-sectional detail are shown in Figure 1.

1.3 Postulated Conditions

The following postulated conditions are considered to ensure that the duct banks can perform their safety function:

- a) Normal
- b) Construction
- c) Settlement
- d) Earthquake

2.0 ACCEPTANCE CRITERIA

Based on the function of duct banks, the following conservative acceptance criteria have been developed:

- a) Allowable concentrated shear deformations in the conduits based on the maximum amount of cable-fill (cable-fill is the percentage of the total cross-sectional area of the conduit that is taken up by the cables) are the following:

<u>Conduit Diameter</u>	<u>Maximum Existing % of Cable-Fill</u>	<u>Concertrated Shear Deformation</u>
2"	20%	1.4"
3"	56%	1.1"
4"	51%	1.6"

Concentrated shear deformation can occur, for example, in a conduit at the interface between a building and a duct bank due to differential settlement.

- b) Longitudinal strain corresponding to the allowable cable-pulling tension is 0.333×10^{-3} , which is several times smaller than the strain corresponding to the breakage of cables.
- c) The minimum bend radius varies from 1.7" to 17" depending on the cable type.

3.0 EVALUATION

3.1 Normal Condition

During the normal operating conditions, the duct banks are buried in the earth. The soil overburden, surcharge and live loads from surface traffic have been determined to have minimal effects on the cables. The cables in the duct banks are suitable for direct burial in wet and dry earth and they have a service life expectancy of 40 years.

3.2 Construction Conditions

The conduits and the duct bank concrete protect the space for cables from being obstructed with laitance and other trash. Before pulling cables through a duct, the duct is cleaned and checked for continuity and obstructions by pulling a segmented hard fiber composition mandrel (rabbit) as shown in Figure 7-3 in Appendix A through it.

The concrete duct banks are protected from the nearby construction activities by placing sufficient earth cover over them.

The temporary and permanent site dewatering systems can produce some settlement of the duct banks. The maximum estimated dewatering settlement is 1 inch. This is included in the evaluation of duct banks for settlement as explained in Section 3.3

A freeze wall has been installed in conjunction with construction dewatering for the auxiliary building. Seismic Category I duct banks cross the freeze wall at two locations. At each location monitoring pits were installed and the soil around and below the ducts was removed to isolate the ducts from freezing effects. Upon NRC staff approval, the portions of the ducts in the excavated pits will be encircled with 6"-thick polyethylene planks and backfilled with fly ash cement mixture and compacted soil.

3.3 Settlement

Settlement of the duct banks has been estimated by the Bechtel Geotechnical Department taking into account the duct bank elevations and the dates of cable pulling in the duct banks. It has been estimated that the maximum settlement from October 1978 through the year 2025 will be 3 inches. It is noted that all of the cables in the

Seismic Category I duct banks were pulled in 1981 or after, except in one case where the cables were pulled in October 1978. As in the case of the prediction of 3 inches for underground piping, the maximum settlement prediction of 3 inches for duct banks takes into account secondary consolidation to the year 2025, dewatering effects, a 0.5-inch allowance for possible loading from laydown, and 0.25 inch for possible seismic shakedown settlement due to an acceleration of 0.19g. The secondary consolidation and dewatering settlements are based on observations made on Borros anchors installed at various elevations in the plant fill. It was also estimated, based on profiles of existing underground piping made in 1981, that the 3-inch settlement of the duct banks could occur over a minimum distance of 25 feet.

Gradual settlement of duct banks in the general soil medium can have minimal effect on the cables. The cables are placed loosely in the duct banks and they generally have some slackness which can accommodate the settlement without stretching the cables. The cables themselves are made of ductile materials capable of considerable stretching before breaking. A conservative evaluation has revealed that the duct banks can tolerate 3 inches differential settlement

over a 12' length, corresponding to the allowable pulling strain of 0.333×10^{-3} . This evaluation does not include the beneficial effects of slackness and ductility of the cables. Thus, the maximum estimated duct bank settlement of 3 inches over 25 feet of the site can be easily accommodated.

Differential settlement at various interfaces between buildings and duct banks has been determined to vary from 0.25 inch to 0.5 inch. The cables can accommodate up to 1.1 inch of concentrated shear deformation due to differential interface settlement as explained in the acceptance criteria.

Only the evaluation for the differential interface settlement effects to the north of the service water pump structure (SWPS) remains to be completed. It should be noted that the fill material north of the SWPS will be excavated for underpinning SWPS and for rebedding the buried piping and duct banks with a fly ash cement mixture. If the evaluation shows that the cables can not accommodate the concentrated shear deformation from the differential interface settlement at the north wall of the SWPS or at the interface between the fill and the fly ash cement mixture, the duct banks can be isolated either partially or completely from the concentrated shear deformation.

Figure 1 shows a possible detail where the duct bank is wrapped with ethafoam at its interface with a building.

The evaluation of duct banks under the diesel generator building before and during the preload program is explained in the response to NRC 10 CFR 50.54(f) question number 7 (a copy of the response is attached as Appendix A). After the preload program, all the conduits in the duct banks were checked in May 1980 and no obstruction or discontinuity was encountered. The cables were pulled through and placed in those conduits in 1981.

3.4 Earthquake

Effects of earthquake excitations on duct banks have been evaluated according to BC-TOP-4A for straight portions of buried duct banks and for bends and interfaces near the buildings. Seismic compression, shear, and surface wave effects have been included. The seismic evaluation has determined the following maximum values from a 1.5 times FSAR safe shutdown earthquake:

- a) Maximum strain in the straight portion is 0.00019.

b) Maximum concentrated shear deformation at a bend is
0.23 inch

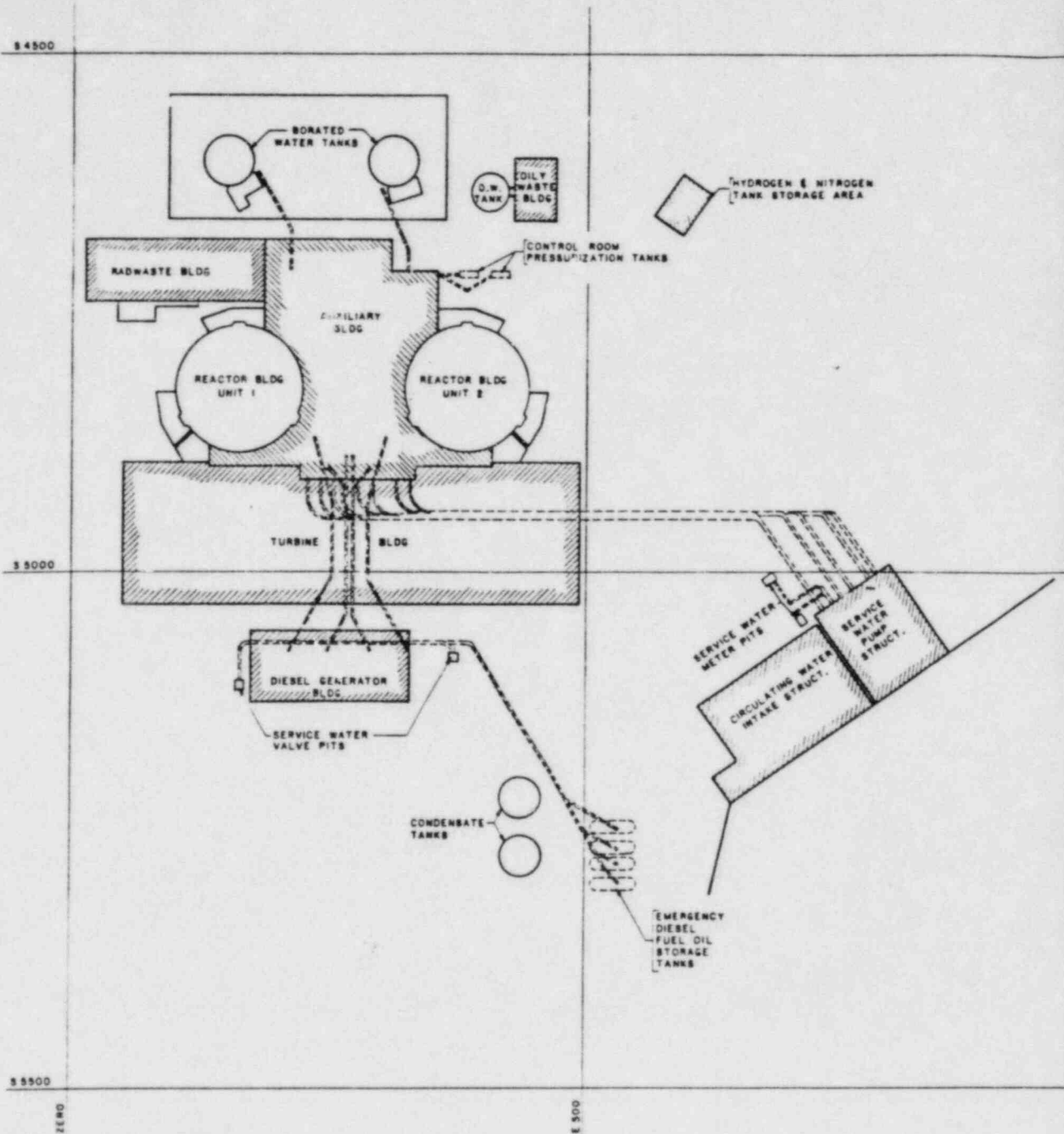
c) Maximum concentrated shear deformation at an
interface near a building is 0.32 inch.

These maximum values are well within those given in the
acceptance criteria.

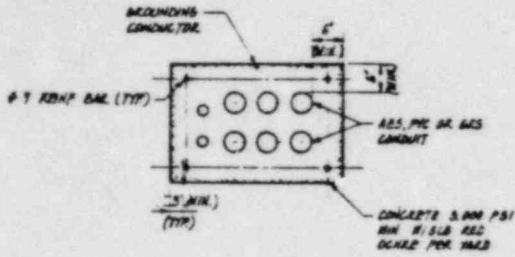
Interaction between a building and a duct bank is
possible if the clearance between them along the axial
direction of the duct bank is not sufficient to
accommodate the maximum seismic relative motion between
them. The effects of this seismic interaction are
expected to be small because the maximum relative
motion along the axial direction of the duct bank is
0.125 inch. The significance of such seismic
interaction effects, if any, is being evaluated. If
necessary, the seismic interaction can be eliminated by
increasing the clearance between a building and a duct
bank.

4.0 Conclusion

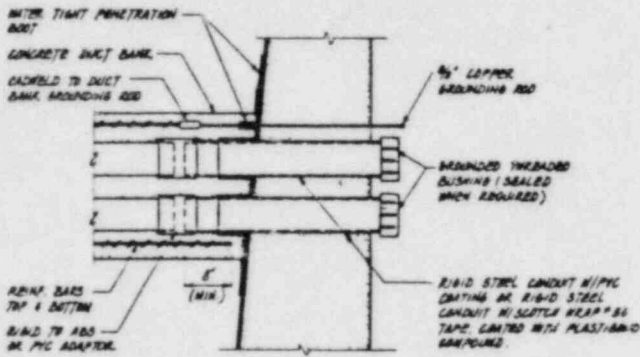
It is concluded that the Seismic Category I duct banks, upon the completion of remaining evaluations and modifications if necessary, will be capable of ensuring under all postulated conditions the integrity of buried, safety-related electrical cables.



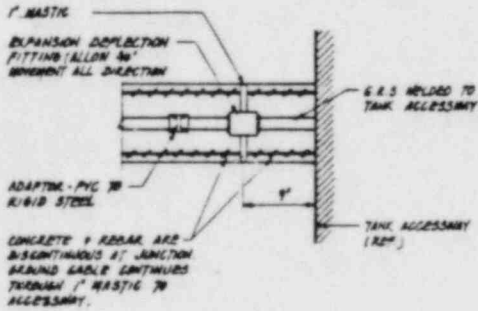
PLAN-SEISMIC CATEGORY I DUCT BANK LOCATIONS



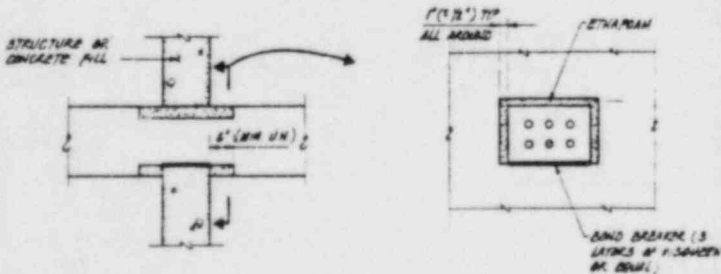
TYPICAL SECTION - SEISMIC CATEGORY I
UNDERGROUND DUCT BANK
(TYPICAL UNLESS NOTED ON DRAWINGS)



DUCT BANK & CONDUIT TERMINATION
AT BUILDING
(TYPICAL UNLESS NOTED ON DRAWINGS)



DUCT BANK & CONDUIT TERMINATION
AT BURIED TANKS
(TYPICAL UNLESS NOTED ON DRAWINGS)



DUCT BANK PENETRATION
AT BUILDING
(TYPICAL UNLESS NOTED ON DRAWINGS)

CONSUMERS POWER COMPANY MIDLAND UNITS 1 AND 2
SEISMIC CAT. 1 UNDERGROUND DUCT BANK
FIGURE: 1

APPENDIX A
RESPONSES TO THE
NRC 10 CFR 50.54(f) REQUEST
REGARDING PLANT FILL
FOR
MIDLAND PLANT UNITS 1 AND 2
CONSUMERS POWER COMPANY
DOCKET NUMBERS 50-329 AND 50-330

Question 7

Describe in detail how you will determine the adequacy of the electrical duct banks in view of the previous loading caused by contact of the diesel generator building foundation with these banks. Describe corrective measures which may be taken in the event of unacceptable results.

Response

Four electrical duct banks run south from the auxiliary building under the turbine building foundation and then turn upward and pass through the footings of the diesel generator building as shown in Figures 7-1 and 7-2. Exploration revealed that the duct banks were in direct contact with the footings and were restraining the diesel generator building settlement.

Parts of the diesel generator building footings and/or parts of the duct bank steps were removed to provide a 12-inch clearance for a vertical joint between the ducts and building footings. This was done to prevent direct load transfer from the building to the duct banks.

A summary of survey data taken during the duct bank isolation period is presented below:

	<u>Bay 1</u> <u>(inches)</u>	<u>Bay 2</u> <u>(inches)</u>	<u>Bay 3</u> <u>(inches)</u>	<u>Bay 4</u> <u>(inches)</u>
Building settlement before isolation of ducts, November 10, 1978	1.56	.95	.97	1.09
Building settlement after isolation of ducts, November 24, 1978	1.85	1.72	2.34	2.72
Rebound (upward movement) of ducts, November 24, 1978 (measured at top of duct bank)	-	.06	.12	.18

Note: Bay locations are shown in Figure 7-1.

During the week immediately after the duct banks were isolated, the east end of the diesel generator building (Bay 4) experienced the largest settlement and the duct bank in Bay 4 had the largest rebound. It is therefore assumed that the duct bank in Bay 4 was supporting the largest imposed building load of the four duct banks. Based on visual observations of the gaps between the building footings and the mud mat, an estimated two-thirds of the east wall of the diesel generator building, or approximately 1,000 kips, was supported by the duct bank in Bay 4.

The duct bank deflection was assumed to be equal to the diesel generator building settlement before isolation. Based on this assumption, the 1.56-inch deflection of Bay 1 and the 1.09-inch deflection of Bay 4 could result in strains in the duct bank reinforcing steel at Point A (see Figure 7-2) which exceed the yield strain. This estimate of strain is based on conservative assumptions and is therefore considered to be an upper limit value.

The load transferred from the building to the duct bank was a one-time load which caused the duct bank to settle directly under the vertical section of the duct as shown by the small amount of rebound measured after the building load was released. Thus, the bending which could have caused the reinforcing steel at Point A to exceed the yield strain is due to settlement. Settlement primarily induces additional strain, which is a self-limited effect and will not affect the ultimate strength of the duct bank.

The function of the duct banks is to provide a space in the ground through which cables may be pulled. They also provide a casing around the cables to protect them during future construction activities in the area. The duct banks are not required to provide a watertight boundary around the cables. Therefore, cracking of the duct banks due to differential settlement does not affect their design functions.

The assumed 1,000-kip load previously mentioned is the highest that will occur during the life of the plant. The load due to settlement of the duct banks during the diesel generator building preload program will be larger than the load during the life of the plant, but less than the assumed 1,000-kip load.

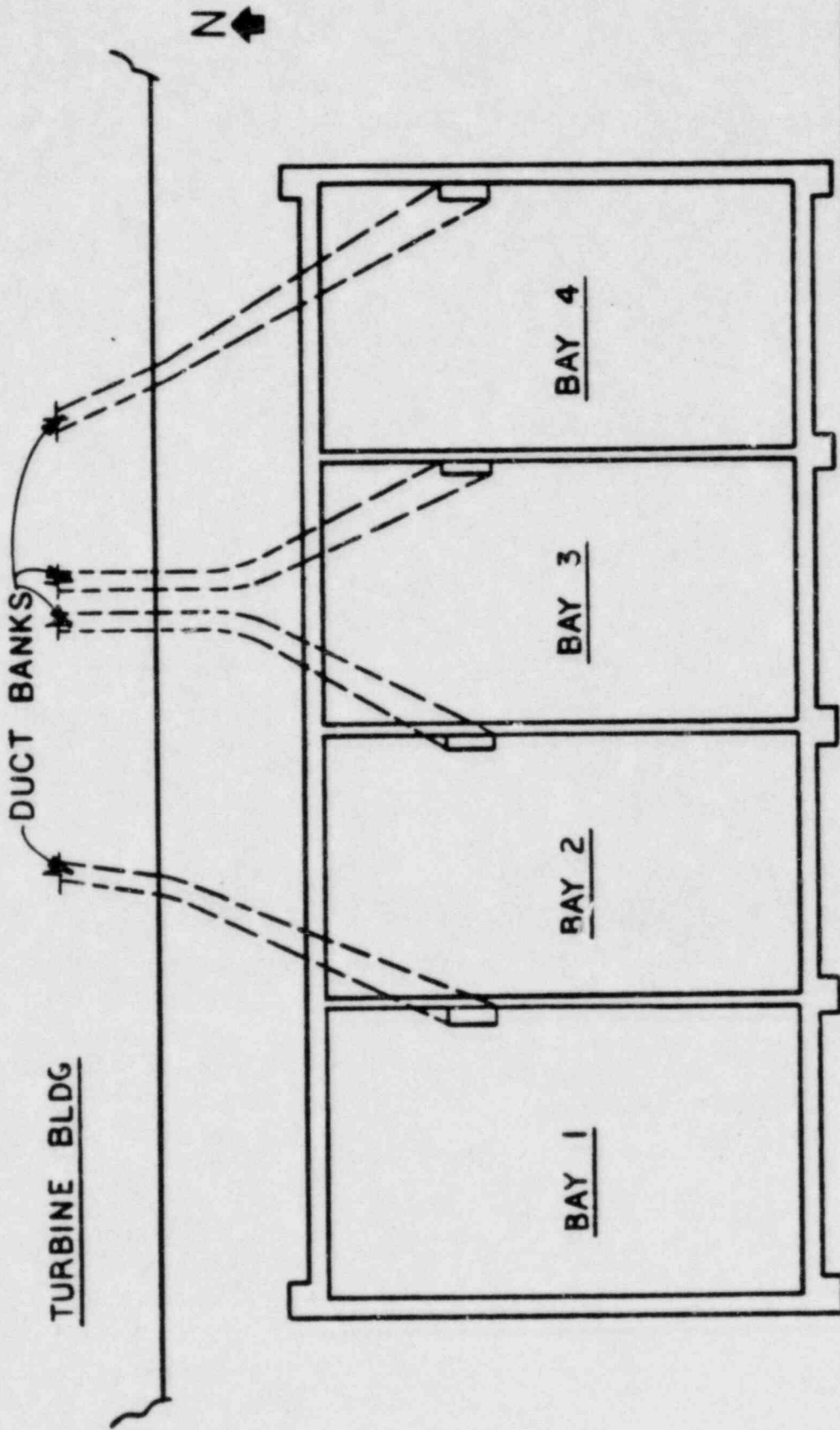
The strains induced in the duct banks due to seismic effects are small (less than 10% of the yield strain) and, when added to the possible strains from settlement, will have no further effect on the function of the duct banks. Therefore, if the duct banks are still intact and continuous with no obstructions after the diesel generator building load has been removed and if the duct banks remain intact after the preload program has been completed, they will be able to withstand all future operating loads.

All four duct banks were checked for continuity and obstructions after they were isolated from the diesel generator building footings. This was accomplished by pulling a segmented, hard fiber composition rabbit through each conduit (see Figure 7-3). The rabbit was pulled through the conduit by hand. No obstruction was detected during the pulling of the rabbit. The continuity check will be performed again after the preload program is completed. The results of this check, along with the results of the duct bank settlement survey, will be available after November 1979.

| 3

In the event that any significant obstructions or discontinuities are encountered, several alternatives will be considered to correct this condition. If the obstructions are small, a router may be pulled through the conduit to remove the obstruction and provide a smooth transition through the conduit. Replacement and rerouting of the duct bank will be studied as alternatives in the event of large discontinuities of the duct bank.

Revision 3
9/79



TURBINE BLDG

DUCT BANKS

BAY 1

BAY 2

BAY 3

BAY 4

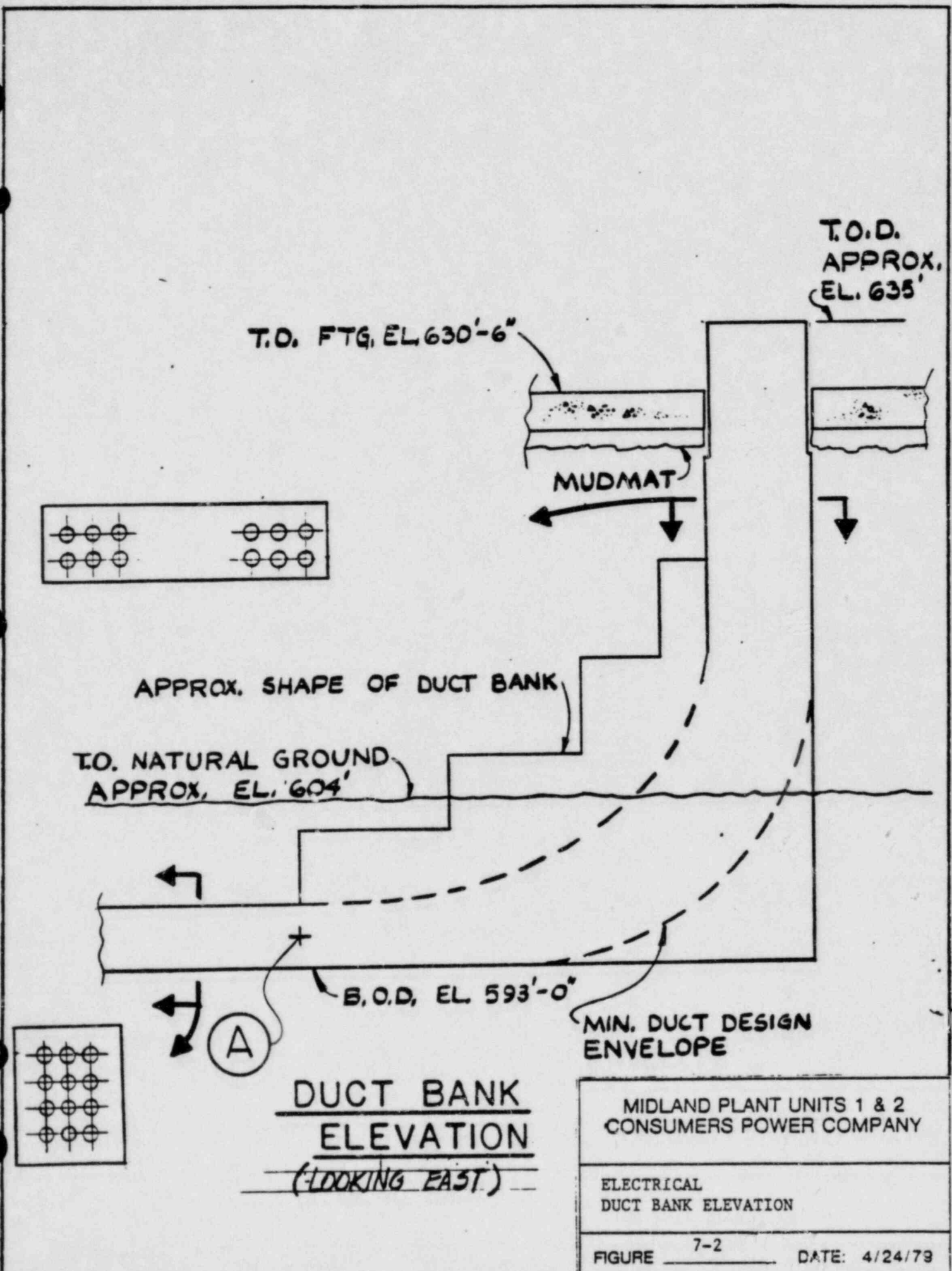
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DIESEL GENERATOR BLDG
DUCT BANK LAYOUT

MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY

ELECTRICAL
DUCT BANK LAYOUT

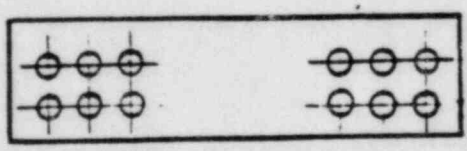
FIGURE 7-1 _____ DATE: 4/24/79



T.O. FTG, EL. 630'-6"

T.O.D. APPROX. EL. 635'

MUDMAT



APPROX. SHAPE OF DUCT BANK

T.O. NATURAL GROUND APPROX. EL. 604'

B.O.D, EL. 593'-0"

MIN. DUCT DESIGN ENVELOPE

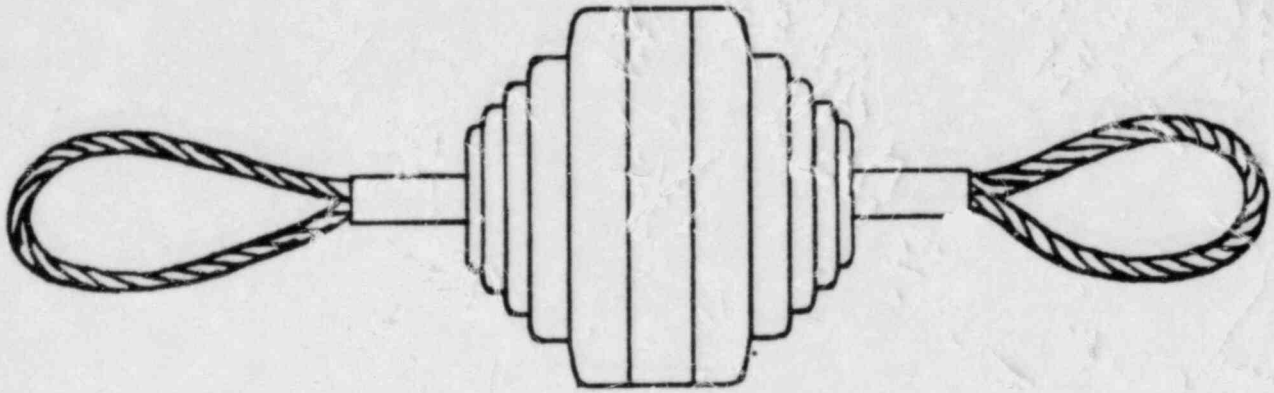
(A)

DUCT BANK
ELEVATION
(-LOOKING EAST)

MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY

ELECTRICAL
DUCT BANK ELEVATION

FIGURE 7-2 DATE: 4/24/79



INSIDE DIAMETER OF CONDUIT = $4\frac{1}{4}$ "
OUTSIDE DIAMETER OF MANDREL = $3\frac{3}{4}$ "

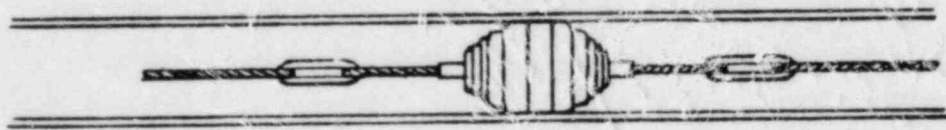


DIAGRAM OF MANDREL (RABBIT) USED
TO CHECK CONDUITS

MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY

RABBIT
FOR ELECTRICAL DUCT

FIGURE 7-3 DATE: 4/24/79

1 MR. STEPTOE: I have a very brief additional
2 direct, Judge Bechhoefer, if that's all right.

3 CHAIRMAN BECHHOEFER: Fine.

4 BY MR. STEPTOE:

5 Q Just going back to these changes, Dr. Shunmugavel,
6 on page 7, as corrected, you state that your evaluation
7 shows that it will be necessary to use etha foam to iso-
8 late the duct banks north of the Service Water Pump
9 Structure. Will it be necessary to isolate the duct banks
10 both at the interface of the duct banks with the service
11 water pump structure and at the interface between the fly
12 ash and the natural and the backfill material?

13 A The answer is yes but not for all the duct banks.
14 There are, I believe, seven duct banks north of the service
15 water structure. Out of seven, only one of them requires
16 isolation at the interface between the fly ash cement
17 mixture and the natural soil backfill. Not natural soil,
18 backfill.

19 Q But do I take it that all of them require
20 isolation at the interface with the service water pump
21 structure?

22 A Yes.

23 Q Moving on to page 9, your correction was --
24 the sentence as corrected reads:

25 "The significance of such seismic

1 interaction effects has been evaluated to ensure the
2 integrity of buildings and the cables in the duct banks.

3 Is the intent of the sentence to indicate that
4 the evaluation shows there is no problem from such inter-
5 actions?

6 A Correct. The buildings and the duct banks meet
7 acceptance criteria.

8 Q Finally, page 8, at the top, a sentence appears
9 that says:

10 "Figure 1 shows a possible detail where
11 the duct bank is wrapped with etha foam at its
12 interface with the building.

13 By the word "possible," did you mean to indi-
14 cate there might be other ways, other than shown in this
15 detail, to accomplish this isolation using etha foam?

16 A Yes, I meant the possible means. The figure
17 shows one of the possible ways of isolating.

18 But what we are planning to do is -- it's not
19 the same as what's shown on the Figure 1. We'd like to
20 put etha foam blankets to the duct banks about 12 feet
21 long from the building, and no change to the building
22 portion of the duct banks. However, the duct bank in
23 just the building. We are not going to change anything.

24
25

4-2,pjl

anything 1

2 Q Will your plans regarding isolation of these
3 duct banks using etha foam -- is that part of the remedial
4 soils measures which will be available to the Staff sub-
5 ject to the work authorization procedure before these
6 modifications are carried out?

7 A Yes, because -- not on the service water pump
8 structure. That portion of the area will be excavated
9 once for underpinning the service water pump structure,
10 also to rebed the piping in that area.

11 So, after they are excavated, when they are going
12 to backfill it with fly ash cement mixture, that's the
13 time we are to go on with this etha foam isolation. And
14 I'm sure they are subject to NRC's work authorization
15 process.

16 Q So that if the Staff wants to review these
17 details they will have the opportunity before the work
18 is carried out?

19 A Yes.

20 MR. STEPTOE: I have no further additional
21 direct, Judge Bechhoefer.

22 CHAIRMAN BECHHOEFER: I believe, before we
23 start cross examination, let's take a 15-minute break.

24 MR. STEPTOE: Fine. Thank you.

25 (Brief recess.)

4-3

25

1 CHAIRMAN BECHHOEFER: Back on the record.

2 Mr. Marshall, I guess you are first.

3 MR. MARSHALL: No, I don't have any direct.

4 Like I said before, I'm passing on this gentleman. I'm
5 giving him a clear bill of health.

6 CHAIRMAN BECHHOEFER: Miss Wright?

7 CROSS EXAMINATION

8 BY MS. WRIGHT:

9 Q Dr. Shunmugavei, are the duct banks in the area
10 near the service water pump structure considered Category
11 1 structures or are the cables within the duct banks con-
12 sidered Category 1 elements and are the duct banks just
13 there to provide space for the cables?

14 A Well, the cables are the Category 1 cables, and
15 the concrete duct bank is there initially to provide
16 space in the earth so that you can pull the cables some-
17 time in the future. That's the only purpose the concrete
18 is there.

19 Q So the duct banks are or are not Category 1 --
20 made of Category 1 concrete or Category 1 structures?

21 A Well, we conversationally call it Category 1 duct
22 banks, but we mean the cables are the Category 1.

23 Q No; I mean the duct banks themselves.

24 A Duct banks themselves made of concrete, and
25

1 they are controlled in terms of Q and all those things.
2 But they have no structural function there, but they
3 are called Category 1, right.

4 Q Okay, thank you. Is the safe functioning of the
5 electrical cables impaired if the duct bank encasements
6 or the plastic or steel conduits are cracked because of
7 differential settlement?

8 A The answer is no, the cables themselves can be
9 directly placed in the earth. Could be wet or dry con-
10 ditions. So the cracking of concrete duct banks are
11 leakage of water through the plastic conduits. Doesn't
12 have to even break, it can come through the connections
13 or something like that. They have no effect on the cables.

14 Q Thank you.

15 CHAIRMAN BECHHOEFER: No shearing effect?

16 THE WITNESS: Shearing conduits running like
17 this, if you have a direct shear at a concentrated point,
18 can have an effect on the cables if that shear deforma-
19 tion is large enough to cut the cables.

20 Generally the conduits are not filled with
21 cables, they are only 20 percent to 50 percent filled.
22 So it can accommodate some shear deformation by packing
23 the cables together.

24 If the shear deformations are large, it could
25 cut the cables. Or cut means break the cables.

4-3,pj3

1 They are explained on one of the pages, page 3.
2 There I have listed the three types of conduits we have,
3 three sizes, two-inch, three-inches, four-inches in
4 diameter, and the corresponding amount of cable fill.

5 Then, at the end, I give the corresponding
6 amount of shear deformation allowable.

7 For example, for a three-inch conduit, I can
8 tolerate 1.1 inch shear deformation.

9 BY MS. WRIGHT:

10 Q When will the FSAR be revised to reflect the
11 actual conditions which will be completed in the field
12 with respect to the duct bank sections that will be
13 supported on etha foam planks north of the service water
14 pump structure?

15 A That's a normal process. It will be done soon,
16 maybe the next three weeks, in the FSAR.

17 As we complete the calculations we incorporate
18 in the FSAR.

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FSAR.

1 Q I think we're looking for an approximate date.
2 Do you have any idea about the time frame? Is it a month?

3 A Well, I've been told one time it is going to be
4 this summer, summer of 1983.

5 MS. WRIGHT: Thank you. That's all I have.

6 (Discussion had off the
7 record.)

8 EXAMINATION BY THE BOARD

9 BY JUDGE HARBOUR:

10 Q On page 4 of your testimony, in Section 3.2,
11 in the second line of that section, the last word, would
12 you tell me what that word means? I'm not familiar with
13 laitance.

14 A Oh, laitance. Any concrete work, all the
15 drippings of cement mixture are aggregated. They just
16 lay around, hardens and forms some kind of obstructions.
17 Those are called laitances.

18 Q On page two of your testimony, at the top of
19 the page, it says a nominal amount of Grade 60 reinforce-
20 ment is provided in the duct banks. Would you explain
21 what that accomplishes and the purpose of the reinforce-
22 ment in the duct bank.

23 A The answer is they do not accomplish any struc-
24 tural function. However, when you pour a mass of con-
25 crete the heat of hydration might crack the concrete

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when it is being hardened. So you put some minimum temperature reinforcements as required by the corps.

So it's mainly to avoid the surface cracking on the concrete Qs.

Q So there is no real structural function that is performed by the reinforcements, then, other than as a temporary construction help or aid, is that correct?

A Right.

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c5

1 BY JUDGE HARBOUR:

2 Q On page seven of your testimony where you discuss
3 the use of the ethafoam to isolate the duct banks, is the
4 purpose of that foam to simply provide a crucible material
5 so that the duct banks will not be subjected to shear?

6 A That's correct.

7 Q Is there any assurance that the ethafoam will
8 maintain its physical or structural integrity over the
9 40 year life of the plant when it's buried in soil?

10 A I think so because when we buy this material we
11 specify the requirements, they are going to be in the soil
12 for 40 years, they're are to serve the purpose, and that is
13 a material specification when you buy this material.

14 Q Are there any standards, tests, or qualifications,
15 that document the ability of this ethafoam to withstand the
16 conditions that will be encountered over that long a period
17 of time?

18 A I'd have to answer I'm not personally familiar
19 with any test. I've seen the -- I don't remember now, I
20 have seen the specifications, what they give -- the material
21 name for this particular polyethylene, ethafoam is the
22 commercial name. That specification is the ASTM specification,
23 does require some other testing. Whether that leads to this
24 life expectancy in a soil, I'm not sure.

25 Q Are you familiar with the ASTM standard number or --

1 A. No, I don't have it.

2 MR. STEPTOE: Judge Bechhoefer, perhaps we could
3 provide this information later for you, perhaps by affidavit
4 or --

5 JUDGE HARBOUR: We would like that, yes, to make
6 it part of the record.

7 BY MR. HARBOUR:

8 Q. If under the conditions of some of the weight of
9 the soil surrounding the foam, if it were to compress over
10 time, would this defeat its purpose of isolating the duct
11 banks from shearing?

12 A. I ask the same questions to the geotechnical
13 engineers who talked with the suppliers. You have some
14 over berm of soil right above the ethafoam. It is going to
15 compress in the beginning, and they have assured me that it
16 is taken into account in the design of ethafoam thickness.

17 And it's not going to defeat the purpose when the
18 soil tries to settle, then it's going to crush the ethafoam
19 rather than affecting the duct banks.

20 Q. I was not concerned about the soil pressure on the
21 duct banks, I was worried about the -- I'm concerned about
22 the degradation of the foam over the time as a result of
23 the constant soil pressure, reducing the thickness of the
24 foam, if you can provide some information.

25 A. Yeah, we ought to get back to the material

1 specifications.

2 BY CHAIRMAN BECHHOEFER:

3 Q Dr. Shunmugavel, on page four, in your paragraph
4 3.1, what does the word minimal mean in the context on the
5 fourth line of that paragraph?

6 What do you view as a minimal effect?

7 A What I meant is you have a rectangular concrete
8 duct bank with conduits, plastic conduits in them. And the
9 cables are inside the conduits, and the cables will never
10 see the soil or burden or any other load coming from the
11 traffic above the surface because the load will cover the
12 concrete and distribute to the soil around and below.

13 The cables will never see the effects of it. I am
14 saying it will never see no effect or minimum effect.

15 Q So at least it's of no significance, in any event?

16 A That's right, to the cables.

17 Q Now, in the same paragraph is the service life
18 expectancy of 40 years, is that service life expectancy if
19 the cables were buried in the earth, itself, or does that
20 mean in the duct banks they have the service life of 40
21 years?

22 A This is a standard specification where you say you
23 want a cable that will serve its purpose at least 40 years
24 when it is directly buried in the earth.

25

1 Q So that 40 years doesn't even include the presence
2 of the duct bank?

3 A No.

4 Q On the bottom of page six and the top of page seven
5 there is a statement that this evaluation does not include
6 the beneficial effects of slackness and ductility of the
7 cables.

8 Does that evaluation take into account seismic
9 deformation?

10 A No, not at this point. The way it says that it
11 can tolerate three inches of differential settlement over a
12 12-foot length and corresponding to that strain given there,
13 this one is a difference of settlement. Earthquake effects
14 are not included yet.

15 Q Now, if you added the effects of a maximum earthquake
16 or, say, a .19 G earthquake, would you -- well, how would
17 that change the -- how close would you come then to the
18 limits of, and I hope I'm using the right word, the limits of
19 strain?

20 A That's given on page eight. The maximum strain
21 from earthquake, at the bottom of page eight, is .00019.
22 So if we subtract that much of earthquake strain from the
23 allowable pulling strain of .333 times ten to the minus three,
24 that will translate into three inches of differential
25 settlement over about 20 feet.

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So you have to have a little longer length to accommodate that settlement so that the total strain is the same.

Q I guess my -- I hope I'm phrasing my questions correctly, but I'd like to ask you how live loads are taken into account or if they are taken into account. I assume they are, but how they're taken into account. And by live loads, does this include something like a train or a truck passing over the duct bank or wouldn't that happen, I don't know, or the operation of the facility itself?

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itself

1 A. Yeah, I think I have addressed that on page four
2 on the top. For the live loads from traffic, like a truck
3 passing over the duct bank, the duct banks are generally a
4 minimum of three feet below the ground surface. So that three
5 feet of soil always gives a cushion. So you will have less
6 impact effect, but you will have a direct load on the
7 duct bank.

8 But this duct bank is a mass of concrete so it
9 can distribute the load to the soil around and below it. So
10 the effect of live loads on the cables, like I said, same
11 load minimal effect.

12 Q Now, would there be live loads on that ethafoam
13 that was talked about on page seven and would that have any
14 effect on that, on the insulation effect of that?

15 A. Any load we add to the area, it could be from
16 laydown equipment or traffic, any load passing by will have
17 a tendency to crush, at least temporarily, the ethafoam.

18 Q Well, does that reduce the insulation effect, then,
19 or is that taken into account?

20 A. It is taken into account. The amount of ethafoam
21 they have in mind is about six inches thick. And the ethafoam
22 can compress quite a bit. Out of six inches it can compress
23 three to four inches, easily.

24 So they are considered in the analysis when they
25 design this ethafoam.

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1 Q Would there be any areas where the compression would
2 be much greater than it would be balanced in some other area
3 where it wouldn't be so much so that in effect you could be
4 down all six inches or -- I mean --

5 A No, we don't expect that much crushing.

6 Q A truck convoy or something.

7 A No. That might sound like a big load, but they
8 have a very minimum -- very little effect when you convert
9 them down, because the truck wheel load disperses as it
10 goes down into the ground, and the unit stress on the soil
11 would be pretty less.

12 But most of our duct banks are pretty deep down, like
13 20 feet, 30 feet below. Sometime they won't even realize
14 this load.

15 Q Well, take the three foot one that you mentioned.

16 A Right, uh-huh. They're not that concentrated
17 heavy loads.

(Discussion off the record.)

19 CHAIRMAN BECHHOEFER: That is all the questions
20 the Board has. Mr. Steptoe?

21 MR. STEPTOE: I have just one question, I believe,
22 on redirect.

REDIRECT EXAMINATION

24 BY MR. STEPTOE:

25 Q Judge Bechhoefer asked you, Dr. Shunmugavel, about

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1 whether the discussion on page six -- I'm sorry, page seven,
2 and the allowable strain criterion takes into account the
3 effects of earthquakes.

4 Would you please refer to the top of page six
5 where there is a discussion of the three-inch prediction for
6 maximum settlement.

7 Does that include any amount which would be
8 attributable -- of settlement which would be attributable
9 to earthquakes?

10 A. Yeah, part of it, a quarter-inch of that three-inch
11 settlement belongs to shakedown settlement due to seismic
12 shaking.

13 Q. But the discussion of the -- which appears on
14 page six and seven, in general refers to settlement effects
15 rather than earthquake effects, is that right?

16 A. Right.

17 Q. And the remainder of earthquake effects, other
18 than seismic shakedown, are discussed on pages eight and nine
19 of your testimony, is that correct?

20 A. Correct, on section 3.4.

21 MR. STEPTOE: I have no further redirect.

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redirect 1

2 only.

3 CHAIRMAN BECHHOEFER: Okay.

4 CROSS EXAMINATION

5 BY MR. MARSHALL:

6 Q I would like to know -- a clarification is all,
7 am I to understand that the cables are encased in conduit?8 A Yeah, they're placed inside of conduit, plastic
9 conduits.10 MR. MARSHALL: That is all I wanted to clarify.
11 That is all.

12 CHAIRMAN BECHHOEFER: Ms. Wright?

13 (Discussion had off the record.)

14 CROSS EXAMINATION

15 BY MS. WRIGHT:

16 Q Dr. Shunmugavel, in your evaluation of the duct
17 banks, did you use the strength of the reinforcing steel in
18 those calculations?19 A No, there is no need to evaluate the duct bank
20 itself, the concrete and the steel, because what I am worried
21 about is the cables. So I am calculating the strain in the
22 cables, the deformation in the cables, but not in the duct
23 banks.

24 JUDGE HARBOUR: That true with live loads?

25 THE WITNESS: The live loads have no effect on the

1 cables, but live loads directly effect the concrete portion
2 of the duct bank.

3 JUDGE HARBOUR: And did you include the reinforcement
4 in calculating the effects on the duct bank?

5 THE WITNESS: No.

6 BY MS. WRIGHT:

7 Q Okay. Are you using soil or lean or K concrete
8 around the foam enclosures?

9 A That portion of the area, not the service water
10 pump structure, they were planning to backfill it with K
11 concrete. I use the word fly ash cement mixture.

12 Q Is there a maximum/minumum span for which you have
13 evaluated the duct banks where they are unsupported by soil?

14 MR. STEPTOE: But supported by fly ash cement
15 mixture just hung in the air?

16 BY MS. WRIGHT:

17 Q No, they're sitting and there is a void underneath
18 the duct bank.

19 A What they mean is during construction time, when
20 you are excavating that area, a certain portion of a duct
21 bank is unsupported. That's the construction process they're
22 evaluating and putting some temporary supports to the duct
23 banks if necessary.

24 Q During the life of the plant do you expect any
25 unbridging or voids underneath the duct banks?

1 A. Well, the answer to that is I don't think we can
2 expect any voids to be around the duct banks. However, I can
3 say this, the very original calculations, design calculations
4 on the duct banks, done about ten years ago, and all duct
5 banks on this particular job, they can assume about ten feet
6 of unsupported duct banks without any soil around and checked
7 the concrete and the reinforcements and in certain places
8 they did put more than a nominal amount of reinforcement just
9 to be on the safe side.

10 Q. Okay. Thank you. And I have a last question.
11 What is a safe strain limit that the cables are capable of
12 being subjected to?

13 A. That is a good time -- I wanted always to say,
14 the cables are made of copper conductors. They can take
15 about 300 to 1,000 times the strain given here on page --

16 Q. Did you say 1,000 times?

17 A. Right.

18 MR. STEPTOE: I'm not sure the witness completed
19 his reference to the page number.

20 THE WITNESS: Page three, item B. That strain,
21 .333 times ten to the minus three is just a recommended
22 strain while pulling a cable through a conduit. That is
23 not the allowable or safe strain for a cable. I just use
24 that as a conservative limit.

25 But in reality, a cable can tolerate about 300 to

5-3,dn4

1 1,000 times that strain.

2 MS. WRIGHT: Thank you very much. That is all the
3 questions I have.

4 JUDGE HARBOUR: Numerically, would that value mean
5 one in three?

6 THE WITNESS: I have it somewhere. This cable
7 is made of ASTM B-33 material. That's the conductor material.
8 That can take a ten to 30 percent strain.

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JUDGE HARBOUR: Thank you.

(Discussion had off the
record.)

CHAIRMAN BECHHOEFER: That's all the questions
the Board has.

Mr. Steptoe, do you have anything further?

MR. STEPTOE: No redirect, your Honor.

CHAIRMAN BECHHOEFER: Anything further based
on -- more questions?

MS. WRIGHT: No, no further questions.

CHAIRMAN BECHHOEFER: Mr. Shunmugavel, I guess
you're excused.

THE WITNESS: Thank you.

(Witness excused.)

CHAIRMAN BECHHOEFER: Mr. Paton or Miss Wright,
do you plan to put Mr. Rinaldi on now?

MS. WRIGHT: Yes, we do, if that's to your
liking.

CHAIRMAN BECHHOEFER: Just on this general area.

MR. STEPTOE: Well, Judge Bechhoefer, I notice
that Mr. Rinaldi's prefiled testimony does address duct
banks or --

MS. WRIGHT: We're going to address Contention 4
and 1 separately. We'll just discuss two pieces of testimony
at this time and then do that separately, if that's to

1 the Applicant's --

2 MR. STEPTOE: Well, all right. It just seems
3 a strange procedure to me.

4 I have no problem, in general, with the Staff
5 testifying on the subject, but are we going to be getting in-
6 to a mode where we put up a witness and the Staff, in
7 general, has the opportunity to come up and comment on
8 our testimony apart from any other testimony that they
9 may have filed on the subject?

10 I'm not trying to be difficult, but I hope that
11 this is not going to become a general practice.

12 CHAIRMAN BECHHOEFER: Well, I think, in general,
13 we will want the Staff's evaluation, at least if --

14 MR. STEPTOE: Yes, Judge Bechhoefer, but the
15 Staff does not participate as a privileged party in
16 these proceedings.

17 In general, parties, whether they're Staff or
18 Applicant, and so forth, file their testimony contemporane-
19 ously and the Staff goes last. But, in general, parties
20 don't have the privilege to -- or are not even expected
21 to comment on other people's testimony except as it
22 relates to their own testimony.

23 I have no problem in this case, but it does
24 seem to me to be a somewhat -- the potential for an
25 unfair advantage may be created here.

1 CHAIRMAN BECHHOEFER: Well, I think, in general,
2 the records of both proceedings do reflect the Staff's
3 evaluation of the particular subject, so that, one way
4 or the other, we ought to have that on the record.

5 MR. STEPTOE: I guess what it undercuts is the
6 idea that -- and, again, not in the specific case; I'm
7 not too concerned about it -- but it undercuts the idea
8 the parties file written testimony in advance, and the
9 ability to cross examine is made difficult, because
10 I don't expect Mr. Rinaldi to say something new and
11 totally different from what we have received.

12 CHAIRMAN BECHHOEFER: Well, you may well be
13 given additional time if that were to happen.

14 (Discussion had off the
15 record.)

16 CHAIRMAN BECHHOEFER: Certainly, if you need
17 time to respond to anything that comes up this late, we
18 certainly would consider that. I don't think you have
19 to worry too much about getting it.

20 MR. STEPTOE: I've expressed a concern, and I
21 won't object to this situation today.

22 CHAIRMAN BECHHOEFER: All right. Mr. Rinaldi.

23 MS. WRIGHT: Mr. Rinaldi.

24 Let the record show that Mr. Rinaldi has been
25 previously sworn in this proceeding.

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Whereupon,

FRANK RINALDI,

called as a witness by Counsel for the Regulatory Staff,
having been previously duly sworn, was examined and
testified as follows:

DIRECT EXAMINATION

BY MS. WRIGHT:

Q Mr. Rinaldi, did you read the testimony and
hear the additional corrections Dr. Shunmugavel made to
his written testimony?

A Yes.

yes

1 Q Do you agree with this testimony as corrected?

2 A Yes.

3 CHAIRMAN BECHHOEFER: This is both sets of testimony,
4 now, both on the Auxiliary Building and the duct banks, is
5 that correct?

6 THE WITNESS: Yes.

7 MS. WRIGHT: I'm sorry, I --

8 CHAIRMAN BECHHOEFER: I just wanted to clarify that.

9 MS. WRIGHT: I'm sorry. I think we would like to
10 address the first piece of testimony, which is the structural
11 evaluation of the Auxiliary Building for seismic shakedown
12 settlement first.

13 CHAIRMAN BECHHOEFER: Oh, okay. I wasn't sure from
14 your questions what you were referring to.

15 MS. WRIGHT: Right. I'm sorry; I wasn't listening.

16 BY MS. WRIGHT:

17 Q Again, did you agree with Dr. Shunmugavel's
18 corrected testimony?

19 A Yes.

20 Q Do you have any comments to make regarding that
21 testimony?

22 A Just that it seems like a reasonable approach
23 that the Applicant is using to evaluate this problem of
24 shakedown in the north part of the Auxiliary Building.

25 Again, the Staff has not reviewed this calculation,

1 and a lot of times in the review in a nuclear power plant
2 it is not necessary for the Staff to review every calculation.

3 We have reviewed many calculations that the Applicant
4 has performed in this work. So the criteria and the approach
5 that the Applicant is using, the Staff finds it acceptable.

6 Q Then you do agree that the Applicant's approach
7 is satisfactory to the Staff?

8 A Yes.

9 Q Did you hear Dr. Shunmugavel's additional direct
10 testimony?

11 A Yes.

12 Q Did you agree with it?

13 A Yes.

14 Q Do you have any comments to make regarding it?

15 A No, no further comment.

16 Q Moving on to the second piece of testimony, which
17 is entitled Testimony of Dr. Shunmugavel regarding seismic
18 Category 1 duct banks at the Midland site, are you familiar
19 with the contents of the written testimony?

20 A Yes.

21 Q Do you agree with it as it has been corrected?

22 A Yes.

23 Q Do you have any comments to make regarding that
24 testimony?

25 A No, other than what has been put on the record

1 during this testimony.

2 MS. WRIGHT: Thank you, Mr. Rinaldi.

3 Staff has no further questions.

4 MR. MARSHALL: If I may have just one question.

5 CROSS EXAMINATION

6 BY MR. MARSHALL:

7 Q I want to know if during the testimony of this
8 witness did you take exception to any part of his testimony?

9 A No.

10 MR. MARSHALL: Very well, that's all.

11 CHAIRMAN BECHHOEFER: Mr. Steptoe?

12 MR. STEPTOE: No, no questions.

13 (Discussion had off the record.)

14 BOARD EXAMINATION

15 BY CHAIRMAN BECHHOEFER:

16 Q Mr. Rinaldi, first with respect to the Auxiliary
17 Building, do you agree that the calculations here adequately
18 takes into account the effects of dead load, live load and
19 seismic load?

20 A Yes. The Staff at one time was concerned whether
21 the load combinations shown on page five of the Applicant
22 testimony was the most conservative load combination versus
23 the load combination where the seismic loads are present.
24 In the load combination on page five only the dead load,
25 the live load and the shakedown load is considered due to the

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void and under the north part of the Auxiliary Building.

In the design on the Auxiliary Building there are other load combinations where the seismic load, the SSE or the OBE are part of the load combination. That was the purpose why we asked the Applicant to state whether this load combination is the controlling one, and we agreed that this can be the controlling one because of the load factors that appear in this load combination.

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combination

1 In this load combination you have a 1.4 load
2 factor for the dead load and 1.7 for the live load.

3 Now, when you use the seismic load design loads
4 you only put a 1.0 load for the live load and the dead
5 load. So it's reasonable to conclude that this load
6 combination would control the design of that area of
7 the Auxiliary Building.

8 Q Now, turning to the duct bank, I have the same
9 question. Do you think the Applicant is taking the
10 various loads -- dead load, live load, seismic load --
11 into account adequately?

12 A Yes. And during an audit that was performed,
13 I believe last summer, we reviewed other portions of
14 duct banks in a different area of the plant which were
15 of concern to the Staff, and our consultant personally
16 reviewed in detail the calculation performed by Bechtel.
17 And some of the questions that were raised this morning
18 were to bring out some of the conservatives that is
19 present in the analysis, like the reinforcing that is
20 present in the duct bank which was not part -- was not
21 relied on in the design of the duct bank, and also that
22 the duct banks were considered unsupported for an unrea-
23 sonable amount of span, and also the fact that when they
24 refilled this area around the service water pump struc-
25 ture this fly ash lean concrete will provide a better

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1 support mixture than any soil that you might place under-
2 neath where you have to compact the soil and establish
3 the property of the soil versus this lean concrete where
4 the properties are much better known and the situation
5 where a void may occur under these duct banks, it's pretty
6 much eliminated by the use of this material.

7 Q Do you agree that the cables are adequately
8 protected against the shear forces caused by an earth-
9 quake?

10 A Well, like he stated in the testimony, the area
11 provided is much greater than the area of the cable.
12 Therefore, any resulting shear on the duct banks is
13 unthinkable. That would reduce the area of the voids
14 inside the banks that provide the passage of the cable
15 to such extent that it would damage the cables which are
16 being relied to provide this power, transmittal of power.

17 (Discussion had off the
18 record.)

19 BY CHAIRMAN BECHHOEFER:

20 Q Do you agree with the analysis that we've heard
21 about how the etha foam would react to dead and live loads,
22 whether it would retain enough insulating capacity after
23 dead and live loads are considered?

24 A Yes, I do. You only could compress the etha
25 foam up to a certain extent. No matter what load you

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might see there, you're never going to compress the whole six inches.

You might easily compress certain percentage of it. And the fact that the soil is overburdened will absorb the load that is imparted on the surface.

And, again, like was pointed out by the Applicant witness, this load is distributed, and when it is applied on this foam the area resisting this load is much greater than the area to which it is transmitted by a wheel load or any other equipment load at the surface.

So the area is increased by a factor of three times as much, you know, at least.

(Discussion had off the record.)

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CHAIRMAN BECHHOEFER: That's all the questions the

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Board has.

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Ms. Wright, anything further?

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MS. WRIGHT: Nothing further.

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CHAIRMAN BECHHOEFER: Mr. Steptoe, do you have

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anything further?

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MR. STEPTOE: No, sir.

8

CHAIRMAN BECHHOEFER: Mr. Rinaldi, you may be

9

excused for the time being.

10

THE WITNESS: Thank you.

11

(Witness excused.)

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CHAIRMAN BECHHOEFER: I think we should break for

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lunch now and come back at 1:30.

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(Whereupon a luncheon recess

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was taken at 12:15 p.m., to

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resume at 1:30 p.m. the same

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day, Thursday, February 17,

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A F T E R N O O N S E S S I O N

(1:45 P.M.)

CHAIRMAN BECHHOEFER: Back on the record. Mr. Paton?

MR. PATON: Yes, Mr. Chairman, I have a -- two very minor or brief matters.

The Applicant earlier this week raised a question about the office of investigation, the matters that are being looked at by the office of investigation. I have some information about that which is that -- well, I have a list of four issues and I would like to tell the Board those four issues and I would like to ask the Board and any parties that if anyone recalls that there are any other issues that they believe the office of investigation or Region III is supposed to be addressing, they would let me know.

This completes the list, to my knowledge, but I wouldn't want to -- if someone is aware of one, I'd appreciate them letting me know.

The four issues -- the first one is a matter involving a misrepresentation about the status of some instrumentation work that had to do with underpinning. That matter, to my knowledge, is complete, and a report was issued recently.

The second matter involves the alleged violation of a Board order. The third matter involves affidavits concerning the Zack Corporation. And the fourth matter concerns six anonymous affidavits provided to Region III by GAP.

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Mr. Keppler estimates -- let me make a different comment. It has been decided that with the exception of one of the six affidavits, that all of those matters will be investigated by Region III and not by the office of investigation. Mr. Keppler advised me that their present estimate for the completion of the investigation of the Zack matters is six months. And his present estimate of at least one of the six affidavits is three months.

I did not get dates on the remaining items, but I believe those dates are limiting. I don't think he expects any of the other matters to exceed six months.

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months

1 JUDGE COWAN: When you speak of the other matters,
2 you mean items two and three that you have given no estimate
3 of time on?

4 MR. PATON: Yes, the violation of the Board order,
5 he did not say, Judge Cowan, but I assumed that he meant to
6 imply that it's within six months.

7 I think when he put the six months on the Zack
8 matter, I think he meant to tell me that the others will be
9 something less than that.

10 JUDGE COWAN: But those other two are not being
11 investigated by Division III, are they, rather, by the Office
12 of Investigation?

13 MR. PATON: All of these matters will be investigated
14 by Region III except for one of the anonymous affidavits.
15 That one will be investigated by the Office of Investigation.

16 CHAIRMAN BECHHOEFER: Those are the GAP matters?

17 MR. PATON: That's correct. Again, Mr. Chairman,
18 I would appreciate it if the Board is aware of any other
19 matters that you believe -- I think this completes the list.

20 CHAIRMAN BECHHOEFER: When you say violations of
21 Board order, does that include all of the matters raised in
22 the memorandum from Dr. Landsman to Mr. Shafer, dated
23 August 24th, about which we had some discussion yesterday?

24 MR. PATON: We're not totally sure that it includes
25 all of -- maybe we can take a look at that and get back to

1 the Board.

2 MS. STAMIRIS: It includes all of the issues
3 discussed in Mr. Landsman's April 24 memorandum which is
4 the only things that were discussed here yesterday.

5 CHAIRMAN BECHHOEFER: August 24th.

6 MS. STAMIRIS: Sorry. Wouldn't you agree that
7 includes everything from Mr. Landsman's August 24th
8 memorandum?

9 CHAIRMAN BECHHOEFER: That was my questions.

10 MR. PATON: I think we better take a look at it.
11 I'm just not certain.

12 MR. STEPTOE: Judge Bechhoefer, all I can say is
13 that when Staff mentioned this to us, I believe it was
14 yesterday, they said this might be the case, gave us a little
15 advanced warning. Applicant was extremely discouraged.

16 As you know, with respect to these affidavits,
17 the Zack matter, Applicant has voluntarily withheld any
18 discovery of these matters for upwards of eight months now,
19 under the understanding that we'd have a report this week.

20 Now it looks like it's going to be another six
21 months.

22 We're just going to have to consider what our --
23 or reconsider what our options are at this point. That's
24 all I've got to say.

25 CHAIRMAN BECHHOEFER: Well, it might affect Mrs.

1 Sinclair's discovery, as well, so --

2 MR. STEPTOE: It might affect the whole progress
3 of this case.

4 CHAIRMAN BECHHOEFER: It, too, was postponed
5 pending completion of these investigations.

6 MS. SINCLAIR: Well, Judge Bechhoefer, I think
7 that's why we really need instead of talking about delay on
8 Region III's part or our part or anyone else's part, let's
9 look at the real causes of delay and get a realistic
10 construction schedule. Within that framework none of these
11 dates will really be unusual or not within target.

12 I'm sure that Mr. Keppler has some idea that the
13 fuel loading date is considerably in the distance of time
14 frame, otherwise he would establish a different kind of priority.

15 But he is being realistic, I think, in terms of how
16 he wants to deploy his resources, knowing that the real delay
17 here is that the -- is the sweeping effect that the special
18 investigation had that was conducted last fall for all the
19 safety -- most of the safety work has been shut down, and all
20 these safety systems have to be pulled out, reinspected and
21 reinstalled. That is a hugh time-consuming job.

22 There has certainly been -- the soil settlement
23 work as extensive as it is, is certainly going to take a long
24 time and I think the burden is on the Applicant to begin to
25 give us a construction schedule so that we identify where the

1 real time frame for this construction is and work within that.

2 CHAIRMAN BECHHOEFER: We have been told that at
3 least by the end of the first quarter, that general time frame,
4 at least, we would be given some sort of further idea, at
5 least, that we can hope for.

6 MS. STAMIRIS: Judge Bechhoefer, I'd like to ask
7 you or the NRC Staff or both of you whether you don't consider
8 that the closeout of these issues is imperative before we
9 have the QA session.

10 I mean, if we are to resolve some of the basic
11 quality assurance issues in this proceeding, I just assumed
12 that the NRC wouldn't consider coming to a hearing on quality
13 assurance without having any kind of resolution on these
14 matters. Is that correct, am I correct in that assumption?

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assumption?

1 MR. PATON: No, you are not.

2 MR. STEPTOE: Judge Bechhoefer, these are operat-
3 ing license contentions --

4 MS. STAMIRIS: No, no.

5 MR. STEPTOE: -- these things are relevant to.
6 They are explicitly referenced in the operating license.

7 JUDGE BECHHOEFER: There are specific conten-
8 tions in the operating license. They may or may not have
9 any bearing on issues in the --

10 MS. STAMIRIS: Well, my memory is when Mr.
11 Bishop was here that time and Mrs. Sinclair was, you
12 know, working with him to get her operators license con-
13 tentions in good order, and we presented our arguments
14 and I believe that the ruling was that all of these Zack
15 issues, I mean, we informally discussed the idea of the
16 Zack issues and the allegations from GAP relating to
17 Zack and all of these things could conceivably either
18 be put in an OM box or OL box.

19 And we -- our position was that they should be
20 considered in the OM proceeding because it was just better
21 to consider such important matters sooner rather than
22 later.

23 And my understanding was that the other parties
24 either agreed or else the Board ruled that, indeed, they
25 were OM matters. And that is why I was making the

1 assumption that they would be a part of the QA hearing
2 in the spring.

3 MR. PATON: Judge Bechhoefer, I was going to
4 raise that question myself. I was going to ask the Board,
5 I've heard various parties discussing this issue, and
6 some of these matters arose during the order of modifi-
7 cation proceeding. But I think now, without much research,
8 my immediate view is that I don't see the need to hold
9 up the order of modification proceeding and the decision
10 in that case on these -- because of these issues. But
11 I really wasn't sure whether the Board ever ruled on
12 that.

13 CHAIRMAN BECHHOEFER: Well, I may be wrong, but
14 I don't recall we ever specifically ruled. Certainly
15 these issues have some bearing on QA matters, but whether
16 that would preclude our issuing on a partial initial
17 decision or not, finding that any conclusions could be
18 made subject to further findings and needed to be changed-

19 MS. STAMIRIS: I'm quite sure there was a
20 ruling.

21 (Discussion had off the
22 record.)

23 CHAIRMAN BECHHOEFER: Certainly any findings
24 concerning the QA program and its implementation could
25 be made subject to modification as a result of a further

1 hearing. Where the OM decision certainly doesn't authorize
2 any sort of operation at all, it would determine whether
3 perhaps additional controls of -- be placed upon the
4 Applicant for further modification of the structure permit
5 or that sort.

6 MS. STAMIRIS: May I ask about the other issue --
7 one of the other issues he spoke about which is the
8 alleged violation of the Board's order in relation with
9 Mr. Landsman's August 24, '82, memo?

10 I hope I am safe in assuming that the Board
11 or the NRC would not consider completing the QA portions
12 of this proceeding without that issue. I mean, after all,
13 that dealt with a violation of the Board's order in this
14 proceeding and if anything has anything to do with what
15 the Board is here to decide in this proceeding, that far
16 and above -- don't you agree, Mr. Paton, that that is an
17 essential part of the quality assurance for this OM
18 proceeding?

1 MR. PATON: I agree that it obviously has a direct
2 relationship to the OM proceeding. I am not at all convinced,
3 however, that the Board could not write its decision in this
4 case indicating that, obviously, if further evidence -- if
5 this matter were not completed that some response could be
6 made to it when it was decided.

7 What I'm saying is that it obviously has a direct
8 relation to the OM proceeding, but I don't see that as
9 preventing this Board from writing a decision in the order
10 of modification proceeding.

11 MS. STAMIRIS: Well, you wouldn't see it if it was
12 in the course of being completed or something.

13 I mean, the statements that were made yesterday
14 is that all these issues would be taken up, you know, later
15 in this proceeding. Weren't they? When we put off going
16 into great detail about Mr. Landsman's April 24th memorandum.
17 Wasn't that with the understanding that they would be taken
18 up later in this proceeding?

19 CHAIRMAN BECHHOEFER: Well, it's clear that they
20 will be taken up.

21 (Discussion had off the record)

22 CHAIRMAN BECHHOEFER: The Board believes that we
23 certainly can go ahead in April with the matters that we have
24 now scheduled -- well, that are scheduled for some time in
25 April.

1 The Board would certainly urge the Staff to try to
2 complete at least that aspect of the investigation. And this
3 is even if you couldn't put it into your direct testimony,
4 even if you had to come up with the oral testimony, maybe
5 supplementing an inspection report.

6 To the extent you could do that, I think that would
7 be useful, either April or the -- we're likely not to finish
8 this issue in April, in any event, but in forthcoming hearings
9 on QA matters, with the portion dealing with the alleged
10 violation of our order and the matters in the Landsman memo.

11 MR. PATON: I agree, Mr. Chairman. I think that's,
12 obviously, entirely appropriate if we can get it done, if
13 there's any way we can get it done.

14 I will urge Region III to do that, and we will tell
15 them what you said.

16 CHAIRMAN BECHHOEFER: And I'm saying we would not
17 even necessarily insist on direct testimony. The Applicants
18 will, obviously, have to have time to respond.

19 But it would be desirable if we can put that aspect
20 in at least.

21 MR. PATON: We will advise Region III.

22 MS. STAMIRIS: Mr. Paton, I have another question
23 on that before we move on to other subjects.

24 Am I correct in understanding that the investigation
25 of the alleged violation of the Board's order has been changed

1 from OI to Region III?

2 MR. PATON: Correct.

3 MS. STAMIRIS: On what basis?

4 MR. PATON: Judge Bechhoefer, I think that's -- all
5 I know is that they sat down and discussed it the night before
6 last, and out of that meeting came the decision that it was
7 a matter for Region III instead of a matter for the Office of
8 Investigation.

9 Now, that's the extent of my knowledge. But, really,
10 I'm not sure that I want to respond to -- that's an internal
11 matter. That's how we do business.

12 CHAIRMAN BECHHOEFER: Right. I think the the
13 particular division in NRC that does a particular job is
14 not too relevant to -- there may be lots of things that
15 dictate that, including things like vacation schedules and --
16 I'm not sure that that's it.

17 MR. PATON: I don't think so, Judge Bechhoefer.

18 There were questions as to what precise matters
19 would be investigated generally when the Office of
20 Investigation was created, what questions they would investigate,
21 as opposed to what particular kinds of questions the region
22 would investigate, and it's a result of that type of thing.

23 After a hard look at it, it has been determined
24 that it's Region III's matter and not the Office of
25 Investigations.

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2 CHAIRMAN BECHHOEFER: The only thing I am con-
3 cerned about is it took OI from sometime in August of '82 to
4 sometime in February of '83 to decermine if they were or were
5 not going to investigate something.

6 But, be that as it may --

7 JUDGE COWAN: Mr. Paton, in your several con-
8 versations with Mr. Keppler, have you gathered whether
9 this business of having the six months to complete things
10 has at present any impact on their expectation of add: ss-
11 ing the QA matter in April, as planned, or at least by
12 the revised schedule which you suggested yesterday?

13 MR. PATON: Judge Cowan, to my knowledge,
14 there's no connection.

15 In other words, I think Mr. Keppler said it's
16 going to take him six months to investigate the Zack
17 matter, and his -- and I assume that he did not expect
18 that would have any impact on our preparation for testi-
19 mony for the April hearing. I don't think he sees that
20 there's any connection between the two.

21 JUDGE COWAN: And I suppose everybody recognizes
22 after he has investigated for six months determining what
23 the situation is he has the right to change his mind
24 again.

25 MR. PATON: I think that's right, Judge Cowan.

This investigation of the Zack matter --

1 (Discussion had off the
2 record.)

3 MS. STAMIRIS: I was going to ask that -- I
4 didn't understand by the way the discussions were going
5 that you were on the verge of making a ruling about this,
6 but I think that it would be important for Mrs. Sinclair
7 and I to talk to some of the people at GAP who we were
8 hoping were going to come in and help on these matters,
9 because it was our understanding-- and I think they
10 probably got that understanding from me, because I thought
11 that these things were all going to be covered as part of
12 the April QA hearings in this proceeding.

13 And I think if we look back at the discussions
14 on where the Zack matters were going to be held, I think
15 there was a ruling that it was going to be a part of the
16 OM proceeding. And so, when we look back in the record,
17 I think we'll see that's why everything has been proceed-
18 ing on our part with that understanding, and I think
19 it's very important that we have an opportunity to speak
20 to them and, like Mr. Steptoe said, consider our options
21 at this point.

22 CHAIRMAN BECHHOEFER: Yes, it's clear the issues
23 are going to be considered, but the Staff is not ready
24 to address them. I'm not sure what anybody can do about
25 that.

1 MR. MARSHALL: Can we hold our options open?

2 CHAIRMAN BECHHOEFER: Well, I don't know if
3 it's possible, but I do think the completion of the Staff
4 investigation is essential before we deal with that
5 particular issue anyway, those particular issues. There
6 are more than one.

7 MR. PATON: Mr. Chairman, I have another issue
8 when we get finished with that one.

9 CHAIRMAN BECHHOEFER: Okay, proceed.

10 Oh, wait a minute.

11 (Discussion had off the
12 record.)

13 CHAIRMAN BECHHOEFER: Mr. Steptoe, do you have
14 anything further?

15 MR. STEPTOE: Not at this time, Judge Bech-
16 hoefer.

17 CHAIRMAN BECHHOEFER: Okay, Mr. Paton.

18 MR. PATON: I just wanted the record to show,
19 Judge Bechhoefer, that the Staff has offered,, in an
20 attempt to possibly move the hearing along -- we have
21 offered to meet with Mrs. Stamiris and Mrs. Sinclair on
22 the lunch hour, and we have offered to meet with them
23 this evening, and we intend to continue making those
24 offers.

25 We do have, as I said before, a witness here

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with a tremendous amount of expertise. He is available, and we are offering to sit down with them whenever they're available and answer any questions they may have.

The last item I have, Mr. Chairman, is that 3:00 o'clock is our deadline for calling our witness in Washington. I don't want to tell him he doesn't have to be here without the Board's permission, on water hammer. But it begins to look to me like it's going to be next to impossible to get to that issue, and I wonder if we could discuss it.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: Why don't we go off the record for a minute.

(Discussion had off the record.)

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CHAIRMAN BECHHOEFER: Back on the record. Mr.

Paton?

MS. WRIGHT: Staff is prepared to go ahead with Mr. Rinaldi and Mr. Kane.

Mr. Kane will be addressing Stamiris Contention 4A subsection 3 and 5; Stamiris Contention 4C(a), (c), (d), (e), and (f), as amended April 20th, 1981; and Warren Contention 1.

Mr. Rinaldi will be addressing Stamiris Contention 4A2; Stamiris Contention 4C(a), (c), (d), (e), and (f); and Warren Contention 3.

Both Mr. Rinaldi and Mr. Kane have been previously sworn in this proceeding.

Whereupon,

JOSEPH KANE

FRANK RINALDI

called as witnesses by Counsel for the Regulatory Staff, having been previously duly sworn by the Chairman, were examined and testified as follows:

DIRECT EXAMINATION

BY MS. WRIGHT:

Q We'll begin with Mr. Kane. Mr. Kane, are you familiar with Stamiris Contention 4A of subsections 3 and 5?

A (WITNESS KANE) Yes, I am.

1 Q Would you respond to those contentions, please?

2 A (WITNESS KANE) Yes. With each of these con-
3 tentions I would like to indicate what the contention is.
4 Most of my response is going to be to identify where
5 either in previous past testimony or the SSER we have
6 addressed these issues.

7 With respect to Stamiris Contention 4A3, the
8 contention reads:

9 "Preloading of the Diesel Generator
10 Building does not allow proper evaluation
11 of compaction procedures because of unknown
12 locations of cohesionless soil pockets."

13 I would like to indicate first that the Staff
14 evaluation of the preloading of the Diesel Generator
15 Building has been provided in the October, 1982, SSER
16 No. 2, on pages 2-24 through 2-34.

17 In previous testimony of November 16th, 1982,
18 following page 8799 we have indicated the Staff's efforts
19 with respect to the foundation soils have been directed
20 to establishing the engineering properties of the soils
21 that have been preloaded through exploration and laboratory
22 testing.

23 We have had discussions in the past that our
24 efforts have not been directed to verifying the degree
25 of compaction, the compaction procedures. The reason

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1 for that is that compaction procedures are required to
2 bring about a condition in the soil that would demon-
3 strate acceptable engineering properties, and we have
4 established the actual engineering properties through
5 the subsurface exploration and laboratory testing.

6 The Staff feels, along with our consultant,
7 the Corps of Engineers, that the completed subsurface
8 explorations and laboratory testing have reasonably
9 established the static and dynamic engineering properties
10 of the foundation soils which were preloaded.

11 These properties have been conservatively used
12 in engineering analysis and the analysis I'm referring
13 to are bearing capacity, liquefaction potential, seismic
14 induced settlements.

15 The results of these analyses have indicated
16 to the Staff an acceptable margin of safety is available
17 for those considerations.

18 One of the latest contentions addresses dif-
19 ferential soil settlement with respect to the Diesel
20 Generator Building. And I would comment on differential
21 soil settlement at that time. That is my response to
22 Stamiris Contention 4A3.

23 Q Would you proceed to your discussion of Stamiris
24 Contention 4A5?

25 A (WITNESS KANE) Yes. Stamiris Contention 4A5

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states:

Preloading of the Diesel Generator Building yields effects not scientifically isolated from the effects of the rise in cooling water and therefore not measured properly.

There are aspects of that contention which the Staff would agree with and there are aspects with which we would not agree with.

The statement that preloading yields effects not scientifically isolated from the effects of the rising cooling water, we would agree with. Whether the piezometric levels were measured properly with the instruments that were installed, it is our understanding that they were measured properly.

In past testimony the Staff has acknowledged their difficulties in evaluating the piezometric data which was obtained during surcharging. These difficulties have arisen from our questions as to whether the full depth of the foundation soils were actually saturated from the cooling pond seepage at the time of surcharging.

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2 Our recognition that piezometers were installed in
3 layer zones of both sand and cohesive soils which influence
4 their values, and also the recognition of the unanticipated
5 behavior in some of the piezometer performance.

6 The Staff, in recognition of those difficulties,
7 has elected to require a determination of the condition of
8 the soils that were preloaded by asking for -- which we
9 have received, the borings and the laboratory testing.

10 With that information we have been able to establish
11 the condition of the soil with respect to settlement and on
12 that basis we were able to overcome our difficulties with
13 the piezometer data. That is my response to 4A(5).

14 Q Are you familiar with Stamiris Contention 4C(a),
15 (c), (d), (e), and (f), as amended?

16 A Yes, I am.

17 Q Would you address Stamiris Contention 4C(a)?

18 A There are several aspects in Stamiris Contention
19 4C. It not only affects many of the structures, but it also
20 affects our evaluation of dynamic response regarding dewatering
21 effects, differential soil settlement, and seismic effects
22 for these structures.

23 The portion of this contention that I hope to
24 address is with respect to differential soil settlement.
25 Mr. Rinaldi is to address the other two portions.

With respect to Stamiris Contention 4C(a), the

1 statement would read: Remedial soil settlement actions are
2 not based on adequate evaluation of dynamic responses regarding
3 dewatering effects, differential soil settlement, and seismic
4 effects for the Auxiliary Building, electrical penetration
5 areas, and feedwater isolation valve pits.

6 In SSER No. 2, which was issued in October of 1982,
7 the Staff has addressed the differential soil settlement
8 aspects with respect to the feedwater isolation valve pit on
9 pages 217 and 223.

10 The Staff indicates that the jacking operation
11 beneath the feedwater isolation valve pit will cause most
12 of the settlement to occur while the jacks are in place and
13 before final load transfer is made to the permanent foundation.

14 The statement in the SSER indicates: Any future
15 settlement which will occur after this time is anticipated
16 to be small and has been addressed in design.

17 With respect to the electrical penetration areas,
18 SSER No. 2 on pages 223 and 240 indicates the differential
19 settlements are anticipated to be small after the final load
20 transfer has been made to the permanent underpinning wall.
21 And that when this underpinning is completed, the EPA will
22 have a stable and safe foundation.

23 That is my response to Stamiris Contention 4C(a).

24 Q. Would you now address Contention 4C(c)?

25 A. Stamiris Contention 4C(c) addresses the borated

1 water storage tank and the aspect I am covering is with respect
2 to differential soil settlement.

3 In SSER No. 2 on pages 2-34 and 2-35 the Staff has
4 presented its evaluation of the surcharging fix performed
5 by the borated water storage tanks.

6 In addition, I did submit testimony in response
7 to this contention at the February 17, 1982, hearing session.
8 It follows transcript page 7444.

9 The conclusion in my previous testimony indicates
10 that differential soil settlements will be small following
11 the surcharging of the valve pits in the ring foundations
12 and will be within acceptable limits that have been safety
13 designed for with proposed new integral ring beam.

14 That is my response to Stamiris Contention 4C(b) --
15 excuse me, 4C(c).

16 Q Would you now respond to Contention 4C(d)?

17 A 4C(d) is with respect to the deisel fuel oil
18 storage tanks. I have presented previous testimony in the
19 February 18, 1982, hearing session. My testimony follows
20 page 7752. And that testimony provides the Staff assessment
21 of the foundation stability and the settlement aspects
22 of the deisel fuel oil storage tanks.

23 What is in the testimony does not cover the
24 settlement values which have -- which have become known
25 since the time of that testimony, and so what I would like to

9-2, dn4

1 do is give the current understanding I have of the settlement
 2 that has occurred and give our conclusion with respect to
 3 that settlement.

4 The concrete pad foundations of the deisel fuel
 5 oil storage tanks rest predominantly on medium to stiff
 6 sandy clay fill. It is not loose, cohesionless soils.

7 One boring showed a thin layer, I think it was
 8 boring DF-5, of loose soils and that has been addressed.

9 Following surcharging of the tanks, which occurred
 10 in 1979, the tanks experienced a maximum settlement of a
 11 quarter of an inch.

12 Following that surcharging, there was little
 13 settlement with respect to the tanks until late 1980 at which
 14 time temporary dewatering conditions caused additional
 15 settlement.

16 The maximum settlement following dewatering reached
 17 a half an inch. When the groundwater table was allowed to
 18 rebound for the full scale large test, there was also a
 19 rebound in the settlement, and I think it reached a maximum
 20 of one-tenth of an inch.

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inch 1 During years of plant operation, an additional
2 settlement of approximately a half an inch has been estimated.
3 Dr. Woods, in his recent testimony, has estimated a maximum
4 settlement of one-tenth of an inch under seismic loading.

5 In recognition of the settlement values that have
6 already occurred and have been measured, and in recognition
7 of the future settlement estimates that have been predicted,
8 which we have indicated agreement in the magnitude of those
9 values, Staff feels that differential soil settlements have
10 been adequately addressed and are acceptable to the Staff.

11 That is my response to Stamiris Contention 4C(d).

12 Q Would you now address Stamiris Contention 4C(e)?

13 A A great deal has been said about the settlement
14 of the Deisel Generator Building. The December 6th through
15 the 10th, 1982, hearing session, provides the transcript
16 of that discussion on settlement. The Applicant completed
17 an analysis which used a best fit straight line approach
18 for the actual measured and predicted settlement values.

19 I and the geotechnical engineering consultant to
20 the Staff has indicated that we feel this straight line best
21 fit was inappropriate. The NRC Staff, through Mr. Shower,
22 indicated at those hearing sessions that it was the Staff's
23 position that the actual measured settlement values were the
24 best characterization of the settlement at the site.

25 Mr. Rinaldi may wish to comment on the same aspect,

9-3,dn2

1 but the conclusion of that hearing was that the structural
2 engineering section of NRC has accepted the Deisel Generator
3 Building based on their independent approach and that is the
4 crack analysis that they performed and their reliance on the
5 surveillane program which is to be required.

6 That is my response to Stamiris Contention 4C(e).

7 Q Would you now respond to Stamiris Contention 4C(f)?

8 A Stamiris Contention 4C(f) deals with the effect
9 of differential soil settlement with respect to the related
10 underlying piping and conduit.

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1 At the February 1982 hearing session I did present
2 testimony that indicated the Staff's agreement with the
3 Applicant's estimate of three inches of maximum future
4 settlement for underground piping.

5 It was indicated in that testimony that this
6 settlement was a conservative upper bound limit which could
7 be expected during the years of plant operation.

8 We have heard testimony today with respect to the
9 settlement that is anticipated under the duct banks. The
10 Staff is in agreement with the magnitude of those settlements
11 which are indicated, and the geotechnical engineering staff
12 feels differential soil settlement has been adequately addressed
13 for underground piping and conduits.

14 Q Does that conclude your testimony regarding
15 Stamiris contention 4C(f)?

16 A. (WITNESS KANE) Yes, it does.

17 Q Are you familiar with Warren contention number one?

18 A. (WITNESS KANE) Yes, I am.

19 Q Would you now address that contention, please.

20 A. (WITNESS KANE) I would like to first read Warren
21 contention one.

22 The contention states: "The composition of the
23 fill soil used to prepare the site of the Midland Plant,
24 Units 1 and 2, is not of sufficient quality to assure that
25 preloading techniques have permanently corrected soil

1 settlement problems.

2 The NRC has indicated that random fill dirt was
3 used for backfill. The components that are in the fill can
4 include loose rock, broken concrete, sand, silt, ashes,
5 et cetera, all of which cannot be compacted through
6 preloading procedures.

7 In response to Warren contention one, I did
8 previously provide testimony at the February 17th, 1982
9 hearing session. My testimony follows transcript page 7444.

10 The testimony indicates that the Staff was not in
11 agreement with Mrs. Warren with respect to the characterization
12 of the plant fill.

13 The Staff has concluded that preloading in the
14 Diesel Generator Building area and in the borated water
15 storage tank area that the soils properties were improved,
16 that denseness and engineering properties were increased
17 because of the preloading.

18 The effects of preloading have been evaluated and
19 reported in SSER number two and have been discussed at great
20 length in previous hearing sessions on the borated water
21 storage tank, on the Diesel Generator Building, and on
22 underground piping.

23 Q Does that conclude your testimony with respect to
24 Warren contention number one?

25 A. (WITNESS KANE) Yes, it does.

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MS. WRIGHT: Judge Bechhoefer, could I have just a moment?

CHAIRMAN BECHHOEFER: I have one point of inquiry. Have the respective sections of the SSER-2 which have been mentioned in the previous testimony been formally sponsored?

It was my recollection we did it by section.

MS. WRIGHT: The SER and the SSER supplements number one and two were both admitted in their entirety, and the subsequent sections which were sponsored as testimony were sponsored by the respective witnesses.

I think I've answered your question.

10-2

10-2,dnl

question 1

CHAIRMAN BECHHOEFER: That doesn't accord with my
2 recollection.

3 MS. WRIGHT: The entire document, I think, is
4 Staff Exhibit No. 14.

5 CHAIRMAN BECHHOEFER: The document is, but I
6 thought that the particular sections were going to be offered
7 as the witnesses testified with respect to those sections.

8 WITNESS KANE: Perhaps I could help. The sections
9 that I have referred to, I have in past testimony sponsored
10 them. And, with respect to underpinning, our consultant,
11 Dr. Poulos, sponsored.

12 So all the sections that I have referred to have
13 been previously sponsored.

14 CHAIRMAN BECHHOEFER: Thank you.

15 MS. WRIGHT: Thank you. Could I have just a minute?

16 CHAIRMAN BECHHOEFER: Yes.

17 (Discussion had off the record.)

18 MS. WRIGHT: Judge Bechhoefer, Mr. Hood would be
19 joining the panel to address Stamiris Contention 4A(2)
20 which has been covered in the direct testimony that Mr.
21 Rinaldi will be sponsoring.

22 Mr. Rinaldi.

23 Whereupon,

24 DARL HOOD

25 called as a witness by counsel for the Regulatory Staff,

1 having previously been duly sworn by the Chairman, was
2 further examined and testified as follows:

3 BY MS. WRIGHT:

4 Q Mr. Rinaldi, do you have before you a document
5 entitled NRC Staff Testimony of Frank Rinaldi regarding
6 Stamiris Contention 4C(a), (c), (d), (e), and (f) and
7 Warren Contention 3?

8 A (WITNESS RINALDI) Yes.

9 Q Do you have any corrections or additions to make
10 in this testimony?

11 A (WITNESS RINALDI) Yes, I have some corrections.

12 On page two, the answer to question three, fifth
13 line, right-hand margin, delete the words one hundred years
14 and replace it with probable maximum.

15 Q Does that conclude the corrections?

16 A (WITNESS RINALDI) No. On page four, the first
17 full paragraph, which begins with: "The effects of
18 differential soil settlements," the sixth line, correct the
19 date 1982 with 1981.

20 On page nine, in the answer to question eight,
21 on the third line, add after W. Paul Chan the words "and
22 Darl Hood".

23 Q Does that complete your corrections?

24 A (WITNESS RINALDI) Yes.

25 Q Is this testimony true as corrected?

1 A. (WITNESS RINALDI) Yes.

2 MS. WRIGHT: Staff moves that Mr. Rinaldi's testimony
3 be accepted into evidence and bound into the record as if read.

4 MR. STEPTOE: No objection.

5 MS. STAMIRIS: No objection.

6 MS. SINCLAIR: No objection.

7 MR. MARSHALL: No objection.

8 CHAIRMAN BECHHOEFER: The testimony will be admitted
9 into evidence and bound into the record as if read.

10 (The document referred to, the testimony of Frank
11 Rinaldi, follow:)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

CONSUMERS POWER COMPANY

(Midland Plant, Units 1 and 2)

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

NRC STAFF TESTIMONY OF
FRANK RINALDI REGARDING STAMIRIS
CONTENTION 4C(a), (c), (d), (e), and (f)
AND WARREN CONTENTION 3

Q1. Please state your name and position.

A1. My name is Frank Rinaldi. I am a Senior Structural Engineer in the Structural Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. A copy of my professional qualifications is part of the record in this proceeding.

Q2. What is the purpose of this testimony?

A2. The purpose of this testimony is to address Stamiris Contention 4C(a), (c), (d), (e) and (f) which provides:

4. Consumers Power Company performed and proposed remedial actions regarding soils settlement that are inadequate as presented because:
 - C. Remedial soil settlement actions are not based on adequate evaluation of dynamic responses regarding dewatering effects, differential soil settlement and seismic effects for these structures:

- a. Auxiliary Building Electrical Penetration Areas and Feedwater Isolation Valve Pits
- c. Borated Water Storage Tanks
- d. Diesel Fuel Oil Storage Tanks
- e. Diesel Generator Building
- f. Related Underlying Piping and Conduit

The Staff has addressed Contention 4C(b) related to the Service Water Intake Building and its Retaining Walls completely, and the Staff has partially addressed Contention 4C(f) pertaining to related underlying piping in a previous hearing. (See Tr. 9687-99 and 9107-8, respectively.) The portions of Contention 4C(f) relating to conduit is addressed in the Staff's discussion of Warren Contention 3.

- Q3. What is the Staff's analysis of the effects of dewatering on each of the structures described in Stamiris Contention 4C(a), (c), (d) and (e)?
- A3. In consideration of the dewatering effects for Auxiliary Building Electrical Penetration Areas, and Feedwater Isolation Valve Pits (AUX-BLDG-EPA-FIVP), Borated Water Storage Tanks (BWST), Diesel Fuel Oil Storage Tanks and Diesel Generator Building (DGB), the Applicant has considered in the design of these structures a one hundred (100) years flood level that would result in water levels of 631'0" for steady state level and included an additional wave action of four and one-half feet (4'6"). Therefore, Applicant has considered the water level to reach an elevation of 635'6". These water level design values are acceptable to the staff. The dewatering plan is implemented for the

purpose of constructing the underpinning walls which will keep the ground water elevation two feet (2'0") below the deepest excavation. The lowest ground water elevation used in the design is elevation 580'0".

The Applicant has considered loads resulting from all of the water elevations, i.e., flood, flood plus wave action, normal design ground water level and dewatered ground water level, for all of the buildings identified in Stamiris Contention 4C(a), (c), (d) and (e) as per staff requirements, in accordance with the criteria of Standard Review Plan (SRP), Section 3.4.2. This conclusion has been verified during the audits at the offices of Bechtel Corp. in Ann Arbor, Michigan.

- Q4. What is the Staff's analysis of the effects of differential soil settlements on each of the structures described in Stamiris Contention 4C(a), (c), (d) and (e)?
- A4. In consideration of the differential soil settlements, the NRC geotechnical staff has verified the values of the differential settlement values and total settlement values applicable to the subject structures.

The BWST foundations were surcharged and new reinforced concrete foundation rings have been constructed, therefore, resolving the staff's concerns identified in the Midland proceeding of February 17, 1982 with respect to the effects of differential soils

settlements for the BWST. (See Tr. 7535-45) The design calculations for the new BWST foundation rings have been audited by the Staff and found acceptable because they meet the design criteria identified in the SRP, Section 3.8.4.

The effects of differential soil settlements have been used by the Applicant in their evaluation of the AUX-BLDG-EPA-FIVP. The Staff has reviewed those calculations during an audit at the Bechtel offices in Ann Arbor, Michigan and has found these evaluations acceptable. (See Rinaldi's Direct Testimony following Tr. 5944 of December 3, 1982 Midland proceeding.) The effects of differential settlement have been considered as a load similar to the dead load of the structures and have been assigned a load factor of 1.4. This agrees with the requirements identified in the SRP, Section 3.8.4 and is, therefore, acceptable to the Staff.

Following the surcharging of the DGB structure, the evaluation of the DGB for the effects of differential soil settlements was complicated by the effects of the impinged concrete electrical ducts. The Applicant used a static structural model with spring with varying properties at each foundation boundary node point representing the non-homogenous nature of the existing soil for long term settlement (tornado/earthquake events) loadings. Because this representation did not duplicate in an exact manner the measured settlements as accepted by the NRC geotechnical Staff, the Staff did not fully rely on the results developed by the

Applicant to evaluate the effects of the differential settlement loads on the DGB. (See December 10, 1982 transcript of Midland proceeding, pages 11,085-89.) Instead, the Staff utilized the documented crack mapping provided by the Applicant to determine the stress levels on the structural components of the DGB resulting from differential soil settlement loads. The results have been documented in the staff testimony presented during the December 10, 1982 hearing. (See Rinaldi/Matra/Harstead Direct Testimony, pages 1-5 following Tr. 11,086.) In conclusion, the staff has found that the stress levels for all load combinations meet the requirements identified in the SRP, Section 3.8.4. Therefore, this structure is acceptable to the staff as a result of the analyses and surveillance commitments made by the applicant as related to differential soil settlement.

Q5. Have the effects of differential soil settlement on the Diesel Fuel Oil Tanks been addressed?

A5. Yes, the effects of differential soil settlement on the Diesel Fuel Oil Tanks were addressed in direct testimony I sponsored along with John Matra. This testimony was entered into the evidentiary record of the Midland hearing held on February 17, 1982. Questions and Answers #12, 15 and 16 of that direct testimony addressed this subject. (See Tr. 7537) To summarize, we provided the following conclusion with regard to the Diesel Fuel Oil Storage Tanks:

"There are four Category I steel Emergency Diesel Fuel Oil Storage Tanks which are located south of the Diesel Generator Building, buried 6' underground. The Applicant has analyzed these tanks for seismic induced loads in conjunction with normal, thermal and differential settlement loads. In addition, the

Applicant has provided a reinforced concrete cover to resist the impact of postulated tornado missiles. These tanks have been designed and fabricated to the requirements of ASME Code, Section III, Class 3 (1974). Their reinforced concrete foundation pedestals have been designed to ACI-318-71, and their tie down is designed to the AISC-1971. The Staff has found that the load combinations and acceptance criteria used by the Applicant to design the four buried steel Emergency Diesel Fuel Oil Storage Tanks meet the Staff's design requirements." (p. 10)

"The Applicant has analyzed and monitored them for effects caused by the soil supporting them. The Applicant has not reported any problem areas from the analysis and monitoring program. Staff believes that the results of the analysis and monitoring program indicate that any structural concerns represented in the above contentions are without merit in regard to the fuel tanks, subject to an audit of the information to be supplied by the Applicant." (p. 12)

- Q6. What is the Staff's analysis of the seismic effects on each of the structures described in Stamiris Contention 4C(a), (c), (d) and (e)?
- A6. Considerations of the seismic effects have been provided for the subject structures in Supplemental Safety Evaluation Report (SSER) No. 2 (Section 3.7 and 3.8). Only, major considerations for the subject structures will be discussed in this testimony. The structural/seismic review of the AUX-BLDG-EPA-FIVP structures is complicated by the fact that we are introducing new construction of the underpinning which is meant to address the problem with the soil (differential soil settlement). At the same time, a new site specific spectrum was being developed by the Applicant for this site. Therefore, the review breaks up the evaluation of these structures in two parts. The underpinning for this building was to be designed to the site specific spectrum. However, the Applicant had not completed this work and chose to use in its place, a spectrum which consisted of a

larger spectrum than the one identified in the FSAR. They use the multiplying factor of 1.5, i.e. the response spectra is multiplied by 1.5. The Staff has reviewed the calculations by Bechtel for the underpinning, using the 1.5 FSAR spectra and found them acceptable because they meet the acceptance criteria of SRP, Sections 3.7 and 3.8.

The Applicant has claimed that 1.5 FSAR spectrum is a more conservative input than the site specific spectrum. The Staff has reviewed two sources of information to assess this conclusion. The first source was a series of floor response spectra for various slabs in this structure which showed that the 1.5 FSAR spectra enveloped the floor response spectra developed by the use of the site specific response spectra.

The second source includes the calculations for moment and shear at controlling locations which showed that the moment and shear at the chosen location are larger for the 1.5 FSAR input than the ones for the site specific spectra input. This review determined that the underpinning of the AUX-BLDG-EPA-FIVP structures is adequate to meet the design conditions for the site based on the soil condition and based on the earthquake input.

The existing structure was designed for the FSAR spectra. The Applicant is committed to re-evaluate the structure in a study called Seismic Safety Margin Review to determine that this existing structure (without underpinning) can withstand the site

specific response spectra and demonstrate acceptable safety limits capacity to assure a safe shutdown of this plant. The Applicant has not completed this study which is expected to be completed in early 1983.

The two sources of information which were previously identified gives the Staff strong evidence that this building can withstand such a design and acceptance criteria. The final Staff evaluation will be issued following the review to the Seismic Safety Margins study.

The new ring beam for the BWST has been designed for the same seismic criteria as the auxiliary building (1.5 FSAR). Also, the Applicant has provided the Staff with preliminary information that gives strong evidence that this building complies with the design and acceptance criteria acceptable to the Staff. Finally, the Applicant will be providing for Staff review a Seismic Safety Margins Study for BWST and the Staff will make an evaluation after completing its review.

The Diesel Fuel Oil Storage Tank and the DGB have been designed for the original seismic loads of the FSAR. The Staff expects a re-evaluation for the site specific response spectra. The Staff will provide an evaluation following their review of the proposed study.

Q7. Are you familiar with Warren Contention 3 which provides:

Pre-loading procedures undertaken by Consumers Power have induced stresses on the diesel generator building

structure and have reduced the ability of this structure to perform its essential functions under that stress. Those remedial actions that have been taken have produced uneven settlement and caused inordinate stress on the structure and circulating lines, fuel oil lines and electrical conduit?

A7. Yes.

Q8. What portion this contention will you be addressing?

A8. I will be addressing that portion of the contention that involves stress on the electrical conduits; the remainder of the contention was addressed by W. Paul Chen on November 17, 1982.

(See Tr. 9108-12)

Q9. Can you respond to that portion of the contention dealing with stress on the electrical conduits?

A9. Yes. The Staff's concerns on the adequacy of the electrical duct banks following the differential settlement of the DGB were addressed in the Midland Plant hearing held on February 17, 1982 in the same testimony identified in the answer to Q6. To summarize, we provided the following conclusions with regard to the electrical conduits (or duct banks):

"The Staff expressed concerns on the adequacy of the Electrical Duct Banks following the differential settlement of the Diesel Generator Building [including induced stress due to preloading], but now believes, on the basis of the following, that those concerns can be dismissed subject to adequate documentation by the Applicant." (p. 11)

"The Electrical Duct Banks, which run under the Turbine Building from the Diesel Generator Building to the Auxiliary Building, have been designed to assure that the cables within them remain functional despite the imposition of seismic and other loads. They are not, however, required to maintained a pressure boundary.

Consumers has stated that it has re-analyzed the duct banks for a limiting case. No adverse effects have been reported. The analyses to evaluate the effects of soil/building differential movement indicated that the reinforcement did not reach the yield stress. In addition, the Applicant has used a device (Rabbit) to check the availability of the individual ducts within each Electrical Penetration Duct Bank" (p. 11)

The Staff has audited the calculation at the offices of its Architect/Engineer to verify the above conclusions and has found them acceptable.

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BY MS. WRIGHT:

Q Mr. Rinaldi or Mr. Hood, are both of you familiar with Stamiris Contention 4A(2)?

A (WITNESS RINALDI) Yes.

A (WITNESS HOOD) Yes.

Q Would either of you respond to that contention, please.

A (WITNESS RINALDI) I would like the record to show that the answer to question four in the previously discussed testimony also identifies the Staff position on Stamiris Contention 4A(2). That contention reads as follows:

"Consumers Power Company performed and proposed remedial actions regarding soil settlement that are inadequate as presented because:

A. Preloading of the Deisel General Building, Sub Part 2, does not preclude an acceptable degree of further differential settlement of Deisel Generator Building.

A (WITNESS HOOD) If I might interject, the word was preclude an unacceptable degree.

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degree 1 Q Mr. Hood, do you also believe that the portion of
2 Mr. Rinaldi's testimony as identified is responsive to
3 Stamiris Contention 4A(2)?

4 A (WITNESS HOOD) Yes, I do. It is -- part of that
5 response is in response to that contention, and that
6 part begins with the last paragraph on page four of Mr.
7 Rinaldi's testimony and continues to, but not including, Q-5,
8 which appears on page five.

9 MS. WRIGHT: That completes that testimony on
10 Stamiris Contentions 4A(2), (3) and (5), Stamiris Contentions
11 4C(a), (c), (d), (e) and (f), and Warren Contentions 1 and 3.

12 (Discussion had off the record.)

13 CHAIRMAN BECHHOEFER: Are the witnesses available
14 for cross examination?

15 MS. WRIGHT: Yes.

16 MS. STAMIRIS: May we go off the record?

17 CHAIRMAN BECHHOEFER: Yes.

18 Why don't we go out for 15 minutes?

19 MS. STAMIRIS: Thank you.

20 (Recess taken.)

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1 CHAIRMAN BECHHOEFER: Back on the record. Mrs.
2 Stamiris?

3 MS. WRIGHT: Could I make one more statement for
4 the record? Could the record show that the Staff has given
5 the reporter seven copies of Mr. Rinaldi's direct testimony.

6 That's all.

7 CROSS EXAMINATION

8 BY MS. STAMIRIS:

9 Q Mr. Kane, I'll ask you some questions first about
10 your testimony on my Contention 4. And on Contention -- I
11 think it was when you were discussing Contention 4C, that
12 portion regarding the electrical penetration areas.

13 And I believe you said that differential settlements --
14 no, I want to move back to the section that you -- the
15 statement that you made regarding the jacking at the feedwater
16 isolation valve pit. And you indicated that it will cause
17 most of the settlement to take place under those jacking
18 circumstances, is that correct?

19 A. (WITNESS KANE) That is correct.

20 Q And that you expected there would be little
21 settlement after this operation was done. Would I be correct
22 in understanding that there are specific limitations and
23 criterias set for observing the settlement during the jacking
24 procedures?

25 A. (WITNESS KANE) Yes.

1 Q Regarding the electrical penetration areas -- well,
2 those criteria for the jacking procedures and settlement
3 under the feedwater isolation valve pit, are the criteria
4 that are set for the Auxiliary Building underpinning operation
5 as a whole that we've discussed before in this testimony
6 or in this procedure, are they not?

7 A (WITNESS KANE) That is correct.

8 Q Regarding the electrical penetration areas, when
9 you said that the differential settlement was anticipated
10 to be small in that area after the underpinning, I'd like to
11 clarify if the differential settlements are anticipated to
12 be small during the underpinning operation?

13 A (WITNESS KANE) The amounts of settlement which
14 is anticipated during jacking is larger than the settlement
15 which is anticipated after the final load transfer is made
16 to the permanent underpinning wall.

17 That settlement, I think, has been estimated around
18 -- I'm talking about the settlement that is anticipated
19 during jacking, I think it's estimated to be around
20 four-tenths to five-tenths of an inch.

21 But that settlement is not enough concern because
22 it has not been connected to the structure and what you
23 are doing is you are forcing the pier down by jacking.

24 Q Then the jacking operation refers to both the EPAs
25 and the feedwater isolation valve pit area?

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1 A. (WITNESS KANE) Both structures are to be jacked.
2 The settlement is anticipated to be the differential soil
3 settlement during plant operation and for both structures
4 it is anticipated to be small because of the jacking.

5 Q. Regarding the settlement at the borated water
6 storage tanks, you again indicated that the -- there would
7 be small settlements expected following the surcharge and
8 ring beam remedial fix that were taking place. I'd like
9 to ask you about the differential settlements that might
10 occur during those operations.

11 Are they also being closely monitored and guided
12 by the objective criteria?

13 A. (WITNESS KANE) It's my understanding that the
14 surcharging at the borated water storage tank is now
15 completed. Following that surcharging they're now going
16 to construct the new wall which will be integral with the
17 old wall.

18 Based on that design, a settlement has been
19 estimated and allowed for this design to check the integrity
20 of the new wall. The amount of settlement that has been
21 estimated, the Staff has found acceptable, and feels the
22 redesign of the new wall will assure that it will be acceptable.

11-2

1 Q Mr. Kane, are you familiar with an incident at the
2 borated water storage tank in approximately April of 1982 in
3 which Mr. Landsman, and I'm not sure if you were involved at all,
4 observed some jacking going on which undermined the corner
5 of the BWST.

6 JUDGE HARBOUR: That was not jacking, excuse me,
7 that was a jackhammer.

8 MS. STAMIRIS: Yes. I don't mean jacking, I
9 mean some operations that were going on with a jackhammer.

10 WITNESS KANE: I was not familiar with the incident
11 when it occurred. Actually it was my attendance here at the
12 last several days that has given me most of the information
13 on that incident.

14 BY MS. STAMIRIS:

15 Q Are you the man primarily responsible in the NRC
16 for the overall acceptability of the remedial fix at the BWST
17 regarding settlement or differential settlement?

18 A (WITNESS KANF) It is my responsibility to have
19 assurance that the settlements that have been estimated are
20 reasonable and acceptable for use in design analysis, yes.

21 Q Mr. Kane, did you make any assessment as to whether
22 or not the incident that took place in April of 1982, as
23 related to you, concerning the BWST, had any impact on
24 producing any further differential settlement at that
25 structure?

1 A. (WITNESS KANE) I have not made any further
2 assessment.

3 A. (WITNESS HOOD) May I comment on your previous
4 question?

5 Q Yes.

6 A. (WITNESS HOOD) The implementation of the design
7 is primarily the responsibility -- the implementation of
8 the remedial action was primarily the responsibility of
9 the region not Mr. Kane. They do draw from Mr. Kane's
10 expertise as needed.

11 A. (WITNESS KANE) I understood the question to
12 address settlement.

13 Q Yes.

14 A. (WITNESS KANE) Which would be our area.

15 A. (WITNESS HOOD) I was referring to the particular
16 incident which was the removal of the soils beneath the
17 structure.

18 Q Well, if in the implementation of any of the
19 remedial action a problem occurred which could affect the
20 assessment of differential settlement and its resultant
21 impact on the structure, would that be -- properly be reviewed
22 by you, Mr. Kane?

23 A. (WITNESS KANE) It would be my understanding the
24 way it would develop, once we are satisfied with the design
25 and we have completed our safety evaluation report, the

1 responsibility for overseeing that construction is carried
2 out inconformance with the commitments and all that have been
3 made, it then becomes the responsibility of the region.

4 I would become involved only if that issue were
5 brought before us by the region.

6 A. (WITNESS HOOD) I think the key point is that the
7 decision as to the need for that expertise is made, rests
8 with the region.

9 Q The decision whether that expertise is needed, is
10 that what you said?

11 A. (WITNESS HOOD) Whether they can handle the matter
12 themselves within their own expertise or whether or not they
13 need to seek our additional expertise is a decision that
14 rests with the region.

15 Q So would I be correct then in understanding, Mr.
16 Kane, that you would be concerned with evaluating the --
17 let's say, the as-built condition as opposed to the design
18 condition only if and when you are called in by the region?

19 A. (WITNESS HOOD) That is not quite the same question
20 as I understood the first one. Part of our work within NRR
21 is to review the FSAR and it's my understanding that the FSAR
22 would reflect the as-built conditions.

23 The as-built -- that is the difference in my opinion
24 between the PSAR and the FSAR in that the FSAR is documenting
25 what is being completed in the field, and NRR has a responsibility

1 to evaluate the significance of the as-built conditions.

2 But in response to the previous questions, if a
3 problem develops in the field, NRR is not immediately
4 involved unless it is requested by the region. So a problem
5 could be developed and the region could handle it and I would
6 not see that until SAR documentation.

7 Q I don't want to spend a great deal more time on
8 this. I'll try and ask one last question in this regard.

9 Mr. Kane, do you foresee, in this separation of
10 duties that you have described, that there could be a case --
11 well, I won't ask it in the hypothetical, but do you believe
12 that in the case of the incident at the BWST that the people
13 of the Region III Staff who are in charge of reviewing
14 the implementation of the remedial fixes, are in a -- do you
15 believe that they can evaluate the potential problems from
16 such an incident as well as you could?

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1 A (WITNESS KANE) I would say the regions have
2 the capability of making the determination whether they
3 can or whether they should be seeking help.

4 A (WITNESS HOOD) Miss Stamiris, may I add to
5 that?

6 My understanding is that Dr. Ross Landsman has
7 a Ph.D. in geotechnical engineering.

8 Q Regarding some of your statements, Mr. Kane,
9 about the diesel fuel oil tanks when you were -- you were
10 going through a list of figures, and I may not have them
11 all correct, but these are just from my notes; the record
12 will reflect what you actually said -- but you said some-
13 thing about a maximum settlement of one-fourth inch
14 occurred during the 1979 surcharge, then there was a half
15 an inch additional settlement.

16 Well, that's what I wanted to ask you. Was the
17 addition half an inch of settlement which you attributed
18 to the temporary dewatering system in late 1980, was that
19 half an inch in addition to the fourth inch or did it
20 constitute a total measurement at that point?

21 A (WITNESS KANE) The half inch was the total
22 maximum settlement recorded for any of the tanks at that
23 time, and it actually rebounded, and I think that after
24 rebound the maximum settlement was four-tenths of an inch.

25 Q Okay, so when you speak of maximum settlement,

1 do you mean to imply the total settlement that has taken
2 place at a structure from -- well, in this case, when you
3 told us about maximum settlement expected, did you mean
4 the total settlement from, let's say, 1978 into the future?

5 A (WITNESS KANE) The settlement history for the
6 diesel fuel oil storage tanks was that there with a quarter
7 of an inch settlement when the tanks were filled. There
8 was an additional quarter inch settlement under the tem-
9 porary dewatering, and then there was a rebound to four-
10 tenths of an inch, and then it is estimated during the
11 years of plant operation that we could have an additional
12 half inch settlement on top of that.

13 Q Regarding the testimony that you made about the
14 Diesel Generator Building, I believe you indicated that
15 the determination was made that the straight line best fit
16 curve method applied by the Applicant was determined by
17 the NRC Staff to be inappropriate and so further measures
18 were taken.

19 When you indicated that structural engineering
20 has accepted the adequacy of this analysis at the Diesel
21 Generator Building on the basis of their crack analysis
22 and the future monitoring procedures, did your personal
23 opinion as a geotechnical engineer differ any with that
24 opinion by the structural engineering department of the
25 NRC?

12-1,pj3

1 MR. STEPTOE: Objection, Chief Judge Bechhoefer.
2 Mr. Kane's personal opinion was put on the record in the
3 hearings in December, and we explored this at extreme
4 length.

5 Mrs. Stamiris chose not to attend that particular
6 day, but it really --

7 MS. STAMIRIS: In November?

8 MR. ST'PTOE: Mr. Kane has already stated for
9 the record his personal opinion and how it differs from
10 the structural engineers'.

11 (Discussion had off the
12 record.)

13 CHAIRMAN BECHHOEFER: Well, the Board will over-
14 rule the objection. The Board was going to ask some
15 similar questions if Mrs. Stamiris didn't, particularly
16 as to whether Mr. Kane still felt the way he did.

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MS. STAMIRIS: That's what I wanted to decide, too, is if his opinion had changed any.

CHAIRMAN BECHHOEFER: We will allow the question.

BY THE WITNESS:

A (WITNESS KANE) I'm being asked for my personal opinion with respect to the settlements that were used to analyze the Diesel Generator Building.

My personal opinion is that the best information available to us is the actual measured settlements.

They were not used by the Applicant, and what was used was what I have been referring to as a straight line best fit. In my personal estimation, I do not feel it was appropriate to do that.

BY MS. STAMIRIS:

Q And do I understand that you feel that way today?

A (WITNESS KANE) Yes, I do.

Q Mr. Kane, was there -- I'm remembering a commitment from the Applicant and when Dr. Peck was on the stand to provide certain further information about the possible dewatering effects on the -- I believe it had to do with the settlement predictions at the Diesel Generator Building.

Does that exchange of information relate directly to this testimony about the actual measured settlements and your feeling that you just expressed about using

1 actual measured settlements?

2 A (WITNESS KANE) It is not a direct relationship.
3 What had been indicated in Dr. Peck's testifying was that
4 the amount of settlement was larger for a given period,
5 and the Applicant was going to look at that information.

6 To my knowledge, NRC has not been furnished a
7 report that addresses that aspect of it.

8 MR. STEPTOE: Mrs. Stamiris, that's correct.
9 We have not yet submitted it. We hope to submit it in
10 the near future for the Staff's review and the other
11 parties' review.

12 BY THE WITNESS:

13 A (WITNESS KANE) (Continuing) The only way it
14 could relate is that the Staff was in agreement with the
15 settlement values that were estimated for the different
16 time frames. There were definite settlement values for
17 different time frames which we ultimately had agreed upon.
18 They are the values that were not used in the analysis.

19 BY MS. STAMIRIS:

20 Q Okay. Mr. Kane, are you aware whether anyone
21 else in the NRC Staff shared your opinions about the use
22 of the actual measured settlements as being, in your
23 opinion, a better method of evaluating this settlement?

24 MR. STEPTOE: Objection, again, Chief Judge
25 Bechhoefer. I think we're going over ground that we dealt

1 with on December 10th in exhaustive detail, and the full
2 range of opinions within the Staff was indicated in that
3 hearing session.

4 (Discussion had off the
5 record.)

6 CHAIRMAN BECHHOEFER: I think we will sustain that
7 one.

8 JUDGE HARBOUR: I would add the transcript
9 reference there of 10521, for those who are interested
10 in looking up that section of the testimony.

11 MS. STAMIRIS: Thank you.

12 WITNESS KANE: May I answer that?

13 MR. STEPTOE: No. I would prefer --

14 CHAIRMAN BECHHOEFER: We sustained the objection.
15 I might say that if you need to make a later
16 statement, if you think the record is incomplete in any
17 way, you may do so. But we thought the ground for the
18 objection was a valid one.

19 WITNESS KANE: Can I ask whether the page that
20 was just referred to contains a question and answer
21 similar to the one that was just asked?

22 JUDGE HARBOUR: The page reference that was given
23 was the beginning of the testimony in reference to the
24 arguments about the straight line plot.

25 (Discussion off the record.)

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WITNESS KANE: The question that I understood was asked, I do not remember being asked that in the past.

MS. SINCLAIR: I think the witness should be allowed to answer.

MS. STAMIRIS: I thought that that was the grounds for the objection and your ruling, and I was going to ask whether that particular question had been asked of Mr. Kane on the record.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: If you either don't think it was asked or don't remember whether it was asked, then we will change our ruling and let you answer, even though I will agree that it could have been asked earlier.

WITNESS KANE: Perhaps what Judge Harbour is recollecting is the question was asked whether I had made my opinion known to members of the NRC Staff, and that question was asked and answered. But I don't consider that to be the same question as Mrs. Stamiris is asking me.

MS. STAMIRIS: Neither do I.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: All right, you may answer that question then.

BY THE WITNESS:

A. (WITNESS KANE) The question, as I understand it, is am I the only member of the Staff who has the opinion that

1 the straight line best fit use of the settlement data is
2 inappropriate, and I would answer it that the only other
3 person on the Staff -- and I'm now excluding the corps of
4 engineers, who has the same opinion as I do -- the only
5 other member of the Staff who has looked at it close enough
6 is my supervisor, Dr. Heller, and it is my opinion he is of
7 the same opinion as I am.

8 A. (WITNESS HOOD) I might add that I have the same
9 understanding.

10 BY MS. STAMIRIS:

11 Q Mr. Kane, to explore the important aspects of this
12 issue, I'd like to ask you, are you aware of other people
13 within your geotechnical branch -- and am I correct in
14 understanding that you and Mr. Heller are in the geotechnical
15 branch and Mr. Rinaldi and others are in the structural
16 engineering branch?

17 A. (WITNESS KANE) That is correct.

18 Q Are you aware of others within the geotechnical
19 branch who disagree with you and Dr. Heller who have looked
20 into it closely, as you have?

21 A. (WITNESS KANE) To my knowledge, no one else in
22 the geotechnical engineering section has been asked to look
23 at it, so they are not knowledgeable enough to give a statement.

24 Q Mr. Kane, are you aware of why the consensus of
25 the geotechnical staff who had studied the issues did not

1 turn out to be the final Staff position?

2 MR. STEPTOE: Objection, Chief Judge Bechhoefer.
3 This really was gone into in great detail on December 10th,
4 and as I recall the final Staff position, it was that the
5 Staff supported Mr. Kane's position with respect to the
6 geotechnical portion or interpretation of that data, and,
7 therefore, they did not rely fully on Applicant's analyses
8 and they took no position with respect to the adequacy of the
9 structural analysis presented by Mr. Weidner.

10 And these questions are really in the nature of
11 discovery, which, if Mrs. Stamiris would read the transcript,
12 she'd see it spread out in great detail what everybody with-
13 in the Staff and all their consultants believe on this
14 particular point.

15 It really is redundant for us to be going into
16 this, regardless of whether a specific question was asked
17 on December 10th or not, because the record is more than
18 complete, and Mrs. Stamiris just chose not to be there that
19 day, and I don't believe that it's appropriate for us to
20 rehashing this stuff.

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CHAIRMAN BECHHOEFER: Well, I don't know her reasons for not being there, whether she chose or she was forced by other circumstances. I don't want any characterization.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: I think the objection to the last question is well taken because I do believe that was explored, if I remember correctly.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: I think Mr. Steptoe correctly characterized the Staff position at that time.

MS. STAMIRIS: Before I ask -- I have some questions I'd like to ask Mr. Rinaldi about his testimony now. I would like to interject a question on Mr. Marshall's behalf which I promised him I would ask, and I'm afraid I might forget if I don't do it now.

BY MS. STAMIRIS:

Q Mr. Marshall did not indicate to me who I should ask this question of, so I'll ask any of you.

I am not positive where he found this word in your testimony or if it was given orally, but if any of you have a recollection of it, perhaps you can help me.

He would like to know what the word reasonable means as you used it.

(Laughter.)

JUDGE COWAN: That's a weasel word.

1 MR. STEPTOE: That's a lawyer's word, sir.

2 JUDGE COWAN: That's anybody's weasel word.

3 MS. WRIGHT: I don't know where that word was used,
4 and unless he can point out the context in which the word
5 reasonable was used it's too broad.

6 BY MS. STAMIRIS:

7 Q May I ask if any of the gentlemen on the stand
8 remember using the word reasonable in their testimony?

9 Mr. Kane?

10 A (WITNESS KANE) Yes, I do.

11 I had a similar discussion with Mr. Marshall about
12 reasonable in the past in the hearing.

13 Q Then do you consider that your views on the word
14 reasonable are already in the record?

15 A (WITNESS KANE) With respect to this particular
16 use of it, no.

17 Reasonable -- I think what I had indicated was that
18 the settlements that had been observed and estimated in the
19 future are reasonable, and they're reasonable to the Staff
20 because of knowing the foundation conditions, and that is,
21 knowing the compressibility characteristics of the fill for
22 those structures, what has been estimated in the future based
23 on the method used gives a value that is reasonable to the
24 Staff.

25 Q Thank you, Mr. Kane.

1 Mr. Rinaldi, I wanted to ask you some questions
2 about your prepared testimony regarding Contention 4C, and
3 on page two of your testimony, and it goes on to page three
4 because it's at the very bottom, is this statement that the
5 dewatering plant is implemented for the purpose of constructing
6 the underpinning walls, which will keep the ground water
7 elevation two feet below the deepest excavation.

8 When you made that statement -- well, Mr. Rinaldi,
9 would you agree that the permanent dewatering plan is
10 implemented for more than just the purpose of constructing
11 the underpinning walls?

12 A. (WITNESS RINALDI) As far as I was concerned from
13 the structural point of view it is for that purpose.

14 You need to dewater the site in order to perform
15 this underpinning operation, and the Applicant committed
16 to dewater two feet below the deepest excavation, and that
17 was acceptable to us from the structural point of view.

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view.

1 Q Are you aware of the need to dewater the plant
2 for the four years of -- or whatever its expected operation
3 is?

4 A (WITNESS RINALDI) The purpose of this question
5 was to address the impact of dewatering on the structure,
6 and that was the sole purpose of this testimony, what
7 impact is dewatering on the structure.

8 Q Do you think that this sentence:

9 "The dewatering plan is implemented for
10 the purpose of constructing the underpinning
11 walls, which will keep the ground water ele-
12 vation two feet below the deepest excavation,"
13 would be more precisely correct if you said the construc-
14 tion dewatering plan is implemented for the purpose of
15 constructing the underpinning walls, which will keep
16 the ground water elevation two feet below the deepest
17 excavation?

18 A (WITNESS RINALDI) Fine.

19 Q Or did you mean to address construction dewater-
20 ing plan as opposed to the permanent dewatering plan?

21 A (WITNESS RINALDI) What I had meant to do is
22 to address the worst condition that the structure will
23 see.

24 If you have a wall and you have certain loads
25 due to the ground water, you have to be able to design

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1 that wall to those ground water loads.

2 Now, whether these loads occur during the con-
3 struction or is due to the normal operation of the plant,
4 I don't think -- the structure does not really tell the
5 difference, as long as it has been designed to withstand
6 that load. It was not significant.

7 Q Mr. Kane or Mr. Hood, do either of you have any
8 information that you think would be helpful to shed light
9 on the distinction I was just making in my previous
10 question?

11 A (WITNESS KANE) Yes. The dewatering plan for
12 underpinning is a temporary construction. There's a per-
13 manent one which is being put in place to eliminate the
14 problem of liquifaction. It would not water the lower
15 table as low as the temporary construction dewatering
16 is lowering into.

17 Q On page four of this testimony, in the middle
18 paragraph on that page there is a discussion of the
19 differential soils settlement in evaluating the Aux. Build-
20 ing ~~EPA~~FIVP and a statement that, ~~comes~~ about three-fourths
21 of the way through that paragraph, reads:

22 "The effects of differential settlement
23 have been considered as a load similar to the
24 dead load of the structures and have been
25 assigned a load factor of 1.4."

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The next sentence reads;

"This agrees with the requirements identified in the SRP, Section 3.8.4 and is, therefore, acceptable to the Staff."

What I would like to ask you -- perhaps Mr. Hood, and I would ask any of you to answer who would be in a better position, but perhaps Mr. Hood would be in the best position to answer concerning the standard review plan and the requirements.

Do you understand that -- or, Mr. Hood, do you believe that the effects of differential settlement which we are considering at the Midland plant site are unusual or beyond what the standard review for differential settlement was written to consider?

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1 A (WITNESS HOOD) I would answer that in the
2 affirmative, yes, I do believe that -- I do not consider
3 that the conditions at Midland are at all typical of
4 nuclear power plants.

5 Q Mr. Hood, --

6 MS. WRIGHT: Excuse me, could I have just a
7 minute?

8 (Discussion had off the
9 record.)

10 MS. WRIGHT: Mrs. Stamiris, could I impose upon
11 you to read the question again to Mr. Hood and I would
12 like for him to note that it's a two-part question.
13 There are two answers required.

14 MS. STAMIRIS: I would have to ask the court
15 reporter to read it back.

16 (Question read by reporter.)

17 WITNESS HOOD: All right. If there are two parts
18 to the question, the way I understand the question to be,
19 are the settlements that we're seeing at Midland typical
20 and normal, and the other part of the question that I
21 understand you were asking is are the -- is the standard
22 review plan applicable for that condition. Is that your
23 statement?

24 BY MS. STAMIRIS:

25 Q Yes.

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1 A (WITNESS HOOD) And I believe I answered only
 2 the first part that said, no, I don't believe that the
 3 that the kinds of conditions we're seeing in Midland are
 4 typical of nuclear power plants, and the kinds of remedial
 5 actions that we're seeing at Midland are somewhat unique
 6 for nuclear power plants.

7 I really think the second part of your question
 8 is more aptly directed to Mr. Rinaldi because at best I
 9 can only give you an indirect answer which would stem
 10 from the fact that I'm not aware that we -- in the course
 11 of our review we've experienced any problems within that
 12 regard and I would tend to answer in the affirmative,
 13 but I think I really should direct that question to Mr.
 14 Rinaldi.

15 Q Mr. Rinaldi, would you like me to repeat that
 16 prior question?

17 A (WITNESS RINALDI) No, I can answer the question.
 18 The second part of your question I would answer is that
 19 the standard review plan, otherwise listed here in the
 20 testimony as SRP, Section 384, identifies what loads
 21 need to be considered in the evaluation and design of
 22 Category I structures, other than the containment. And
 23 one of the loads that can be considered, if applicable,
 24 is the differential settlement load.

25 In the course of review at NRC I haven't seen

1 this load being used in a load combination to evaluate a
2 structure before.

3 However, in the case of Midland, it became
4 apparent that we need to consider the differential settle-
5 ment load.

6 Now, the question of what load factor was to be
7 applied to this load was a matter of discussion. And
8 originally the Applicant wanted to use a load factor of
9 1.0.

10 However, the Staff determined that settlement
11 load is equivalent to a dead load and should be used with
12 a load factor of 1.4. This would be more conservative
13 than what the Applicant had originally proposed and
14 this has been done and the results of the calculations
15 have been ordered by the Staff.

16 Q In the next paragraph, on this same page four of
17 your testimony, I guess I should read the whole sentence.

18 The first sentence, "Following the surcharging
19 of the DGB structure, the evaluation of the DGB for the
20 effects of differential soil settlements was complicated
21 by the effects of the impinged concrete electrical ducts."

22 Will you describe in more detail for me, Mr.
23 Rinaldi, how the concrete electrical ducts impinged the
24 Diesel Generator Building structure?

25 A (WITNESS RINALDI) Well, this has been documented

1 by the Applicant and basically there are four electrical
2 duct banks which come into the building and the four base.
3 And they were attached to the building and these duct banks
4 caused a load on the building which the building wasn't
5 designed for.

6 And the results of this load were cracks observed
7 along the walls, especially in the tier walls of the
8 building. As I understand, the duct banks have been
9 separated and there is -- and this load has been eliminated,
10 which was imposed on the building by the duct banks.

11 Q Is it your understanding that the preloading
12 of the Diesel Generator Building produced any further
13 stresses on the electrical duct banks than the stresses
14 that were there or I don't mean to say only the elec-
15 trical duct banks, I mean to ask, do you believe that the
16 preloading imposed any stresses on the electrical duct
17 banks or the structure itself that -- beyond those that
18 were there previous to the preload?

19 MR. STEPTOE: Judge Bechhoefer, I object with
20 respect to the building. I know that question's been asked
21 and answered. With respect to the duct banks, I believe
22 that there is testimony that says the duct banks were cut
23 free before the preload.

24 In addition, Mr. Shunmugavel who just finished
25 giving testimony on duct banks, included an attachment

1 which was about these Diesel Generator Building duct banks
2 and the basis for believing they were -- that they were
3 not unduly damaged.

4 That testimony was given this morning. AnIn
5 that period of time I know that Mrs. Stamiris chose not
6 to be here.

7 CHAIRMAN BECHHOEFER: Off the record. ~~the record.~~

8 (Discussion had off the
9 record.)

10 CHAIRMAN BECHHOEFER: I think we will sustain
11 that. I think it was discussed at the previous hearing.

12 MS. STAMIRIS: Well, I'm not trying to re-ask the
13 question, but I want -- maybe it's just a question of
14 wording, but the way this sentence reads, it says,
15 "Following the surcharging of the DGB structure, the
16 evaluation of the effects of the soil settlements was
17 complicated by the effects of the impinged concrete
18 electrical ducts."

19 And from all of the testimony that I had under-
20 stood was in the record up to this time, I thought all
21 the complications from the duct banks occurred prior to
22 the surcharging, but this testimony implies that there
23 were complications following the surcharging and perhaps
24 I'm wrong.

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wrong

1 CHAIRMAN BECHHOEFER: You can ask about that.

2 MS. STAMIRIS: That is what I want to ask Mr.

3 Rinaldi about.

4 WITNESS RINALDI: I agree with you, the duct banks
5 were separated before the surcharge. But, like I stated
6 before, there were cracks which imparted in the structure
7 due to the impingement of the duct banks. And this did --
8 was a factor in the evaluation because cracks resulted from
9 the impingement of the duct banks which still were on the
10 structure during the surcharge and afterward.

11 BY MS. STAMIRIS:

12 Q But there was no recontact between the duct banks
13 and the building during the surcharging?

14 A (WITNESS RINALDI) No.

15 Q Mr. Rinaldi, on page five of your testimony,
16 regarding the Staff, particularly, I think, as it's been
17 explained in this hearing before, the structural engineering
18 branch accepted the analysis of the settlement at the Deisel
19 Generator Building.

20 I'd like to read you a sentence about three-fourths
21 of the way down the paragraph on page five and ask you about
22 that. In fact, it's the concluding sentence which reads,
23 "In conclusion, the Staff has found that the stress levels
24 for all load combinations meet the requirement identified in
25 the SRP, Section 3.8.4."

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1 When you made that statement, when you said that
2 the Staff has found the stress levels acceptable, did you
3 base that acceptance on the crack study alone at this point
4 in time?

5 A. (WITNESS RINALDI) No, this crack study was
6 superimposed to any loads which were determined to be on the
7 building due to other loads.

8 For example, seismic or tornado loads, dead load,
9 live load.

10 Q I didn't mean that. I understand how you could
11 interpret it that way.

12 What I mean to ask is did you, because of the
13 doubts expressed within the geotechnical branch as to the
14 accuracy of the settlement measurements, did you put your
15 weight instead on the basis for accepting the overall stress
16 levels, did you base your acceptance instead on the crack
17 study?

18 A. (WITNESS RINALDI) If I could help the question
19 along, I would say that in determining the stresses, the
20 effect of the stresses of the differential settlement on the
21 structure, we did use the crack evaluation for the structure
22 which I then defined the state of stress in the structure and
23 this was superimposed with all the other loads that were
24 determined before and we feel that in using the crack
25 evaluation, we already have a dead load and live load and then

1 we were again superimposing with the dead load and live
2 load computed in the analysis.

3 Therefore, we were considering the dead load and
4 live load twice, in effect.

5 Q I'd like to ask Mr. Kane whether -- Mr. Kane, is
6 it your understanding that the overall acceptance of the --
7 by the NRC Staff for the stress levels at the Deisel Generator
8 Building was based on the crack study instead of the settlement
9 readings that we have discussed before?

10 A. (WITNESS KANE) The crack study and the effect of
11 settlement inducing stresses is one consideration. Mr.
12 Rinaldi has been referring to other combinations like
13 earthquake, wind, other load combinations. They are estimated
14 separately of the crack and the effects of settlement.

15 So a certain amount of stress is estimated for
16 those other load combinations.

17 Now, when it comes time to address settlement,
18 the NRC, the structural engineering branch, has estimated
19 stresses induced based on the widths of crack, have come
20 up with a stress and have added that on to the other stresses
21 computed for the other load combinations, and that is the
22 basis for their accepting it.

23 Q So then the Staff acceptance is based on all of
24 these combined crack and load combinations, which you and Mr.
25 Rinaldi have just described, instead of the measurements of

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settlement which we have talked about before?

A. (WITNESS KANE) The crack analysis is intended to cover the fact that the settlements are not being used.

Q Now, what I'm trying to go at, and I'm not quite certain whether the settlements and those measurements that we've talked about before are included in any of these other load combinations or things that Mr. Rinaldi talked about that were combined with the crack analysis to evaluate the overall stress, or did this new approach of taking the cracks plus all the other necessary load combinations replace the other type of assessment with the settlement measurements?

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MR. STEPTOE: Objection, this was gone into on December 10th; extensive detail.

MS. STAMIRIS: I'm simply trying to determine if one replaced the other or if one was used in addition to the other or, you know, to get some idea of what weight was put on which analysis.

MR. STEPTOE: I think the witness just answered that.

(Discussion had off the record.)

CHAIRMAN RINALDI: I think the answer was given both in December and also here today, so we'll sustain that.

BY MS. STAMIRIS:

Q On page seven of your testimony, near the top, you are talking about the seismic -- you are talking about the seismic considerations.

And you said they -- this is the second or the first full sentence on top of page seven, "They use the multiplying factor of 1.5, i.e., the response spectra is multiplied by 1.5."

Would any of you three -- I'm wondering if -- I thought the response -- I thought the FSAR, the original SSE was multiplied by 1.5 as opposed to the response spectra being multiplied by 1.5.

Can you tell me which is correct, anyone on the panel?

A. (WITNESS RINALDI) Well, the 1.5, you're

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correct, times the FSAR spectra. The SSE is a spectra. There is a spectra for SSE which is 140BE is done for both of them.

Q So that when you said the response spectra, you mean that would be -- that means the FSAR, the original?

A. (WITNESS RINALDI) Yes.

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Yes

1 Q Okay. Thank you. In the next paragraph on this
2 page, when you said that the Staff has reviewed two sources
3 of information to assess this conclusion, being a conclusion
4 about the FSAR seismic input, you said the first source
5 was a series of floor response spectra for various slabs
6 in the structure.

7 When you said this structure, did you mean the
8 Auxiliary Building?

9 A (WITNESS RINALDI) Yes.

10 Q And were any other -- you were referring in your
11 testimony, then, just to the review that has been undertaken
12 at the Auxiliary Building?

13 A (WITNESS RINALDI) Yes. Question six addresses
14 the seismic effect and I take up one structure at a time.
15 First the Auxiliary Building, then the other structure.

16 Q Okay. Thanks. At the bottom of this page when
17 you say the seismic safety margin review, well, it talks
18 about the Applicant being committed to reevaluate the
19 structure with the seismic safety margin review to determine
20 that this existing structure, without underpinning, can
21 withstand the site specific response spectra and demonstrate
22 acceptable safety limits capacity to assure its safe shutdown
23 of the plant.

24 Has that seismic safety margin review at the
25 Auxiliary Building -- well, you say in the next sentence

1 that it will be completed in early '83.

2 Do you have any -- do you know any more precisely
3 at this point when that will be?

4 A. (WITNESS RINALDI) The way I understand, all this
5 seismic margin work will be submitted to the Staff prior to
6 April 1st, '83.

7 Q. And when you say all, do you mean the overall
8 seismic margin review for all the structures?

9 A. (WITNESS RINALDI) Yes.

10 Q. On the last pages of your testimony, my question
11 is on page ten, but it relates to your answer nine on page
12 nine, and in your closing sentence where you say the Staff
13 has audited the calculations at the offices of its architect
14 engineer to verify the above conclusions and has found them
15 acceptable, does the NRC Staff make any effort to review in
16 any way the adequacy of the original input data or the
17 accuracy of the original data that you received?

received 1

2 A. (WITNESS RINALDI) I'm sorry, I do -- I don't
understand your question.

3 Q Okay. Besides reviewing the calculations that are
4 done on certain data, does the NRC Staff do any kind of
5 sampling effort or make any effort to assure themselves
6 that the data they receive is accurate?

7 A. (WITNESS RINALDI) Well, let me tell you what was
8 done, maybe that would clarify the issue.

9 We visited the Bechtel office and one of my
10 consultants spent just about a full day to go over all the
11 input that was used; meaning, the seismic load and other
12 loads for these electrical duct banks.

13 And I'm sure the first think you would investigate
14 would be the loads that would be used in the analysis. Then
15 you would investigate the model that was used. And then
16 he would look at the results and see if they were acceptable
17 to code allowables.

18 So this would be the normal procedure that we have.

19 Q Thank you. That does explain it.

20 MS. STAMIRIS: I don't have any other questions on
21 this. Well, I better look at my notes.

22 I don't have any further question on this testimony.

23 CHAIRMAN BECHHOEFER: Mrs. Sinclair?

24 MS. SINCLAIR: Yes.

25

CROSS EXAMINATION

1 BY MS. SINCLAIR:

2 Q Mr. Kane, you said that in your mind the difference
3 between the PSAR and FSAR was that the FSAR was a document
4 of the as-built construction of the plant as compared to the
5 preliminaries, is that correct?

6 A (WITNESS KANE) Ultimately the FSAR document, in
7 my personal opinion, would be documenting how the plant was
8 built.

9 Q So do I understand --

10 A (WITNESS KANE) I should qualify that to say that
11 is what I expect to see in geotechnical engineering.

12 Q I see. Do I understand, then, that the final
13 safety analysis report is an ongoing document since we are
14 quite a distance from completion of construction?

15 A (WITNESS KANE) I think Mr. Hood should answer that.

16 A (WITNESS HOOD) Yes, the FSAR is somewhat of a
17 living document and that the plant is not yet completed and
18 there is therefore logically an effort -- still some updating
19 in progress to reflect the following condition of the plant.
20 It's a mixture of anticipation in some cases and actual
21 completed construction.

22 Q Yes, the reason I asked that is that Mr. Keppler
23 has made considerable point of the fact that quite a bit
24 in the Deisel Generator Building was found not to measure up
25 to the design and that the as-built condition is different

1 from the design.

2 And I just wondered if the design that they were
3 looking at was in the FSAR.

4 A. (WITNESS HOOD) Yes and no. The FSAR -- I'm not --
5 my comment is not to a specific aspect of design. Generally
6 speaking, there are facets of the design for which the
7 construction is complete and for which the FSAR does reflect
8 the completed design.

9 There are facets of the design for which the
10 construction is under way or has not yet started and which --
11 and, therefore, if the design is reflected in the FSAR, it is
12 not yet -- it is not yet the final design, necessarily, in
13 the sense that it may not -- it can't possibly be the
14 final design if the construction is not completed, if you
15 follow my meaning.

16 The underpinning is an example. What the FSAR
17 does describe is what is anticipated as a final design when
18 that underpinning effort is complete. It is what we plan
19 on having.

20 Q. And then you compare it with --

21 A. (WITNESS HOOD) But to carry the analogy farther,
22 if it became necessary during the course of that implementation
23 of that design to make an alteration, then that is something
24 that would be reflected in the future.

25 Q. Thank you.

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A. (WITNESS HOOD) In the future or at the point it occurs.

Q I see. But the FSAR has to be the as-built condition of the plant, is that correct?

A. (WITNESS HOOD) Ultimately the FSAR will reflect the condition of the plant as constructed.

Q I see. Okay. Mr. Kane, do you know of any other building site with the type of soil we have here where permanent dewatering wells also were in place for any length of time?

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time

1 A. (WITNESS KANE) Any other nuclear power plant?

2 Q Not necessarily, just a building site. I just want
3 to know if we're going according to experience here or just
4 theoretical calculations.

5 A. (WITNESS KANE) In my experience with the corps
6 of engineers, I have read of corps of engineers projects
7 where permanent dewatering was installed for the life of
8 the project, which would be a dam and reservoir to control
9 water, but I'd have to go back and search what projects
10 that did occur.

11 Q I see. To you knowledge has the operation of
12 permanent dewatering wells affected the integrity of soil
13 over any extended period of time or the integrity of the
14 building?

15 A. (WITNESS KANE) Would you repeat the first -- was
16 the operation of the permanent dewatering system?

17 Q Yes. If it's operated over any length of time
18 has it affected the integrity of the soil when operated over
19 any length of time?

20 A. (WITNESS KANE) I recall in past testimony addressing
21 the effects of the dewatering. The dewatering does affect
22 the soils. Some of them are benefits and some are disadvantages.
23 The major disadvantage is that it causes settlement because it
24 increases the load on the soils.

25 We have addressed the effects of that dewatering in

1 allowing for that in the settlement estimates which are
 2 considered in design.

3 Another feature is prolonged pumping. If you do
 4 it from a system that is not properly designed, and I'm now
 5 talking about the well installation, the screening, and the
 6 filter in the well itself, which prevents the fines from
 7 being pumped into the well. At Midland we have looked closely
 8 at the design of the well and have satisfied ourself that the
 9 design is a good design and we should not have that problem
 10 with pumping of fines. So the dewatering system, in my
 11 estimation, has been looked at and found to be satisfactory.

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Q. When you go from the ground dewatering plan to the permanent dewatering plan you said that you would raise the water level.

Will raising this water level with the permanent dewatering plan affect the structures?

A. (WITNESS KANE) The temporary dewatering plan that's now in effect for the Auxiliary Building is doing it in a more localized area, the immediate area of the underpinning.

It's not affecting the large arial extent that the permanent water system will. There will be some effect when the temporary dewatering system is shut off and you would go to the permanent dewatering system.

But the effects would be to give a minimal amount of rebound to the structures.

Q. Has the operation permanent dewatering wells affected the water table for people in the area off the plant site, to you knowledge, from actual experience?

MR. STEPTOE: Objection, it is outside the scope of his testimony. That question, if anything, would relate to another subsection of Contention 4 which has already been addressed by other witnesses, including, I believe, Gonzales and Mr. Paris, and this testimony explicitly addresses Contention 4A which deals with preloading of the Deisel Generator Building and subsections of Contention 4C which deal with various structures and piping and conduit at the

1 site. It does not extend to the effects of dewatering off
2 the site.

3 In addition, we do have an operating license
4 contention on that, on that point.

5 MS. SINCLAIR: Yes, I forgot about that. That is
6 all my questions.

7 CHAIRMAN BECHHOEFER: Did you say that was all your
8 questions?

9 MS. SINCLAIR: Yes.

10 CHAIRMAN BECHHOEFER: Mr. Steptoe or --

11 MR. STEPTOE: Applicant has no questions.

12 BOARD EXAMINATION

13 BY JUDGE HARBOUR:

14 Q I will ask this question to the panel. This relates
15 back to the underpinning of the BWST on a foundation which
16 occurred -- does anybody know or do any of you know whether
17 the settlement monitoring of the BWST continued through
18 that period of undermining and to later periods of time?

19 A. (WITNESS KANE) It would be my understanding that
20 it was being conducted before and after that and is now
21 continuing, so there should be a record of settlement.

22 Q And would the NRC have those records or would
23 anyone in the NRC have seen those records?

24 A. (WITNESS KANE) It would be my understanding that
25 there has been no submittal of settlement data on the borated

1 water storage tank at that time and beyond, that I know of.

2 Q Do you mean other than in the report that we have
3 seen in these hearing or --

4 A. (WITNESS KANE) I have not seen settlement of the
5 borated water storage tank and the dates that that was indicated
6 to occur. It would be my feeling that when we got to resolving
7 the details of technical specifications, we would want to be
8 looking at that data at that time.

9 A. (WITNESS HOOD) May I interject? I believe Mr.
10 Kane's comments were directed to submittals to NRR. It does
11 not necessarily include submittals to the region.

12 Q Are you able to answer the question for the region,
13 as well?

14 A. (WITNESS KANE) I answered it from NRR. I do not
15 know what has been given to the region.

16 A. (WITNESS HOOD) Nor do I.

17 Q But do you feel confident that this -- the settlement
18 over this period of time will be reviewed at some point by
19 the NRC?

20 A. (WITNESS RINALDI) I'd just like to interject
21 something, that whatever settlement you are going to obtain
22 now, I think is a positive action because once the settlement
23 is over with, you're going to build a new foundation wall,
24 and then the tanks are going to be releveled.

25 So, in essence, you are starting new again. So

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1 it's advantageous to get as much settlement as possible now
2 and get the consolidation state where the structure -- where
3 we'll see less in the 4E operation, I guess.

4 A. (WITNESS KANE) It's my understanding the
5 settlement was under the valve pit and not on the ring beam
6 foundation.

7 Q. Mr. Kane, do you have something more to add on
8 that one?

9 A. (WITNESS KANE) I was responding to Mr. Rinaldi.
10 I was responding to Mr. Rinaldi.

11 JUDGE HARBOUR: Oh.

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1 BY CHAIRMAN BECHHOEFER:

2 Q Mr. Kane, I'd like to ask you first concerning
3 one of the changes to your testimony on page two. What's
4 the number of years return period for the flood which
5 was used by the -- which was used by the Applicant?

6 You crossed out a 100 year flood level and just
7 said a probable maximum flood level.

8 A (WITNESS KANE) The testimony you are referring
9 to is Mr Rinaldi's.

10 Q I'm sorry. Mr. Rinaldi, page two.

11 A (WITNESS RINALDI) This was just information
12 that -- used from the hydrology people. I just indicated
13 what load we used and the design of the structure. This
14 is the load that is used.

15 The probable maximum flood level is the load
16 that is used and the elevation given is that probable
17 maximum flood level.

18 It's just the type of -- it was not intended to --
19 to indicate this 100 year.

20 JUDGE HARBOUR: May I ask a question? I hope
21 that someone on this panel can answer it. Shouldn't the
22 probable maximum flood have an initial capital letters
23 on each of the three words?

24 WITNESS KANE: It is normal to capitalize
25 Probable Maximum Flood, yes.

1 JUDGE HARBOUR: And is there not a standard
2 method for calculating the Probable Maximum Flood?

3 WITNESS KANE: There are methods, yes. I'm
4 not quite sure everyone would agree to the standard. There
5 are variations. I think that you can do within those
6 guidelines.

7 JUDGE HARBOUR: And is that the Probable Maximum
8 Flood that was referred to in this sentence on page two?
9 It's that kind of flood?

10 WITNESS RINALDI: Yes.

11 JUDGE HARBOUR: Is the Probable Maximum Flood,
12 the flood which is required in the Center Review Plan to
13 be used for plant conditions?

14 WITNESS RINALDI: Yes.

15 MR. STEPTOE: Judge Bechhoefer, if it will help,
16 I'm informed by Mr. Budzik of Consumers Power that the
17 Probable Maximum Flood for Midland corresponds to failure
18 of all the upstream dams rather than to a specific return
19 period rainfall. Mr. Hood may remember that.

20 JUDGE HARBOUR: If I'm allowed to testify, the
21 Probable Maximum Flood never has any necessary connection
22 to a period of time, it is not a probablistically calcu-
23 lated flood. It is a term which is called Probable
24 Maximum Flood, but is not probablistically calculated.

25 It's calculated from the maximum atmospheric

1 conditions thought conceivable by meteorologists to cause
2 flooding conditions, coupled with various bad ground levels
3 and imposed on any downs that may occur in the rivers and
4 as to whether they will survive the collapse.

5 CHAIRMAN BECHHOEFER: No more cross examination
6 allowed.

7 (Laughter.)

8 JUDGE COWAN: Now I'm jealous.

9 BY CHAIRMAN BECHHOEFER:

10 Q Mr. Rinaldi, in your -- in the calculations
11 which you have done or which you are testifying about
12 concerning the use of one and a half times the FSAR
13 spectra, I think earlier this -- in this proceeding there
14 was some testimony that one and a half times the FSAR
15 spectra did not completely correspond to the site specific
16 response spectra.

17 Does that difference play any part in your
18 testimony here?

19 A (WITNESS RINALDI) No, the seismic margin, the
20 study will address it fully, that this comparison that
21 you are addressing. But the initial information given
22 of it, like this two sources that we're referring to,
23 to assess the Auxiliary Building to this new seismic load,
24 basically is some preliminary information that has been
25 provided by the structural mechanics associate which

1 is doing the work for Consumers Power.

2 That indicates that this 1.5 FSAR spectra, when
3 you develop a floor response spectra for various controlling
4 floors in the structure, the 1.5 times the FSAR spectra
5 is more conservative than the site specific spectra which
6 has been attributed to the site by the geology people.

7 Q Does this take into account that the 1.5 FSAR
8 spectra may not envelope all aspects of the site specific
9 response spectra?

10 A Well, what we have seen so far, it has enveloped
11 the aspect, the same considerations for the site specific
12 spectra. If it will be a problem for equipment or things
13 like this, I don't know at this point, or any other part
14 of the structure.

15 But so far what we've seen for every floor that
16 the Applicant has shown to us, any results, the 1.5 FSAR
17 spectra has enveloped the floor response spectra that you
18 would attain using the site specific spectra, and the
19 stress, like, shear and movement at some location, for
20 which we had seen results, indeed, the greater for the
21 1.5 FSAR spectra than for the site specific spectra
22 input.

23 Q Mr. Kane, I don't specifically recall from
24 December whether you had any reservations or not about
25 using the crack system to estimate settlement of the

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1 Diesel Generator Building; but, first, did you have any
2 reservations at that time?

3 A (WITNESS KANE) I indicated in December that I
4 knew it was not the normal procedure for estimating the
5 stresses. I also indicated at that time it was not in
6 my area of expertise and so I don't think I should comment.

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comment

1 Q I see. I was going to ask you, have you talked to
2 Mr. Kane -- or Mr. Singh any more about that subject? I
3 believe he had some fairly strong reservations.

4 A (WITNESS KANE) I have talked to Mr. Singh and
5 neither one of us have changed our mind. He still feels
6 the crack analysis is not as good as the normal practice.

7 JUDGE BECHHOEFER: That is all the questions the
8 Board has.

9 MS. WRIGHT: Staff has no questions.

10 CHAIRMAN BECHHOEFER: Mrs. Stamiris?

11 MS. STAMIRIS: Yes, I have one issue that I
12 truthfully forgot to ask when it was my first turn on
13 direct examination and it's very important to me and so I
14 think -- and I think it will be very short, you know, I
15 mean, I'm sure.

16 It probably will entail two or three questions in
17 about five minutes on this subject.

18 CHAIRMAN BECHHOEFER: Go ahead.

19 RECROSS EXAMINATION

20 BY MS. STAMIRIS:

21 Q Would any of the -- well, I think Mr. Kane or Mr.
22 Rinaldi would be in the best positions probably to answer from
23 a technical point of view.

24 When you are considering the combined effects of
25 the draw-down from dewatering with the potential seismic

1 events, have you taken into account any reduction in the lateral
2 support on structures due to the draw-down of the dewatering
3 system?

4 A. (WITNESS KANE) I will attempt to go first and Mr.
5 Rinaldi can answer. Actually, when you draw down water, you
6 are taking away a large force and that is the force of the
7 water, and so you would actually be removing a large lateral
8 force.

9 Q. You would be removing a large lateral support, then,
10 to the structure or --

11 A. (WITNESS KANE) The lateral force would still be
12 the soil, but the walls have to be designed to withstand
13 both the earth pressure and the water pressure and its
14 thickness and its design has to withstand those forces.

15 When you take away the water forces, the forces
16 that are being imposed on that wall are significantly reduced.

17 Q. So when you conduct the seismic margin review,
18 do you take into account that potential for reduction in
19 the lateral forces?

20 A. (WITNESS KANE) That Mr. Rinaldi can answer.

21 A. (WITNESS RINALDI) From the audit we have ascertained
22 that we've used both limiting cases. The case where you have
23 the highest water elevation with the highest force due to
24 the hydrology on the site, and also the part where you have
25 lower ground water elevation.

1 Usually you look at both conditions and if you have
2 a structure which retains water, then the case of -- that
3 Mr. Kane brought up before would not apply.

4 If you have water inside the structure, then you
5 eliminate the water on the outside, then you only consider
6 the water that you have on the inside.

7 I'm sorry if I have confused you.

8 Q No, it's just your answer is technical and my
9 experience is --

10 A (WITNESS RINALDI) In order to make it simple,
11 let's say you have a wall and we have a water pressure on
12 one side due to the soil. Usually it's represented by a
13 triangular load so you can imagine a wedge pushing on this
14 wall.

15 Now, if you have water on the inside, that would
16 bring a counter-balance force like two people pushing on a
17 wall. When you remove one, you only consider one force.
18 And in the other case you might have two forces.

19 Q Well, since the dewatering system will only remove
20 the force of the water laterally on the outside, am I correct
21 in understanding that you have taken that removal into
22 account in your seismic margin review?

23 A (WITNESS RINALDI) The Applicant has taken account
24 of it in the design of the structure. Now, what the Applicant
25 has done for the seismic margin review, I haven't seen the

1 results, but I would imagine they have done a similar approach,
2 considering the two limiting cases.

3 Q So from your expertise, then, do you consider that
4 it would be important to take into account any potential
5 reduction in lateral forces due to the drawdown of the
6 dewatering system on the outside of the structures?

7 A (WITNESS RINALDI) Especially for structures that
8 have water on the inside, like service water pump structure
9 has water on the inside, stores water on the inside.

10 Q Okay. Now, the question I wanted to ask is am I
11 also correct in understanding that the seismic margin review
12 will not apply to the containment structures which house
13 the reactors?

14 A (WITNESS RINALDI) As far as I know, I think it will.

15 Q It will? Oh, good. All this time I thought it
16 wasn't going to.

17 A (WITNESS HOOD) My understanding is it will.

18 Q Okay.

19 A (WITNESS RINALDI) It will address every category
20 one structures required for shutdown, so the containment is
21 a very important --

22 Q So because of the fact that the reactors are founded
23 on the glacial tilt, that has not, you know, exempted it in
24 any way from any of this other seismic margin review or
25 anything else for structures. I thought it was for structures

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founded on fill or affected by sediment.

A. (WITNESS RINALDI) The seismic margin review is due to the change in the spectra for the site, the seismological requirements at the site.

Now, the other condition is only required to the poor soil condition for the structure which are being underpinned, so underpinning is one -- one action is being taken over and the seismic reevaluation is independent of that.

Q Will the seismic margin review apply the site specific response spectra equally to all of the category one structures onsite?

A. (WITNESS RINALDI) All the category one that are needed for the safe shutdown of the plant. I don't believe some items like this fuel oil storage tank, I don't think they're involved. But I don't make that determination.

13-9,dnl

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CHAIRMAN BECHHOEFER: I believe we received the list of structures to which it will or won't apply. I can't remember, but --

MR. STEPTOE: It's my letter dated February, Mrs. Stamiris. It contains a list, enclosure one.

JUDGE HARBOUR: Of what year?

MR. STEPTOE: '83.

BY MS. STAMIRIS:

Q One follow-up question I did have is, Mr. Rinaldi, in response to a question from Judge Harbour, I believe you added that you considered that whatever settlement might be received, for instance, at the borated water storage tank now would be a positive settlement because it would move you along to the -- to the settlement that you were trying to -- well, I'm sorry, I don't want to say -- I believe you said it would be a positive settlement and you explained your answer.

Would you agree that differential settlement that could occur because of undermining in one particular area, that because of that differential, that that would not necessarily be a positive settlement at the borated water storage tank?

A. (WITNESS RINALDI) Well, the differential settlement would have to be looked for specific value that you are considering. But I was just addressing the fact that for the

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1 ring support there would be -- that would be beneficial. I
2 think -- I don't know the information where this undermining
3 took place. Mr. Kane indicated it was at the -- it was not
4 at the ring, it was outside the ring. So my explanation
5 was mainly for the ring.

6 Any further settlement of the ring would not
7 change the condition. Maybe it would make it better. But
8 if you have this differential settlement and a major
9 differential settlement, it would be something to look at
10 the cause of why it's happening.

11 I was just addressing something has already
12 occurred, nothing else that will occur as a result of that.
13 So I was kind of limiting my statement.

14 MS. STAMIRIS: Thank you. I have no further
15 questions.

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1 MR. STEPTOE: It's Mr. Marshall's turn.

2 CROSS EXAMINATION

3 BY MR. MARSHALL:

4 Q Dr. Rinaldi, I'd just like to ask you a few
5 simple questions just to clarify in my mind. Isn't it
6 true that concrete floats and buoyancy won't make it float?

7 A (WITNESS RINALDI) In the liquid state it will
8 float, yes.

9 Q Moreover, isn't it true that it will harden
10 under water?

11 A (WITNESS RINALDI) A limited amount will cure
12 it once it has --

13 Q Yes.

14 A (WITNESS RINALDI) Yes.

15 Q If that's true, why do you dewater in that area,
16 underneath one that doesn't have water and a building
17 that doesn't have any water or liquid on the inside?

18 A (WITNESS RINALDI) I think you ought to get
19 people there to work and be able to get the concrete to
20 harden first to a minimum preset state, and then, if you
21 have water application after that, controlled water
22 application, it might help the process of hardening the
23 concrete.

24 Q Well, Doctor, didn't you just say that the
25 cement will harden under water? If you pour it under

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1 water and leave it set in a form it will harden, correct?

2 A (WITNESS RINALDI) In a controlled state, yes.

3 Q Yes, and, also, Doctor, concrete will float.
4 If the ground around it has a certain buoyancy, it will
5 float, is that true?

6 A (WITNESS RINALDI) Well, I think --

7 MR. STEPTOE: Objection. It has been asked and
8 answered, I think.

9 BY MR. MARSHALL:

10 Q Well, the thing I'm trying to find out is it
11 confuses me. If that is true, why all of the pumping of
12 the water away from around it? That seems to be a contra-
13 diction in terms, and I'm trying to find out why.

14 MR. STEPTOE: I think the witness answered that
15 the people have to work.

16 MR. MARSHALL: To work?

17 MR. STEPTOE: To work down there where they're
18 pouring concrete. I could be wrong. But that's what I
19 thought the witness said.

20 BY MR. MARSHALL:

21 Q Do you mean that actually this is only a tem-
22 porary proposition?

23 A (WITNESS RINALDI) Yes.

24 Q Well, that's what I'm trying to find out.

25 A (WITNESS RINALDI) Yes.

1 Q That's all I wanted to know.

2 A (WITNESS RINALDI) Going back and floating
3 concrete --

4 Q That's all I wanted to know, if it was temporary
5 or if that's a permanent thing you're doing there, if this
6 is going to be perpetual. I'm trying to find out if this
7 is going to be a continuous running operation.

8 I'd like to ask if the geotechnical engineer,
9 Mr. Kane, concurs with Dr. Rinaldi on that assumption.

10 A (WITNESS KANE) Mr. Marshall, there's two
11 dewatering operations. One is a temporary one which
12 lowers the water table down below the level that these
13 underpinning piers are going to be installed, and it's
14 lowered to permit them to do the work safely without the
15 excavations caving in.

16 Q Okay, I got that.

17 A (WITNESS KANE) That work is temporary. But there
18 is a permanent dewatering system which will permanently
19 remove water from the Midland site during plant operation.

20 Q Well, as a geotechnical engineer, will you
21 explain to me, please, just briefly, not extensively, what
22 the permanent dewatering system is for, what function it
23 has.

24 A (WITNESS KANE) It has nothing to do with con-
25 crete or concrete curing. It has to do with loose sands
that potentially could liquify.

14-2,dnl

liquify 1

MR. MARSHALL: That's what I wanted to find out.

2

That's all.

3

CHAIRMAN BECHHOEFER: Mr. Steptoe?

4

MR. STEPTOE: Nothing, Your Honor.

5

CHAIRMAN BECHHOEFER: The Board has no questions.

6

Miss Wright, do you have anything further?

7

MS. WRIGHT: No, Your Honor.

8

CHAIRMAN BECHHOEFER: Anything further?

9

I believe this panel may be excused.

10

(Witnesses excused.)

11

CHAIRMAN BECHHOEFER: We would like to take a very

12

short break.

13

(Recess taken.)

14

CHAIRMAN BECHHOEFER: Proceed.

15

Whereupon,

16

DARL STEVENS HOOD,

17

called as a witness by counsel for the Regulatory Staff,

18

having previously been duly sworn by the Chairman, was

19

further examined and testified as follows:

20

DIRECT EXAMINATION

21

BY MR. PATON:

22

Q Mr. Hood, would you state your full name and your

23

position with the NRC.

24

A My name is Darl Stevens Hood. I am project

25

manager for the Midland project for the NRC Staff.

1 Q Do you have with you a copy of a document entitled
2 Testimony of Darl Hood for NRC Staff regarding loose sands
3 beneath the service water piping?

4 A I do.

5 Q Are there any corrections, additions or deletions
6 to be made to that document?

7 A No.

8 Q Are the statements contained therein true?

9 A They are.

10 MR. PATON: Mr. Chairman, I offer the document
11 just identified by Mr. Hood into evidence, and I have provided
12 the reporter with seven copies.

13 MR. STEPTOE: No objection.

14 CHAIRMAN BECHHOEFER: Any objection.

15 MS. STAMIRIS: No objection.

16 MR. MARSHALL: No objection.

17 CHAIRMAN BECHHOEFER: The document will be admitted
18 into evidence and bound into the transcript as if read.

19 (The document referred to, the testimony of Darl
20 Stevens Hood, follows:)

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10/29/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
CONSUMERS POWER COMPANY	)	Docket Nos. 50-329 OM & OL
(Midland Plant, Units 1 and 2)	)	50-330 OM & OL

TESTIMONY OF DARL HOOD FOR THE NRC STAFF
REGARDING LOOSE SANDS BENEATH SERVICE WATER PIPING

Q.1 Please state your name and position with the NRC.

A.1 My name is Darl S. Hood. I am the NRC Staff's Project Manager for the Midland Plant application for operating licenses. A statement of my professional qualifications has been filed in this proceeding.

Q.2 Please state the purpose of this testimony.

A.2 In its Memorandum and Order (Reopening Record on QA Matters and Establishing Schedule for Prehearing Conference and Discovery), dated July 7, 1982, the Licensing Board asked for additional testimony regarding, in part, a Memorandum from Darl Hood, dated March 16, 1982, entitled, "Notification of Loose Sands Beneath Service Water Piping" (Attachment 1). This testimony discusses related events prior to and after that notification.

Q.3 When did the NRC Staff first become aware that loose sands existed beneath the service water piping located north of the Service Water Pump Structure (SWPS) and the Circulating Water Intake Structures (CWIS)?

A.3 By July 1980 the Staff had become aware of loose sands in this area from its review of the applicant's logs of borings drilled in 1979.

Q.4 Was the Staff concerned that the loose sands could impact these service water pipes?

A.4 Yes, because the loose sands under maximum design earthquake loading have the potential to liquify. But it was the Staff's belief, based upon its interpretation of the applicant's response to 10 C.F.R. 50.54(f) Question 47, Parts 1a and 1b that liquefaction potential would be adequately addressed by maintaining this area in a dewatered condition while the plant was in operation. Prior to March 3, 1982, reviews by the Staff and its consultant, the U.S. Army Corps of Engineers, had assumed groundwater levels in the power block area would be controlled to elevation 595 ft. and limited to elevation 610 ft. thus addressing the liquification potential.

On March 3, 1982, the Staff and its consultant met with the applicant to discuss dewatering criteria for the Midland site. Attachment 2 is a partial summary of that meeting (Enclosures 2 & 3 thereto are excluded). At the beginning of the meeting, Mr. Dennis Budzik of Consumers Power Company stated that Bechtel's Geotechnical Engineering Group under Dr. S. Afifi, had reviewed site data and had concluded that groundwater levels, at other than the areas of the diesel generator building (DGB) and the railroad bay (REA) of the auxiliary building, need not be controlled to elevation 595 ft. nor limited to elevation 610 ft. Mr. Budzik said the

purpose of the meeting was to acquire Staff agreement with dewatering criteria, including the applicant's plan to limit ground water control to these two areas.

Q.5 Did the Staff agree with the applicant that liquefaction potential without groundwater control could be limited to the DGB and RBA?

A.5 No. Dr. Afifi was not present at the meeting and the applicant was unable to answer Staff questions regarding details of the basis for Dr. Afifi's conclusion. Therefore, the Staff requested the applicant to submit to the NRC and its consultant copies of Bechtel's liquefaction analysis for foundation soils above elevation 610 ft., including identification of (1) the water levels assumed in the analysis, (2) the critical blow count ("N") values and (3) location of any points in the foundation soils that failed to provide an acceptable margin of safety against liquefaction type failure. The purpose of this was for the Staff to determine if we agreed with Dr. Afifi's assessment.

Q.6 Subsequently, was information provided to the Staff and its consultant?

A.6 Yes. As noted in Enclosure 1 of the March 12, 1982 telephone summary (Attachment 1), Bechtel's study on liquefaction was provided. It showed loose sands in the plant fill above elevation 610 at locations other than the DGB and RBA, specifically beneath the 26" service water piping just north of the SWPS and CWIS. The telephone call also notified the Staff of the applicant's remedial

plan to replace the loose sand beneath the SWS pipe with stable material.

Q.7 When were the Licensing Board and hearing parties notified of loose sands beneath the SWS piping?

A.7 I described the March 12, 1982 telephone call that same morning during a telephone discussion with the Board and hearing parties.

Q.8 With the correction proposed for the SWS piping, does the Staff now agree that dewatering control during plant operation can be limited to the vicinity of the DGB and RBA?

A.8 Yes. The Staff's conclusion to this end is presented in Section 2.5.4.5.5 of SSER #2.



ATTACHMENT 1
UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 1 1982

Docket Nos: 50-329/330 OM, OL

APPLICANT: Consumers Power Company
FACILITY: Midland Plant, Units 1 and 2
SUBJECT: Notification of Loose Sands Beneath Service Water Piping

On March 12, 1982, the NRC was notified of loose sands located in the plant fill, north of the Service Water Structure and Circulating Water Intake Structure, at Midland Plant, Units 1 and 2. The sand extends to Elevation 610 and is located beneath about 500 feet of seismic Category I pipe.

Enclosure 1 is a record of the telephone conversation which provided this notification. Enclosure 1 also indicates the Applicant's decision to remove this material to avoid potential liquefaction problems.

A handwritten signature in dark ink, appearing to read "Darl Hood".

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: See next page

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Geotechnical Engineers, Inc.
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1017 Main Street
Winchester, Massachusetts 01890

RECORD OF TELEPHONE CONVERSATION

DATE: March 12, 1982 9:45 a.m.

PROJECT: Midland

RECORDED BY: Joseph Kane

CLIENT: _____

TALKED WITH: James Meisenheimer

OF

Consumers Power Co.

ROUTE TO:

INFORMATION

ACTION

G. Lear
L. Heller
✓D. Hood
M. Hartzman
H. Singh
P. Hadala
J. Kane

MAIN SUBJECT OF CALL: CPC future submittal of information on results of
liquefaction studies

ITEMS DISCUSSED:

J. Meisenheimer indicated that CPC has mailed the results of Dr. Afifi's evaluation of liquefaction to Dr. Hadala and that he will have this same information for me to review during next week's design audit. This information was identified as being required for Staff review at the March 3, 1982 meeting in Bethesda on permanent dewatering. The results of Bechtel's study on liquefaction do show loose sands in the plant fill above elev. 610 at locations other than the Diesel Generator Building and Railroad Bay.

J. Meisenheimer indicated the loose sands located in the plant fill north of the Service Water Structure and Circulating Water Intake Structure within the foundation area of the 26" diameter service water lines will be removed and replaced with either lean concrete or stabilized soils. This is the first notification to NRC of this intended replacement work and involves approximately a 500 foot length of Cat. I pipe (26"Ø) and will extend in depth to El 610. The replacement option has been selected by CPC in this area rather than relying on the permanent dewatering system to maintain the water level at elevation 595.



ATTACHMENT 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 16 1982

Docket Nos. 50-329/330 OM, OL

APPLICANT: Consumers Power Company
FACILITY: Midland Plant, Units 1 and 2
SUBJECT: SUMMARY OF MARCH 3, 1982 MEETING ON DEWATERING CRITERIA

On March, 1982, the NRC staff and consultants met in Bethesda, Maryland with Consumers Power Company (The Applicant) and Bechtel, to discuss site dewatering criteria for Midland Plant, Units 1 and 2. Meeting attendees are listed by Enclosure 1.

BACKGROUND

Loose sands with low blowcounts are known to exist in the backfill soils beneath certain structures of the Midland plant. To prevent liquefaction from occurring during an SSE earthquake event, a permanent dewatering system is being provided to maintain groundwater elevations at safe levels. The dewatering system is not designed to seismic Category I requirements and a recharge test was initiated beginning February 4, 1982 to verify that sufficient time would exist for repair or well replacement before water levels causing liquefaction concern would be reached. The Applicant's estimates of the repair times needed for various types of system losses were presented during a previous meeting on February 23, 1982, but are repeated here by Enclosure 2 for convenience.

The dewatering system is described in "Responses to NRC Requests Regarding Plant Fill", questions 24 and 47, except that the 90 days which was estimated by analysis for groundwater levels to rise from operating elevation 595' to the maximum permissible elevation of 610' beneath the Diesel Generator Building (DGB) or the Auxiliary Building Railroad Bay Area (RBA) will be a shorter period. The Applicant now expects the recharge tests to support at least 60 days to reach elevation 610' beneath either of these two structures.

SUMMARY

The Midland permanent dewatering system has been designed on the basis that the foundations of the DGB and the RBA are the Structures where liquefaction is a concern. The meeting opened with the Applicant asking Staff agreement that these are the only critical structures. The Staff's inability to respond to the Applicant's question for agreement is affected by the manner that the Staff and its Consultant conducted their review of the liquefaction problem and their assumptions on what portion of the plant site was to be dewatered to E1.595. The meeting also discussed several non-seismic underground pipes in close proximity to the DGB and the RBA. These are discussed herein.

The reviews of the dewatering system and liquefaction problem by the NRC Staff to date have been based upon the assumption that the groundwater level for the entire site would be limited to a maximum elevation 610'. The basis for this assumption is the Staff's interpretation of the response to Q.47. However, the applicant explained that levels at other than the DGB and RBA would not be required to be held (by a Tech. Spec.) to E1.595 and 610'. The Applicant will provide a dewatering control plan for the site as previously requested by the NRC Staff which will identify the specific areas to be dewatered to E1.595 and the monitoring wells which will be in operation to assure that this level is being maintained.

The evaluation by Dr. Afifi's geotechnical engineering group from which the Applicant concluded that no liquefaction concern exists for seismic Category I structures other than the DGB and RBA, has not been presented to the Staff. The Staff requested a submittal of Bechtel's liquefaction analysis for foundation soils above elevation 610', including identification of (1) the water levels assumed in the analysis, (2) the critical "N" values (blow count) and (3) location of any points in the foundation soils that failed to provide an acceptable margin of safety against liquefaction type failure.

Boring DF-5 shows that an approximately 3 foot thick layer of loose sand with low blowcounts indicative of potential liquefaction exists beneath the underground diesel fuel oil storage tank. The lateral extent of this loose sand layer, and whether it is hydraulically connected to other areas, is not definitely known. The alternatives available to CPC to address this problem included: Alternative No. 1 - The loose sand layer isolated and localized. An evaluation of all completed borings may demonstrate whether the loose sands in the diesel fuel oil tank area are isolated. Additional borings and piezometers may be needed to reach this conclusion. If found to be isolated and localized, an approximate calculation with conservative assumptions (e.g. zero shear strength for loose layer, horizontal seismic coefficient of 0.19) using a pseudo-static approach could possibly demonstrate a high margin of safety against tank movement during an SSE earthquake event because of available passive resistance against the ends of the fuel tanks. Alternative No. 2 - The loose sand layer is not isolated but is extensive and continuous. For this determined condition, Consumers would have to demonstrate the adequacy of the permanent dewatering system in maintaining the groundwater level of elevation 595.

Several non-seismic, underground circulating water lines are located to the east and west sides of the DGB, about 18' below its base. The lines rest upon the natural sand layer underlying the power block area in which the dewatering wells will normally control the groundwater level to elevation 595'. The Applicant described its analysis of a postulated break of the line nearest the DGB as presented in response to Question 49, "Response to NRC Requests Regarding Plant Fill". The analysis indicates that the predominate flow from the postulated break is downward through the natural sand layer and that the nearest dewatering well would activate at 3.3 days, at which point

the groundwater elevation at the edge of the DGB is at elevation 607'. The lines are capable of being isolated from the cooling pond by butterfly valves at both the inlet and discharge points, drained, and then repaired with the reactor unit in a cold shutdown condition. The Applicant plans to add two monitoring wells (OW-3 and OW-4) near this area, one near the NE corner of the DGB and one near its SE corner.

The Applicant recommended two articles from technical journals for Staff review:

1. "Well Water Design for Earthquake Induced Motions" Journal of the Power Division of American Society of Civil Engineers, pp. 377, Nov. 1973 issue.
2. "Ground Water Studies for Nuclear Power Plant Siting" Geological Society of America, Reviews in Engineering Geology, Vol. IV, 1979.

Non-seismic lines from the Condensate Storage Tanks pass directly beneath the DGB and through the sand backfills beneath the DGB. These lines are enclosed by a concrete sleeve for the length of pipe directly beneath the DGB. However, because the sand backfills are hydraulically connected to the deeper natural sand layer, and because of the limited volume of the Condensate Storage Tank (300,000 gallons), these pipes are not considered to pose a potential liquefaction concern. Similarly, the lines from the Primary Water Tank and from the Utility Water Tank pose no concern for liquefaction of the backfill sands beneath the RBA.

The Applicant discussed the current results of the recharge tests. Enclosure 3 is a handout of the ground water levels measured for 22 wells. The Applicant feels that extrapolation from these data will show that the criteria of 60 days provided for repair is being met for the DGB area. No increase in level has been measured in the RBA and these wells are still dry. The Applicant plans to acquire at least 40 days of recharge test data, and on March 15, 1982 will consider terminating the test. Continued testing is of concern to the construction schedule since excavation of access shafts for the Auxiliary Building underpinning is in progress and activation of the freezeway is planned. Mr. Brunner of the Applicant's legal staff stated it is Consumers plan to advise the Staff of its March 15 decision, but that the Company's position is that Staff concurrence is not needed to stop the recharge test since the test is not a remedial action, per se. The Staff replied that no assurance of extrapolation capability could be provided at present and the technical specification requiring achievement of cold shutdown might be based upon the actual measurements of recharge period rather than an extrapolation of the measured rate to elevation 610'. The Applicant stated that its proposed technical specification would be based upon a normal shutdown period (about 7 days) prior to reaching the groundwater elevation 610' at the DGB or RBA. Since the recharge test duration already exceeds the proposed repair periods at this location, the Applicant considers that extension of the recharge test beyond 40 days to be an economic issue, rather than a safety issue. The Staff also expressed concern that the need for groundwater level control and associated criteria for areas other than the DGB and RBA should be determined prior to termination of the recharge test.

The Applicant identified 10 temporary dewatering wells located along the underground west plant dike near the Administrative Building and some mop up wells nearer the structure. These are shown on Drawing 7220-C-1311 Rev. 1, "Yardwork - Freezeway Plan and Profile - Sheet 2". A copy of this drawing was provided Mr. J. Kane.

Darl Hood

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ENCLOSURE 1

ATTENDEES

March 3, 1982

D. Hood
M. Fliegel
R. Gonzales
D. Budzik
N. Swanberg
W. Paris, Jr.
J. Schaub
J. Musenheimer
J. Kane
P. Hadala

LB#4/ DL/NRR
HGEB/DE/NRR
HGEB/DE/NRR
CPCo
Bechtel
Bechtel
CPCo
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NRC/NRR/DE/HGEB
USAEWES

1 MR. PATON: I have a few questions on further
2 direct.

3 CHAIRMAN BECHHOEFER: Fine.

4 BY MR. PATON:

5 Q Mr. Hood, what specifically was the purpose of the
6 -- there's a reference on page two to a meeting of March 3rd.
7 What specifically was the purpose of that meeting?

8 A The purpose of the March 3rd meeting was to
9 discuss the dewatering plans for the Midland site.

10 At the beginning of that meeting Consumers
11 indicated their intent was to acquire Staff agreement that
12 the dewatering for the site could be limited to two specific
13 areas. Those areas were in the vicinity of the Deisel
14 Generator Building and the railroad bay area.

15 Q And did they provide you with a basis for that
16 request?

17 A They indicated that it was -- that dewatering
18 could be limited to those two areas on the basis of studies
19 that had been performed by Bechtel's geotechnical section
20 under Dr. Afifi.

21 Q Did they provide you with the results of Dr.
22 Afifi's study?

23 A Not at that time.

24 Q Was any representative of Consumers Power Company
25 at that meeting able to address the results of Dr. Afifi's

1 study?

2 A. Only by way of a conclusory statement as to the
3 results of the study, but there was no detail available to us
4 of the study at the meeting.

5 Q So I assume you were not able to accomplish the
6 purpose of the meeting, is that correct?

7 A. That is correct.

8 Q And who called this meeting?

9 A. As I recall, the meeting was requested by Consumers
10 Power Company.

11 Q Did you ever obtain the results of Dr. Afifi's
12 study?

13 A. Yes, we did.

14 Q Approximately when?

15 A. It was about a week or so after a telephone call
16 of March the 12th from a Mr. Meisenheimer to a Mr. Joe Kane.

17 Q Did the NRC review the results of Dr. Afifi's
18 study?

19 A. Yes.

20 Q Did you concur with that study?

21 A. Yes, the NRC did concur ultimately with the fact
22 that dewatering can be limited to the two areas.

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14-3,pjl

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However, this study, when we received it, indicated that there was a third area that was of concern, and that area was just north of the service water pump structure and the adjacent circulating water intake structure. So we could not at that time agree with it.

Q At the March 3rd meeting, was any explanation offered as to why no one could discuss the details of Dr. Afifi's study?

A I do not recall any such explanation.

MR. PATON: I don't have any further questions, Mr. Chairman. He is available for cross examination.

(Discussion had off the record.)

CHAIRMAN BECHHOEFER: Mrs. Stamiris?

MS. STAMIRIS: Yes.

CROSS EXAMINATION

BY MS. STAMIRIS:

Q Mr. Hood, in relation to this incident that you've just been describing in response to Mr. Paton's questions, did you consider at this time, in March of 1982, that Consumers Power Company had a commitment to the NRC to seek staff concurrence prior to doing any soils related work?

A There was a voluntary agreement that took place. Is that what you're referring to?

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1 Q Well, and did -- there was a voluntary agreement,
2 and I would like to ask you particularly -- I consider that
3 there were two parts to the agreement, so I want to focus,
4 and I don't mean to explain my perceptions of the thing,
5 but I want to ask you whether you believe that Consumers
6 Power had made a commitment before this Board and the
7 parties to seek Staff concurrence prior to proceeding with
8 soils remedial work.

9 MR. STEPTOE: Objection; relevance.

10 MS. STAMIRIS: Of relevance?

11 MR. STEPTOE: What relevance does this have,
12 this line of cross examination have to the subject matter
13 of Mr. Hood's testimony?

14 MS. STAMIRIS: Would you like me to explain?

15 CHAIRMAN BECHHOEFER: Yes.

16 MS. STAMIRIS: Well, I believe it's relevant
17 because I think that whether or not Consumers did proceed
18 or was going to proceed had the Staff not intervened
19 without openly informing the Staff or seeking their con-
20 currence is a key issue in this whole loose sands testi-
21 mony and is an issue before -- or should, I would think,
22 be of interest to the Board in this proceeding.

23 BY THE WITNESS: Mrs. Stamiris, may I repeat
24 the comment I made earlier? The Applicant stated that
25 the purpose of the meeting was to acquire the NRC's

1 agreement that the dewatering could be limited to two
2 areas. That was at the March 3rd meeting.

3 MS. STAMIRIS: Okay, well, I would like to con-
4 tinue, then, from there.

5 BY MS. STAMIRIS:

6 Q Do you believe that this concurrence that the
7 meeting, in your mind, was called to address was the type
8 of a concurrence that Consumers Power Company had committed
9 before this Board and parties to seek?

10 A I don't think that that prior agreement was as
11 much a factor as the fact that the Applicant knew it had
12 to get Staff approval of the dewatering design.

13 Q But don't you -- I'm asking --

14 A I mean, also, the Staff is required to approve,
15 as part of the normal licensing process, the -- it's more
16 in the way of a review, is what I'm trying to say. It's
17 a typical review that's done as part from some separate
18 requirement for soil remedial areas.

19 Perhaps I'm not being too clear.

14-4,dnl

clear

1 But, I think, if you're asking me what is motivating
2 this particular request on the part of the Applicant, it's
3 more the fact that he realizes the Staff has to approve
4 the permanent dewatering system. And it's a rather significant
5 part of the design if he is to limit -- if he is to provide a
6 design that is based on two areas, and I don't think he would
7 want to proceed too far with that design without getting
8 some initial Staff concurrence or agreement. Otherwise --
9 well, I'll stop there.

10 Q Okay. Mr. Hood, I meant to establish, and I
11 thought it would be a simple thing to establish whether or
12 not you remembered a particular commitment by the Applicant
13 in this hearing specifically going to the soils remedial
14 work to seek NRC concurrence, and I think you've already
15 explained all of your memory on that subject, am I correct?
16 Your understandings of what the commitments were.

17 THE WITNESS: Would you repeat the question, please?

18 MR. STEPTOE: Judge Bechhoefer, we all remember
19 that there was an agreement by the Applicant respecting
20 proceeding with remedial soils work and obtaining NRC Staff
21 concurrence before this Board issued its April 30th, 1982
22 order.

23 I think Mrs. Stamiris ought to move on to some
24 point.

25 MS. STAMIRIS: If I had gotten that -- you know,

1 I didn't -- I'm ready to move on. I would have been ready
2 to move on a long time ago with that statement.

3 BY MS. STAMIRIS:

4 Q Now, what I wanted to know is: Do you think that
5 the Applicant was proceeding properly in terms of this
6 incident? Do you believe that the Applicant was proceeding
7 properly in giving you all the information that they had
8 regarding the moving forward with the soils remedial work
9 in this instance?

10 A "In this instance;" do you mean with regards to
11 the dewatering system?

12 Q I mean --

13 A Or is your question in reference to the particular
14 meeting, or is it broader?

15 Q Okay, I mean to ask whether you believed that the
16 events that you described so far to Mr. Paton about the
17 March 3rd meeting and the fact that Consumers Power Company
18 had this study and referred to some conclusions about the
19 study at that meeting but at that time did not indicate to
20 you that there were three areas that needed dewatering? Do
21 you think that that was the proper way for the Applicant to
22 proceed in view of their previous commitment?

23 MR. STEPTOE: Objection. The witness has already
24 stated that the meeting was not motivated so much by the
25 commitment as by the normal operating license review, so

1 there's no foundation for the question.

2 I also object to the vagueness of the question in
3 terms of what is proper and improper. That word has got
4 certain emotional overtones which should not be allowed to
5 slip into the record without examination.

6 If Miss Stamiris wants to ask Mr. Hood whether
7 he thinks the Applicant was trying to deceive him at that
8 meeting, or some other point that she wants to make, she
9 ought to state so explicitly and ask those pointed questions.

10 MR. PATON: Judge Bechhoefer, I think the question
11 is proper. She has developed that the Applicant asked the
12 Staff for permission to do something with inadequate
13 information, without providing the basis for it, and she's
14 asking him is that, in your opinion, consistent with their
15 commitment not to proceed without Staff approval.

16 I thought the question was pretty easy.

17 MR. MARSHALL: Chief Judge Bechhoefer, I don't
18 see any emotional ejection in this question at all.

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14-5,dnl

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CHAIRMAN BECHHOEFER: If the intent of the question were as Mr. Paton stated it, I think it's an appropriate question.

Was that the intent?

MS. STAMIRIS: I'm sorry to say that I was having trouble mentally focusing on what Mr. Paton was saying, and I couldn't tell you, without hearing it back, if it was precisely the question I asked.

MR. PATON: I don't mind trying it again.

CHAIRMAN BECHHOEFER: Well, why don't you try it again.

MR. PATON: I believe the question was that the record shows that the Applicant sought permission from the Staff on March 3rd without providing the basis for their request, and the question is: Is that consistent with their commitment not to proceed without Staff approval? Or is that request appropriate in light of their agreement not to proceed without Staff approval.

JUDGE HARBOUR: Is that the intent of your question, Mrs. Stamiris?

MS. STAMIRIS: I think so. I would like to, you know, hear the answer to that question.

MR. STEPTOE: I still object to that question because there's not a proper foundation in the record based on Mr. Hood's previous answer that the purpose of the

1 meeting, or the motive of the meeting was not connected to
2 the commitment or agreement between the Staff and the
3 Applicant to get approval before proceeding.

4 MR. PATON: I don't understand what difference it
5 makes about the motive of the meeting.

6 MS. STAMIRIS: And I disagree with Mr. Steptoe's
7 characterization, because I thought I remembered hearing
8 Mr. Hood -- although he didn't refer to their prior
9 commitment -- hearing him say that he believed that the
10 Staff, or that the Applicant had called the meeting in order
11 to find out if they had the Staff concurrence to proceed
12 on these.

13 (Discussion had off the record.)

14 CHAIRMAN BECHHOEFER: I believe the witness may
15 answer whether it was consistent with the agreement. But I
16 don't think it matters why the meeting was called.

17 MS. STAMIRIS: Right.

18 CHAIRMAN BECHHOEFER: But this is the methodology
19 which the Applicant took, so whether that was consistent with
20 the commitment is an appropriate question.

21 MS. STAMIRIS: That's what I mean to go on, Mr.
22 Hood.

23 THE WITNESS: I'm afraid, with all this discussion,
24 I've -- I don't understand the question.

25 Can I ask for a simple statement of the question?

14-5, dn3

6:00 P.M.1

CHAIRMAN BECHHOEFER: Well, I could try it simply.

2 Was this meeting which is mentioned here which only
3 sought permission for two areas consistent with the Applicant's
4 commitment to provide the Staff with -- to request permission
5 from the Staff for certain activities?

6 THE WITNESS: There's no specific remedial action
7 that is being requested. Rather, what the Applicant is
8 requesting us to do is to agree that the design of the
9 dewatering system can be limited to two areas.

10 So it's not as though he were requesting us to
11 approve a specific remedial action, he's asking us to approve
12 a detail which will influence the design. It's not like he
13 wanted to go out and start some construction activity.

14 There is that difference, and it's giving me a
15 little difficulty in answering this question.

16 I thought I understood the question to be asking
17 whether or not it was appropriate for the Applicant to be
18 asking for our approval and not providing us a detail for
19 that approval at the same period.

20 Now, was that a question?

14-6

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14-6,ojl

question. 1

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CHAIRMAN BECHHOEFER: It was sort of part of the question.

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THE WITNESS: If that was the question, then my answer to it would be no, it's not appropriate.

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I believe this Applicant understands that the Staff seldom takes things at face value, but we look to the basis behind the conclusions that the Applicant has reached in an attempt to perform some technical judgment as to the suitability of that conclusion.

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So I believe this Applicant understands that Staff requires more than just bottom line conclusions but further bases for that judgment.

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BY MS. STAMIRIS:

Q Mr. Hood, in the March 3rd, 1982 meeting in

which the Applicant sought to limit their dewatering to two areas despite the knowledge they had about three areas in the geotechnical report, do you think that the Staff was being completely open and above board? I mean, do you think the Applicant was being completely open and above board with the Staff at that time?

21

MR. STEPTOE: Objection. The question is --

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23

MS. STAMIRIS: You told me to be direct before. You told me to ask --

24

25

MR. STEPTOE: Objection. I have no problem with the directness of the question, but the question assumes

1 a fact which is not in evidence, which is that the Appli-
2 cant had knowledge of three areas at the time of the meet-
3 ing and that the person who made the request knew that and
4 didn't disclose it.

5 MR. PATON: Judge Bechhoefer, he could be asked
6 that question. The question is whether the Applicant
7 attempted to mislead the Staff. He can express his
8 opinion on that.

9 The information he got several weeks later clearly
10 showed that the Applicant was aware of three areas.

11 MS. STAMIRIS: But I thought that Mr. Hood had
12 also testified that at the time of the March 3rd meeting
13 the Staff did not have the results of the geotechnical
14 report but that the Applicant did have the results of
15 Mr. Afifi's Bechtel geotechnical report, and that's where
16 I form the basis for my question.

17 MR. STEPTOE: I don't recall any such testimony,
18 Judge Bechhoefer.

19 THE WITNESS: I don't think I said that, Mrs.
20 Stamiris.

21 MS. STAMIRIS: Oh,

22 BY MS. STAMIRIS:

23 Q Do you know whether the Applicant had the
24 Bechtel geotechnical report at the time of the March 3rd
25 meeting?

1 A The Applicant indicated to us at the March 3rd
2 meeting that studies had been performed by Dr. Afifi, and
3 he presented to us the results of Dr. Afifi's study.

4 I'm using Dr. Afifi; I mean his section. I
5 don't mean Dr. Afifi personally.

6 But he indicated that studies had been performed,
7 and he presented to us the results of that study.

8 I do not know specifically whether the Applicant
9 had reviewed that study or not or whether he was just
10 relying on Bechtel's study.

11 But, to answer your own question, it seems to
12 me that there are two possibilities. Either the study
13 had been performed as of March 3rd and the study just
14 was not sufficient that it would detect the third area,
15 or the other possibility is that the study had not been
16 performed as of March 3rd, 1982.

17 I do not know which was the case.

18 Q Are those the only two possibilities that you
19 can conceive of at that time, that either the study had
20 not been performed or did not cover those things? Is
21 that what you're --

22 A In view of the fact that the subsequent events
23 revealed there was a third area, I guess I'm depending
24 on the likelihood. Yes, those are the only two possibili-
25 ties of which I am aware.

14-6,pj4

1 Q Well, do you think the possibility -- I'm not
 2 asking you -- do you think the possibility existed that
 3 there was a complete study which had been read but it
 4 just wasn't shared with NRC?

5 A You're saying another possibility is if the
 6 study existed and it showed results and it was just not
 7 shared with NRC?

14-7

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1 Q Yes.

2 A I guess that is a possibility.

3 MR. STEPTOE: Does that question assume that the
4 results showed three areas which needed dewatering?

5 MS. STAMIRIS: Well, that's what I had in mind.

6 MR. STEPTOE: Well, I'm not sure that is what the
7 witness had in mind when he answered.8 THE WITNESS: That's what I thought I was answering,
9 that a third possibility would be that the study had been
10 performed and the study did indeed show the existence of a
11 third area and that the information conveyed to the NRC was
12 not consistent with the results. That is a third possibility.

13 MS. STAMIRIS: Okay, thank you.

14 BY MS. STAMIRIS:

15 Q Now, at the time of the March 3rd meeting, can you
16 tell me who some of the other -- well, does -- I want to know
17 who some of the NRC people were at the March 3rd meeting with
18 you.19 Is there such a listing in your who else was
20 at that March 3rd meeting with you from the NRC?21 A Yes, the summary of the meeting, which is
22 Attachment 2 to my testimony, includes as enclosure one of
23 that attachment the attendees at the March 3rd meeting.24 MS. STAMIRIS: Since I see that Joe Kane was at
25 that meeting and he is here, I wonder if it would be helpful

1 to have Mr. Kane go on the stand to give his impression of
2 this and also the telephone conversation.

3 MR. PATON: We'd be glad to have Mr. Kane join
4 the stand.

5 CHAIRMAN BECHHOEFER: Why don't you do that.
6 Whereupon,

7 JOSEPH KANE,
8 called as a witness by counsel for the Regulatory Staff,
9 having previously been duly sworn by the Chairman, was
10 further examined and testified as follows:

11 CROSS EXAMINATION

12 BY MS. STAMIRIS:

13 Q Mr. Kane, have you been listening to this testimony
14 about the March 3rd meeting?

15 A (WITNESS KANE) Yes.

16 Q Okay. I'd like to ask you, Mr. Kane, when you
17 were at this meeting and heard the Applicant's people release
18 certain conclusions of the Bechtel geotechnical report, as
19 Mr. Hood has testified, did you make the assumption at that
20 time, on March 3rd, that those people had read the study
21 that they were -- I mean, maybe you don't know for sure,
22 but do you think that probably those people who were relating
23 the conclusions had read the geotechnical study which they
24 were referring to?

25 MR. STEPTOE: Objection. The question calls for

1 speculation.

2 MS. STAMIRIS: No; I'm asking him what was in his
3 mind on March 3rd, 1982. I don't believe that's speculation.

4 MR. STEPTOE: I'm sorry; he -- the question asks
5 the witness to describe his own thought processes as to
6 what he supposed about what some other person had done at
7 that time.

8 (Discussion had off the record.)

9 CHAIRMAN BECHHOEFER: I think the question probably
10 should be reworded to the extent that -- did anyone at the
11 meeting from Consumers or Bechtel act as if they had either
12 received the study or had gone through the study, either
13 state or act as if they had the benefit of the study?

14 WITNESS KANE: Yes. It was my impression. Mr.
15 Budzik was aware of the results of the study and was indicating
16 to us the conclusions of that study.

17 CHAIRMAN BECHHOEFER: Did he further indicate
18 whether he had read the complete study or was just aware of
19 its general conclusion.

20 WITNESS KANE: We did not get into the --

21 CHAIRMAN BECHHOEFER: Or couldn't you tell?

22 WITNESS KANE: I cannot tell. We did not get into
23 the details. What was being stated to us was the conclusions
24 of the study.

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study. 1

CHAIRMAN BECHHOEFER: Mr. Hood, you may, if you have anything to add to that.

WITNESS HOOD: That is consistent with my understanding as well.

BY MS. STAMIRIS:

Q Mr. Hood or Mr. Kane, in your recollection of the March 3rd meeting, was there any mention by the Applicant at that meeting of three potential -- or three areas in need of dewatering?

A (WITNESS HOOD) No, there was no mention of any third area at that meeting. The only two areas that were discussed were the Diesel Generator Building area and the railroad bay area.

Q Mr. Kane, do you think that if the Applicant had -- if any of the members of -- representing Consumers Power Company at that meeting had read the study that they should have shared with you information about the third area near the service water pump structure?

MR. STEPTOE: Objection. That question has got a number of unfounded assumptions in it.

First of all, the study did show the existence of the third area. Second of all, that the Applicant's witnesses were asked to share their conclusions.

The testimony says that they were unable to discuss the matter. So there's no foundation for the

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1 assumptions in that question, and it's built on nothing
2 but speculation.

3 MR. PATON: Mr. Chairman, could I request that
4 the question be re-read?

5 CHAIRMAN BECHHOEFER: Yes.

6 (Question read.)

7 MR. STEPTOE: The question clearly does assume
8 the study indicates a third area of potential liquefaction
9 near the service water pump structure, and there's no
10 foundation in the record for that.

11 CHAIRMAN BECHHOEFER: Mr. Paton?

12 MR. PATON: I think the objection is well founded.

13 (Discursion had off the
14 record.)

15 MS. STAMIRIS: I would like to ask a quick
16 question and go on.

17 CHAIRMAN BECHHOEFER: I think we'll sustain the
18 objection.

19 MS. STAMIRIS: Okay.

20 BY MS. STAMIRIS:

21 Q Mr. Kane, I'll ask a similar question this way:
22 Do you believe that if any of the people present repre-
23 senting Consumers Power Company at the March 3rd, 1982
24 meeting had any knowledge of the third area in need of --
25 well, the third area near the service water pump structure,

1 which was later determined to be in need of dewatering,
2 that they should have shared that information with you at
3 that meeting?

4 A (WITNESS KANE) If they had knowledge, they
5 should have shared it, and it should not have been indi-
6 cated at the meeting that there were only two areas.

7 Q Thank you. Mr. Kane, was it indicated at the
8 meeting that there were only two areas?

9 A (WITNESS KANE) Yes.

10 Q All right, Mr. Kane, I believe you were the --
11 were you the first person in the NRC to receive informa-
12 tion about the third area near the service water pump
13 structure?

14 No; that's -- I will withdraw that question,
15 because I think that's practically impossible to answer.

16 But, to your recollection, is this record of
17 the telephone conversation -- was this the first time that
18 you found out anything about this third area at the service
19 water pump structure?

20 A (WITNESS KANE) Yes, in answer to your question.

21 Q Okay. In the top paragraph in the record of
22 the telephone conversation attached to this testimony,
23 this second sentence says:

24 "This information was identified as being
25 required for Staff review at the March 3rd,

14-8, pj4

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1982 meeting in Bethesda on permanent dewatering."

I'd like you to tell me precisely what you meant by "this information" and by whom it was identified as being required for Staff review.

14-9

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14-9,dnl

review 1 A. (WITNESS KANE) The information that is identified
2 is identified in Mr. Hood's testimony on page three in answer
3 to question five. And it says: "Therefore, the Staff
4 requested the Applicant to submit to the NRC and its
5 consultant copies of Bechtel's liquefaction analysis for
6 foundation soils above elevation 610 feet, including
7 identification of (1) the water levels assumed in the
8 analysis, (2) the critical blow count ("N") values, and
9 (3) location of any points in the foundation soils that
10 failed to provide an acceptable margin of safety against
11 liquefaction type failure."

12 That is the information.

13 Q. Mr. Kane, during this telephone conversation or at
14 any other time, did you ask --

15 Perhaps not in these precise words, but did you
16 ask for an explanation from the Consumers' people as to why
17 they hadn't shared this information with you at the March 3rd
18 meeting?

19 MR. STEPTOE: Objection. The question assumes
20 that they had the information to share at the meeting. The
21 testimony indicates that they couldn't discuss it. They
22 didn't have the information --

23 MR. PATON: Judge Bechhoefer, it doesn't hurt
24 to ask the question.

25 MS. STAMIRIS: That's right.

1 MR. PATON: All she did was say "did you ask that
2 question?"

3 (Discussion had off the record.)

4 CHAIRMAN BECHHOEFER: We'll overrule that.

5 Answer the question as asked.

6 BY THE WITNESS:

7 A. (WITNESS KANE) The question that's before me is
8 did I ask anyone from Consumers why they have not shared that
9 information with the NRC? Is that it?

10 BY MS. STAMIRIS:

11 Q. The question I asked precisely was why they had
12 not shared that information with the NRC at the March 3rd
13 meeting.

14 A. (WITNESS KANE) I did not ask that question.

15 I think I could help clarify the atmosphere by
16 indicating what the conditions were at that meeting.

17 The NRC's consultant, the corps of engineers'
18 Paul Huldolla, had completed a liquefaction, an independent
19 liquefaction analysis of his own based on what he understood
20 was going to be the areal extent of the dewatering, and that
21 was in response to 50-54F questions and in recognition of
22 where the dewatering wells had been placed. So he had
23 assumed an areal extent of dewatering and made his liquefaction
24 analysis based on what he understood the Applicant was going
25 to do.

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It came out at this meeting that what he understood and I understood to be the areal extent to be dewatered was not going to be the area to be dewatered, at least by committing in a tech spec.

The Applicant was indicating at that meeting it was going to be the Deisel Generator Building area and the railroad bay area. And what they effectively did was what we had been understanding was no longer valid.

And now that we understood that we're saying what is the basis for your saying these are the only two areas, and they are referring us to Dr. Afifi's study.

And so we are saying now for the first time, because of what we understood had been changed, you will now have to submit that information to us because it's the first time it's becoming important to us.

But I did not ask why you had not submitted it to us beforehand.

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14-10,dnl

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1 Q Is your testimony that now, meaning today, that --
2 or at the time this testimony was prepared -- and perhaps
3 I should ask you, Mr. Hood -- that they need not provide --
4 when you said they -- I thought you said they need not provide
5 that information to us, and I'm not sure what you meant by
6 that information.

7 A. (WITNESS KANE) Are you referring to something I
8 said?

9 Q Yes, Mr. Kane.

10 A. (WITNESS KANE) Up until now we had made our own
11 independent liquefaction analysis, and we didn't feel we needed
12 Dr. Afifi's analysis.

13 Now that the areal extent of dewatering that
14 was going to be required and committed to was different than
15 what we had conceived, we felt now there is a need to ask for
16 Dr. Afifi's results.

17 Q But when you say now, you meant now back in March?

18 A. (WITNESS KANE) I'm sorry; you're correct. I meant
19 now, on March 3rd, that we know that that we're asking for
20 that information.

21 Q Okay.

22 A. (WITNESS HOOD) After we realized the areal extent
23 is to be limited, then our position changes.

24 Q Well, do you think that, had the Staff given their
25 concurrence to limit the dewatering to the two areas which

1 the Applicant discussed with you at the March 3rd meeting,
2 that that would have provided a sufficient amount of
3 protection against the liquefaction potential, Mr. Kane?

4 A. (WITNESS KANE) If you're asking me if the Staff
5 had accepted just those two areas and knowing only of the
6 things I knew on March 3rd, then I would say no, it would
7 not have given sufficient liquefaction potential protection.

8 A. (WITNESS HOOD) If I might add to that, Mrs.
9 Stamiris. I don't think it's likely that this Staff is
10 likely to have accepted such a recommendation without some
11 basis for the study being provided.

12 I think that's a tribute to the technical staff,
13 particularly those assigned to this Midland project.

14 Q. Since the geotechnical study by Bechtel by Dr.
15 Afifi was in existence at the March 3rd meeting, do you think
16 that, considering the purpose of this meeting, that that
17 study should have been read by both the Consumers people
18 and NRC people?

19 MR. STEPTOE: Objection. Again Mrs. Stamiris
20 assumes that the study was in existence. The testimony is --

21 CHAIRMAN BECHHOEFER: Well, it says it was.

22 MR. STEPTOE: Well, the testimony said that Afifi
23 had viewed site data and made a conclusion. Does it say that
24 there was a study in existence?

25 CHAIRMAN BECHHOEFER: Dr. Afifi should be fired

1 if there wasn't.

(Discussion had off the record.)

3 WITNESS KANE: Can I add something?

4 CHAIRMAN BECHHOEFER: Yes.

5 SITNESS KANE: Wouldn't it be easier to just ask
6 the Applicant whether the study existed on March 3rd?

7 MR. PATON: Mr. Chairman, I think that's an
8 excellent suggestion.

9 You know, we're taking a lot of time. Mr. Budzik
10 is here. We could direct a few simple questions to him.

(Discussion had off the record.)

12 CHAIRMAN BECHHOEFER: We'd have to put him on the
13 stand, though, to do that. I won't say join the panel. You
14 wouldn't have to physically do that.

15 MR. STEPTOE: Judge Bechhoefer, I don't know at this
16 point whether there was or not, but I'm informed there was
17 not as of that time, and I cannot agree with your assertion
18 that Dr. Afifi should be fired. But what I mean by a study
19 is a written report documenting conclusions, and so forth,
20 and --

21 CHAIRMAN BECHHOEFER: I was not referring to final
22 form then, but there must have been some report or study
23 upon which Dr. Afifi based his conclusions.

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conclusions1

2 MR. PATON: Mr. Chairman, Mr. Budzik is in the room.
3 He's the man who has the information. I don't know why we
4 keep on speculating. Why don't we just get the answer?

(Discussion had off the record.)

5 CHAIRMAN BECHHOEFER: Could we ask Mr. Budzik just
6 that question? If he knows.

7 MR. STEPTOE: Let me ask Mr. Budzik.

(Discussion had off the record.)

8
9 MR. STEPTOE: We'll be willing to put Mr. Budzik up
10 on the stand, but both Mr. Budzik and Mr. Schaub both of
11 whom were at that meeting, assert that there was no report
12 in existence at that time, no written report in existence
13 at that time.

14 MR. PATON: Mr. Chairman, I would suggest that in
15 the context of all we've heard in the last 45 minutes that
16 that sounds certainly worth a few more questions than that
17 assertion. That seems at least unusual. And I would like
18 to ask Mr. Budzik a few questions.

19 CHAIRMAN BECHHOEFER: Yes, I think that would be
20 desirable if he could do that.

21 MR. STEPTOE: We're willing to put Mr. Budzik or Mr.
22 Schaub, but preferably Mr. Budzik up on the stand at the
23 conclusion of the Staff's testimony.

(Discussion had off the record.)

24
25 CHAIRMAN BECHHOEFER: I'd just open the inquiry

1 whether it would be better to interrupt the Staff's testimony.
2 It could save some time on cross examination to have the
3 factual basis for questions.

4 MR. PATON: I agree, Mr. Chairman.

5 CHAIRMAN BECHHOEFER: A lot of these questions
6 are quite hypothetical.

7 MR. STEPTOE: I disagree, Judge Bechhoefer. That
8 gives the Staff a privileged position in this proceeding.

9 MS. STAMIRIS: I think it would be helpful, because
10 in the proceeding before it has always been difficult when
11 I have to ask questions in the hypothetical like if such and
12 such a document was in existence, and I think it would be a
13 simple matter to clear it up at this point, and I think it
14 would expedite the cross examination on the whole subject if
15 we got that established first.

16 (Discussion had off the record.)

17 CHAIRMAN BECHHOEFER: Well, I guess we will wait
18 to hear from Mr. Budzik, but we will allow the questioners
19 to make various assumptions in asking questions. And, as an
20 alternative, we could have the Applicant's witness appear
21 briefly to clear that up, but we won't insist on it. But
22 we will allow certain assumptions to be made.

23 MR. STEPTOE: As long as the assumptions are clearly
24 stated in the question, Applicant will not object to that
25 procedure.

1 MR. PATON: Mr. Chairman, could I suggest that this
2 is putting form way ahead of substance. I mean, you were
3 absolutely correct when you said the appropriate way to go
4 is to put Mr. Budzik up and ask him a few simple questions.
5 We've all been spending about the last 30 or 45 minutes on
6 one very simple question, and that is what did the Applicant
7 know when he came to that meeting.

8 Mr. Budzik is here. To proceed with hypothetical
9 questions, and all that, and then get to Mr. Budzik is simply,
10 in my opinion, wasting a lot of time.

11 MR. STEPTOE: Judge Bechhoefer, I have another
12 suggestion, which is if the Staff witnesses will be excluded,
13 then I will put my witnesses up on the stand.

14 MR. PATON: Absolutely. We'd be very glad to have
15 the Staff witnesses excluded so that we don't take any unfair
16 advantage of the Applicant, as Mr. Steptoe says.

17 We would request that they be excluded just to
18 make sure that he doesn't have any undo concern about that.

19 (Discussion had off the record.)

20 CHAIRMAN BECHHOEFER: If we do that, which is
21 perfectly, I think, acceptable, we would have to -- the
22 questioners would have to -- well, I'm not sure whether the
23 answer would come out that way or not.

24 (Discussion had off the record.)

25 CHAIRMAN BECHHOEFER: Well, through further

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questioning of the Staff.

MR. STEPTOE: I certainly would like to talk to
 my witnesses before I put them up there, though.

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1 (Discussion had off the record.)

2 CHAIRMAN BECHHOEFER: We were thinking the best
3 course of action would be to adjourn for the evening at the
4 present time, start up tomorrow morning with the Applicant's
5 witness or witnesses.

6 Now, if you think both of them should be on,
7 that's perfectly okay. That would be with the Staff witnesses
8 excluded. Then we would resume the Staff.

9 MS. STAMIRIS: Would my questioning of the Applicant's
10 witnesses be limited to that one question, you know, about
11 whether the study was in existence and then I would have a
12 chance -- I mean, would I be able to examine their -- what
13 knowledge, let's say, they brought to the meeting on March
14 3rd, 1982, beyond just that one specific question? Obviously
15 it would have to relate to at least.

16 MR. PATON: Mr. Chairman, I would like to
17 suggest, I certainly think it wouldn't be limited to one
18 thing. I think we should be allowed to explore what Mr.
19 Budzik's knowledge was.

20 CHAIRMAN BECHHOEFER: I was certainly thinking in
21 terms of various -- I certainly wouldn't limit it to whether
22 the final report -- if there was a draft, draft one, draft
23 two, draft six, or had they been circulated, that kind of
24 thing, that kind of question, of course.

25 It would depend how far beyond that. I wouldn't

1 make any commitments beyond that type of thing.

2 MR. STEPTOE: I assume we'd be putting the witness
3 up to talk about more than just the existence of the report,
4 but that the issue would be the stated knowledge they brought
5 with them to that meeting.

6 MR. PATON: Mr. Chairman, in fairness to the
7 Applicant, I think obviously he can conduct whatever direct
8 examination he wants.

9 CHAIRMAN BECHHOEFER: Of course, of course. I
10 think we should follow that procedure. We also think it
11 would be a good idea to start at 8:30 tomorrow rather than
12 9:00, just in the hope that we can -- I don't know that we'll
13 be able to finish everything, but we'll give it a try.

14 MR. PATON: Mr. Chairman, could I address that?

15 CHAIRMAN BECHHOEFER: Yes.

16 MR. PATON: If we're --

17 CHAIRMAN BECHHOEFER: If you have any objection to
18 that --

19 MR. PATON: If we're about to adjourn, if we finish
20 with the loose sands matter and we get onto the steam tube
21 contention, is there -- we do have two water hammer witnesses
22 here.

23 Is it still possible that we might reach that water
24 hammer contention? I guess it's possible.

25 Could we ask Mrs. Sinclair, I think that's probably

1 the critical factor is Mrs. Sinclair's cross examination of
2 our witness.

3 CHAIRMAN BECHHOEFER: We can go off the record
4 for a moment.

5 (Discussion had off the record.)

6 CHAIRMAN BECHHOEFER: Back on the record. The
7 Board has decided after discussion with the parties, the
8 Board has decided that after completing the loose sands matter,
9 which will take place at the beginning of the session
10 tomorrow, we will go on next to the water hammer contention
11 and then if we have time we will start the steam generator
12 tube contention.

13 We will resume tomorrow at 8:30 A.M.

14 (Whereupon adjournment was
15 taken in the above entitled
16 cause at 6:25 P.M., to resume
17 at 8:30 A.M. the next day,
18 Friday, February 18, 1983.)
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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

NUCLEAR REGULATORY COMMISSION

in the matter of: CONSUMERS POWER COMPANY (Midland Plant,
Units 1 & 2)

Date of Proceeding: February 17, 1983

Docket Number: 50-329 & 50-330 OM & OL

Place of Proceeding: Midland, Michigan

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

Pauline James & Associates

Official Reporter (Typed)

Pauline James

Official Reporter (Signature)