

ORIGINAL

OFFICIAL TRANSCRIPT
PROCEEDINGS BEFORE

NUCLEAR REGULATORY COMMISSION

DKT/CASE NO. 50-329 OL & OM
50-330 OL & OM
TITLE Consumers Power Company
Midland Plant, Units 1 & 2
PLACE Midland, Michigan
DATE December 7, 1982
PAGES 10346 thru 10597

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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 : Docket Nos. 50-329 OL
 9 : 50-330 OL
 10 -----x

11 Midland County Courthouse
 12 301 West Main Street
 13 Midland, Michigan 48640

14 Tuesday, December 7, 1982

15 Evidentiary hearing in the above-entitled matter
 16 was resumed pursuant to adjournment, at 9:15 a.m.

17 BEFORE:

18 CHARLES BECHHOEFER, Esq., Chairman
 19 Administrative Judge
 20 Atomic Safety and Licensing Board

21 DR. FREDERICK P. COWAN, Esq., Member
 22 Administrative Judge
 23 Atomic Safety and Licensing Board

24 DR. JERRY HARBOUR, Esq., Member
 25 Administrative Judge
 Atomic Safety and Licensing Board

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C O N T E N T S

<u>WITNESS</u>	<u>DX</u>	<u>CX</u>	<u>BD</u>	<u>RDX</u>	<u>RCX</u>
RALPH B. PECK					
by Mr. Marshall		10359			
by Mr. Paton		10380			
by Judge Cowan			10408		
by Chairman Bechhoefer			10410		
by Judge Harbour			10428		
by Chairman Bechhoefer			10435		
by Judge Cowan			10438		
by Chairman Bechhoefer			10440		
by Mr. Miller				10444	
by Ms. Stamiris					10455
by Ms. Sinclair					10481
by Mr. Marshall					10502
by Mr. Paton					10504
Mr. Chairman Bechhoefer			10508		
by Ms. Stamiris					10510
by Ms. Sinclair					10513
JOSEPH KANE					
by Mr. Paton	10520				
by Ms. Stamiris		10523			
by Mr. Marshall		10538			
by Mr. Miller		10564			
by Chairman Bechhoefer			10573		
by Ms. Stamiris		10584			
by Mr. Brunner				10590	
by Chairman Bechhoefer			10591		
by Ms. Stamiris					10596
DARL S. HOOD					
by Mr. Paton	10519				
by Ms. Stamiris		10545			
by Mr. Marshall		10559			
by Mr. Miller				10565	
Afternoon Session		10444			
Evening Session		10564			

E X H I B I T S

For Identification Received

Staff Exhibit No. 16 10404

P R O C E E D I N G S

1
2 CHAIRMAN BECHHOEFER: Good morning ladies and
3 gentlemen. Before we resume this morning, are there any
4 preliminary matters including -- are we going to be
5 advised about the meeting last night?

6 MR. PATON: Yes, Mr. Chairman.

7 CHAIRMAN BECHHOEFER: You may proceed. Why
8 don't you begin with that.

9 MR. PATON: Well we met and Mr. Kane talked
10 to Dr. Peck and the agreement was that the information
11 needs to be studied a little further, so I expect to ask
12 Dr. Peck some questions and demonstrate what we are
13 interested in. I expect that I will ask him a question
14 and I expect that he will say that he wants the opportunity
15 to look at it a little further and then the record will
16 show what the subject is and then we are going to
17 indicate to the Board that Dr. Peck is going to take a
18 look at it and send us the information and we are going
19 to take a look at it and then we will reply. And that
20 way, the record will be complete.

21 It has to do with additional settlement. What I
22 am saying is that the record will be clarified, I hope,
23 when I get through asking Dr. Peck some questions.

24 CHAIRMAN BECHHOEFER: All right. Are there
25 other preliminary matters?

1 MR. STEPTOE: Chief Judge Bechhoefer, on an
2 unrelated matter -- I suppose the Board already knows
3 this -- but last week the Supreme Court granted
4 certiorari in the Table S-3 case which means they have
5 agreed to hear the appeal and that that of course will
6 continue to stay the effectiveness of the Court of
7 Appeals' decision pending that review by the Supreme
8 Court.

9 CHAIRMAN BECHHOEFER: I had heard that although
10 I have not seen it in writing. But I have heard that.

11 MR. PATON: There is another preliminary
12 matter, Mr. Chairman, and that is I think we should
13 discuss the order of witnesses.

14 We had requested -- the plan I think was when
15 Dr. Peck finished, that we would proceed with the
16 Applicant's case, their structural case. The Staff has
17 asked the Applicant if we could put Mr. Kane on following
18 Dr. Peck and that they hold off on their structural
19 witness until after Mr. Kane has completed his testimony.
20 They have agreed to this.

21 MR. STEPTOE: That is correct,
22 Chief Judge Bechhoefer. The Staff has also agreed to
23 recall Mr. Kane, if necessary, for cross-examination on
24 one issue which more properly relates to the structural
25 analysis of the building and the input parameters for

1 that structural analysis. It simply will be very
2 difficult to cross-examine before the structural
3 witnesses had explained --

4 CHAIRMAN BECHHOEFER: Would you plan to present
5 Mr. Kane with some of your structural witnesses,
6 Mr. Rinaldi --

7 MR. PATON: We did not plan to do that. If
8 that becomes necessary and the Board wants to do it that
9 way, we would do it but we did not plan to do it that
10 way.

11 CHAIRMAN BECHHOEFER: I see.

12 MR. PATON: Mr. Chairman, also, could we ask
13 the Applicant if they have been able to produce these
14 stipulations that we have been discussing? I would like
15 to take care of that near the beginning of our
16 discussion on the Diesel Generator Building instead of
17 waiting until the -- I have not seen it in its present
18 condition yet.

19 Can we ask when that will be produced?

20 MR. MILLER: Right now.

21 MR. PATON: That's great.

22 CHAIRMAN BECHHOEFER: Is this going to be
23 Joint Exhibit 5?

24 MR. PATON: I expect so, Mr. Chairman, yes.
25 I want a chance to read it in its present condition. I

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suggest that we proceed and we will have a chance to
 look at this probably a little later and offer it into
 evidence but I would like to read it.

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CHAIRMAN BECHHOEFER: All right, fine. Any further preliminary matters?

MS. SINCLAIR: Yes, I would like to comment on a matter in which these hearings are being conducted.

Dr. Peck was permitted to delete a portion of his testimony at the last minute. That testimony had everything to do with advancing the theory that he had relied on for his predictions, the casagrande theory. He spoke of it in numerous times throughout his text and this altered in a significant way, the basis on which cross examination could be pursued.

Dr. Harbour stated that these deletions were made known to us in a conference call on Friday, December 3rd. This still gives us only three hours of one working day before 9:00 o'clock a.m. Monday morning, or yesterday, to realize our cross examination.

The Federal Code requires that testimony on which cross examination will take place, should be filed at least five days ahead of time, that is 10 CFR Part 2 and Appendix 5, Section 2.

In the text, and which was admitted on pages 24 and 25, Dr. Peck speaks most favorably about the casagrande, four times on page 24 and at least three times on page 25. The large sections deleted from Dr. Peck's testimony indicated his approval of the

1 casagrande theory. He also deleted all the Woodward
 2 and Clyde curves from his testimony which he relied on in
 3 part and discussed it in his testimony as being developed
 4 according to the standard casagrande theory.

5 When I attempted to point to those tables in
 6 the revised testimony, of course I couldn't find them
 7 and this accounts for the snickering on the part of the
 8 Applicant's counsel and Dr. Peck when I attempted to
 9 point to those as an example of reliance on the casa-
 10 grande theory. Dr. Peck of course would know that since
 11 I had Dr. Anderson for a consultant, that Dr. Anderson
 12 had studied with Dr. Seed. Dr. Seed is an outstanding
 13 expert on soil mechanics at the University of California
 14 at Berkley. Dr. Seed is opposed to the use of the
 15 casagrande theory; and therefore, it is Dr. Peck's best
 16 interest to cull that part of the testimony of fact out
 17 of his testimony.

18 Dr. Anderson had advised me on what the short-
 19 comings were on the casagrande theory and I was pursuing
 20 my cross examination on that basis.

21 Furthermore, I have additional information but
 22 I cannot give it to the Board at this time but Dr. Seed,
 23 who is an outstanding expert on seismic analysis in
 24 California, and he has many reasons to be concerned
 25 about soil mechanic analysis. He would not agree at all

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2 and Clyde curves from his testimony which he relied on in
3 part and discussed it in his testimony as being developed
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10 grande theory. Dr. Peck of course would know that since
11 I had Dr. Anderson for a consultant, that Dr. Anderson
12 had studied with Dr. Seed. Dr. Seed is an outstanding
13 expert on soil mechanics at the University of California
14 at Berkley. Dr. Seed is opposed to the use of the
15 casagrande theory; and therefore, it is Dr. Peck's best
16 interest to cull that part of the testimony of fact out
17 of his testimony.

18 Dr. Anderson had advised me on what the short-
19 comings were on the casagrande theory and I was pursuing
20 my cross examination on that basis.

21 Furthermore, I have additional information but
22 I cannot give it to the Board at this time but Dr. Seed,
23 who is an outstanding expert on seismic analysis in
24 California, and he has many reasons to be concerned
25 about soil mechanic analysis. He would not agree at all

1 on Dr. Peck's evaluation, that is, that seismic analysis
2 would have nothing to do with secondary settlement.

3 I will try to bring those references and any
4 information to this Board I received. Thank you.

5 MR. MILLER: I would just like to respond very
6 briefly. First of all --

7 CHAIRMAN BECHHOEFER: I was going to say one
8 thing, simply, I think you have drastically misunderstood
9 Dr. Peck's testimony that we not only have received but
10 that we got before, did not ever rely on casagrande,
11 either theory or methodology, whichever you determine.
12 There was no reliance -- in fact, it was very critical
13 of that and what was deleted was a portion which was
14 critical of that theory.

15 The portions you have cited are the relation-
16 ship to the particular type of instrument -- piezometer
17 which Dr. Casagrande apparently developed. That still
18 remains but that doesn't relate at all to the matter for
19 which was deleted which was critical of Dr. Casagrande,
20 was not -- Dr. Peck, as far as I understood it, never
21 relied on all of that, so that I wonder if you are
22 listening to the testimony.

23 There was never any reliance on it. It was
24 critical, as I have read it at least --

25 MS. SINCLAIR: Ahl of these Woodward and Clyde

1 tables, consolidation test tables, were developed accord-
2 ing to --

3 CHAIRMAN BECHHOEFER: He was criticizing that.
4 That was in there because he thought it was not a good
5 system; not because he was relying on the system. That
6 is the way I read it. Now if I am misreading it, I
7 would like to be told. Mr. Miller, maybe you can add
8 further comments. My understanding was that Dr. Peck
9 never relied on it at all. I am a layman who is listen-
10 ing to this testimony and reading it, but it is my under-
11 standing of it.

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it.

1 MR. MILLER: Mr. Chairman, I think that your
2 understanding and mine certainly coincide. I would like
3 to first state that I am not aware of any snickering that
4 is going on with respect to the examination by Miss
5 Sinclair at any time nor by any other Intervenor. Further-
6 more, I think that everybody has been most solicitous of
7 the Intervenors, despite repeated interruptions when other
8 people are talking, which is a characteristic that Miss
9 Sinclair has in the way she conducts herself in these
10 proceedings.

11 So I resent and absolutely reject the notion
12 that there has been any impoliteness shown to her or any
13 other intervenors in the conduct of these proceedings.

14 Second of all, with respect to the scope of
15 cross examination, the deletion of the material, the
16 testimony that was circulated to the Board and the parties
17 on November 15th, was substituted. There was substitution
18 made for it. There is a paragraph, 4.3 in the testimony
19 as admitted on page 80, of Dr. Peck's testimony which I
20 believe, he would testify, if asked, is a capsule version
21 of the detail that he went into in the original version
22 of his testimony. I believe that Judge Bechhoefer is
23 quite correct, although Dr. Peck is certainly available,
24 to answer questions about it, in asserting that the Casa-
25 grande instructions that were used as a result -- were

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derived as a result of the NRC request forwarding program,
are not the basis for his opinion.

And indeed, the summary paragraph on page 80 so
states. I think that Dr. Peck is available and has been
available for cross examination on the basis for his
opinion, and I believe there's been complete compliance
with the requirements with respect to the testimony and
the scope of permissible cross examination.

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MS. SINCLAIR: I would like to state in my own behalf that I have been aware of numerous instances when counsel for the Applicant has discredited through their actions and their attitudes and attempted to discredit what I was talking about in that fashion. And, given the fact that we appear here at a greatly prejudiced position in terms of professional assistance -- that is, we have no lawyers, we have no expert witnesses -- we are attempting to deal with topics of great importance to this community and to our lives and to our families.

I feel that I need to express my desire that counsel should conduct themselves with the kind of decorum that they claim they are conducting themselves with for the benefit of the record and that this should be a reality in these hearings.

Thank you.

CHAIRMAN BECHHOEFER: Any further matters?

MR. MARSHALL: Well, I might just say, Judge, that I live so far into the woods that I fail to see the forest for the trees, inclusive of the well-worn family tree, the Bar Association.

CHAIRMAN BECHHOEFER: Well, let's resume cross-examination of Dr. Peck.

Mr. Marshall, you're first up this morning.

MR. MARSHALL: Thank you very much, Judge.

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1 It's been a long time, hasn't it, Dr. Peck?

2 DR. PECK: Over a year.

3 Whereupon,

4 RALPH B. PECK,

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

8 CROSS-EXAMINATION

9 BY MR. MARSHALL:

10 Q To get things off to the right start this time,
11 for the record, you do not have a plane to catch today,
12 do you?

13 A That is right.

14 Q All right. So we can sort of just kind of
15 move along? Because I am not in any hurry.

16 A I wouldn't want to push it that far.

17 Q Well, I don't want to excite you or get you
18 overexcited, or anything like that, because I'm just a
19 farm boy, like I told you.

20 Now, Doctor, I want for my first question to
21 ask you, last night I spent a great deal of the night
22 reading your symposia and gave a good portion of that
23 time to it, so that's why I say I'd like to just kind of
24 go a little easy.

25 Doctor, would you tell me for my first question,

2-1-3 1 what assumptions have you made in this matter, Doctor?

2 MR. MILLER: I'm sorry. I hate to object to
3 the very first question, but it's so vague. Can't we be
4 a little bit more precise than what --

5 MR. MARSHALL: I'll get to that, if you'll let
6 him answer the question.

7 MR. MILLER: I don't know how the witness can
8 answer that question.

9 MR. MARSHALL: He can answer it very easily.

10 MR. MILLER: Since he has over 80 pages of
11 prepared testimony with him --

12 MR. MARSHALL: You're hurting yourself,
13 counsellor.

14 This is cross-examination, Judge. I'll get to
15 that, if you will just give me a chance.

16 I think Ms. Sinclair very aptly put it just a
17 few moments ago, counsellor.

18 MR. MILLER: Well, I am not going to permit,
19 without protecting the record, a witness to be harassed
20 on questions that are so vague --

21 MR. MARSHALL: I will not harass the witness.

22 CHAIRMAN BECHHOEFER: I don't think the witness
23 can really answer that question without almost reading
24 his entire testimony.

25 I think you'll have to be more precise.

1 MR. MARSHALL: I'll be very precise.

2 CHAIRMAN BECHHOEFER: Assumptions on what
3 subject?

4 MR. MARSHALL: I just wanted him to answer the
5 question any way he wanted to answer it.

6 I'll get to that, and you'll find out I'm not
7 just asking questions --

8 CHAIRMAN BECHHOEFER: I think you'll have to
9 make it more precise as to what areas, because there are
10 thousands of assumptions in this testimony.

11 MR. MARSHALL: Thank you. That's one of the
12 things that I wanted you to get to, both you and
13 counsellor over here.

14 Very good.

15 CHAIRMAN BECHHOEFER: I'm just taking a number
16 off the top of my head, but there are many, many
17 assumptions --

assumptions

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MR. MARSHALL: That's good that he made a similar observation.

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CHAIRMAN BECHHOEFER: No, I think he can't answer the question as you've asked it. Now, you can pin it down a little bit --

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MR. MARSHALL: I'm confident that the doctor could answer it, but we'll strike that question. I will go to my next question.

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BY MR. MARSHALL:

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Q Now, Doctor, as I said before, I read your entire symposium regarding the Diesel General Building, and after struggling through a great deal of strange terms, you admit on page 37 -- and that starts down in the transfer reference, and in particular down -- I want you to read that down there which starts "the reference points". I want you to read that for the record, on page 37. And with the word load.

18

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MR. MILLER: Beginning with the word "Therefore"?

20

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MR. MARSHALL: No, it begins with -- yes, that's correct. Yes. Yes.

22

I want him to read that into the record.

23

24

MR. PATON: Judge, could I ask again, what is the starting place?

25

MR. MARSHALL: It's on page 37 and it's down

1 eight from the bottom. It starts with therefore.

2 MR. PATON: Okay. Thank you.

3 MR. MARSHALL: And it stops with load, and I
4 want you to read that into the record, Doctor.

5 BY THE WITNESS:

6 A (Reading)

7 "Therefore, the reference points on the
8 building walls, even without correction, are
9 the best indicators of the progress of settle-
10 ment under the surcharge load."

11 BY MR. MARSHALL;

12 Q Thank you. Now, Doctor, this is my question:
13 Doctor, isn't it true that this discovery could be made
14 by anyone?

15 A I should think so.

16 Q Thank you. Two: Would you say that it requires
17 a Ph.D. or an expert for your conclusion?

18 A No, although I don't suppose that would be a
19 disadvantage either.

20 Q I didn't ask you that, Doctor. I asked, Doctor,
21 if it requires a Ph.D. or an expert to arrive at this
22 conclusion.

23 JUDGE HARBOUR: He answered the question.

24 CHAIRMAN BECHHOEFER: Yes, he answered the
25 question.

1 MR. MARSHALL: Yeah, he answered it, but he said--
2 well, all right, he qualified it a little bit different
3 than I thought he should, because I'm a farm boy, and I
4 want you to keep remembering that.

5 BY MR. MARSHALL:

6 Q Three: Doctor, let's turn to page 39. It's
7 entitled Interpretation of Settlement Data. I would like
8 to have you read, it says here, "Significant information
9 concerning the characteristics of a settlement --" I
10 want you to read this statement aloud into the record.

11 MR. MILLER: Excuse me. These matters are already
12 in the record.

13 MR. MARSHALL: That's all right.

14 MR. MILLER: Well, but why burden the record
15 with having him read it in again, Mr. Marshall?

16 MR. MARSHALL: I'll get to that if you just give
17 me an opportunity. You've all -- you've out-guessed me
18 all the way along, all of you, and you're experts and
19 I'm not. Give me a chance, will you. Maybe we might
20 learn something.

21 MR. MILLER: How many sentences do you want him
22 to read into the record?

23 MR. MARSHALL: I just want him to start and read--
24 I want him to read that statement out loud, this statement
25 right here, "The most significant information concerning" --

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CHAIRMAN BECHHOEFER: The first sentence?

MR. MARSHALL: The characteristics of the settle-
ment.

And I want you to read the statement aloud into
the record.

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1 JUDGE HARBOUR: The first sentence you're
2 referring to, Mr. Marshall?

3 MR. MARSHALL: Yes, on the Diesel Generator
4 Building, and the surcharge. I want him to read that into
5 the record.

6 BY MR. MARSHALL: ~~MR. MARSHALL~~

7 Q These portions I want you to -- I want to bring
8 this to your attention later at some point in time.

9 (Discussion off the record.)

10 MR. MARSHALL: I'm not clouding up the record,
11 if that's what you're afraid of. And we're not going to
12 be long here.

13 CHAIRMAN BECHHOEFER: Okay, we'll allow him to
14 do it this time. But not too many of these sentences --

15 MR. MARSHALL: Oh, all right.

16 CHAIRMAN BECHHOEFER: -- because they are
17 already in the record.

18 MR. MARSHALL: I understand, but I just want
19 to pick this out for the Board later.

20 CHAIRMAN BECHHOEFER: All right. Well, you can
21 do it by cross-referencing, too, by just having him refer
22 and asking him to refer to a certain sentence.

23 But we'll let him read this one in, if you want
24 him to.

25

1 BY THE WITNESS:

2 A "The most significant information concerning the
3 characteristics of the settlement of the Diesel Generator
4 Building under the surcharge loading is contained in the
5 semi-logarithmic plots contained in Responses to NRC
6 Requests Regarding Plant Fill, Supplemental Figures 27-52
7 through 27-77, in which the linear relationship between
8 settlement and logarithm of time is clearly shown between
9 about Days 100 and 200."

10 BY MR. MARSHALL:

11 Q Okay, now let's turn to Page 50. On the seventh
12 line, second paragraph, Page 50, starting with inferences

13 A The remainder of the paragraph?

14 Q No. Doctor, I have found some assumptions you
15 have made at this point. Would you pick out those
16 assumptions, please?

17 A Yes, these particular inferences are with
18 respect to the base level for piezometric pressures,
19 which, as I said, was not exactly known because the
20 surcharge existed.

21 Q Well, Doctor, could you go to the blackboard
22 there and draw that out for us on the blackboard?

23 MR. MILLER: Excuse me. I don't believe
24 Dr. Peck had concluded his answer.

25 CHAIRMAN BECHHOEFER: Wait until he finishes.

2-3-3 1 MR. MARSHALL: Okay.

2 BY THE WITNESS:

3 A (Continuing) One assumption -- one possibility,
4 let us say, was that the normal ground water level without
5 any surcharge would have been about three feet below pond
6 elevation, and that assumption has certain justifications
7 which I have mentioned.

8 And a second assumption is that the relation
9 between ground water and time during this period from when
10 January to the end of May has the same variation with
11 respect to time as the variation in level of the pond
12 but that the actual values at the beginning and the end
13 of this time period are the ones that were measured in
14 the piezometers.

15 Those two assumptions gave two possibilities
16 for the variation of base level, base ground water level
17 with time during that period of the surcharge, and they
18 appeared to me to be reasonable limiting assumptions.
19 The real variations should have been somewhere between
20 those two.

to

1 BY MR. MARSHALL:

2 Q Are you through, Doctor?

3 A Yes, sir.

4 Q Can you go to the blackboard now and indicate
5 on the blackboard the inferences that can be drawn on
6 the basis of reasonable limiting assumptions? Can you
7 draw that out for us on the blackboard?

8 MR. MILLER: I object. I see no reason to
9 have Dr. Peck put either words or figures on the
10 blackboard at this point in time. It is simply
11 irrelevant to anything before this Board, unless
12 Mr. Marshall can indicate what this exercise --

13 MR. MARSHALL: Well, I'll try, if I can have --
14 this is cross-examination, and anything that's done on
15 direct examination -- and certainly this is direct
16 testimony -- I can certainly examine, I would think.

17 MR. MILLER: Yes, but I believe it's improper
18 to require a witness to perform calculations or to draw
19 charts or diagrams on cross-examination.

20 MR. PATON: Mr. Chairman, I think that I might
21 agree with Mr. Marshall if he could demonstrate to the
22 Board that the only -- that whatever point he's trying
23 to make is relevant, and then that the only way he can
24 make it is to have the witness go to the board and draw it
25 on the board.

1 MR. MARSHALL: Thank you.

2 MR. PATON: I mean, I think he should first
3 clarify exactly where he's going. And then, if that's
4 relevant, the Board could deal with it.

5 MR. MARSHALL: It will become very apparent
6 in the next just very few seconds here, very few minutes.
7 I'm not going to have a long dissertation here today.
8 We're not going to -- I'll be over very shortly.

9 MR. PATON: I'm asking the Board to ask you
10 to state for the record where you're going.

11 CHAIRMAN BECHHOEFER: I think you ought to do
12 that, because --

13 MR. MARSHALL: Well, I'm going to conclude this
14 cross-examination in just a very few minutes, after he's
15 done this. I'll probably ask one more question. Maybe
16 two.

17 CHAIRMAN BECHHOEFER: No, but what I'm saying
18 is why will drawing anything on the board lead to
19 anything --

20 MR. MARSHALL: It would help to clarify the
21 questions that he's made on his assumptions so that we
22 can best understand him.

23 We're not experts. I've been telling you over
24 and over. You have to draw pictures for us.

25 We're Intervenors.

1 MR. MILLER: Yes, and in response to the
2 Intervenor's contentions, a good deal of talent has been
3 assembled by both the Staff and the Applicant to respond
4 to the concerns that are a basis for that.

5 MR. MARSHALL: Not from me. I haven't caused
6 any grief.

7 Would you say that?

8 All right then, please.

9 MR. MILLER: Might I just -- excuse me for one
10 second, Mr. Marshall.

11 Dr. Peck, if you would look at Figure C-29 in
12 your appendix, is that a pictorial representation of the
13 data that you have been referring to?

14 THE WITNESS: Yes, that is.

15 MR. MARSHALL: Well, how are you going to rule
16 on it, Judge? I'll accept your ruling either way you
17 call it.

18 CHAIRMAN BECHHOEFER: Well, if you were asked
19 to go to the board and write something or draw something,
20 would this be about what you would try to do?

21 THE WITNESS: Yes, sir, that's right.

22 MR. MARSHALL: That's satisfactory.

23 CHAIRMAN BECHHOEFER: I don't think he has to
24 do that then.

25 MR. MARSHALL: That's satisfactory. We won't

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have to duplicate services then. Very good.

MR. MILLER: We're helping you out.

MR. MARSHALL: Very good.

I told you I was a farm boy. You Chicago high-priced lawyers help once in a while even at that.

2-5fol

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that

1 BY MR. MARSHALL:

2 Q Now, Doctor, it says here that inferences can
3 be drawn on the basis of reasonable limiting assumptions,
4 correct?

5 A That's right.

6 Q Now, as far as I can see, Doctor, in this entire
7 work, you have made three assumptions. Doctor, those are
8 your only assumptions. Could there be any more for such
9 an important situation?

10 That's my question.

11 MR. PATON: I object unless he asks the witness
12 whether he agrees that those three assumptions were the
13 only assumptions he made.

14 That's a premise that I don't think the record
15 has established.

16 MR. MARSHALL: Well, the record doesn't reflect
17 that there's any other than these three.

18 MR. PATON: Well, if he would ask the witness --
19 I think the witness is the one that should --

20 MR. MARSHALL: Well, I tried that in the first
21 place.

22 CHAIRMAN BECHHOEFER: You asked it differently.
23 Ask him if those three are the only assumptions.

24 BY MR. MARSHALL:

25 Q Well, Doctor, are these the only three

2-5-2
1 assumptions that appears in your work?

2 A No, I'm quite sure they're not.

3 Q Can you show me some others?

4 Like I said, I spent the biggest part of last
5 night reading your work.

6 MR. PATON: I object, Mr. Chairman. I can't
7 conceive of the purpose of Dr. Peck leafing through his
8 testimony and demonstrating additional assumptions that
9 he made.

10 I'm not sure what purpose it would serve.

11 MR. MARSHALL: Well, now, let's see. We'll
12 wait for the ruling.

13 CHAIRMAN BECHHOEFER: I think we'll have to
14 sustain that one.

15 MR. MARSHALL: Very well.

16 CHAIRMAN BECHHOEFER: I think there are a
17 number of other assumptions, but --

18 MR. MARSHALL: Then we'll go on to a little
19 more further.

20 BY MR. MARSHALL:

21 Q Let's see if we can find the assumptions. Let's
22 turn to Page 51. I'd like to have you read the second
23 paragraph on Page 51 into the record.

24 MR. MILLER: Mr. Marshall, will it help if I
25 stipulate what the word assumption appears in that

1 paragraph? Will that be sufficient identification for
2 the record, without having Dr. Peck reread testimony --

3 MR. MARSHALL: No, no. There's something else
4 that I'm interested in here, rather than assumptions,
5 right now.

6 MR. MILLER: It is a matter of record,
7 Mr. Marshall.

8 MR. MARSHALL: It's in the record, but --

9 BY MR. MARSHALL:

10 Q Well, I'll just ask you, you see, in paragraph --
11 I want to take my time here.

12 Second paragraph, Page 51. It appears you have
13 disregarded all your assumptions on that paragraph,
14 Doctor.

15 A Is that a question, sir?

16 Q Yes.

17 A By the second paragraph, do you mean the one
18 that begins with irrespective or the one that begins with
19 in summary?

20 Q The one -- the assumption it is equivalent to
21 stating that there was no excess pressure, then going
22 down, "irrespective of choice or limiting assumptions,"
23 and to the end of that sentence.

24 Can you read that, "irrespective of choice,"
25 starting there, and end up with "should not be expected"

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into the record.
A "Irrespective of choice of limiting assumptions, the hatched areas correspond well with the times at which maximum settlements were initiated. Since the settlement curves are influenced by the rigidity of the structure, whereas the piezometers represent point measurements, an exact correlation should not be expected."

Q That's correct. That's all I wanted to know. And I'm saying -- and my question is that isn't it true that it appears that you disregarded all of your assumptions there?

A No, what this says is that having made two limiting assumptions within which the actual situation ought to fall because they are limiting assumptions, you get about the same answer either way. And that means, then, that one can accept the results or the conclusions that it draws from either of these assumptions.

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1 Q Now, Doctor, Mary Sinclair said that there's
2 been people snickering at her in this courtroom. You
3 weren't here at all the times she was referring to, but
4 the judges have been here.

5 Now, this is a qualifying thing I'm doing now.
6 I'm not going to let Mary Sinclair ask this question,
7 nor am I going to let Barbara Stamiris, sitting next to
8 her. But I'm going to ask you will you answer one
9 question -- and I'm not trying to be facetious -- for
10 me, just one last question.

11 CHAIRMAN BECHHOEFER: Ask the question and
12 find out.

13 MR. MARSHALL: Well --

14 CHAIRMAN BECHHOEFER: You've got to ask the
15 question.

16 MR. MARSHALL: Like I said, I'm not being
17 facetious --

18 CHAIRMAN BECHHOEFER: I know.

19 MR. MARSHALL: -- and I don't want to hear
20 an objection.

21 BY MR. MARSHALL:

22 Q What way is north?

23 Hold it.

24 MR. MILLER: Excuse me. I'm going to object.
25 This is really getting to the point --

2-6-2

1 MR. MARSHALL: I'm taking exception.

2 MR. MILLER: -- where we are not even close to
3 an orderly proceeding which is designed to develop
4 information which is going to be of use to the Board.

5 MR. MARSHALL: This is my last question. I'm
6 taking exception. I probably won't even do any redirect
7 unless you make it nasty.

8 MR. MILLER: Excuse me, Mr. Marshall.

9 Judge Bechhoefer, it seems to me that the Board,
10 and certainly on behalf of the Applicant, have been
11 really quite forbearing in terms of objections, but
12 we're really just cluttering up the record with total
13 irrelevancies.

14 MR. MARSHALL: Judge, I take exception to his
15 objection, and I want to say this, that a man that can
16 make all of these predictions and all of these
17 assumptions and all these logarithms certainly ought to
18 know north from south, and I will not let Mary Sinclair
19 nor Barbara Stamiris help me out. I want him to answer
20 that one question and that's the conclusion of my
21 cross-examination.

22

23

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25

1 MR. PATON: Mr. Chairman, I would like to --

2 CHAIRMAN BECHHOEFER: It has to be relevant.

3 MR. MARSHALL: It is relevant.

4 CHAIRMAN BECHHOEFER: You have to explain why
5 all of --

6 MR. MARSHALL: It is relevant. It is relevant to
7 my entire examination.

8 CHAIRMAN BECHHOEFER: How?

9 MR. MARSHALL: Because it is assumption. Now
10 I know where north and south is, and I'm not asking the
11 Court if they know. I'm asking the expert if he knows,
12 in this room, and which way he indicates north to be.

13 MR. PATON: Mr. Chairman, I would like to show
14 that the Staff also objects to that question because we
15 can't see its relevance to the issue.

16 MR. MARSHALL: The thing is, he could base it
17 upon an assumption, couldn't he?

18 CHAIRMAN BECHHOEFER: Why I think that', --

19 MR. MARSHALL: He could say he doesn't know,
20 couldn't he?

21 CHAIRMAN BECHHOEFER: I don't think it is rele-
22 vant to the testimony.

23 MR. MARSHALL: It is part of the --

24 CHAIRMAN BECHHOEFER: We will sustain the objec-
25 tion. I don't think it is relevant.

1 MR. MARSHALL: That's all the questions I have.

2 CHAIRMAN BECHHOEFER: Mr. Paton?

3 CROSS EXAMINATION

4 BY MR. PATON:

5 Q Dr. Peck, did you say yesterday that optical
6 surveys can be read to 1/16th of an inch under ordinary
7 circumstances?

8 A Yes, I think so, approximately.

9 Q Is it true that optically surveyed settlement
10 readings at Midland were measured to 1/16th of an inch?

11 A I don't know if that is true.

12 Q Assuming good engineering survey methods are
13 followed, do you feel inaccuracy of optical leveling
14 better than 1/8th of an inch is obtainable?

15 A My experience would suggest to me that although
16 accuracies greater than are obtainable, even when one is
17 using all the procedures when a construction project to
18 attempt to measure within -- to read, let's say, to an
19 eighth of an inch, that there are likely to be observations
20 that must surely occasionally be as much as an eighth of
21 an inch, different from a succeeding observation which
22 ought to give the same answer, for example. It seems to
23 come out that way.

24 Q All right, Dr. Peck. I may not have understood
25 your answer but I understood it to mean that occasionally

1 or sometimes, you will get a reading that is as much as
2 one-eighth of an inch, but did I get the thrust of your
3 answer?

4 A Yes, and perhaps it would be better to say that
5 you could not infrequently be a 16th off and whether it is
6 plus or minus, suggests that when you are reading a refer-
7 ence point over a period of time, even if it doesn't move,
8 it may appear to be an eighth of an inch higher and then an
9 eighth of an inch lower upon successive readings, when in
10 reality, the movement may have been very small.

11 Q What I want to get at is what degree of accuracy
12 would you hope to obtain, and I respond to your statement
13 where you say, sometimes we may be an eighth of an inch
14 up or an eighth of an inch below --

15 A No, 1/16th of an inch above or below.

16 Q A 16th above or a 16th below. If you take into
17 account all of the measurements as opposed to some that
18 might be off, what degree of accuracy do you think can
19 be obtained?

20 A A considerably higher order of accuracy. That
21 is, if one constructs a best fit curve through a series
22 of observations that have been plotted, the accuracy of
23 that curve is considerably higher than of any of the
24 individual values.
25

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values

1 BY MR. PATON:

2 Q What level of accuracy -- let me ask that in a
3 different way.

4 Is this situation at Midland such that it would
5 affect your answer? I mean, is there anything at Midland
6 that would change the answer you just have given?

7 A Not that --

8 Q What I am indicating is, is there anything in
9 Midland that would lead you to believe that the degree of
10 accuracy would be less there than it would be typically?

11 A I don't think so because I was answering the
12 question from the background of construction projects on
13 which observations of this kind would be made and would
14 be attempted with a fairly high order of accuracy.

15 Q With respect to the Midland plant, and the
16 condition at Midland, the importance of differential
17 settlements affecting on the Diesel Generator Building,
18 what order of survey accuracy do you believe should be
19 required?

20 A I think this would depend on the purpose to
21 which one expects to put the results of the observations.

22 Q Let me try the licensing of the nuclear power
23 plant that has, as one of its structures, the Diesel
24 Generator Building.

25 A Well that's pretty broad.

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1 From my point of view, and the point of view of
2 the geotechnics of the situation, where I am trying to
3 understand and predict settlements, I suspect I might
4 need a lower order of accuracy that might be needed to
5 determine the -- precisely the shape of the building, for
6 example.

7 Q Let me ask you to try to really address what I
8 said, and that is that whatever considerations we are
9 here for the purpose of determining whether to license a
10 nuclear power plant that has as one of its necessary
11 structures, a Diesel Generator Building.

12 So what I'm saying to you is, to the extent
13 that you are able to address the precise situation that
14 is before this Board, please do so, and to the extent
15 that you think you are not able to do that, please tell
16 the Board.

17 MR. MILLER: I guess I will really refrain from
18 objecting until we have some further definition as to
19 where Mr. Paton's line of questioning is going. But I
20 believe we are getting well outside the scope of
21 Dr. Peck's direct testimony.

22 The question as asked, furthermore, is really
23 quite general in terms of asking Dr. Peck to keep in mind
24 all the criteria that the NRC Staff, the Licensing Board,
25

1 director of nuclear -- regulations and so on, would look
2 at in determining whether to license the power plant.

3 MR. PATON: Mr. Chairman, I can't imagine a
4 question that is more relevant and specific and precise
5 than the one --

6 The Board has before it whether or not to license
7 the Midland Nuclear Power Plant. The specific issues we
8 are talking about this week is the Diesel Generator
9 Building.

10 The very, very critical piece of information
11 here is the settlement data and the accuracy to which it
12 was read. If Dr. Peck, for some reason, believes that
13 within his area of expertise of geotechnical engineering
14 he has an answer, that's fine. And if he feels some
15 misgivings about addressing precise issues that are before
16 the Board, he can say so.

17 MR. MILLER: That is a drastic
18 oversimplification of -- we have had -- I think by now --
19 literally dozens of witnesses who have addressed this
20 overall issue of licensing, I suppose in the broadest
21 sense, the Midland Nuclear Power Plant.

22 There are going to be witnesses who will be
23 addressing the structural adequacy of the Diesel
24 Generator Building. Dr. Peck is here to testify on the
25 geotechnical aspects of the Diesel Generator Building.

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The question is limited to the degree of accuracy that he felt he needed to enable him to predict settlements. I think that is well within the scope of his direct testimony and he could answer.

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answer. 1

2 MR. PATON: Judge Bechhoefer, the geotechnical
3 engineers tell the structural engineers about settlement,
4 and the structural engineers take that into account in
5 their analysis. But it is the geotechnical engineers that
6 tell the structural engineers what the settlement figures
7 are.

8 Now if Dr. Peck disagrees with that, that's fine.
9 But, I am asking him to what degree of accuracy do you
10 think it is appropriate in this case -- and I am not
11 talking generalities, I'm talking about Midland, I'm
12 talking about today, I'm talking about the Diesel Generator
13 Building, I am talking about the issues before this Board.
14 I have difficulty with the Applicant's objection.

15 CHAIRMAN BECHHOEFER: Are you talking about
16 accuracy of settlement?

17 MR. PATON: I will ask him that question.

18 CHAIRMAN BECHHOEFER: He may answer.

19 THE WITNESS: Could I have the question, again.

20 JUDGE HARBOUR: Mr. Paton, is your question
21 essentially, is a 16th of an inch accuracy in level
22 surveys good enough for the geotechnical engineer to make
23 his evaluation?

24 MR. PATON: I would like to -- that's an
25 excellent question. I would like to emphasize to Dr. Peck
that it is in the context of what I am asking -- I am

1 asking him that question in the context of the precise
2 issues that are before this Board, a nuclear power plant,
3 the Midland Nuclear Power Plant, this Diesel Generator
4 Building in this case.

5 In other words, I am not asking him a general
6 question. I am asking about the issue that is before the
7 Board.

8 THE WITNESS: I will try to answer the question,
9 but I still have some difficulty with it and I will explain
10 why.

11 For my use, to come to my recommendations or
12 conclusions that seem to me to be significant, I needed
13 settlement time records in order, for example, to determine
14 the effectiveness of the surcharge, when to take it off,
15 things of this sort.

16 In a general way, the accuracy of plus or minus
17 a 16th of an inch for the settlement levels gave time
18 settlement curves that were reasonably satisfactory to
19 make those interpretations. But, you will recall that
20 in order to refine the data, to be able to make a more
21 precise conclusion as to the shape and slope of the time
22 settlement curve on a semi-load plus, we put in 40 borros
23 anchors to get considerably greater accuracy for that
24 particular purpose.

25 I think it is very hard to generalize on what

1 accuracy one needs for a broad purpose such as to licensing
2 of a nuclear plant. You make observations for a particular
3 purpose, in one instance to define with the precision one
4 needs, the slope of the time settlement curve for a par-
5 ticular purpose, and in other instances, you don't need
6 the information that precisely or that accurately, and I
7 don't really see how I can generalize without having
8 specific objectives among the many objectives that one
9 has to meet in constructing, I suppose, licensing such a
10 plant.

11 Q Did you read Mr. Weidner's testimony?

12 A Yes, very rapidly.

13 Q Let me show you what chart and ask you if you
14 had a chance to take a look at it.

15 Dr. Peck, I want to show you page 56 of Mr.
16 Weidner's testimony, and I want to ask you about the
17 straight line that appears near the bottom of that chart.
18 Take your time.

19 CHAIRMAN BECHHOEFER: What page?

20 MR. PATON: Page 56.

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ans
1 THE WITNESS: I take it you are referring to
2 this heavy line that goes through the shaded area?

3 BY MR. PATON:

4 Q Yes sir. Now first, I want to ask you
5 generally, there are arrows there drawn to some measured
6 settlements and those apparently are the numbers that
7 due not have lines drawn around them. Do you agree
8 that that is the type of information that the geotechnical
9 engineer gives to the structural engineer?

10 A I'd say that's the kind of information the
11 surveyor gives to the structural engineer in their
12 measured settlements.

13 Q Do you understand what Mr. Weidner -- do you
14 understand the significance of that straight line? Do
15 you know what he's done there?

16 A No, I don't believe I do. That is, I have
17 read the testimony but not with an attempt to analyze
18 it.

19 Q Let me ask you this. Would you agree that
20 the information indicated as measured settlements -- you
21 didn't read his testimony to understand that what he
22 did was to -- I will say -- "straight line" that
23 information? Do you understand what that means?

24 MR. MILLER: I'm going to object to that
25 characterization of Mr. Weidner's testimony, especially

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1 if questions are directed to this witness.

2 If there is a portion of his testimony you want
3 him to comment on, let's get to it.

4 MR. PATON: The witness said he read it
5 rapidly. If he doesn't understand what I mean, that's
6 fine. I just asked him if he understood what was meant.
7 He may not.

8 MR. MILLER: I think you characterized
9 Mr. Weidner's testimony.

10 MR. PATON: If he doesn't understand it, that's
11 fine.

12 MR. MARSHALL: Take exception to the
13 objection as usual. He may answer if he knows.

14 BY MR. PATON:

15 Q Dr. Peck, I understand that you did not spend
16 a lot of time reading from Mr. Weidner's testimony, and
17 if it is not immediately apparent to you, that's fine.

18 CHAIRMAN BECHHOEFER: He can answer the
19 question -- you can answer the question if you can.

20 THE WITNESS: The question was, do I understand
21 the significance of this straight line?

22 BY MR. PATON:

23 Q Yes sir.

24 A I am not sure that I do. I guess I should
25 rephrase that by saying that I don't think I do.

1 Q Dr. Peck, are you at all familiar with the
2 settlement data that was provided to Mr. Weidner to
3 perform his structural analysis?

4 A I know the settlement data that were provided
5 to him. I don't know specifically what or all of what
6 might have been given him.

7 Q Was that not within the scope of your
8 responsibility?

9 A No sir.

10 Q Do you know who did that?

11 A Not specifically, no sir.

12 CHAIRMAN BECHHOEFER: Point of inquiry. When
13 Mr. Weidner is here, is he going to be able to answer
14 questions about the particular data he was given?

15 MR. STEPTOE: Yes sir.

16 MR. MILLER: Absolutely.

17 CHAIRMAN BECHHOEFER: He won't say it was
18 within the scope of somebody else's responsibility and
19 he just took what he was given?

20 MR. STEPTOE: He was provided the information
21 but he knows where it came from.

22 MR. MILLER: Correct.

23 CHAIRMAN BECHHOEFER: So that if he were
24 asked questions as to whether the line was smoothed out
25 properly --

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MR. STEPTOE: He would be able to explain how that line was derived, given the data that he was given by the surveying --

CHAIRMAN BECHHOEFER: I want to make sure that the subject doesn't fall within the crack.

MR. STEPTOE: No, it will not.

MS. STAMIRIS: Judge Bechhoefer, with this situation arising, wouldn't it be important to determine when Mr. Weidner is here, a comparison of the data represented by that line in his analysis with the data that Dr. Peck had achieved as a result of his settlement and geotechnical analysis? And, I would hope that somehow, that we don't just accept that certain information came from the surveyor and have then no way of confirming how it corresponds to the data that Dr. Peck had in his testimony.

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1 MR. PATON: Mr. Chairman, could I say something.
2 Let me make a statement that perhaps the Applicant doesn't
3 agree with but, my concern is the same as yours,
4 Judge Bechhoefer.

5 The Staff believes that the straight line
6 demonstrated or shown on Page 56 of Mr. Weidner's
7 testimony, that method, that is input that a geotechnical
8 engineer gives to the structural engineer. Now the
9 method followed here, taking actual measured settlement
10 data and straight lining it, our theory is ~~and~~ and the
11 Applicant may disagree -- that that is within the
12 expertise of the geotechnical engineer and not a
13 structural engineer.

14 The theory is, this is the input, this is the
15 settlement data that the structural engineer uses to
16 do his analysis. Now I want to stay with this because
17 of the Board's concern and my concern that it falls
18 through the crack.

19 We think this method demonstrated here, the
20 straight lining, is within the expertise of the
21 geotechnical engineer, and so -- just a minute.

22 (Discussion off the record.)

23 What I am indicating is, Dr. Peck, I believe
24 indicated that that was not within the scope of his
25 assigned tasks, and from what I just said, I would assume

1 that Mr. Weidner would not be the appropriate witness.
2 So I have the same concern the Board does.

3 Now maybe the Applicant disagrees with that --

4 MR. STEPTOE: Judge Bechhoefer, Mr. Weidner
5 will be able to address how this analysis was done, and
6 I might take this opportunity to state that counsel has
7 represented this straight line as if it were derived by
8 using a ruler and drawing a line through the measured
9 points within the error band. That is an
10 oversimplification of how that line was developed, as
11 Mr. Weidner will be able to discuss.

12 MR. PATON: Mr. Chairman, that is not
13 responsive to what I said, and if the Applicant disagrees,
14 that is fine.

15 What I said was, that is not. That is more
16 within the expertise of a geotechnical engineer than a
17 structural engineer. Now maybe they disagree.

18 MR. STEPTOE: I guess we would disagree.

19 MR. MILLER: Yes.

20 JUDGE COWAN: Is it possible to develop right
21 now, between these two counsel, who did indeed decide
22 to put the straight line in, approximating the data in
23 some way because if that can be answered, then that's
24 the person who should explain.

25 MR. STEPTOE: Mr. Weidner is the person who can

3-5-3
1 explain that, and I don't want to --

2 JUDGE COWAN: And take responsibility for it?

3 MR. STEPTOE: And take responsibility for it.

4 Further, the actual numbers which appear here
5 in terms of measured settlement, as opposed to the line
6 which fits through the data, the actual numbers are
7 numbers which came from a surveyor's -- came from
8 Bechtel's geotechnical division, but those numbers -- it
9 is clear that any one who wants to can make comparisons
10 between the numbers, these numbers and the numbers in
11 Dr. Peck's testimony, and they will find that they are
12 consistent.

13 CHAIRMAN BECHHOEFER: Well I would think
14 Dr. Peck -- maybe he doesn't have enough information --
15 but if he knows the measured settlements and he sees a
16 line, he perhaps could be able to comment whether he
17 thinks that line was drawn correctly, particularly its
18 slope. Perhaps you could develop questions along that
19 line; I don't know. Maybe Dr. Peck will be able to
20 answer from the data he has.

21 Is there an outstanding question?
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B-6;±
question

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MR. PATON: No, there is not. I don't believe there is.

MR. STEPTOE: Excuse me, Judge Bechhoefer, I may have slightly misstated myself. These numbers, I am told by Mr. Afifi of Bechtel, came directly from the surveyors, went to the structural engineers. Mr. Afifi did look at them for the geotechnical department at Bechtel, but the numbers that appear here came straight from the surveyors to the structural engineers. But, it does not modify what I said earlier, that Mr. Weidner is the man to talk about how this line, what appears to be a line here, was derived from the surveying data.

CHAIRMAN BECHHOEFER: I think Dr. Peck, if he has enough information, he certainly has the expertise to give his opinion on whether that line or that slope was derived directly.

If he could do it, I don't know.

MR. MILLER: If Dr. Peck can answer that question, I would be happy to have him do so.

CHAIRMAN BECHHOEFER: Can you answer that one or don't you have enough data to know whether that -- the straight line was drawn correctly in view of the fact -- well put it this way, from a layman.

If you connected the points which said, 1.12 and 1.86, you both -- and you are finishing that line

1 would be considerably different from where it is here --
2 if you connect the data points directly so that -- or
3 almost any of the data points so that --

4 THE WITNESS: It is hard to answer that without
5 some indication or perception of how that straight line,
6 of course, is going to be used.

7 I think I can say this, if for some reason one
8 wanted to represent the actual measurements, the actual
9 settlements by a straight line, that this straight line
10 that falls within an error band of plus or minus an eighth
11 of an inch, it appears to be a reasonable representation
12 of the observations. But, I think one has to go a little
13 further and come to some conclusion as to what use one
14 wants to make of the straight line, whether one wants a
15 straight line or whether one could deal with a broken
16 line that applies directly on the measurements.

17 It is the purpose of trying to work with this
18 information to analyze the behavior of the building in
19 some way. Then, how this line fits or what other fit
20 one wants to use, would depend on the structural model
21 that is about to be analyzed as well as on the soil data
22 themselves.

23 This is certainly a soil structure interaction
24 problem and it sounds very good to say this straight line
25 fits within the error band. It falls within it and it

3-6-3 1 looks like a good fit.

2 But I think one also then has to know why one
3 wants to do this in the first place and that, I would
4 trust, is what Mr. Weidner is going to be talking about.

5 JUDGE COWAN: Mr. Paton, I am encouraged by
6 what he just said to inquire whether your concern is
7 related to the -- what I see as an open item to the SSER
8 in regard to the analysis of the differential pressures
9 and so forth. Is that what is concerning you?

10 MR. PATON: The Staff has concerns with the
11 use of the straight line and the structural analysis.
12 Mr. Kane will testify that he does not think it is
13 appropriate.

14 JUDGE COWAN: And that essentially is reflected
15 in what I read in the SSER?

16 MR. PATON: That's correct.

17 JUDGE COWAN: Where there is an outstanding
18 disagreement in regard to the structural analysis because
19 of whether the building is really rigid or not.

20 MR. PATON: That's correct.

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MR. STEPTOE: Judge Bechhoefer, if I resume to give you a preview of what Mr. Weidner will say, we have used the word "straight line" throughout to describe this heavy black line which falls within the error band.

MR. Weidner will testify that that is not in fact a straight line drawn with a ruler but is a surface or line that comes out of the structural model beginning with the straight line and then through a number of interactions, coming -- using the model to attempt to come close to the measured values so that it may be curved slightly. It may not be as direct a straight line.

JUDGE COWAN: I hate to confirm anything but I laid a straight line on that and it is not exactly straight.

MR. STEPTOE: I will let Mr. Weidner -- when he gets up, I will do a brief direct examination to discuss how the line was derived at and for what purpose.

JUDGE HARBOUR: Before we leave that, I would just like to ask Dr. Peck, while he has it in front of him, would you say that the second measurement from the left is then an eighth of an inch of the calculated settlement? Is the calculated settlement within an

3-7-2 1 eighth of an inch of the measured settlement?

2 THE WITNESS: The second one from the left is --

3 JUDGE HARBOUR: On the bottom row.

4 THE WITNESS: The 1.86?

5 JUDGE HARBOUR: The 1.12 measured versus the
6 1.27 calculated --

7 THE WITNESS: Almost to the nearest significant
8 figure.

9 JUDGE HARBOUR: Yes.

10 THE WITNESS: I think that is probably where
11 the line curves.

12 JUDGE HARBOUR: Please go ahead.

13 MR. PATON: I think in light of Dr. Peck's
14 disassociation with this page, I would not ask him
15 further questions.

16 CHAIRMAN BECHHOEFER: On that or anything?

17 MR. PATON: No, just on that.

18 Dr. Peck, would you turn to Page 35 of your
19 testimony. There's a sentence beginning on the third
20 line with the words, "the plotted". Would you read that
21 to yourself and then I want to ask you a question.

22 (Witness complying.)

23 BY MR. PABBY: MR. PATON:

24 Q Would you now turn to Figure C-12.

25 (Witness complying.)

1 Can you tell me from Figure C-12 on what date
2 you switched to permanent benchmarks for this DG-16?

3 A The indication would be something like the
4 10th of September, although in fact, I think there was
5 a period of transition or overlap.

6 Q Doesn't Figure C-12 show an adjustment before
7 the switch to permanent benchmarks was made?

8 A Yes.

9 Q Can you explain why that adjustment was made?

10 A I don't recall the details of the tabulated
11 information. Now what I used when I made this plot, the
12 tabulated points were the ones that gave the uncorrected
13 curve. And I would think, trying to reconstruct now,
14 how I did this, that the change in the benchmark, would
15 have occurred to coincide with that break. But as I
16 recall, there were some gaps and overlap in the data
17 and I don't remember why that happened. There may be
18 some enlightenment in Mr. Lenzini's interpretation of
19 that.

20 JUDGE HARBOUR: There were several curves on
21 Figure C-12, and I would like, for the record, to show
22 which curve we were just discussing.

23 THE WITNESS: The curve for DG-16.

24 BY MR. PATON:

25 Q Dr. Peck, have you completed your answer or are

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1 you still --

2 A No, I haven't. Mr. Lenzini's plot, which is
3 on Figure A-39, would indicate that there is a gap in
4 the middle of August or slightly thereafter which is at
5 about the same position as the little line marked with a
6 small b on my Figure C-12, and then thereafter, there
7 is a reduction of data near the end of August at which
8 time I would presume we are back to the permanent
9 reference points. So unless I were to see some
10 indication in the charts that I used, this triangle may
11 be misplotted. It may be that it does belong to
12 somewhere near the end of August or sometime early in
13 September.

14 I have a recollection and I would say it is
15 vague, that the tabular data that I used had somewhere
16 a general statement about a date of transfer of reference
17 points which may have been supposed to represent the
18 period of transition rather than a specific date.

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CHAIRMAN BECHHOEFER: Mr. Paton, we are going to want to take a morning break very shortly. Would it be useful for you to have Dr. Peck try to find that reference during the break?

MR. PATON: We are satisfied with his answer but we may -- I don't think it is necessary to put it on the record. We may discuss it with him on the break but we are satisfied with that answer.

CHAIRMAN BECHHOEFER: All right, fine.

MR. PATON: I have one more which I can either do now or later.

CHAIRMAN BECHHOEFER: You can do it now.

BY MR. PATON:

Q Dr. Peck, the last question I have for you concerns the matter that you discussed with Mr. Kane. I will just try 16 and see what happens.

CHAIRMAN BECHHOEFER: Perhaps we could introduce this as 16, but you might want to check --

MR. PATON: It will be Staff Exhibit 16.

Dr. Peck, do you have before you a drawing that shows the settlement history of Marker DG-3 after September 14, 1979?

THE WITNESS: Yes sir.

MR. PATON: Mr. Chairman, we obtained this drawing from the Applicant and I would ask -- well I will

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1 offer it into evidence as Staff Exhibit 16 and I have
2 shown copies to the Intervenors, also.

3 MR. MILLER: We have no objection.

4 CHAIRMAN BECHHOEFER: Was this applied in
5 response to a Staff request?

6 MR. PATON: I would have to ask Mr. Kane. I
7 think the answer is yes, it was not -- is that
8 correct?

9 MR. KANE: It was a verbal informal request.

10 MR. PATON: It was given to us by the Applicant.

11 CHAIRMAN BECHHOEFER: All right. Absent any
12 objection, the Board will accept Staff Exhibit 16 into
13 evidence.

(The document referred to,
previously marked Staff
Exhibit No. 16 for
identification, was received
in evidence.)

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19 MR. PATON: Thank you, Mr. Chairman, I am
20 handing to the reporter the copies of this exhibit.

21 CHAIRMAN BECHHOEFER: Off the record.

(Discussion had off the
record.)

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24 BY MR. PATON:

25 Q Dr. Peck, you had had a chance to look at that

3-8-3 1 drawing before you took the stand today; is that
2 correct?

3 A That's correct.

4 Q Do you recognize the curve on the drawing as
5 the settlement history for Marker DG-3--- let me stop
6 there.

7 A Yes sir.

8 Q All right. Do you also recognize the curve,
9 this curve as an extension of the information reflected
10 on Figure C-20 of your testimony?

11 A Not exactly. Figure C-20 is a similar curve
12 which is the average for all the perimeter reference
13 points; whereas, your exhibit is for a specific
14 reference point, but they are with that limitation,
15 telling the same story.

16 Q Do you have an opinion as to whether the slope
17 on the curve shown on Staff Exhibit 16 is steeper than
18 the slope shown on Figure C-20 between 100 and 200 days?

19 A Well one has to make an allowance for a couple
20 of things. The scales are different. And since
21 Exhibit 16 is for DG-3, which is one of the monitors
22 that shows the maximum settlement, you would expect the
23 slope to be greater than that for the average of all the
24 settlements points, so that this is a little bit like
25 comparing apples and oranges.

3-804
1 Q This is the information I think you have
2 agreed to take a more careful look at and to supply the
3 results of your analysis to the Staff; is that correct?

4 A Yes, that's correct.

5 MR. MILLER: Judge Bechhoefer, I would just
6 like to state for the record that the results of
7 Dr. Peck's analysis, that this data will be provided to
8 the Board and the other parties, when it is provided to
9 the NRC Staff.

10 I would hope that within a reasonable time
11 frame, after the information is submitted to the Staff,
12 it will indicate its concurrence or lack thereof with
13 whatever conclusions are reached by Dr. Peck.

14 In the event that Dr. Peck's conclusions are,
15 upon careful analysis, there's nothing in this later
16 settlement data that would cause him to reach any
17 different conclusion than the ones expressed in his
18 testimony, and if the Staff thereafter agrees with his
19 supplementary conclusion, I would hope that we could
20 leave it with the Board on the basis of the written
21 submissions and not require further evidentiary hearings
22 on this rather limited subject.

23 Of course, if the data turns out to show
24 something different or inconsistent with Dr. Peck's
25 conclusions, that's a different set of facts and we have
to consider at that point where such evidentiary hearing,
further analytical work is required.

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MR. PATON: I certainly agree with Mr. Miller.

2 I think that if there's nothing significant about the
3 information, then I agree with Mr. Miller.

4 CHAIRMAN BECHHOEFER: When we take a break, I
5 would like Dr. Peck to compare that new information with
6 Figure 825. Perhaps he could give us some conclusion,
7 whether he thinks that data is consistent.

8 JUDGE HARBOUR: And for clarification, I would
9 like to know the location of marker DG3 in Figure A-14
10 in Dr. Peck's testimony, the DG3 is shown as the southeast
11 corner of the building on the diagram itself, DG3 is
12 shown as being in the second bay from the -- excuse me,
13 I'm sorry, I apologize, retract my statements. It is
14 shown the same place on both. I was confusing an eight and
15 a three.

16 CHAIRMAN BECHHOEFER: Did you have further
17 questions at this time?

18 MR. PATON: That is all the questions the Staff
19 has.

20 CHAIRMAN BECHHOEFER: After the break, Dr. Peck,
21 you may want to compare those two figures. We will take a
22 15-minute break now.

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1 (Discussion had off the
2 record.)

3 CHAIRMAN BECHHOEFER: Back on the record.

4 I think Dr. Cowan will lead off.

5 EXAMINATION BY THE BOARD

6 BY JUDGE COWAN:

7 Q Mr. Peck, in comparing Staff Exhibit 16 with
8 Figure C-20, which we were doing just before the break,
9 I have a little problem with the abscissa plot between
10 100 and 200 hours and the other -- days, and in the other
11 case I see a plot between 1,000 and 2,000 days.

12 Is there a mislabeling of the abscissa on this?

13 A No. Figure C-20 takes us up to the end of the
14 surcharge period, which was on the order of 250 days or so.
15 And, as I understand it, the Staff's Exhibit 16 picks up
16 after removal of the surcharge, and we're now -- and that
17 brings us up to date, and we are now a couple thousand
18 days after the beginning of the surcharge program.

19 So there is actually a gap in time between the
20 end of my Exhibit C-20 and the beginning of Staff's Exhibit
21 16.

22 Q So we are not then comparing the slope on Staff
23 Exhibit 16 between 1,000 and 2,000 hours with the slope
24 shown on C-20, between 100 and 200 hours?

25 A These are days.

1 Q Days. Excuse me.

2 A Well, we are in the sense that the slope of the
3 secondary curve while the surcharge was acting is the basis
4 for predicting what this secondary slope might be well
5 into the future. So we are out in the future now when we
6 are in the neighborhood of a couple thousand days.

7 Q I understand that. My problem is there seemed to
8 be a question that it was comparing the slope shown on
9 Exhibit 16 with some slope C-20.

10 A A better comparison was the one that Judge
11 Bechhoefer pointed out on Figure 825, which actually refers
12 to DG3.

13 If we compare that slope with the one on Staff
14 Exhibit 16, now, this is the question that we're now looking
15 at.

16 (Discussion had off the
17 record.)

18 BY JUDGE COWAN:

19 Q So the ordinate, as labeled, is it correct our
20 attention should be directed to this 825 so as to be com-
21 paring slopes that apply to the same time period?

22 A Yes, sir.

23 BY CHAIRMAN BECHHOEFER:

24 Q How do you compare those slopes?

25 A You translate the slope into inches of settlement

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per log cycle. On Figure 825 it's something in the order of an inch and a quarter per log cycle. And the slope that you see on Staff Exhibit 16 appears to be steeper than that -- it is steeper than that, but that's a complication in that during this period of the steep slope we have had the extensive lowering of the water table. So there are two settlements in this calculated -- in this spotted settlement, the secondary settlement due to ground water lowering.

And what I'm proposing to do is to compare those slopes or settlements at times when the ground water lowering was the same at different dates. That way we can sort out secondary settlement, which is what is shown on Figure 25, from the addition associated with the ground water lowering.

(Discussion had off the record.)

BY CHAIRMAN BECHHOEFER:

Q Dr. Peck, I'd like you to answer a question about a hypothetical right now.

If you put back the surcharge in the building right now so that the static load were as high as the highest -- the highest load that the surcharge had on it, what would the settlement look like? Would you get any sort of an episode of some sort?

A Yes, there would be settlement which would be

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essentially elastic now, and it would occur almost directly in proportion to the amount of surcharge, and then there would be continuous settlement with time, presumably along the same log time relationship that was established the first time. The amount of that elastic settlement would probably be on the order of the elastic rebound that we saw when they took the surcharge off, which was something a little more than a quarter, or say a third of an inch, and that's about what I'd expect to happen again when you put the surcharge on.

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Q Well, carrying this over to what actually is going to happen, would the beginning of the live load, which means the beginning of some vibrations and putting the plant into operation -- I'm not talking now about the completion of the building, which is already there, but the new live load which will start when the plant starts operating -- will that produce a similar effect?

Because I sort of recall that you equated the surcharge with the maximum live load that would occur, that the surcharge at least envelops that.

A Well, the surcharge certainly envelops it. It's considerably larger, I think, than the sum of the dead loads and live loads as it produces stresses at all depths that are at least that large. So the surface load is considerably larger per unit of area.

So I think what would happen if we assume -- and this is hypothetical, again -- if we assume that the live load is, say, five percent of the deadload,

then the application of that live load over and above any loads that are in the building right now shouldn't produce more than five percent of that three-tenths of an inch, or whatever the elastic settlement was going to be, would be very small.

Q I see. So we would not assume -- well, should we assume for conservatism that the live loads plus

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1 existing static load will equal the greatest amount of the
2 surcharge?

3 A Well, I think that we don't really need --

4 Q I thought you made that assumption at one point,
5 and I was just trying to see what kind of an episode would
6 be created when the plant starts operating.

7 A The surcharge was arranged so that at all points
8 within the depths of the plant fill the stresses under the
9 surcharge would be at least equal to those produced by the
10 deadload of the structure and the live load.

11 In order to accomplish that at depth, at the
12 bottom of the fill, we have to have much higher stresses
13 near the surface. So that, in fact, the only portion of
14 the fill that would be subjected to stresses close to
15 those actually equal to the deadload of the building plus
16 the live load would be very near the bottom of the fill,
17 whereas the seat of settlement, of course, is throughout
18 the fill and largely near the top.

19 So the surcharge program was extremely conser-
20 vative in that respect. And most depths, the stresses
21 applied by the surcharge are considerably in excess of the
22 stresses associated with the deadload and live load.

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BY CHAIRMAN BECHHOEFER:

Q Let me ask you. You have either recommended or stated that there will be monitoring. Would you suggest that readings be taken at about the time the live load is commenced or shortly thereafter?

A I believe that they are already being taken and I think in a fair proportion, a live load is already on the structure, if I understand correctly. That is, the --

Q Well I was talking about the operation of the live load. The dynamic load, I had been told, is the correct term.

A Yes, and as I say, I think the observations are already being made, key observations in this respect, are the continuation of the deep borros anchor points, for example, and they should be made at some predetermined schedule plus any other time when something new happens until the behavior of the building is well established.

Q Does the live load include the weight of the diesel generator or equipment or machinery?

A That is in the live load that's -- let's say, I call the live load plus dead load.

Q And that is installed in the structure now?

A I understand that is so, at least practically all.

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1 Q My next series of questions you will have to
2 understand that I am a layman for these. I have seen
3 that when the log time there is used, you essentially
4 get a smooth line or maybe not precisely straight, but
5 when the real time scales are used, you get these
6 episodes and in predicting the future or -- shouldn't
7 you -- you can correct me if I am wrong instead of trying
8 to draw a line through some sort of an average, shouldn't
9 the bottom of the episode be used to predict future
10 settlement or were they? That's what I don't
11 understand.

12 A Well to start with, the same episodes should
13 show on both the arithmetic and the log of the plots.
14 They look different because of the peculiar way the
15 time schedule is shortened. But, they are there and
16 they are recognizable even though the form is different.

17 The procedure that has been used for forecasting
18 the settlement has been to say that that portion of it
19 which arises from the secondary consolidation will follow
20 the straight line on the semi-log plot.

21 In addition to those settlements, if there are
22 some loads applied that will now produce essentially
23 elastic movements, one should add those in and this has
24 been done in the sense that the settlements due to
25 dewatering, for example, have been added to the

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1 settlements that were predicted on the basis of the log
2 time curve.

3 So I think we are properly conservative in that
4 respect.

5 Furthermore, of course, the projection of the
6 semi-log time plot is based on a time when the surcharge
7 was acting and as discussed a little while ago, at most
8 depths. The stress in the soil now is less than when the
9 surcharge is acting. So this projected time settlement
10 curve with surcharge should itself be an upper bound
11 for the settlement associated with the secondary
12 portion of the process.

13 Q Now in determining that slope, I know you have
14 testified as to the unreliability of preconsolidation
15 data. But does this mean that you were starting on an
16 assumption that the beginning of your measurements on
17 zero, and the slope starts from there, or does your slope
18 take into account some possible settlement which may
19 have occurred before most of the instruments for
20 measuring it were installed? And would this affect the
21 shape of the slope, I guess the term is?

22 A When the surcharge itself was put on, there
23 was a considerable settlement. That part we call
24 primary which was associated with squeezing water out
25 of the voids, of the clay until all of the excess pore

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pressures dissipated.

That part of the settlement, of course, occurred under the surcharge. And if we never come back and put a bigger load on and the surcharge is reduced, that sort of settlement would occur again.

As the surcharge sat there and the primary settlement took place, we then got on to the straight line curve and the forecast for settlement started at a time when we knew what the settlements were by measurement and then extrapolated on the basis of the straight line semi-log curve.

The rate of settlement in the future with respect to log time is really independent at this stage as to how much settlement took place before. So it is not part of the forecast.

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forecast 1 BY CHAIRMAN BECHHOEFER:

2 Q Wouldn't the settlement, due to the surcharge
3 have taken place in any event, although just over a longer
4 period of time if the building had just been built and then
5 allowed to operate? Didn't the surcharge just speed up
6 what otherwise would have happened?

7 A Yes, that's right.

8 Q Then shouldn't the starting point be a point
9 somewhat higher than actual measurements taken there before
10 the surcharge or after the surcharge might -- shouldn't
11 the starting point be what the ground level was before
12 anybody put anything on it? And doesn't that affect the
13 slope or could it affect the slope?

14 A No, the slope that we actually get our measure-
15 ment, which is the basis for our forecast, might have been
16 different had we done something differently, put on a
17 different surcharge or built the building without a sur-
18 charge, we would have gotten different slopes, but --

19 A That really wasn't my question. Wouldn't you have
20 gotten a different slope if your starting point were,
21 shall we say, ground zero, which is what it was before
22 anybody put anything on it, and if you started from that
23 point on?

24 Even though you don't have an actual measurement
25 of it, you could perhaps make some assumptions as to how

1 much of it settled before you started measuring. If you
2 started way up somewhat higher and, I can't tell you how
3 much, but --

4 (Discussion had off the
5 record.)

6 Q I'm talking about the absolute amount of settle-
7 ment over the life of the plant and starting at the point
8 where it was before anybody put anything on the ground.

9 A Yes, that is, from the day that the mud mat
10 was poured, for example, and the mud mat started to
11 settle, there were movements going on and as the building
12 was built, then these movements became then the settlement
13 of the building. A considerably part of that had occurred
14 before we put the surcharge on. More occurred after-
15 wards.

16 Since though at this time we are interested in
17 what is going to happen from now on, at least that is one
18 of our interests, one cannot distinguish between the pri-
19 mary and secondary portions of the settlement while they
20 are both going on simultaneously. So after the primary
21 disappeared, we get onto the straight line plot that we
22 could use for forecasting.

23 Q What I am wondering is, if you start at a higher
24 point, would your line run out into the future instead of
25 showing three inches of settlement, show five or six

1 inches of settlement? I have not tried to throw out any-
2 thing like that but if you start with a higher starting
3 point and you get down to the same level, using your con-
4 necting points, your plotting points, the slope after the
5 surcharge, wouldn't a somewhat greater angle produce more
6 settlement in the end? And again, I am a complete layman
7 and that's why I'm not sure I am not oversimplifying some-
8 thing.

9 A No, I think what happens is that after we have
10 gone through over the physical things that happened, put
11 on the fill, we built the new structure, we put on the
12 surcharge and we waited until we got on the straight line
13 curve, all the things that happened before that represents
14 settlement, included some settlement of the structure which
15 is there and which, I'd say, the structure has had to step.

16 Arbitrarily, the day the fill went on was called
17 day one. When we got to the secondary portion at some
18 later date, from then on, in order to predict settlement,
19 all we have to do is take off of that curve whatever num-
20 ber of days after day one we want to call our initial
21 date and we picked and made certain of the day I think the
22 plant was virtually completed or went into operation. I
23 don't remember -- we were talking about a 40-year life and
24 we said, starting as of a certain day is when we will
25 begin to talk about the 40-year life. We are interested

1 in the settlement after that certain date. This is pre-
2 dicted correctly.

3 As soon as we decide what day it is we want to
4 start counting from, we can predict how much settlements
5 will occur at any later date. That's independent of
6 whatever happened up to Day 1.

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1 BY CHAIRMAN BECHHOEFER:

2 Q Well that's what I am trying to determine. I
3 realize that in your methodology it is, but my real
4 question is, primary consolidation is just an example of
5 what would have occurred over a longer length of time.

6 If there had been all of these lengthy
7 consolidations, shouldn't your Day 1 be two or three
8 years before you actually started and wouldn't this, if
9 you extended the line, show a greater settlement than if
10 you started where you did start? That is what I am
11 trying to figure out on whether --

12 A I think I see.

13 Q My problem is, is three inches or whatever the
14 figure was -- it may not be three inches but I will say
15 three inches -- is that realistic or, if we draw the
16 line from what I call ground zero, would you get something
17 more?

18 A No. I think you would not. What happens is
19 this. That when the fill was placed originally, during
20 replacement, some excess pore pressures developed,
21 consolidation began and we saw, of course, that the
22 building started to settle without apparent motivation.

23 But those excess pressures had dissipated
24 before surcharge was put on. The piezometers showed
25 that. Then we put the surcharge on and our really only

1 interest in counting days, starting with the day the
2 surcharge is on, is that we know what the shape of the
3 time settlement curve looks like when you apply a load
4 and the pore pressure dissipates, and we know that eventually
5 at some time, you will find this break where you go from
6 primary to secondary when the pore pressures are
7 dissipated. And then from then on, we are on this
8 straight curve that we can use.

9 Now there is no magic in establishing Day 1 as
10 of a certain date. We could as well have started
11 counting days sometime when we decided we were on a
12 straight line secondary curve, and from then on out, the
13 settlements will take place in accordance with that
14 relationship.

15 Whatever settlement we had up to that point
16 has happened and as part of the total settlement picture,
17 that is part of the absolute settlement that has
18 occurred. Whether it will occur in the future,
19 secondary settlement would be determined by the slope of
20 the curve from the date we want to start counting.

21 MR. MILLER: Judge Bechhoefer, perhaps if I
22 might ask this one question, it may help, I don't know.

23 Dr. Peck, could you describe for us the curve
24 that is actually being met, the slope of which is being
25 measured? Is it a curve that represents a line through

1 all of the points of settlement or sets only through
2 those points of settlement that occur after primary
3 consolidation has been accomplished?

4 JUDGE COWAN: I think that it is almost
5 exactly what he just said.

6 MR. MILLER: I think so but perhaps at this
7 point --

8 THE WITNESS: You would like me to say it in a
9 more intelligible way.

10 MR. MILLER: Perhaps you could refer to a
11 diagram, one of the things --

12 THE WITNESS: Yes, I think so. 827, I think
13 that may be a little simpler.

14 825 would be better because it is along the
15 plot. The nearly complete settlement record from the
16 time the surcharge was put on -- actually it isn't
17 complete because it starts at Page 10, you notice, and
18 this particular plot -- is represented by these
19 miscellaneous points that are not even connected by a
20 curve until we get up to something like Day 75 or so.

21 During that period, for one thing, excess pore
22 pressures were being measured by the piezometers which
23 would tell us that there's primary settlement going on.
24 There's also secondary settlement going on but we can't
25 tell one from the other. We couldn't use this part of

5-3-4
1 the curve, for example, to forecast anything unless we
2 really worked out the rate of dissipation of the pore
3 pressure.

4 But once we get past about Day 90, there is a
5 transition in the curve and we get on to what is certainly
6 a straight segment. At that time, we have nothing but
7 secondary consolidation going on and from that time on,
8 then we could forecast what the settlement would be in
9 the future, no matter what has happened before that.

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BY CHAIRMAN BECHHOEFER:

2 Q Well what I was trying to ascertain was whether,
3 since primary consolidation represents what would have
4 occurred through secondary consolidation, although over a
5 much longer period of time, should you start at either
6 point where you have zero up at the top, 10 up at the top
7 or even go back a few years for that and maybe not try to
8 draw those lines between zero and 70 but connect zero
9 directly with -- or zero directly with what occurs maybe
10 at the 80 -- 80-day line, and shouldn't that be the
11 historical slope of secondary consolidation?

12 A If we knew what the secondary consolidation was
13 or had been back at Day 1 or Day 10 or Day minus 10, even
14 under the weight of the fill, we could establish that
15 relationship, we would find that after you subtracted
16 out the primary consolidation, you would be on the straight
17 line which would be the backward extension of the straight
18 line we are looking at.

19 But someday, some date, that we choose to start
20 making the forecast from what is represented by a point
21 on the point on the part of the curve that we know, then
22 we can go forward from there.

23 Q Well, if preconsolidation pressures could be
24 ascertained, would that have enabled you to start earlier?

25 A No, and I am not quite clear why you would want

1 to start it earlier.

2 Q Well, I would want to start earlier only if it
3 made the slope more accurate and I would think maybe it
4 would at least change the slope to some degree, and that
5 is what I am trying to figure out.

6 A The only evidence we have that it wouldn't change
7 the slope is that after you get done with primary consolida-
8 tion, the slope stays constant. We really don't know how
9 primary and secondary are combined until the primary is
10 over.

11 JUDGE HARBOUR: Is that an empirical observation
12 that you are referring to?

13 THE WITNESS: That's right, that's right. The
14 theory tells us that one settlement doesn't stop but it
15 approaches a horizontal asymptote whereas we always find
16 that instead of approaching the horizontal line, we get a
17 straight line that has a slope. That difference between
18 the theory which doesn't take into account everything,
19 obviously and what we actually get, is what we call secon-
20 dary consolidation. It is a fancy name for that part of
21 the consolidation process that we determined experimentally
22 instead of theoretically.

23 JUDGE HARBOUR: First of all, I want to ask if
24 the Staff was going to ask Dr. Peck some more questions
25 at this hearing about Staff Exhibit 16 concerning the

1 curve that is shown. Were you planning to ask some more
2 questions today?

3 MR. PATON: No, we had completed our examination.
4 Dr. Peck indicated that he was going to submit some addi-
5 tional information but we have no more questions.

6 (Discussion had off the
7 record.)

8 BY JUDGE HARBOUR:

9 Q On Staff Exhibit 16 in the steep portion of the
10 slope there, from in the vicinity of 800 to 1200 days, more
11 than a thousand, I believe you described the steepness of
12 that slope to dewatering; is that correct?

13 A I think that is going to turn out to be the proper
14 explanation.

15 Q And therefore, you would predict that when that
16 episode is completed, the settlement will return to the
17 slope similar to that on A-25 which shows roughly one and
18 a quarter inches per logcycle of time; is that correct?

19 A That's correct.

20 Q Have you testified already as to the absolute
21 amount of settlement which you believe will result from
22 the dewatering?

23 A I testified as to the amount that had resulted
24 from the dewatering down to about elevation -- I think it
25 is 595 -- and we know that that is something like a quarter

1 to a half an inch. That dewatering was going on for, let's
 2 say, a couple of hundred days until perhaps February, 1982.

3 So we have that effect of dewatering effect in a
 4 portion of this curve. Then, we have the situation where
 5 the water level was allowed to come up, was drawn down
 6 again. It was actually drawn down below the level that it
 7 was before.

8 What I think will happen is that if we pick com-
 9 parable water levels -- in fact, I tried this out in one
 10 case to see if it looks promising, and it does -- and com-
 11 pare the settlements at the two dates and find the corre-
 12 sponding settlement for log cycle, compare that with the
 13 settlement log time curve up to that point.

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point

1 There seems to be reasonable agreement about
2 the curves for which we have our data such as Staff
3 Exhibit 16, as you can see, has a great many points.
4 It is hard to distinguish among them. This is computer
5 plot and I don't distrust computers totally but I think
6 it is going to be desirable to plot this to an expanded
7 scale where we can identify the points to see what the
8 settlements actually were and perform this operation on
9 all the reference points and see what turns up.

10 BY JUDGE HARBOUR:

11 Q I suppose my question really is, would you
12 care to predict the approximate future location of the
13 inflection point on that curve as far as settlement is
14 concerned?

15 A We are likely to get this scatter of points
16 which makes it difficult to determine the curve until we
17 stop changing the water levels --

18 Q Until you start changing the water levels?

19 A Yes. That is, when the permanent dewatering
20 system goes in and we have what, from then on presumably,
21 will be a fairly static situation. Then, I think we will
22 return quickly to the normal secondary slope.

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1 I hate to mention the subject of error in the
2 scatter band, and so forth, but it's obvious that with
3 these settlement points such as DG-3, we have that
4 consideration. And I think our best information in
5 beginning this study would be from the deep borros
6 anchors, where we have less scatter.

7 Q I guess I'm really trying to get you to
8 predict the amount of settlement that's likely to occur
9 as a result of dewatering.

10 MR. MILLER: Perhaps it would be helpful for
11 the record, Dr. Harbour, if you could specify whether
12 you're referring to effects of the permanent dewatering
13 system or the dewatering system -- that the dewatering
14 that is now taking place was a draw-down of the water
15 table to levels that I believe are below those anticipated
16 once the permanent system is in place, and perhaps
17 Dr. Peck could share with you the diagram that he has
18 in front of him which shows water level -- it's a
19 continuation of Text Figure 6 in Dr. Peck's prepared
20 testimony.

21 MS. STAMIRIS: What page does that follow,
22 please?

23 MR. MILLER: I'm sorry; the text figure follows
24 Page 79.

25 MS. STAMIRIS: Thank you.

6-1-2

1 BY THE WITNESS:

2 A The dewatering began to affect the water levels
3 substantially sometime around, say, March 1981, and the
4 amount of dewatering that occurred up until about
5 February 1982 resulted in something like a quarter to a
6 half-inch settlement. That's the average settlement,
7 averaged in two ways, as you can see in the plot just
8 below. The borros anchors have been used for one
9 average and the regular settlement reference points for
10 another.

11 When the water levels came back up, as they
12 did in about June or July of 1982, there was detectable,
13 I should say, in the -- particularly in the borros
14 anchor data, a small rise, perhaps one or two-tenths of
15 an inch. And then, as the water level went down again,
16 we came back to additional settlement totally just
17 about a half an inch, a little bit more than we had had
18 before under the preceding dewatering.

19 Now, I think, for all practical purposes, the
20 amount of settlement that might occur due to further
21 dewatering below this level, if it should occur, will
22 be in the near proportion to the increase in hyperstatic
23 stress. So it's going to be a fraction of what we have
24 seen occur before.

25 I think if the water level fluctuates up and

6-1-3
1 down over a 30 or 40 foot difference in elevation we
2 will see a small but fairly consistent elastic rise and
3 fall, which -- of the ground surface, which occurs not
4 so much on account of expansion and compression of the
5 fill but of the whole column all the way down to bedrock
6 surface, because all of this is compressible material;
7 stiff, to be sure, but with a column of 200 or 300 feet
8 high you can expect to get measurable movements.

9 MR. MILLER: Excuse me. If I might just
10 interrupt one more time. Again, for the record, could
11 you indicate the elevation of ground water table first
12 on the last point on Text Figure 6, and then if you could
13 tell us for the record what it shows on the document to
14 which you were referring for a period of time subsequent
15 to the last point on Text Figure 6.

16 THE WITNESS: What page was that?

17 MR. MILLER: It's right after Page 79, sir.

18 THE WITNESS: The last point on Text Figure 6
19 is, I would judge, in mid-August, and the last point
20 on the more recent version of that figure brings us up
21 to early November.

22 During that period we've had an additional
23 draw-down of perhaps 15 feet, which is 15 feet, roughly,
24 below any previous draw-down.
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6-2-1
down

1 BY JUDGE HARBOUR:

2 Q That's a draw-down to Elevation 580 since then?

3 A Yes.

4 BY CHAIRMAN BECHHOEFER:

5 Q Would that be approximately on that straight
6 line that -- or even lower -- the straight line that's
7 underneath the line indicating the water levels?

8 (Discussion had off the
9 record.)

10 BY THE WITNESS:

11 A What you can see from the line below the one
12 that indicates the water levels in Text Figure 6 is a
13 very slight rise and fall of the settlement that appears
14 to follow the rise -- appears to follow the rise and
15 fall of the water table. It mirrors it in a very
16 small degree. And we have seen a little further
17 settlement because we now have a little further draw-down.

18 But I think that the magnitude of the
19 variations that you see on this diagram, compared to the
20 variations in water table, give you a pretty good
21 indication of what future draw-down settlements may be.
22 They are going to be quite small, certainly.

23 (Discussion had off the
24 record.)
25

1 BY CHAIRMAN BECHHOEFER:

2 Q Dr. Peck, I'd like to go back to some of
3 Mr. Paton's questions on accuracy of the measurements.
4 And, first, does the plus or minus in the optical level
5 accuracy -- does the fact that during the period of time
6 there were some transfers of readings -- does that
7 affect that accuracy of the final results that come out
8 of that?

9 I mean, does the process of transferring some
10 of the reasons in itself add to the uncertainty of those
11 readings?

12 A I should think that -- yes, that is a factor
13 that enters into the uncertainties.

14 Q Would that make some of the readings less
15 accurate than an eighth of an inch, for instance, plus
16 or minus a sixteenth? of

17 A Well, I can't say flatly whether it would or
18 not.

19 Q But it could, is that correct?

20 A Yes, I believe it could.

21 Q Now, if you made an assumption with respect
22 to the plus or minus readings, and if the assumption were
23 that the latest of your readings was as far minus as you
24 could get and the first of your readings was as much
25 plus as you could get, would that make a difference in

6-2-3
1 your final answer, your conclusion as to predicted
2 settlement?

3 I'm trying to figure out the most error that
4 we could get in your prediction.

5 A I suppose we shouldn't really be talking about
6 the most error we could get, because it's an
7 oversimplification to be talking about plus or minus an
8 eighth of an inch or plus or minus a sixteenth of an
9 inch for an error band unless we really define what
10 we're talking about.

11 In reality, the measurements that a surveyor
12 makes, either when he is simply taking levels or when he
13 is transferring reference points, as well, have a sort
14 of a probablistic distribution, and the chances of being
15 close to the value he measured are better than the
16 chances that the real value is as far away as an eighth
17 of an inch or so.

18 You can't draw an envelope and say no
19 measured point can be outside of that envelope. It's
20 a matter of probabilities, and there are procedures
21 for analyzing these things that, in general, surveyors
22 do use in adjusting their net works and level
23 elevations, and so on.

24 And I think probably the best answer, then,
25 would have to come from an analysis which the surveyor
may or may not have made -- I don't know -- of what the
error of distribution really might be.

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be.

1 Q Well, what I'm trying to figure out is if one were,
2 presumably, being conservative and assuming the worst could
3 happen -- that was what I was trying to see -- what kind of
4 result would we get? Because often we are asked to be
5 conservative and to assume the worst even though the worst
6 won't happen, or even if the worst is not likely to happen.
7 That was where my question arose from.

8 A Well, it's hard to define what the worst would be.

9 In my view, certainly, this plus or minus an
10 eighth of an inch that we talked about a little earlier,
11 I would say, is the worst that could happen, and it's prob-
12 ably a pretty conservative thing.

13 Q Right. So if the top reading were up an eighth
14 and the bottom one were down an eighth, or maybe it should
15 be a 16th, how would that affect your ultimate conclusion
16 as to the amount of settlement, the secondary settlement to
17 be predicted? Or would it?

18 A Oh, it wouldn't.

19 Q That's what I was trying to --

20 A Yeah, I see. The prediction of settlement is
21 based only on the slope of the secondary curve, and we
22 start with a point on that curve on a certain date and we
23 predict out to, say, 40 years.

24 That's independent of the actual elevation. That
25 is, the production which is based on the forecast does not

1 depend on the survey errors, particularly any transfer
2 errors.

3 Q Well, if the slope started on, say, an eighth of
4 an inch or a 16th of an inch higher and ended an eighth or
5 a 16th of an inch lower, would the slope be enough different
6 to change anything?

7 A The initial difference or error, whatever you call
8 it, would carry through. So that at the end of 40 years,
9 if it was an eighth of an inch too high to start with, it
10 would, presumably, end up being an eighth of an inch too
11 high.

12 Q No; and too low to end up with is what I am trying
13 to --

14 A Oh, no. No, the same point wouldn't start too
15 high and too low.

16 Q Well, that's what I was trying to -- if you figure
17 the error, at the maximum whether that could happen. That's
18 what I was trying to drive at.

19 A No. I think, if there are errors, it would be
20 errors of initial elevation between successive points around
21 the building. That type of error would come into the
22 picture there.

23 CHAIRMAN BECHHOEFER: I see.

24 BY JUDGE COWAN:

25 Q Continuing along this same line, in trying to

1 evaluate the validity of your prediction of the expected
2 settlement, did you make any kind of an estimate of the
3 probable error or the 90 percent reliability, or of the
4 projection of this best line that you draw in this similar
5 plot -- did you make that kind of an evaluation?

6 A I didn't make a formal evaluation of that kind,
7 no.

8 I did look at the nature of the errors that might
9 be introduced in a graphical way. That was one of the
10 intents of my Figure C-18, in which the time settlement
11 curves -- this is to an arithmetic scale -- are plotted
12 for all the external reference points without any attempt
13 to correct across the gaps where reference points were
14 transferred. And what I was interested in looking at these
15 diagrams was the extent to which they were consistent,
16 whether there was cross-over, things of this sort. And I
17 think you can tell by looking at the figure that there is
18 a rather remarkable consistency among the shape and the
19 order of occurrence of these curves. But I didn't make a
20 formal probabilistic analysis.

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analysis

1 Q What sort of a margin do you envision between
2 the value of predicted settlements that you arrived at
3 and what would be permissible?

4 (Discussion had off the
5 record.)

6 JUDGE COWAN: Judge Bechhoefer isn't quite
7 sure what permissible means, but permissible in terms
8 of regulatory requirements, perhaps.

9 BY THE WITNESS:

10 A That I can't answer because I don't know the
11 regulatory requirements.

12 JUDGE COWAN: That's probably one to hold for
13 the Staff.

14 (Discussion had off the
15 record.)

16 BY CHAIRMAN BECHHOEFER:

17 Q Dr. Peck, yesterday you provided one example
18 of a situation where surcharging was used on a structure
19 that had already been started?

20 A Yes.

21 Q Was that structure -- was the reason
22 surcharging was used there caused by a lack of
23 information about the soil, or was it caused by some
24 known defects in the soil?

25 A I believe in that case it was known that the

6-4-2
1 soil was quite heterogeneous. It was also known that
2 there were likely to be so many large boulders and blocks
3 of soil -- of rock in the soil that there was really no
4 practicable way of investigating whether it was loose or
5 dense or what its bearing capacity might be.

6 So, having known that in advance, the
7 structure was started, settlement took place, and then
8 it was decided that the best thing to do was to iron
9 out the settlement by means of a surcharge.

10 Q Right. Would you consider the ground
11 conditions under -- in that situation at least somewhat
12 comparable to those we are confronting at Midland?

13 A No, I would say there was a very considerable
14 difference. The ground conditions at the former site
15 consisted of material largely above the water table,
16 largely cohesionless, whereas we are at Midland primarily
17 below water table and dealing to a large extent with clay
18 soils. So that in detail the soil characteristics are
19 quite different.

20 Q So that what you're in essence saying is that
21 the surcharge program at Midland was -- is a first
22 attempt, really, at accomplishing what you're trying to
23 accomplish under conditions which are comparable?

24 A I suppose you could say that. There's simply,
25 as far as I know, is no precedent for all the

1 combination of circumstances we have here, so the
2 precedents that I drew were representative of various
3 aspects of this job.

4 Q Now, yesterday we had considerable discussion
5 about three-quarters of an inch of differential
6 settlement, and I wanted to ask, isn't the more
7 realistic figures -- I guess it's not too different,
8 but .83 inches, as appears on Figure -- as, at least,
9 I read Figure 8 to state?

10 MS. SINCLAIR: Where is Figure 8?

11 Where is that figure?

12 CHAIRMAN BECHHOEFER: Text Figure 8.

13 JUDGE HARBOUR: Just before Page 80.

14 THE WITNESS: .83 was your number?

15 CHAIRMAN BECHHOEFER: Yes.

16 BY THE WITNESS:

17 A Okay, that's right.

18 BY CHAIRMAN BECHHOEFER:

19 Q Is that significantly different from three-
20 quarters of an inch to make any difference? Is it
21 enough different from three-quarters to make any
22 difference?

23 A No, I don't think so.

24 Q Is that the figure we really should be using
25 when we talk about differential settlement?

6-4-4
1 A Yes, I'd agree to that. The 1.15 and the 1.98,
2 of course, are both probablistic values themselves, but
3 you're right:right.

4 (Discussion had off the
5 record.)

6 CHAIRMAN BECHHOEFER: The Board has no further
7 questions. I propose we break for lunch before redirect.
8 Is that --

9 MR. MILLER: Fine.

10 CHAIRMAN BECHHOEFER: -- satisfactory?

11 (Whereupon, a luncheon recess
12 was taken in the above-
13 entitled cause until 1:45 p.m.
14 on the same date.)
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1 CHAIRMAN BECHHOEFER: Back on the record. Does
2 the Applicants have any redirect?

3 MR. MILLER: Yes, I have some brief redirect of
4 Dr. Peck.

5 REDIRECT EXAMINATION

6 BY MR. MILLER:

7 Q Dr. Peck, would you describe the circumstances
8 under which you prepared the figures that are found in
9 Appendix C of your testimony?

10 A Yes. While the surcharge was in place, and
11 shortly thereafter, I was of course receiving plots of
12 settlements and piezometric observations from the project.
13 Reviewing these records, reaching my general conclusions
14 about what they indicated whether it might be possible to
15 move the surcharge, the extent to which primary consolida-
16 tion was developing and things of this sort.

17 I had quite definite conclusions from my general
18 perusal of these pieces of information that were furnished
19 to me, but at the same time, I realized, and it was cer-
20 tainly true, that questions were being raised about many of
21 the records and my interpretation of the record.

22 Those associated with the project knew that I was
23 disregarding in some instances, data which I called aberrations
24 and this sort of thing. So I decided in about November of
25 1980, that it would be desirable for my own benefit to

1 settle down and go through all of the data, make my own
2 plot, combine on single plots -- I think for the first time
3 probably, the combined record of the history of the loading
4 for the surcharge, the water levels, the piezometric obser-
5 vations, corresponding settlements, so that I could get a
6 clearer picture of what was going on and I set down my con-
7 clusions and thoughts at this time as a sort of a summary to
8 myself.

9 That's the origin of those figures. You can see
10 by the dates on them they were drawn in December or November,
11 1980, which is some little time actually before the last
12 time -- for the first time that I appeared here.

13 At the time I did appear here, incidently, and the
14 questions turned to technical matters, I testified with the
15 background of this information but it wasn't in the direct
16 testimony, in the prepared testimony, and I think that some
17 of the discussions that we got into concerning how I
18 treated data, which data I gave the most weight to, and so
19 forth, I didn't have the benefit of being eliminated by any
20 of the illustrations.

21 At any rate, those documents predated my last
22 appearance here. Then as I think I have mentioned, in
23 this hearing, having done this, and having recognized that
24 there were some occasional gaps in the record such as
25 transfers of reference points and the like, it seemed quite

1 likely to me that many of the discrepancies would be
2 eliminated if the data were reviewed again from the begin-
3 ning.

4 I asked that Dr. Lenzini -- or Mr. Lenzini, could
5 be engaged to start from scratch, not with the documents,
6 the nine volumes, or whatever that I had based my review
7 on, but from as nearly to the original records as possible
8 to review, once more and see what could be determined about
9 the nature of some of the omissions or the consistencies of
10 the data.

11 That accounts for the existence for what is now
12 Appendix A.

13 Q Thank you. Just to be sure we are straight on
14 the record, Mr. Lenzini's work is found in Appendix A,
15 is subsequent to your preparation of the drawings that are
16 found in Appendix C; is that correct?

17 A Yes, a considerable length of time.

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time

1 BY MR. MILLER:

2 Q If we turn to Page 52 of your prepared
3 testimony, Dr. Peck, yesterday you were examined
4 regarding the termination of readings on piezometers,
5 PZ-28 and PZ-38. Can you tell me, referring to Appendix
6 A, why the readings were terminated? I direct your
7 attention to Page A-8.

8 (Witness complying.)

9 A Yes, the text there which is Mrs. Lenzini's,
10 says that Piezometer 28 was destroyed 7 August 1979
11 and Piezometer 38 was destroyed 16, August, 1979.

12 Q Dr. Peck, could you describe for us briefly
13 how the number of different piezometers, placed around
14 the Diesel Generator Building were established? And
15 more specifically, whether the number that was chosen
16 attempted to take account of construction conditions
17 and so on in the field?

18 A They were about three main considerations in
19 the establishment of the piezometers and their number.

20 One was to have in any given location, several
21 piezometers at different elevations where possible,
22 generally about three. The purpose of this was to get
23 some indication of whether the water that was being
24 squeezed from the clay was flowing upward or downward.
25 In other words, to what extent the flow was comparable

7-2-2
1 to that in a more or less homogeneous material.

2 The second consideration was to cover sufficient
3 areas to make sure that the information would be adequate
4 for either determining on the average what was going on
5 or in determining if in this extent, there were
6 differences in the piezometric behavior beneath different
7 parts of the building.

8 And thirdly, the group of piezometers were
9 established at close enough spacing so that if a
10 substantial number of them should be damaged and
11 destroyed, there would be back-up information because
12 the piezometers, it seems they are always being
13 destroyed on a construction job. One can't help it
14 so you put in more than you need.

15 The net result of all of this was a very large
16 number of piezometers, larger than one would expect to
17 have under most ordinary buildings but a sufficient
18 number to take care of these eventualities.

19 Q Dr. Peck, yesterday you were examined by
20 Ms. Sinclair from a document that was entitled "The
21 Testimony of Harry Singh", concerning the Diesel
22 Generator Building.

23 Ms. Sinclair directed your attention to a
24 portion of that document that dealt with the crushing
25 of the grains of particles of sand. Do you recall that

1 line of examination?

2 A Yes.

3 Q Do you recall the pressure expressed in tons
4 per square foot that was found in that document as being
5 a pressure sufficient in the author's estimation to
6 crush the grains of sand?

7 A I recall that at the maximum test pressure,
8 which was 64 tons per square foot, that I believe
9 Mr. Singh expected there could be some crushing of the
10 sand grains. And I think he may have said that the
11 crushing might have occurred at somewhat smaller
12 pressure.

13 Q I see. Can you tell us by reference to
14 your prepared testimony or otherwise, what the pressures
15 are that will actually be experienced under the Diesel
16 Generator Building at the Midland site?

17 A The pressures at the various elevations and
18 locations are shown, for example, on Text Figure 4
19 which follows Page 76, and they are in the order of
20 five to six kips per square foot which means two and a
21 half to three tons per square foot.

22 Q Dr. Peck, based on your experience, would you
23 expect any crushing of grains of sand to occur at the
24 pressures to which you just testified?

25 A I wouldn't say there couldn't be any, but I

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1 would expect there to be virtually none.

2 Q Yesterday, Ms. Sinclair also asked you with
3 respect to certain correction factors which are discussed
4 on Page A-6 of Appendix A of your testimony. Could you
5 describe for us, please, the nature of the correction
6 factor which is set forth on that page of the appendix?

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appendix 1

BY THE WITNESS:

2 A Yes. The term "correction factor" in most
3 instances, was probably a misnomer. In order to extend
4 the piezometric tubes, up through the fill as the height
5 of the fill was increasing, sections of tubing had to be
6 added. Every time a section of tubing was added, the
7 measurements of piezometric level had to be made from the
8 top of that tubing, a measuring device that was lowered
9 down to the water surface and a distance below the top
10 of the tube was required.

11 Every time there was a new length of tube
12 added, there had to be a new elevation established for
13 the top of that new tube. It became a new reference
14 elevation, in effect.

15 And when a tube was added or taken off, then
16 there was a change of six or seven or, four feet or so
17 depending on the length of the tube. That had to be
18 taken into account. Those lengths only became
19 correction factors in case somebody perhaps forgot to
20 write down they took off that tube. Otherwise, they are
21 simply necessary adjustments in the reference levels.

BY MR. MILLER:

22
23 Q Thank you. In response today to questions
24 from Chairman Bechhoefer, I believe you stated that if
25 one looks at all the specific characteristics of the

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1 surcharge program at Midland, having in mind both the
2 soil characteristics and the fact that the building was
3 under construction, I believe your words were that in
4 essence, "the surcharge program at Midland was
5 unprecedented". Do you recall that testimony, sir?

6 A Yes.

7 Q In your experience as a geotechnical engineer,
8 what affect if any does the presence of a structure on a
9 site to be surcharged have?

10 A The effect would depend certainly on the kind
11 of structure and its rigidity and so on.

12 The presence of the structure would usually
13 have a very little affect on the transmission of stresses
14 into the subsoil associated with the surcharge.

15 If the structure is there first, it of course
16 depends on the movement with the fill and if the fill
17 were settled greatly differentially, then the structure
18 would participate in that differential settlement and
19 it would modify the settlement somewhat over -- in
20 comparison to what it would have been had there been no
21 structure.

22 There is very little affect, I would say, on
23 the behavior of the subsoil, whether the structure
24 exists or not. What happens to the structure, of
25 course, depends on what kind of settlements actually

7-3-3 1 occurred.

2 Q Thank you. Finally, Dr. Peck, you were
3 questioned by Mr. Paton with respect to the function of a
4 geotechnical engineer with respect to provisions of
5 settlement measurements for use in a calculation of
6 structural adequacy of that structure. Do you recall
7 that interchange?

8 A Yes.

9 Q In your experience, Dr. Peck, is there any
10 convention or protocol which would tell us what discipline,
11 that is geotechnical engineering or structural
12 engineering, should decide how soil settlement figures
13 are to be used in calculation of structural adequacies
14 of a structure?

15 A No. In my experience, I have come to a very
16 strong belief, actually, that engineers tend to divide
17 themselves into compartments that don't exist.

18 We draw boundaries sometimes between
19 geotechnical engineers and structural engineers, civil
20 engineers and geologists, and soil mechanics and rock
21 mechanics and so on. These are not really well-defined
22 boundaries.

23 If a soil is acted upon by a structure, the
24 two have to act together. We speak quite properly of a
25 soil structure interaction. And as far as I am concerned,

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there has to be an interaction between the soil engineer, the foundation engineer and the structural engineer.

They should cross the boundaries, they shouldn't be there really in the first place. I really think structural engineers should know something about soils and soil engineers should know something about structures.

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structures¹

2 If they are subdivided in some organizational
3 fashion, then they should be in very intimate communica-
4 tion with each other and decide how they are going to
5 handle these interactions. But if, as far as I know, no
6 identified, defined or agreed upon boundaries as to where
7 these responsibilities stop and start. There shouldn't be
8 any such boundaries.

9 MR. MILLER: Thank you, I have no further ques-
10 tions of Dr. Peck.

11 CHAIRMAN BECHHOEFER: Miss Stamiris.

12 RE CROSS EXAMINATION

13 BY MS. STAMIRIS:

14 Q Dr. Peck, in regard to what you are just saying
15 about the interaction between soil and structural engineers,
16 does that coincide with what your practice was in this
17 case between your expertise and the expertise of the struc-
18 tural engineer?

19 A I think so. I can hardly recall a meeting when
20 there weren't quite a few representatives, all of the
21 disciplines that might be involved and participating.

22 Q With reference to the figure from Mr. Weidner's
23 testimony and the discussion about straight lining that
24 data, if that data was received from the survey measurements
25 as you indicated, doesn't that somehow seem to sidestep
the whole purpose of your geotechnical analysis if that

1 kind of structural -- that kind of information upon which
2 a structural analysis is based could have been received
3 simply by surveying measurements, then what was the point
4 of this five-year study that we have been involved in on the
5 geotechnics of the soils in relationship to the Diesel
6 Generator Building?

7 A Well, there were more things to be considered with
8 respect to the building than just its shape as of a parti-
9 cular time, which could be determined by the survey. That
10 was one of the milestones of the life of the building, you
11 might say, at which it was desirable to investigate the
12 capabilities, the structural capabilities of the building.

13 But, there will be movements in the future, for
14 example. There must be estimates of what the deformed shape
15 would be at some time in the future so that the state of
16 the building under those conditions can also be investi-
17 gated. That of course couldn't be determined by just surveys.

18 Q Well, were you concerned with what was the worse
19 example of curvature that occurred in the Diesel Generator
20 Building as a result of the surcharge load?

21 MR. MILLER: I'm sorry, do we have a reference to
22 curvature?

23 MS. STAMIRIS: Or I will ask Dr. Peck if he is
24 aware of whether curvature occurred in the walls of the
25 Diesel Generator Building under the surcharge load?

1 THE WITNESS: I prefer to call it distortations
2 which included curvatures and maybe some other changes in
3 geometry.

4 BY MS. STAMIRIS:

5 Q And would the figures in your testimony that
6 indicated the most differential settlements between various
7 points along a wall, would that represent the same wall
8 that experienced the most curvature?

9 A The figures in the various drawings in this text
10 represent the positions of the structure at several dis-
11 crete points.

12 As I recall it, perhaps along the exterior walls--

13 Q Could you direct me to a figure, please?

14 A I am looking at Text Figure 8 --

15 Q Thank you.

16 A Which follows page 79. There are no points shown
17 on the cross walls in this figure, for example, so these
18 data would provide no information about the curvature or
19 distortion of those walls. And on the end walls, there
20 is one intermediate point, three points that don't define
21 a curve. They help to establish what the shape might have
22 been, but these points by no means would permit one to
23 determine the curvature of the cross walls and even very
24 much of the end walls.

25 Q All right. Did the surcharge load produce further

1 differential stresses on the building which resulted in
2 cracking?

3 A By and large, I believe the surcharge loading
4 tended to close some of the cracks that existed, cracks
5 that were caused by the hard spots that had been cut from
6 and freed from the building before surcharging. I am quite
7 sure that some cracks may have opened, and I expect cracks
8 tended to close.

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BY MS. STAMIRIS:

Q You are not aware of significant opening of cracks along particular walls indicating differential settlement?

MR. MILLER: Excuse me. I really have to object. I believe this is both beyond the scope of any cross-examination or redirect examination of Dr. Peck, and it is a subject that was explored by Mrs. Stamiris when Dr. Peck was here over a year ago.

MS. STAMIRIS: I don't think I ever talked to him about stress on the building, and until he just made the statement that he did about the interconnection between the two sciences or fields I did not pursue it because I thought we were trying to create a distinct division or separation between those.

I want to end up by asking him about the effects of that on the analysis of the soils underneath the building and to what degree if the building cracked and gave; in other words, it did not act as a rigid structure but, indeed gave way to certain degrees under the surcharge load, whether that kind of phenomenon was experienced, and, if so, taken into account in his analysis.

(Discussion had off the record.)

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CHAIRMAN BECHHOEFER: Yes, that's all right.
The witness may answer the question you had.

MS. STAMIRIS: I wasn't sure from Dr. Peck's answer whether, indeed, such cracking did occur which indicated that the building might have been acting as a not so rigid structure.

BY THE WITNESS:

A To begin with, although this is, relatively speaking, among most structures a quite rigid one, it isn't, of course, a rigid structure.

It did experience some cracking, particularly before the surcharge was applied. The change in rigidity of the structure associated with the cracking, if even measurable at all, certainly had no significance with respect to the transmission of the surcharge load to the subsoil.

Their structure being a box containing compartments in which the fill could be placed was of such a geometry that the fill load could be applied to a very large extent either through the walls of the structure and the footing or the intervening spaces directly to the soil that the stiffness of the structure could have no significant effect on the distribution of pressures in the underlying materials produced by the surcharge. It wouldn't have made any difference, even

1 if there had been some modification of the pressure from
2 the surcharge as a result of the stiffness of the
3 building, because the -- for two reasons: The margin near
4 the ground surface of pressure associated with surcharge
5 over that which would be exerted by the building was so
6 great that there would be ample prestress in the upper
7 levels under any circumstances. And the deeper one goes
8 in the subsoil the less effect on the stress distribution
9 the stiffness of the structure on the surface actually
10 has.

11 So I took it into account, but my accounting
12 said that it was of no significance.

13 BY MS. STAMIRIS:

14 Q When we were speaking about -- when Mr. Paton
15 was asking questions and there was some discussion on the
16 effects of dewatering, I believe you said that as the
17 water levels would go up and down that there would be a
18 very slight change in the surface level of the soil. Did
19 you make such a statement?

20 A Yes, I think so.

21 Q In response to those water levels?

22 A Yes.

23 Q And you mentioned something about a compressible
24 column all the way down to the bedrock. Now, did you
25 mean that -- I mean, this type of a column all the way down

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1 to the bedrock would not be affected by dewatering or
2 water tables, would it?

3 A It would be affected. The effect would be
4 extremely small, but it's not zero.

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zero.

1 Q Okay.

2 A I hope I didn't mislead anybody by the use of the
3 term column, because what I'm thinking of is an extensive
4 mass of the stiff soil above which we have the mass of fill
5 or natural soil in which the water level fluctuates.

6 That changes the stress all the way from the zone
7 of the water table where the fluctuations occur clear down
8 to and even through into the bedrock. Because we have a
9 quite thick mass, several hundred feet as glacial till,
10 even very small stresses producing very small strains can
11 over that great thickness produce an undoubtedly measurable
12 settlement or rise as the water tables vary.

13 It's an elastic response, essentially.

14 JUDGE HARBOUR: Is that due just simply to the
15 weight of the material primarily, of the water, the mass
16 of water?

17 THE WITNESS: Yes, it is due to the change in
18 bouyancy in the upper layers.

19 BY MS. STAMIRIS:

20 Q Do you think that there would be a probability
21 that a dewatering system drawing water up could affect
22 water from a lower aquifer?

23 MR. MILLER: I'm going to object. I really think
24 that's well beyond the scope of any cross examination or
25 my redirect.

1 MS. STAMIRIS: If it makes any difference, that's
2 the only question I'm going to ask on that subject. I'm not
3 leading into a series, but I would like an opinion on that.

4 (Discussion had off the
5 record.)

6 CHAIRMAN BECHHOEFER: I think we'll let him answer
7 it.

8 THE WITNESS: I'm going to have to ask Miss
9 Stamiris to repeat it, but I would like to make an addition
10 to the answer to your question, if I might.

11 The difference is indeed due to the weight of the
12 water, but in soil mechanics parlance, at least, since it
13 is the intergranular stress or the effective stress that
14 actually produces or reduces settlement that it is the
15 bouyant effect on this upper material that establishes the
16 stress in the soil skēleton that produces the settlement.

17 It isn't quite as direct as just adding six feet
18 of water on top of a column of soil.

19 Now, I'm sorry, Mrs. Stamiris, I lost it.

20 BY MS. STAMIRIS:

21 Q Dr. Peck, can you answer in a general sense,
22 based on your knowledge of ground water patterns in relation
23 ship to ground water systems, whether dewatering could --
24 there would be a probability of a dewatering system drawing
25 water up from a lower aquifer and the interaction between

1 different aquifers and water systems?

2 A Again -- and I think I have to answer this as you
3 suggested, in generalities -- there would be an effect and
4 it would be so small that you couldn't measure it.

5 Q Thank you. Dr. Peck, I believe that you said that
6 you would be able -- when you analyzed more precisely the
7 data representing that in Staff Exhibit 16 that we would be
8 in a better -- or you would be in a better position when the
9 permanent dewatering system goes into effect to see what the
10 actual long term effects would be.

11 Is it your understanding that the dewatering --
12 how does the dewatering that's going on now differ from what
13 you expect the permanent dewatering to be?

14 A I don't think you understood the answer in the
15 way I intended it, at least, to that first statement.

16 Q No.

17 A The effects of the dewatering that may be incor-
18 porated in this diagram, in effect, masks the secondary
19 settlement they were interested in evaluating. And if I was
20 talking about effects of dewatering, it wasn't effects on
21 the subsoil of the structure or anything of that sort but
22 simply on our ability to sort out these two aspects of
23 settlement.

24

25

1 Q Well, I did understand it the way that you
2 intended it, but I want to ask you how the dewatering
3 that is going on now will differ from the dewatering that
4 is expected in the future.

5 A As I understand it, the dewatering that is
6 going on now, which is presently directed towards
7 construction dewatering in preparation for underpinning
8 and things of this sort, would be accomplished certainly
9 in those areas where the construction operations would
10 be needed, although, as I understand it, part of the
11 permanent dewatering system is being used in this
12 temporary capacity. Ultimately there will be a permanent
13 system operating continuously that will keep the water
14 level at a constant elevation in different parts of the
15 plant, different elevations in different parts, but it
16 won't be fluctuating very much, whereas now there may be
17 zones that are locally dewatered, the water level under
18 the permanent dewatering system may actually rise a
19 little higher than has been drawn down to at present.

20 So there are variations to be expected during
21 the construction period, and after the permanent system
22 goes into operation there would be fewer such variations,
23 there should be an equilibrium sort of system.

24 JUDGE HARBOUR: But, Mrs. Stamiris, do you mean
25 in respect to the plant or in respect to the Diesel

1 Generator Building?

2 MS. STAMIRIS: Well, I thought if it was more
3 uniform over the whole plant site. I didn't know there
4 were variations.

5 BY MS. STAMIRIS:

6 Q I suppose I should ask in relation to the
7 Diesel Generator Building, in view of your response.

8 A I think the general statement would still be
9 applicable to the Diesel Generator Building. That is,
10 until the permanent dewatering system goes into routine
11 operation there are likely to be some variations in water
12 level beneath the Diesel Generator Building, and there
13 would be, presumably, none or fewer thereafter.

14 Q Do you know what the ground water level is
15 now at the Diesel Generator Building?

16 A It should be the elevation that we see on this
17 drawing of the dewatering settlement on construction
18 activities at the Diesel Generator Building. As of
19 mid-October it was about Elevation 582, and I believe it
20 is maybe a little bit lower now. I don't know exactly.

21 Q Thank you. In separating out the effects of
22 dewatering from the secondary consolidation which you
23 are going to attempt to do when you review this data on
24 Staff Exhibit 16, do you expect there to be long term
25 effects due to dewatering that will be need to separated

1 out from the secondary consolidation?

2 A I don't believe there will be long term
3 effects that will be of significance or that will affect
4 the predictions of settlement.

5 Q Okay. You did -- do I remember correctly that
6 you indicated that you expect the curve that is dropping
7 on Staff Exhibit 16 -- you expect that it will rebound
8 and then follow a different line of settlement, or the
9 ground water level will follow a different curve?

10 A I think we will see a better defined curve
11 because this is, obviously, hardly a curve but a
12 collection of spots, so that it's hard to make an
13 interpretation at the moment.

14 Q Okay. With regard to your overall analysis
15 of the geotechnical results of the surcharge at the
16 Diesel Generator Building, were you applying what I, for
17 lack of a better word, will call your usual engineering
18 standards?

19 I mean, did you use the same standards that
20 you would use in any structural soil interaction
21 situation?

22 A I think I can say I used standards that were
23 appropriate to the project. That is, this depends on
24 how you define standards.

25 I used the knowledge and information that I had

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and asked for whatever information I needed in order to
come to a solution with which I was satisfied with respect
to this project.

Now, I would apply appropriate standards, I
think, if somebody asked me to investigate the foundations
of a filling station, but they wouldn't be, in one sense,
the same standards.

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standards 1

2 Q So, then, if this building had not been a nuclear
3 plant at a nuclear -- I mean, a building at a nuclear plant,
4 would your standards have been less conservative?

5 A I expect that they would not have been less con-
6 servative with respect to, perhaps, a number of other loca-
7 tions where the building might have existed. This would
8 depend on the needs of the project. If it were a foundation
9 for a power plant on a hydro project, for example, I cer-
10 tainly would apply, I think, equally stringent standards.

11 Q Okay. I believe that you said that even under a
12 1.5 SSE or earthquake factor that you would expect no ques-
13 tion of sand, is that correct?

14 Well, you said virtually no pressure --

15 A Virtually no.

16 Q -- of sand prticles. But in response to an
17 earlier question by me you said that you didn't analyze
18 any earthquake factors, and so I wondered if those two
19 statements are inconsistent in your mind?

20 A No, I don't think so. Even if you were to ask
21 me from scratch if I would expect it under the circumstances,
22 my opinion right off the cuff would be I wouldn't expect it.

23 Q Oh, I see. So then your opinion that you would not
24 expect any significant question of sand particles was an
25 off the cuff reaction as opposed to an analysis based on
some specific data?

1 A Yes, I think that's right; off the cuff meaning I
2 relied on my experience and not without any background.

3 Q And did you coordinate your efforts with Dr.
4 Hendron's assessment of the seismic shakedown capacity that
5 would be likely -- well, no, I'll skip that question.

6 Can you tell me briefly on what you based your
7 conclusion that secondary consolidation was achieved under
8 the surcharge of the Diesel Generator Building?

9 MR. MILLER: Judge Bechhoefer, I have to object.
10 This is the substance of Dr. Peck's prepared testimony and
11 all the cross examination we went through yesterday.

12 As asked, the question is so broad I'm sure it
13 has been covered in prior testimony.

14 MR. MARSHALL: How can you be sure that it has been
15 covered?

16 MR. MILLER: I read his testimony.

17 MR. MARSHALL: That's fine. I just wanted to know.

18 (Discussion had off the
19 record.)

20 CHAIRMAN BECHHOEFER: Well, Dr. Peck, you may have
21 answered that, but is there anything you could add to your
22 answers or something with any more specificity that you might
23 add?

24 THE WITNESS: The only thing I could do different
25 would be to bow to the adverb briefly, and, very briefly,

1 I judge it on the basis of the shape of the settlement log
2 time curve and the disappearance of the excess pore
3 pressures.

4 BY MS. STAMIRIS:

5 Q Okay. Did the results of the additional borings
6 requested by the NRC Staff that were taken in any way con-
7 flict -- did any of that boring information conflict with
8 your analysis that the secondary consolidation had indeed
9 been achieved at the Diesel Generator Building?

10 A Not in my judgment.

11 Q In your judgment, there were no -- there was no
12 data which indicated a lack of secondary consolidation at
13 any point under the Diesel Generator Building?

14 A That's right.

15 MS. STAMIRIS: I don't have any more questions
16 for Dr. Peck at this time.

17 I'm sorry; I see one that I missed on one page here.

18 CHAIRMAN BECHHOEFER: Okay.

19 BY MS. STAMIRIS:

20 Q Dr. Peck, when you were making your prediction of
21 anticipated differential settlement going into the future,
22 the amount of differential settlement that you were pre-
23 dicting that could take place, did that take into account
24 the effects of underground utilities or installations that
25 are now connected under the Diesel Generator Building?

1 MR. MILLER: Excuse me. I do believe that question
2 was asked and answered yesterday, over objection, I might
3 add.

4 (Discussion had off the
5 record.)

6 MS. STAMIRIS: I thought his answer was that all
7 the utilities were disconnected prior to the preload or
8 that the rattlespace was enough to allow that there wasn't
9 going to be any interaction during the preload period and
10 what I want to know is if there's any intereaction between
11 settlement and utilities that can be expected in the future
12 during plant operation that might be different than that that
13 was experienced under the surcharge load.

1 MR. MILLER: I believe his testimony yesterday
2 was specifically directed to future settlements.

3 MR. MARSHALL: I don't recall that, Mr. Miller.

4 (Discussion was had off the
5 record.)

6 CHAIRMAN BECHHOEFER: Dr. Peck, is there
7 anything additional to what you testified to yesterday
8 that you might add in response to Mrs. Stamiris'
9 current inquiry?

10 I mean, are there other factors that should be
11 taken into account or --

12 MR. MILLER: I have a page number. On 10314
13 of yesterday's transcript the witness answered: "These
14 figures do not assume that the building is going to
15 be hung up on the piping, and I feel quite sure that
16 that will not happen. The rattlespaces will take care
17 of that, for example, and --"

18 MR. MARSHALL: I apologize. I recall it now.
19 Yes, I do recall it.

20 MS. STAMIRIS: How would it be if I dropped
21 that question and replaced it with one other that
22 Mr. Miller just reminded me of.

23 BY MS. STAMIRIS:

24 Q There was a transcript reference that I looked
25 up myself, and it has to do with a statement that

1 Mr. Miller made yesterday that said that -- and I don't
2 have -- I believe it was on 10,337, Mr. Miller said
3 something to the effect that Mr. Lenzini's review was
4 undertaken to further corroborate Dr. Peck's conclusions.
5 And I wondered if any consideration was given to -- I'm
6 sorry; I need to ask first whether Mr. Lenzini is a
7 colleague of Dr. Hendron's and what your relationship,
8 also, is with him.

9 A Mr. Lenzini and Dr. Hendron are both on the
10 staff of the Civil Engineering Department at the
11 University of Illinois. They also work together on other
12 projects, I believe.

13 Mr. Lenzini at one time was a student of mine
14 when I was at the University of Illinois. And I hasten
15 to say that he hasn't been at the University of Illinois
16 continuously since those days.

17 Those are the relations.

18 Q Thank you. And in regard to the review that
19 was undertaken, to use Mr. Miller's words, to further
20 corroborate your conclusions, I wonder if any
21 consideration was given to a more independent type of
22 review or a more objective or farther removed type of
23 review or analysis of the data?

24 MR. MILLER: I object to the characterization.
25 I don't think there's any foundation for any suggestion

1 on this record that the review performed by Mr. Lenzini
2 was neither independent nor objective.

-3 MS. STAMIRIS: Well I think that the
4 relationships that Dr. Peck mentioned speak for themselves,
5 as far as a possible conflict of interest in such an
6 undertaking of the review. And because of that
7 relationship and because of a statement which seemed to
8 go along with what I was thinking was that it was
9 undertaken for the very purpose of trying to corroborate
10 certain conclusions. That doesn't seem like a very
11 objective, scientific, detached way to go about things as
12 important as this. And that is why I wondered if any
13 consideration was given to what I would say is a more
14 independent, objective, detached analysis --

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1 MR. MILLER: Well I think Ms. Stamiris is
2 certainly free to argue from the facts that have been
3 established on the record that Mr. Lenzini's words
4 should be discounted in some way by the Board because of
5 circumstances she mentioned. But to characterize the
6 character of this witness that way is simply without
7 foundation on the record and I don't believe there is
8 anybody who is going to come forward to take the witness
9 stand and say that the review by Mr. Lenzini was in fact
10 nonobjective or partial or in some way unprofessional.

11 CHAIRMAN BECHHOEFER: If you put a different
12 characterization on it, though, I think the witness can
13 answer --

14 MR. MILLER: Was there somebody else considered
15 for the job, I think that would be a fair question.

16 CHAIRMAN BECHHOEFER: For corroborational
17 purposes. Why don't you just ask it that way, in terms
18 of -- with a mutual characterization or -- did you
19 consider others when you thought of having a study to
20 corroborate your own or not corroborate as the case may
21 be but --

22 THE WITNESS: That wasn't the purpose of
23 engaging Mr. Lenzini. It was to have an independent
24 evaluation. I did consider the possibility that other
25 people might be chosen. I chose Mr. Lenzini because I am

-1-2 1 familiar with the quality of the work he does and his
2 independence. I can assure you that there was no
3 possibility, considering the type of person he is, that
4 he would be in any way influenced by any of my findings
5 if he found something different.

6 CHAIRMAN BECHHOEFER: You don't think he would
7 be intimidated in any way by his prior --

8 THE WITNESS: I am a considerable distance from
9 him now and he is quite a bit bigger than I am. I don't
10 think he is intimidated by me in any respect.

11 BY MS. STAMIRIS:

12 Q Well Dr. Peck, to follow up on that, when you
13 use the words, there is no possibility, that is, that
14 is a very extreme choice of terms, and I would like to
15 ask you if the purpose of this study by Dr. Lenzini was
16 to determine the accuracy of the analysis on the basis
17 of the data and indeed, not to corroborate, did you not
18 consider that just for outward appearances of potential
19 conflict of interest or potential intimidation or
20 whatever, when a former student is asked to evaluate
21 the world-reknowned expert's analysis? Did you not
22 consider that for other reasons? Perhaps, it would have
23 been more prudent to have someone other than Mr. Lenzini
24 undertake this review.

25 A What you are really saying is --

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MR. MILLER: Dr. Peck, I have to object. I think there is a mischaracterization of what Dr. Lenzini was asked to do and secondly, this is about the third or fourth time in the last two days that the words "conflict of interest", has been thrown about. Extremely loosely, as far as I am concerned, without some expression on the record as to just what is referred to. I think that question is vague and argumentative as well.

well.

1 MS. STAMIRIS: I think Mr. Miller has mischarac-
2 terized my question. I had asked a very different question
3 than what I asked before and I asked if -- I didn't charac-
4 terize the study of Mr. Lenzini. I said if the purpose of
5 the study was to determine the accuracy as opposed to the
6 purpose being to corroborate the data, then did Mr. -- did
7 Dr. Peck feel that for other reasons, which I won't repeat
8 at this point, that it might have been more prudent to ask
9 someone else to understand that review than Mr. Lenzini.

10 MR. MILLER: I have to have Dr. Peck answer that
11 question.

12 CHAIRMAN BECHHOEFER: You may answer.

13 THE WITNESS: The most important quality that I
14 wanted and that I think any engineer would want in a person
15 to do any job, is his ability to do the job that you want.

16 If I were to follow your line of reasoning, I
17 suppose this would imply that the less I knew about a per-
18 son's characteristics and credentials, the better he would
19 be to do a particular engineering job. I have a feeling that
20 having been associated with many students and many other
21 people who are not students, knowing personally a great
22 many people in this profession, that I would much rather
23 have the advantage of choosing a person who's capabilities
24 and qualities I know than of shooting in the dark, as it
25 were and asking somebody to do it whose capabilities I

1 didn't know.

2 BY MS. STAMIRIS:

3 Q For the last question on the subject, I will ask
4 you whether or not you think there are numerous other indi-
5 viduals who are just as qualified that perhaps someone else
6 could have picked up to do the job and do it as well as
7 Mr. Lenzini did.

8 A That could be.

9 MS. STAMIRIS: All right, I don't have any further
10 questions.

11 CHAIRMAN BECHHOEFER: Miss Sinclair.

12 RE CROSS EXAMINATION

13 BY MS. SINCLAIR:

14 Q Dr. Peck, did I understand you to say that the
15 surcharge, to your knowledge, added little or no additional
16 stress to the building?

17 A No, I don't think I said that.

18 Q What kind of stress do you think was added to the
19 building?

20 A By the --

21 Q By the surcharge?

22 Let me put it another way. I think it follows
23 some of the questions that Barbara asked. I wanted to know
24 if there were additional cracks in the building, and I
25 believe you said that some of the cracks were closed?

1 A Some of the cracks, I think, I said, tended to
2 close.

3 MS. SINCLAIR: Well, I think I might as well
4 introduce this as an exhibit right now. It is that Army
5 Corps of Engineers document.

6 CHAIRMAN BECHHOEFER: Miss Sinclair, I think I
7 mentioned it should be sponsored -- well you can ask for it
8 to be introduced but the person to ask to authenticate it
9 is a Staff witness.

10 MS. SINCLAIR: Well, I will just give you a copy
11 to look at.

12 CHAIRMAN BECHHOEFER: You can identify it now but
13 you ought to wait until the Staff witness who is respon-
14 sible for it before we determine whether it should go in
15 or not.

16 MS. SINCLAIR: Well, you can look at it while I
17 am speaking.

18 On page three in the last paragraph -- is it
19 proper for me to read this?

20 CHAIRMAN BECHHOEFER: You can ask him questions
21 about it but why don't we identify the document. You may
22 offer it into -- have it introduced -- not introduced but
23 identify it as a proposed exhibit, if you wish. I don't
24 think we can formally have it on the record with this
25 witness but I think we can perhaps do it when Mr. Singh

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is here.

MS. SINCLAIR: All right. This is a document called "Testimony for ASLE Hearings, Midland Nuclear Power Plant, Diesel Generator Building, Service Water Pump Structure". It is dated November 16, 1981 introduced as an exhibit as Sinclair Exhibit 1.

CHAIRMAN BECHHOEFER: Well, it would be marked and identified as Sinclair Exhibit 1.

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exh. 1

1 BY MS. SINCLAIR:

2 Q On Page 3, it says, "The settlement observed prior
3 to surcharge indicates uneven settlements, creating
4 differential settlements, resulting in curvature.
5 Consequently, additional flexural and shear stresses
6 has been induced in the structure".

7 Did you advise the Applicant that the building
8 would be further stressed by the surcharge?

9 A I think the Applicant understood this.

10 Q Well that wasn't my question. I wondered if
11 you advised him that there would be considerable,
12 additional stress to the building?

13 A No I didn't need to. They knew it.

14 Q So they are willing --

15 A I object to the word, "considerable", which I
16 don't know whether it is in the letter or whether you
17 mentioned it, but there would be curvatures and so forth.

18 Q Is there any evidence that you know of that
19 points to the fact that cracks were indeed closed --

20 MR. PATON: Mr. Chairman, I will object unless
21 she says when --

22 MS. SINCLAIR: I mean during the surcharge.

23 THE WITNESS: For one thing, I saw some of the
24 cracks before the surcharge was placed and I looked at
25 the building after the surcharge was removed. And I would

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1 say some of the cracks appear to have closed. That was
2 my own judgment.

3 Secondly, I believe I have seen reports or
4 comments to this effect in the documents, but I can't
5 tell you where.

6 BY MS. SINCLAIR:

7 Q I see. Down toward the bottom of that paragraph,
8 it says (reading.) "The walls supported by this footing
9 have shown a considerable increase in the number of
10 cracks since the surcharge load was applied. The number
11 of cracks prior to surcharge was 10 and the number of
12 cracks since surcharge was 16".

13 So that is better than a 50 percent increase
14 in the number of cracks in the building as a result of
15 the surcharge. It goes on to say (reading.) "The
16 additional curvature created by the surcharge appears
17 to have been a major factor in increasing these cracks".

18 CHAIRMAN BECHHOEFER: Creating these cracks.

19 MS. SINCLAIR: Oh, creating these cracks.

20 MR. MILLER: Is there a question pending?

21 MS. SINCLAIR: No, I just wondered if --

22 JUDGE HARBOUR: I am not sure he answered the
23 previous question. I may not have heard but I thought
24 you asked if he was aware of any cracks that had been
25 created by the loading. Do you know of any, yourself,

1 that were created by the surcharge in addition to those
2 that you saw that may have been closed?

3 THE WITNESS: That is not the question I
4 thought I was answering. I thought I was --

5 JUDGE HARBOUR: I may have misphrased --

6 THE WITNESS: The question I thought I was
7 answering or was answering was whether or not I had any
8 knowledge that cracks, some cracks were closed as a
9 consequence of the surcharge.

10 JUDGE HARBOUR: Yes, I thought subsequent to
11 that there was another question.

12 THE WITNESS: I see.

13 BY MS. SINCLAIR:

14 Q Are you aware or are you aware of the
15 additional cracks that were induced in the building by
16 the surcharge?

17 A Well I am willing to accept this statement as a
18 statement of fact.

19 MR. MILLER: Are you referring to Exhibit 16?

20 THE WITNESS: Yes, Question 6.

21 JUDGE HARBOUR: Did you have any personal
22 knowledge, though, of cracks that formed?

23 THE WITNESS: No. When I looked at the
24 building, for example, I wasn't counting cracks and I
25 couldn't say whether new ones had appeared as this would

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1 indicate.

2 BY MS. SINCLAIR:

3 Q Let's go to Page 6. On Page 6, the Army Corps
4 of Engineers is discussing the manner in which you
5 arrived at some of the information that they were
6 evaluating. In connection with the preconsolidation
7 pressures of the surcharge play of boring --

8 A Could you tell me where you are on the page,
9 please?

10 Q At the bottom of the page -- Section 5 at the
11 bottom of the page.

12 A Thank you.

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you.

1 BY MS. SINCLAIR:

2 Q And it said, in the opinion of the Corps of
3 Engineers, they discussed the manner in which your data
4 was arrived at. It says (Reading)

5 "In the opinion of the Corps of Engineers,
6 soil information obtained by proper sampling and
7 testing as in the case of the soils in this dis-
8 cussion are more reliable than those obtained
9 on the basis of the in depth property and the
10 soil descriptions. The three factors used by
11 Dr. Peck provide only rough data and cannot be
12 relied on".

13 Do you know that if part of your calculation for,
14 what we were discussing here, of long term-secondary settle-
15 ment, if you used these kinds of calculations or those
16 related to that in any way to the settlement in any way --

17 MR. MILLER: I am sorry. I am totally confused
18 by the question. There are a lot of "these" and "that's".
19 I am not sure what she is referring to.

20 MS. SINCLAIR: This paragraph discusses the manner
21 in which Dr. Peck arrived at certain information that the
22 Army Corps of Engineers was looking at, and they said that
23 the factors used by Dr. Peck can provide only rough guidance
24 to engineers and cannot be relied on. So, I am asking first
25 of all, was this method of arriving at your information

1 discussed here, a part of the method that you used in your
2 calculations for the secondary settlements that we are
3 talking about here? Or, is it not related at all?

4 THE WITNESS: It is not related at all.

5 BY MS. SINCLAIR:

6 Q What was this in relation to this calculation?

7 A This is in relation to the evaluation of some of
8 the test results from the series of borings requested by the
9 Corps of Engineers.

10 Q Was the purpose of the borings to in any way
11 connected with determining the amount of settlement?

12 A It was to the Corps.

13 Q Barbara tells me it was to determine whether
14 secondary consolidation was achieved. Do you agree with
15 that?

16 A No. It was to determine whether secondary con-
17 solidation was reached.

18 Q Well, I will take your word. Would you agree that
19 it was for the purpose of seeing if secondary consolidation
20 was reached?

21 A I think that was the principal purpose that the
22 Corps had in mind, although I can't really testify in
23 detail what they had in mind. This was their program in
24 effect, not mine.

25 Q The Army Corps of Engineers goes on to say that

1 the results obtained, using these kinds of factors could
2 very well be used to design ordinary structures, but for a
3 category I structure used at the nuclear power plant, it
4 is not advisable to depend on them.

5 If they were using this data to reach some con-
6 clusion about whether secondary consolidation had been
7 reached and said that these factors could not be relied on,
8 how much more thorough would the measures or the studies
9 have to be to be suitable for a category I structure?

10 MR. PATON: I object.

11 MR. MILLER: I am going to have to object also.
12 I really allowed Miss Sinclair to examine Dr. Peck on a
13 document that he didn't prepare, and to my knowledge, may
14 have seen only once before. But really we are asking him to
15 speculate on what was in the Corps' mind when this document
16 was prepared.

17 I understand the author of the document is going
18 to be available for examination, and I suggest those ques-
19 tions are more properly addressed to that individual.

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1 (Discussion had off the
2 record.)

3 CHAIRMAN BECHHOEFER: Let me ask you one thing.
4 The evaluation, in your evaluation which is referred to
5 on Page 6, perhaps elsewhere, am I correct that that
6 evaluation did not enter at all into the conclusions
7 reached in your testimony before us?

8 THE WITNESS: Yes, that's right, that is
9 correct.

10 CHAIRMAN BECHHOEFER: That evaluation, just
11 for background -- how did the particular evaluation
12 arise? I just want to make the record clear on this.

13 THE WITNESS: The Corps felt that by making
14 additional borings on certain tests, they could make a
15 better determination of the extent to which the
16 surcharge program had been successful, specifically,
17 whether the preconsolidation load indicated by the
18 samples by means of certain tests would demonstrate
19 whether or not those samples had been fully consolidated
20 under the weight of the surcharge.

21 The Corps conducted these tests and made some
22 interpretations. The Corps had the tests conducted,
23 actually by an outside firm and I reviewed some of the
24 results that they obtained and I was performing what you
25 might call, internal tests, to see whether these results

1 seemed to me to be consistent.

2 Some of the tests or criteria that I applied
3 are the ones that are referred to in the last paragraph,
4 for example, on Page 6.

5 They are not necessarily things that I relied
6 on heavily but there are a variety of cross-checks and
7 even empirical evidence that one can use to check the
8 consistency of the data. I had come to some conclusions
9 on the basis of these tests, that I had transmitted to
10 Bechtel and which eventually went to the Corps. This is
11 their response to my interpretation of those data.

12 This is all, of course, subsequent to the
13 removal of the surcharge and construction of the buildings
14 and so on.

15 CHAIRMAN BECHHOEFER: I just wanted to
16 ascertain that this is something completely different
17 from the evaluation which you have given us in your
18 testimony.

19 THE WITNESS: That's right.

20 BY MS. SINCLAIR:

21 Q Dr. Peck, while you are here, I just wanted to
22 ascertain, before the author of the paper is here, whether
23 you did indeed use these three factors that are discussed
24 here verbal description of soils and empirical
25 equations in arriving at your calculations and your data

1 that are in your testimony. I just want to confirm it,
2 to clear it up for myself.

3 MR. MILLER: I believe the question was asked
4 and answered but why don't you tell us one more time,
5 Dr. Peck.

6 THE WITNESS: I used these quantities or
7 descriptions that you have mentioned as part of the
8 background that helped me to interpret the test results.

9 BY MS. SINCLAIR:

10 Q What additional factors did you use besides
11 this?

12 A There were the test data themselves, of course,
13 which was the primary purpose of having carried out the
14 exercise from the point of view of the Corps.

15 Q All right, I just wanted to make sure that we
16 have enough information from you so that we can pursue
17 cross-examination of Mr. Singh when he is here.

18 Can you tell me if the factor of time can lead
19 to changes in soil so that you have other soil that is
20 in secondary consolidation? I mean, the soil is in some
21 other form as a factor of time?

22 A Well I haven't changed my mind about that since
23 yesterday, no.

no.

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BY MS. SINCLAIR:

Q Would you like to describe what elastic deformation of sand and clay is?

A It's deformation that is fully recoverable if a stress is removed.

Q What kind of stress would that be?

A Any kind.

Q Pressure?

A That is one possibility. Tension, shear.

Q Any seismic pressure or stress?

A If the pressure produced by seismic forces, the same answer applies.

Q I see. Could you tell us what seismic shakedown is?

MR. MILLER: I am going to object. Dr. Hendron was here and that was his testimony and he is available for cross examination.

MS. SINCLAIR: In the beginning of his testimony, it said that this is a Category I structure and therefore, it should be -- the criteria should include its being able to function, the building should be able to function in the event the safe shutdown earthquake -- there's been very little discussed about the seismic integrity or analysis of the Diesel Generator Building and it seems to me that this is --

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1 CHAIRMAN BECHHOEFER: I think the discussion went
2 on when a different witness was there.

3 MR. MILLER: With respect to soils, and certainly
4 with respect to the structure itself, witnesses that get to
5 appear, I'd want to address the ability of the structure
6 itself that deals with the seismic events.

7 CHAIRMAN BECHHOEFER: I will sustain that objec-
8 tion.

9 BY MS. SINCLAIR:

10 Q Can you tell us why you deleted such a substantial
11 amount of your testimony which would have given us much
12 more for cross examination?

13 MR. MILLER: I am going to object. We went into
14 that yesterday and Dr. Peck responded to questions, I
15 believe, from Miss Stamiris and from Miss Sinclair.

16 MS. SINCLAIR: I don't believe he told us why
17 he deleted so much of his testimony.

18 CHAIRMAN BECHHOEFER: I think that was asked and
19 answered.

20 MS. SINCLAIR: Well then I would like to ask
21 this other question.

22 Would you like to say for the record that you did
23 not rely to the Casagrande theory at all in developing your
24 predictions of the secondary consolidation?

25 MR MILLER: Once again, there is no foundation on

1 the record that --

2 MR. MARSHALL: I take exception.

3 MR. MILLER: There is no foundation that a Dr.
4 Casagrande exists. Dr. Peck has testified just to the con-
5 trary. So in any event, he must have answered that question
6 at least twice yesterday.

7 MR. MARSHALL: The question is in the testimony and
8 I believe he can answer, yes or no.

9 CHAIRMAN BECHHOEFER: I thought that same question
10 was asked and answered. I think he said earlier, he did
11 not rely on -- my recollection is that Dr. Peck did not
12 rely on Dr. Casagrande at all in any part of his testimony
13 except with respect to using one of the instruments rele-
14 vance.

15 MS. SINCLAIR: I guess Judge Bechhoefer, I have
16 heard you say that quite a number of times but I would like
17 to have Dr. Peck tell me that.

18 CHAIRMAN BECHHOEFER: I think he said it; I am
19 not making that up. I think he said it.

20 MR. MARSHALL: If he said it once what is the
21 objection to him saying it one more time so we can all hear
22 him.

23 CHAIRMAN BECHHOEFER: I think Mr. Miller has it in
24 the record.

25 (Reading.)

1 BY MS. SINCLAIR:

2 Q Is there any record as part of this proceeding of
3 the initial data that you used for arriving at your secon-
4 dary consolidation predictions and what your results were
5 that we can compare them to what you came up with as a
6 result of the recalculation of the data?

7 A I am sorry, would you try that again.

8 Q Well you had told us that you first used the
9 data made available to you and came up with your predictions
10 and your calculations based on that. And then, you went
11 to Mr. Lenzini and asked him to recalculate all the data
12 to see how close it would come to what you had -- I wonder
13 if there is any part of -- as part of the record in this
14 proceeding, we do have as an exhibit, what your initial
15 calculations were based on the initial data prior to Mr.
16 Lenzini's recalculation.

17 A That's what the body of most of this text is and
18 all of the figures in Appendix C, those are my own use of
19 the initial data which came out of the answers to the
20 questions as to the responses -- I guess that is the proper
21 term -- which are --

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1 BY MS. SINCLAIR:

2 Q All of that testimony in Appendix C would have
3 been predated and done by you prior to Mr. Lenzini's
4 calculations?

5 A About a year and a half ago.

6 Q I see. Now yesterday, you said that if there
7 was differential settlement that was more than .75, you
8 said it just was not possible. But today, you said that
9 based on Figure 8 at .83, as Bechhoefer pointed out to
10 you, was indeed the differential settlement; is that
11 correct?

12 A Well the first part of your statement, I don't
13 recognize. As I said, differential settlement of .75
14 was not possible. I don't even know what that means.

15 Q Three-quarters of an inch was in your testimony.

16 A As I say, I don't recognize, in that form at
17 least.

18 Q You predicted in your testimony that the
19 differential settlement would be three-quarters of an
20 inch.

21 A I believe the exact wording is about three-
22 quarters of an inch.

23 Q All right. And I am sure that I asked you if
24 it was any higher, and then Barbara asked you could it be
25 any higher. If it wasn't any higher -- could it possibly

1 be any higher, and you said it couldn't be. But today,
2 you are agreeing that the prediction could be .83
3 differential settlement.

4 A I will simply submit this. About three-
5 quarters of an inch is sufficiently equivalent to .83.

6 Q But yesterday you said Consumers could fire you
7 if it was any higher than three-quarters of an inch.

8 MR. MILLER: I'm going to object. I think
9 Ms. Sinclair is simply arguing with Dr. Peck. He said
10 what his conclusions are.

11 MR. PATON: I think the argument is over the
12 distinction about three-quarters of an inch and about
13 .83 inches, and I think Dr. Peck has explained that he
14 regards those two figures as roughly equivalent; is that
15 correct?

16 THE WITNESS: Yes sir.

17 BY MS. SINCLAIR:

18 Q Is it proper to ask what your fee is for your
19 work, Dr. Peck? I mean, we are the ratepayers and we
20 would like to know what fees were --

21 MR. MILLER: I think it is objectionable on the
22 grounds Ms. Sinclair gave as to the basis for the
23 question.

24 Furthermore, it seems to me that it is totally
25 irrelevant to any issue before this Board what Dr. Peck's

-3
1 fees are.

2 MR. MARSHALL: I don't want to object to what
3 he is saying because it is a conflict here as to who is
4 paying for the consultants. I am not sure that Consumers
5 Power is paying for this. That is why I won't raise an
6 objection to his objection.

7 CHAIRMAN BECHHOEFER: The amount of his fee is
8 not relevant to anything we have to rule on. Same
9 objection as to that.

10 BY MS. SINCLAIR:

11 Q Do I understand that after you arrived at your
12 predictions on secondary settlement, that you didn't
13 make any effort to make sure these data were available
14 to the structural engineers?

15 MR. MILLER: I believe -- I will object on the
16 grounds that that is an absolute 180 degree
17 mischaracterization of what his testimony was, if I
18 understood your question.

19 MR. MILLER: Would you repeat the question?

20 (Question read.)

21 CHAIRMAN BECHHOEFER: Well I will sustain that.
22 I don't think he testified to that.

23 JUDGE HARBOUR: I am certain he didn't.

24 MS. SINCLAIR: Well I was just asking if I
25 understood it properly.

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CHAIRMAN BECHHOEFER: You did not.

MS. SINCLAIR: Well then I will ask it in another way.

Did you make sure that the structural engineers had your data --

THE WITNESS: No, it is not my province to make sure who has the data.

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1 MS. SINCLAIR: Well, I guess that question
2 occurred to me because you gave us something of a
3 dissertation on how disciplines should really interact
4 and work together and not be so compartmentalized, and
5 I heartily agree with that, and that is the reason I
6 asked this question, to see to what extent the engineers
7 such as you themselves take the responsibility for
8 making sure their data goes to the appropriate people
9 as used.

10 I guess that's all the questions I have.

11 RECROSS-EXAMINATION

12 BY MR. MARSHALL:

13 Q Well, now, Dr. Peck, if I can cease to become
14 an object of an objectionable object, I would like to
15 ask you just a couple of questions. If I become
16 objectionable, then I'll have to ask you to -- the first
17 question is that you, in answering some of the questions
18 for Mrs. Sinclair, stated in regards to cracks after the
19 removal of the surcharge that you noticed that the
20 cracks, or many of them were filled. You stopped right
21 there.

22 A No, that wasn't what I said, sir.

23 Q Then tell me what, again, did you say?

24 A I said I noticed that some of the cracks
25 appeared to be smaller.

1 Q Smaller? Very well. I seem to remember some
2 testimony, Doctor -- and I don't think you were here --
3 with reference to the removal of that surcharge, and I
4 don't even know who was testifying, but the word I'm
5 going to use is well known to construction laborers,
6 so I don't think it's going to be bothering you any.

7 Grout was the word, and it seemed that they
8 stated those cracks were grouted sometime along in that
9 period of time when the surcharge was being removed. Are
10 you familiar with that?

11 A No, I'm not familiar with that.

12 Q Do you know that that was or was not done?

13 A I don't believe it was done, but I would not be
14 sure.

15 Q Well, I'm not sure that it was either, that's
16 why I'm asking. And I heard some conversation along
17 those lines, because if I'm understanding it correctly --
18 do you know what grout is?

19 A Yes.

20 Q If I understand it correctly -- and I'm not a
21 construction man, I'm a farm boy -- grout is a very fine
22 cement made of very fine sand that will sift into cracks
23 and fill cracks. Am I correct, as you understand it?

24 A That's one form of grout, yes.

25 Q Well this is the kind that I've heard discussed

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1 in this room sometime during the surcharge, or shortly
2 thereafter, this was happening, with a different group of
3 people, construction people.

4 That's all I wanted to know, if you were aware
5 of it, if you knew about it, and that's all the questions
6 I have for you.

7 (Discussion had off the
8 record.)

9 CHAIRMAN BECHHOEFER: Mr. Paton?

10 MR. PATON: Mr. Chairman, I may have one
11 question.

12 RE-CROSS-EXAMINATION

13 BY MR. PATON:

14 Q Dr. Peck, Chairman Bechhoefer asked you a
15 question about possible inaccuracies from changing
16 benchmarks, from going to one benchmark to another. My
17 question is: Isn't it true that the vast majority of
18 settlement measurements were taken on permanent
19 benchmarks, where you would not have the problem of
20 transferring to temporary benchmarks?

21 A My impression was, which may be wrong, that
22 with respect to the Diesel Generator Building -- let me
23 back up. Are we talking about benchmarks or reference
24 points?

25 Q Settlement markers that they were reading, like

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A My impression was that on most of these points, or at least many of them, that were the permanent reference points it became covered by surcharge, at which time there is a temporary point being read at a higher elevation. Then, when the surcharge was removed, the survey reverted to the permanent one.

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one. 1 Q Dr. Peck, I'm not sure you answered the question.
2 Let me try it again.

3 I mean over a period of time. I think you just
4 indicated that there were some where the problem might arise
5 because there was a change from a permanent benchmark to a
6 temporary benchmark. My question is, over a period of time,
7 isn't it true that the vast majority of settlement measures
8 were taken on permanent measurements?

9 MR. MILLER: May we have some further definition?
10 Are you talking about the total number of settlement measure-
11 ments that were taken, the majority taken on permanent as
12 opposed to temporary?

13 MR. PATON: That's the question I'm trying to ask,
14 yes.

15 BY THE WITNESS:

16 A Let me state my understanding of what I mean by a
17 benchmark at a reference point, because I'm not sure we're
18 still on the same wavelength.

19 I take it a benchmark is some established elevation
20 from which one starts to make a survey and a survey has
21 reference points.

22 That was the definition I was using, at least.

23 JUDGE HARBOUR: Could those reference marks also
24 be referred to as settlement markers?

25 THE WITNESS: They could.

1 Now, I th nk there were permanent benchmarks
2 for the surveys, probably for all of the surveys, but my
3 impression with respect to the reference points in the Diesel
4 Generator Building, for example, is that what we call the
5 permanent reference points, or permanent survey points were
6 at times obstructed when a temporary one was used, and then,
7 when possible, the surveyors returned to the permanent ones.

8 BY MR. PATON:

9 Q All right, you said they were at times obstructed.
10 The rest of my question is whether -- do you agree that the
11 vast majority of the settlement measures were taken on the
12 permanent reference markers?

13 A I don't think so. And when I looked at, for
14 example, my figure C-18, I see this gap in the records for
15 all the external points, for example, in March and in
16 September, which I take to be a time at which a transfer
17 was made temporarily in the measurements from the permanent
18 to the temporary reference points.

19 Q Dr. Peck, I suggest that observations have been
20 made from March of 1978 to the present time. In light of
21 that, would you still -- you just indicated a certain period
22 of time in which there was a possibility of a change from
23 permanent to temporary benchmarks, but observations have
24 been made since March of -- let me just ask you this: Do
25 you agree that observations have been made since March of

1 1978?

2 A Yes, that's probably right. If you're talking
3 about the vast majority of the observations meaning reading
4 the same reference point ten times as ten observations,
5 then I agree with you. There was a period when all the
6 reference points in the Diesel Generator Building -- almost
7 all -- were temporary points during that period.

8 Q How long was that period?

9 A That was from about mid-March to mid-September
10 of 1979, when the surcharge was there.

11 Since that time, I think probably most of them,
12 maybe all of them, have been made on permanent reference
13 points.

14 MR. PATON: That's all the questions I have,
15 Judge Bechhoefer. I do have a statement I'd like to make
16 before Dr. Peck leaves. Could I make it now?

17 CHAIRMAN BECHHOEFER: Fine.

18 EXAMINATION BY THE BOARD

19 BY CHAIRMAN BECHHOEFER:

20 Q Well, Dr. Peck, just one further thing. In the
21 way I read your testimony, you really weren't relying on
22 reference points much, if any, before the application of
23 the surcharge. Is that true?

24 A That's right.

25

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1 Q So that would be early '79 sometime?

2 A That's right. My plotting and my interest in
3 the information in order to make predictions began
4 somewhere in January of '79.

5 CHAIRMAN BECHHOEFER: Right. Thank you.

6 MS. SINCLAIR: Judge Bechhoefer, I had one
7 more question. I was wondering if Dr. Peck had
8 predicted the sharp downward slope of the curve in
9 Staff Exhibit 16 once the water was drawn down to 592.

10 CHAIRMAN BECHHOEFER: I had thought he had said
11 he was still going to analyze that.

12 If he can answer it, fine.

13 MS. SINCLAIR: Well, I just wanted to know
14 if he predicted it, which would have been --

15 THE WITNESS: Well, I hadn't predicted that
16 the ground water level -- or hadn't foreseen it was
17 going to be drawn down that low. So that introduces a
18 new point to be considered.

19 (Discussion had off the
20 record.)

21 CHAIRMAN BECHHOEFER: I'm wondering whether
22 there was still a question pending or whether anyone
23 has any further questions they wish to ask this witness.

24 MS. STAMIRIS: I have some recross based on
25 the last round. Shall I go ahead and --

10-3-2 1 CHAIRMAN BECHHOEFER: Yes, why don't you go
2 ahead.

3 RECROSS-EXAMINATION

4 BY MS. STAMIRIS:

5 Q Dr. Peck, to start with the last question first,
6 I believe you just said that the break in data which
7 represents -- on Figure C-18, which represents the change
8 from temporary to permanent settlement monitoring points
9 was roughly from March of '78 till sometime in 1979.
10 Didn't you indicate that?

11 A March of '79 to September of '79.

12 Q This break represents a break from March of '79
13 till September of '79?

14 A That's right.

15 Q Okay.

16 A That is the period, essentially, when the
17 surcharge occupied the building.

18 Q And does that correspond, then, to a period when
19 the sand level reached a certain point and overtook the
20 first monitoring points?

21 A Yes.

22 Q When you said in response to Mrs. Sinclair's
23 questions and some others that you thought -- you made a
24 reference to cracks which closed -- I can't remember how
25 you said it. Maybe they didn't close all the way, but

1 tended to close up while under the effect of the surcharge,
2 is that correct?

3 A After the surcharge had been placed and
4 removed, some of the cracks that had previously been open
5 had tended to close.

6 Q Well, wouldn't it be important to determine
7 whether, in fact, those cracks tended to close up prior
8 to application of the surcharge, for instance, when the
9 electrical duct banks were released? Do you think that
10 that indeed accounted for the closure of cracks that you're
11 referring to, as opposed to the effects of surcharge?

12 A Possibly in addition to, but not necessarily
13 as opposed to. But you are quite right that some closures
14 did occur when the duct banks were released.

15 Q And those closures that occurred when the duct
16 banks were released took place roughly in November of
17 1978, didn't they?

18 A That seems reasonable.

19 Q Well, would I be correct in assuming that they
20 took place within a month after the duct banks were
21 released? Wouldn't I?

22 A Probably right away.

23 Q Okay, I thought so. Okay, then what I want to
24 know is what analysis did you do of cracking immediately
25 prior to the surcharge and immediately after the

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surcharge in order to determine which cracks were actually caused by the surcharge?

A I didn't make any such analysis at all.

Q Okay, did someone else, to your awareness?

A I believe there are people who studied the cracks, but I do not know exactly who or what they found out.

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Q Okay. And, let me see, there was one other question.

When you said that in your judgment there was no data provided by the original, or by the additional borings which were requested by the NRC Staff and the Army Corps of Engineers, which to you indicated a lack of secondary consolidation, I want to ask as a follow-up question to that, are you aware of a difference of opinion in that regard expressed by the Army Corps of Engineers?

A Yes.

MS. STAMIRIS: Okay, thank you. I don't have any other questions now.

CHAIRMAN BECHHOEFER: Are there further questions--

MR. MILLER: No, I have no further questions.

CHAIRMAN BECHHOEFER: Either re-redirect or--

MR. MILLER: No.

(Discussion had off the record.)

RE-CROSS EXAMINATION

BY MS. SINCLAIR:

Q I just wondered at what point will we start to consider that one and a half inch maximum secondary settlement? Will it be after this curve, you know, irons out, or do you include this curve in your prediction?

A The dates that the predictions apply to are

1 spelled out on Text Figure 8 at the present time, just
2 before Page 80.

3 I'm sorry, Text Figure 5, which follows page 78,
4 which specifically tells the dates from December 31, '81
5 to December 31, 20-25,, so it begins on December 31st of
6 1981.

7 CHAIRMAN BECHHOEFER: You know, your Text Figure
8 8 talked about total surcharge --

9 THE WITNESS: That's right.

10 CHAIRMAN BECHHOEFER: -- and it also had some dates.

11 THE WITNESS: Yes, but the question, I think, had
12 to do with the beginning of the secondary settlement, which
13 is spelled out on Figure 5.

14 BY MS. SINCLAIR:

15 Q So then this curve would be included partially,
16 at least, within that date, is that right?

17 A Yes.

18 CHAIRMAN BECHHOEFER: By "this curve," do you
19 mean Staff Exhibit 16?

20 MS. SINCLAIR: Yes.

21 CHAIRMAN BECHHOEFER: Okay.

22 BY THE WITNESS:

23 A Yes, that's right. The time covered by some of
24 these points was within that period for the estimate of
25 secondary settlements.

1 Q So do you expect that curve to stay down at
2 this point -- and since the dewatering, the permanent
3 dewatering plan, I understand, the water level is going
4 to be at 595-C, that's right about the point at which this
5 curve is now.

6 A I hate to say I expect something, because as soon
7 as I say I expect something on this project it immediately
8 becomes a prediction, but what I think I would expect is
9 that once the dewatering situation stabilizes the curve
10 will become parallel to the slope that's indicated by
11 Figure 5, or that's implied in Figure 5. It will be dis-
12 placed below the curve that would have been drawn had the
13 dewatering settlement not taken place.

14 MS. SINCLAIR: Thank you.

15 CHAIRMAN BECHHOEFER: Any further questions?

16 MR. MILLER: None.

17 CHAIRMAN BECHHOEFER: The Board has none.

18 Mr. Paton, you wanted to make a statement?

19 MR. PATON: Yes, Mr. Chairman.

20 Mr. Chairman, several hours ago, you alluded to a
21 problem that the Staff sees, and that is something falling
22 through the cracks. And what I'm getting at is the
23 accuracy of the optical leveling surveys that establish the
24 actual measurement settlements that were used as input into
25 the structural analysis.

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I think it's fair to say that Dr. Peck did not address those matters, and when Mr. Weidner gets here I'm sure he can tell us what he did with the data, but it seems to the Staff that the accuracy of that data is quite significant, and we were wondering if the Applicant would plan to produce the witness that would address the accuracy of that data. It seems to us that that's appropriate.

It seems to us at this point that that fact is, in fact, falling through the cracks.

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1 MR. MILLER: Well, I believe that Mr. Weidner
2 will be able to address that subject, and if for any
3 reason he is unable to respond to questions there are
4 other witnesses who are readily accessible who can respond.

5 MR. PATON: If we want to go that way it's all
6 right, Mr. Chairman, but that hardly seems responsive.

7 If Mr. Weidner is going to testify to the
8 accuracy -- I know Mr. Weidner is going to tell us a lot
9 about what he did with his data when he got it, but,
10 frankly, I'd be very surprised if he could testify as to
11 the accuracy of the data he received from the survey
12 people.

13 But, if that's the Applicant's position, that's
14 the way we go. But I just think --

15 CHAIRMAN BECHHOEFER: Well, if he can't answer
16 the questions, we may have to consider then whether
17 further witnesses are necessary.

18 I'm certainly not ruling that out.

19 (Discussion had off the
20 record.)

21 CHAIRMAN BECHHOEFER: Is there any reason why
22 we can't excuse Dr. Peck at this time?

23 MR. PATON: No.

24 CHAIRMAN BECHHOEFER: Dr. Peck, you're excused.

25 THE WITNESS: Thank you.

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(Whereupon, Dr. Peck was
excused.)

CHAIRMAN BECHHOEFER: Why don't we take an
afternoon break, 15 minutes, before -- I assume when we
resume that Mr. Kane will be testifying?

MR. PATON: Yes.

(Short recess.)

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1 CHAIRMAN BECHHOEFER: Back on the record.

2 MR. PATON: The last document is a stipulation
3 involving the Diesel Generator Building. It has been
4 shown to all parties. I am not sure the Board has a copy.

5 CHAIRMAN BECHHOEFER: No.

6 MR. PATON: Mr. Chairman, we are ready to
7 proceed with Mr. Kane and there are just a few sections
8 of the SER involved, so I would also ask Mr. Hood to
9 join him on the witness stand.

10 Whereupon,

11 JOSEPH KANE

12 DARL S. HOOD,

13 called as witnesses by counsel for the Regulatory Staff,
14 having been previously sworn by the Chairman, was further
15 examined and testified as follows:

16 DIRECT EXAMINATION

17 BY MR. PATON:

18 Q Mr. Hood, would you state your full name
19 please for the record?

20 A (WITNESS HOOD) My name is Darl S. Hood.

21 Q Are you familiar with the portions of the SER
22 that you are sponsoring with respect to the Diesel
23 Generator Building?

24 A (WITNESS HOOD) Yes, I am.

25 Q What sections are those?

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1 A (WITNESS HOOD) Those are Sections 1.12 and
2 they include 1.12.5.

3 Q Are the statements contained in those sections
4 true?

5 A (WITNESS HOOD) Yes.

6 Q Mr. Kane, would you state your full name for
7 the record, please?

8 A (WITNESS KANE) Joseph Kane.

9 Q And what sections of the SER and the SER
10 supplements are you sponsoring in connection with the
11 diesel generator testimony?

12 A (WITNESS KANE) As a Staff member, I am
13 sponsoring SER Section 2.5.4 and Supplement to the Safety
14 Evaluation Report No. 2 and I am sponsoring Sections
15 2.5.4.1.2, 2.5.4.4.2, 2.5.4.5.1, 2.5.4.5.2, 2.5.4.5.4,
16 2.5.4.5.6, 2.5.4.6.3, 2.5.4.7 and 2.5.4.8, and these
17 sections pertain to the Diesel Generator Building.

18 Q And there are several other sections or
19 subsections that will be sponsored by Mr. Singh when he
20 arrives tomorrow; is that correct?

21 A (WITNESS KANE) That is correct.

22 Q Are the statements contained in those sections
23 true?

24 A (WITNESS KANE) Yes.

25 Q I neglected to ask you, Mr. Kane, are there any

1 corrections, additions or deletions to be made with
2 those statements?

3 A (WITNESS KANE) To my understanding, the
4 corrections that were required have been made previously.

5 Q Mr. Hood, do you concur in that? Do you have
6 any corrections to be made to sections that you named?

7 A (WITNESS HOOD) No, I have no corrections.

8 Q Mr. Kane, do you have with you a copy of
9 Mr. Weidner's testimony?

10 A (WITNESS KANE) Yes, I do.

11 Q I direct your attention to Page 56.

12 A (WITNESS KANE) I have Page 56.

13 Q Have you read Mr. Weidner's testimony to
14 understand the significance of the almost straight line
15 that appears at the bottom of that figure?

16 A (WITNESS KANE) I have read it sufficiently
17 to understand the significance of that line.

18 Q Is that almost straight line a proper
19 utilization of the actual measured settlement input?

20 A (WITNESS KANE) It is Staff's position that
21 the best data that we would have available to us are
22 the actual settlements and that the line which is
23 indicated by the values in blocks which appear to be
24 almost straight line, are not appropriate.

25 Q One last question, Mr. Kane. If the line which

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1 appears to be straight but we have been advised is not
2 quite straight, if that line were straight, would that
3 eliminate consideration of the differential settlement?

4 A (WITNESS KANE) If you are to define
5 differential settlement that takes out -- was understood
6 to be rigid body motion, my answer would be yes.

7 MR. MILLER: Would you read back the last
8 question?

9 (Question read.)

10 BY MR. PATON:

11 Q Mr. Kane, I think you'd better repeat the
12 answer.

13 A (WITNESS KANE) I will restate my answer.
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answer. 1 MS. STAMIRIS: Can we have that question restated,
2 please.

3 MR. PATON: Yes.

4 Mr. Kane, let me restate the question. If the
5 line you have referred to were straight, would that eliminate
6 consideration of differential settlement?

7 A (WITNESS KANE) If you define differential settle-
8 ment, as a difference between elevation between points, no.
9 But if we're talking from the standpoint of engineering and
10 the effect differential settlement has on a structure and
11 you assume the structure rotates as a complete unit, as
12 a rigid body, then assuming that, then assuming that the
13 straight line rotation, it would take out the effects of
14 differential settlement.

15 MR. PATON: That is all my questions, Judge
16 Bechhoefer. The sections are already in evidence.

17 CHAIRMAN BECHHOEFER: Miss Stamiris or Miss
18 Sinclair, either one.

19 MS. SINCLAIR: I don't have any questions.

20 CROSS EXAMINATION

21 BY MS. STAMIRIS:

22 Q Mr. Kane, did you sponsor the section of sur-
23 charging of the Diesel Generator Building on 2-24 of the
24 SSER?

25 A (WITNESS KANE) Yes, I did.

1 Q In the first paragraph of that section, the bottom
2 sentence refers to -- well, I will read it: (Reading)

3 "By December 1978, the largest measured
4 settlements located in the southeast corner of
5 the building had reached 4.2.5 inches which
6 already exceeded the building's initial 40-year
7 settlement prediction of 2.8 inches".

8 I would like to direct your attention to a certain
9 portion of the December 6th, 1979 order, the OM order for
10 this proceeding which makes a reference to settlement
11 expectations of the Diesel Generator Building and ask you
12 whether it is consistent with that. This is Appendix A
13 under the notice of violation attached to the December 6th
14 order, and I think to clarify for everyone, if you would
15 read all of Section 1(a) out loud, and then I will ask you
16 about it.

17 A (Witness complying.)

18 A (WITNESS KANE) I have read Paragraph 1(a) from
19 the document that is identified as Appendix A, notice of
20 violation. (Reading)

21 "The FSAR is internally inconsistent in
22 that FSAR Figure 2.5-4(b) indicates settlement
23 of the Diesel Generator Building to be on the
24 order of three inches or FSAR Section 3.8.5.5
25 (Structural Acceptance Criteria) indicates

1 settlements on shallow spread footings founded
2 on compacted fill to be on the order of one-half
3 inch or less. The Diesel Generator Building is
4 supported by a continuous shallow spread footing".

5 Q All right. On the basis of that statement in the
6 December 6th order about the half inch of settlement on the
7 shallow spread footing, do you understand that statement to
8 mean that a half inch of settlement was expected for shallow
9 spread footing, according to that section of the FSAR?

10 A (WITNESS KANE) From this document, I would
11 understand that the FSAR in Section 38, 3.8.5.5 indicates
12 settlements, four shallow spread footings to be a half inch
13 or less.

14 Q Does that denote any inconsistency with the
15 sentence that I read previously on page 2-4 of the SSER which
16 says that the 40-year settlement prediction for the Diesel
17 Generator Building was 2.8 inches?

18 A (WITNESS KANE) It does denote an inconsistency.
19 I think there is an explanation of that inconsistency.

20 When you put a time frame under or around the
21 document that we are referring to, the 2.8 inches that
22 appears in the portion I am sponsoring, is referring to
23 the FSAR and I am not sure of the date, where it is indi-
24 cated in that FSAR version that the settlement is 2.8
25 inches.

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Section 3.8 of the FSAR is the structural portion. I am not sure what is the date of that version of the FSAR -- it is a half inch.

It is an inconsistency but there's a explanation -- what I am referring to, there is a FSAR version that does indicate it to be 1.2 inches.

11-3
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1 BY MS. STAMIRIS:

2 Q But do you understand that both of these
3 measurements although they may be for different purposes
4 and found in different portions of the SSER, address
5 what the 40-year or what the expected settlement
6 prediction is to be for the Diesel Generator Building?

7 Well, I should say in that case, for shallow
8 spread footings.

9 A (WITNESS KANE) I would interpret these two
10 statements, the half-inch and the 2.8, to be at two
11 separate times, that to be the estimate of the footings
12 under the Diesel Generator Building.

13 In other words, I felt it was at one time a
14 half-inch and it was increased to 2.8 inches.

15 Q So you do not think that prediction of the
16 expected settlements for the Diesel Generator Building
17 footings was increased from a half-inch over the last
18 time to 2.8 inches over the lifetime?

19 A (WITNESS KANE) That is correct.

20 Q And would I be correct in understanding that
21 you don't know -- you can't be certain upon what that
22 was based or you don't have any more details about that
23 change?

24 A (WITNESS KANE) I have some additional
25 information. It is my recollection, that if you go back

11-3-2 1 to the PSAR, which precedes the earlier version of the
2 FSAR, that you would find in there a statement that says
3 the settlement that is expected for the footings that are
4 going to be founded on the compacted fill is a half-inch.
5 I think that is the basis for the half-inch.

6 Q All right. Mr. Kane, at the bottom of Page 2-24
7 is a statement that says (reading.) "Statement of the
8 surcharge fill was initiated in January 1979", and then
9 the sentence goes on to tell about when it was completed.
10 And there are also some -- there's a table on Page 2-33
11 that denotes time frames of -- what time frame accounted
12 for before surcharging data and what time frame accounted
13 for during surcharge data.

14 I would like to show you this document which
15 is Stamiris Exhibit 30 which has been introduced before
16 and also ask, based on your memory, if indeed the actual
17 sand application began in about November of 1978 instead
18 of in January of 1978.

19 A (WITNESS KANE) This document would indicate
20 that the surcharge line which, if defined, which it is
21 not on this drawing, is defined as the start of the
22 surcharge, then it would be indicated that it is
23 beginning towards the end of November of 1978. I think
24 maybe it would help the record to indicate that it is my
25 recollection that some preparation was made at the site

11-3-3
1 prior to January and I am talking about placement of some
2 fill in preparation for the surcharge.

3 But to some people's mind, that would not be
4 called surcharge.

5 Q All right. Mr. Kane, with regard to that, I
6 would just say two or three feet of sand that was placed
7 in November of 1978 and continued in place until January
8 of 1979, when the increments of sand were increased for
9 the surcharge, considering this two or three feet of sand
10 that was present, would that be significant in computing
11 what I will call base line data for the beginning of
12 settlement at the Diesel Generator Building?

13 A (WITNESS KANE) No because as indicated on
14 Page 233, we are asking the Applicant to address what
15 I would call, base line settlement data from the time it
16 was initially measured, which is back as far as March of
17 1978.

18 Q All right. Then let me first ask you then
19 whether the existence of the, let's say two and a half
20 feet of sand over the area of the Diesel Generator
21 Building for a period of three months, do you think that
22 that would cause some settlement in the diesel generator
23 soils?

24 A (WITNESS KANE) Yes and it was being observed
25 and recorded by surveying methods.

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Q The piezometers or -- all right. Tell me how those measurements of its effects were registered?

A (WITNESS KANE) It is my understanding in November of 1978, the reference markers, such as DG-3 -- DG-1 -- were in place and being recorded.

1-4fol

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BY MS. STAMIRIS:

Q And I am sorry if I am repeating myself, but I want to make sure that your statement that it would be of no significance for the analysis, the ultimate surcharge results, includes a consideration of preconsolidation pressures?

A (WITNESS KANE) I indicated that the settlement is significant and I hope I have indicated that this settlement, which is occurring under this two or three foot of layer, prior to the beginning of the surcharge, is being recorded and the Applicant is addressing that settlement back as far as March of 1978.

Q All right. Mr. Kane, at the bottom of Page 233 under the sentence under Parentheses 2, where it says that the Staff has questioned however, the manner in which the measured settlements were used as input for the structural analysis and you -- the NRC goes on to discuss the employment of the best fit straight line methodology to a plot of points, would this be another example of the methodology that is reflected in Staff Exhibit 16?

A (WITNESS KANE) I am not sure I understand your question.

Q Well if I --

A (WITNESS KANE) By what you mean methodology in

11-4-2

1 Exhibit 16?

2 Q In Exhibit 16, do you believe that the Applicant
3 was employing a methodology which could be termed a
4 straight line best fit through a plot methodology?

5 A (WITNESS KANE) The reference here to straight
6 line best fit does not pertain to Exhibit 16. The
7 better figure to be looking at is straight line best fit
8 which is what Mr. Paton referred to on Page 56 of
9 Mr. Weidner's testimony.

10 Q Yes, I think I have the wrong -- I am sorry.
11 I meant to refer to that page, 56. That has not been
12 identified as an exhibit, has it?

13 MR. MILLER: Part of Mr. Weidner's testimony.

14 MS. STAMIRIS: I understand that.

15 I want you to disregard the questions that I
16 asked and I want to ask you if the instance that you are
17 talking about at the bottom of Page 2-33 is another
18 example of the same type of methodology that is
19 employed on Page 56 of Mr. Weidner's testimony.

20 WITNESS KANE: The statement that appears on
21 Page 2-33 about straight line best fit, does pertain
22 to the heavy line which is shown on Mr. Weidner's page 56
23 testimony.

24 BY MS. STAMIRIS:

25 Q Were there other examples of this type of

11-4-3

1 methodology by the Applicant? By that, I mean,
2 employment of a straight line best fit through a plot of
3 data?

4 A (WITNESS KANE) Yes and you could see the
5 figures that pertain to that on Pages 57 and 58 of
6 Mr. Weidner's testimony.

7 Q And those are the only examples that you are
8 aware of?

9 A (WITNESS KANE) They are the ones that are being
10 referred to on Page 2-33.

11 Q Now what I want to understand is, whether there
12 are other examples of this methodology, of which you are
13 aware in the Applicant's review of the surcharge
14 undertaking.

15 A (WITNESS KANE) That's a difficult question
16 to answer because it is so broad in that I know a lot
17 of the work that the Applicant has done where he has used
18 straight line -- and I would accept it --

19 Q I will try to phrase it this way. Are these
20 three examples that you cite on Page 2-33 the only
21 instance of usage of that straight line best fit through
22 a plot methodology which caused you some concern?

23 A (WITNESS KANE) Yes.

24 Q Thank you. Mr. Kane, do you agree that
25 three-fourths of an inch or .83 inches represents a

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conservative upper bound of differential settlement for the Diesel Generator Building to be expected in the future?

A (WITNESS KANE) Knowing the dates that that covers and it is my understanding it covers from December 31st, which I think is December 31 of 1980 -- could I check --

CHAIRMAN BECHHOEFER: Mr. Kane, let me --

WITNESS KANE: It is 1981?

CHAIRMAN BECHHOEFER: No, it is December 14, 1979 to December 31, 2025. .75 the dates are a little different. Those dates are December '81 to 12-31, 2025.

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1 A (WITNESS KANE) The confusion is coming about
2 because originally the Applicant projected the
3 settlement from December of 1979. Because we had
4 meetings in 1980 and 1981, it was felt unnecessary to
5 be projecting settlements back in December 1979 when we
6 had the actual settlement measurements.

7 And so it's my understanding that in meetings
8 of 1982 there was an agreement reached with the Applicant
9 that the projected settlement should be from December of
10 1981 because we had measured settlements up to that date.

11 BY MS. STAMIRIS:

12 Q Mr. Kane, do you understand --

13 MR. MILLER: Excuse me. I'm not certain that
14 answered the question that you posed.

15 MS. STAMIRIS: No. I'm going to go back and
16 ask him about what he just said.

17 BY MS. STAMIRIS:

18 Q I want to ask Mr. Kane whether you understand
19 Dr. Peck's prediction of three-fourths inch -- or let's
20 use .83 inches of expected settlement, a differential
21 settlement predicted over the lifetime of the plant.

22 Do you understand that to encompass the time
23 frame from December 1981 until December 20-25?

24 A (WITNESS KANE) Yes, that is my understanding.

25 Q And do you agree with that prediction of

12-1-2
1 differential settlement?

2 A (WITNESS KANE) For that time frame, yes.

3 Q Was there any discrepancy over the amount of
4 different settlement that occurred from the time when
5 the surcharge was initiated until December of 1981 that
6 was not expected?

7 MR. MILLER: Object. I don't understand the
8 question. But maybe the witness does.

9 MR. PATON: Well, Mr. Chairman, I don't think
10 that's a proper objection. I think if the witness
11 understands the question -- why don't we ask Mr. Kane
12 if he understands the question.

13 CHAIRMAN BECHHOEFER: Mr. Kane, do you
14 understand the question?

15 WITNESS KANE: I wish she would repeat the
16 question.

17 BY MS. STAMIRIS:

18 Q Mr. Kane, I mean to ask whether there was any
19 differential settlement which occurred since the
20 initiation of the surcharge in 1979 up until December
21 of 1981 that was unexpected or more than was predicted?

22 A (WITNESS KANE) The information that we have
23 brought to the attention of the Applicant and Dr. Peck --
24 and that is the settlement which is now occurring
25 because of the dewatering that is going on -- is being

12-1-3 1 evaluated because it appears to be at a slope that is
2 steeper than what has been predicted by the surcharge
3 program.

4 I was not aware that dewatering is below the
5 level that it was when the full recharge test was run.
6 I didn't realize it was below now 592. And that
7 information, that dewatering has to be looked at as
8 a possible reason we're getting more settlement than I
9 would have anticipated and whether, after having looked
10 at that, in my estimation, we should also be looking at
11 how does that compare to what has been predicted by the
12 extension of the straight line which the Applicant is
13 using for secondary consolidation.

14 Q Okay, Mr. Kane, I appreciate that answer in
15 that I think I may have left the word differential out
16 the last time I raised that question.

17 I understand that we are -- is it your
18 understanding on the subject that you just discussed
19 that both Dr. Peck and the NRC Staff will be coming back
20 to this Board and the parties with some sort of
21 resolution or further testimony on the subject of what
22 settlement is now occurring?

23 A (WITNESS KANE) Based on discussions I heard
24 this morning, it's my understanding that the Applicant
25 will look at the information, write a report, a letter

1 report that evaluates that information, submit it to all
 2 parties, and, if there is a problem with that information,
 3 then we would come back if it is felt -- and I'm not sure
 4 by all parties or by whom -- but if it is felt that it
 5 is explainable and not significant, then we may not come
 6 back.

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1 Q Will the NRC -- you will be one of the people who
2 will be making that determination or evaluation of the data
3 supplied by Consumers, won't you?

4 A (WITNESS KANE) For the Staff, yes.

5 Q Does the NRC Staff plan to inform the parties of
6 their evaluation of that data?

7 A (WITNESS KANE) I would be happy to, but I feel
8 maybe Mr. Hood would like to address that.

9 MR. PATON: Mr. Chairman, I will answer the
10 question and ask Mr. Hood to correct me if I am wrong.
11 We will be very happy to respond indicating whether we
12 see any significance in the information.

13 WITNESS HOOD: I agree with that. My pause was
14 due to ascertaining the question. I'm afraid I was not
15 that attentive at the moment.

16 CHAIRMAN BECHHOEFER: Mr. Hood, would that type of
17 information give rise to a portion of a new SER supplement,
18 or would it only do so if it created further problems?

19 MR. PATON: Mr. Chairman, for example, if the
20 information was not significant, could we get that question--

21 CHAIRMAN BECHHOEFER: Right.

22 MR. PATON: I mean, I assume if it's not significant
23 it would not --

24 WITNESS HOOD: May I have a moment?

25 The question involves evaluation of public data.

1 That evaluation is such that it causes us to alter any con-
2 clusions made in the SER or causes us to -- indicates the
3 need for any change in something that is presently in that
4 SER or lends significant new information to what is stated
5 in the SER, then it would be the subject of a further sup-
6 plement to the SER.

7 I guess my answer to you, it depends on the
8 assessment we make of the data.

9 BY MS. STAMIRIS:

10 Q Now, Mr. Kane, to go back to the other thing I
11 was asking about in terms of differential settlements, has
12 there been any differential settlements which has occurred
13 since the preload which is more than was expected?

14 A (WITNESS KANE) Staff Exhibit 16 presents the
15 settlement history after 9-14-79 for one reference marker.

16 That information, along with a lot of other
17 information for the other markers, has to be evaluated and
18 the extent of differential settlement evaluated.

19 That has to be done. That has not yet been done.

20 Q So, by that answer, would I be correct in under-
21 standing that you intend to evaluate the differential
22 settlement between the various points of the most recent
23 data while you are reviewing the settlement data?

24 A (WITNESS KANE) That is correct.

25 MS. STAMIRIS: Thank you.

1 CHAIRMAN BECHHOEFER: Mr. Kane, has the Staff
2 received any other reports of post surcharge removal settle-
3 ment which -- for which the slope differs significantly from
4 that which has been predicted?

5 WITNESS KANE: The information that we were pro-
6 vided at the last hearing, which Staff Exhibit 16 is one
7 of those drawings -- there's a large amount of the data
8 that was provided has the similar behavior as we see on
9 Staff Exhibit 16.

10 So the settlement that we're getting on the
11 dewatering is not just occurring at that marker, it's
12 occurring at many of the markers.

13 CHAIRMAN BECHHOEFER: I see.

14 BY MS. STAMIRIS:

15 Q Mr. Kane, that information which was provided to
16 the NRC Staff, of which Staff Exhibit 16 is one example,
17 was provided at the specific request of NRC, was it not?

18 A (WITNESS KANE) It was a specific request but
19 it was done in a very formal manner. I was at the hearing
20 in November. I was trying to understand when additional
21 settlement has occurred, and I asked a representative from
22 the Applicant, and I think I was given the data the next
23 day.

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MS. STAMIRIS: Thank you.

Would there be a Staff witness at another time to address the structural aspects of the Diesel Generator Building and the surcharge?

MR. PATON: Mr. Rinaldi will be here this week to address the structural aspects of the Diesel Generator Building.

MS. STAMIRIS: Okay.

WITNESS HOOD: Mrs. Stamiris, may I go back to one of your earlier questions and attempt to determine if some supplementation is necessary or not?

MS. STAMIRIS: Please.

WITNESS HOOD: You earlier asked Mr. Kane his opinion in regards to three-quarter inches of additional settlement, and I believe he did answer that question.

I know there's also a discussion in the hearing about three-quarters of an inch versus ~~3~~ inches, and I'm not sure in the particular question you asked if you intended to infer any difference between three-quarters of an inch and what was called almost three-quarters of an inch.

MS. STAMIRIS: Well, I did not intend to.

WITNESS HOOD: Thank you.

CHAIRMAN BECHHOEFER: Mr. Hood, do you draw any significance to that difference? Because I think I may be

2-3-2

1 the fault behind the .83 getting discussed. So --

2 WITNESS HOOD: No, sir, I don't.

3 CHAIRMAN BECHHOEFER: Do you agree with
4 Dr. Peck when he saw no essential difference between --

5 WITNESS HOOD: I don't attribute any particular
6 significance to the difference, no, sir.

7 BY MS. STAMIRIS:

8 Q Going back to that question on the differential
9 settlement, Mr. Kane, I think I got off the track in my
10 questioning and I don't know if I ever went back. If I
11 did, I can't remember your answer. But the original
12 question and the one I want to ask you now is: Do you
13 agree with Dr. Peck's estimate of .83 inch of expected
14 differential settlement over the life of the plant? Do
15 you agree with his prediction for differential
16 settlement?

17 A (WITNESS KANE) I'm going to put the time frame
18 that I understand is -- that goes with that prediction.
19 And it's my understanding the time frame is 12-31-81 to
20 the end of the plant operation, which is 12-31-2025.

21 With that time frame, and if I'm being told
22 the differential settlement is three-quarter of an inch
23 or .83 of an inch, do I feel that it is a -- or do I
24 agree with that value to be used for differential
25 settlement, then I would say yes.

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1 CHAIRMAN BECHHOEFER: Well, let me ask you this
2 right now. Do you think some different time period should
3 be used in predicting differential settlement over the
4 life of the plant?

5 WITNESS KANE: No, sir, because we have some
6 records now that tell us what the differential settlement
7 has been up to that time, so we have that by measurement.
8 And what we're trying to do now is estimate the amount
9 of differential settlement we are going to have for the
10 plant life, so there's no need to go back beyond that
11 date.

12 BY MS. STAMIRIS:

13 Q Mr. Kane, in your geotechnical assessment of
14 the surcharge at the Diesel Generator Building, to what
15 extent did you rely on finite element studies?

16 A (WITNESS KANE) Not at all.

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1 Q Would that go more to the structural aspects of
2 the surcharge on the Diesel Generator Building?

3 A The structural would not be evaluating the sur-
4 charge. What the structural will be doing is evaluating
5 the settlements which were induced by that surcharge.

6 Perhaps it's clear in your mind, but it's not
7 clear in my mind. The settlements that occur came from
8 the surcharge and before and after. Those settlements are
9 used in a structural analysis which would be the finite
10 element analysis.

11 But to evaluate the adequacy of the surcharge
12 program no finite element analysis was made.

13 WITNESS HOOD: I believe Mr. Kane meant to say
14 that the structural would be considering the effect of the
15 settlement.

16 BY MS. STAMIRIS:

17 Q That was what I was wondering about. And then that
18 would be addressed by Mr. Rinaldi for the NRC Staff?

19 A (WITNESS HOOD) Yes.

20 A (WITNESS KANE) It is the position of the NRC that
21 the settlements would rightfully or normally be the respon-
22 sibility of the geotechnical engineer. That is the input
23 that we are to evaluate and indicate to the structural
24 engineer its adequacy, and that information then is used
25 in the structural analysis.

1 Q Will you be here or be taking the stand with Mr.
2 Rinaldi as a part of the structural analysis also?

3 MR. PATON: Mr. Kane will be here. Wheher he's on
4 the stand or not, I don't think so. He may be, but he will
5 be here.

6 BY MS. STAMIRIS:

7 Q Well, Mr. Kane, I'll ask you whether you are aware
8 of the recent findings of the NRC Staff from Region III
9 regarding hardware in the Diesel Generator Building. And
10 are you aware in a general way of the findings I'm referring
11 to that took place roughly in November of 1982?

12 A (WITNESS KANE) I'm not aware other than to have
13 been present in a conversation which indicated there were
14 some different problems based on Region III's inspection.

15 I do not know any of the details.

16 MR. PATON: Mr. Chairman, we have a list of the
17 items of hardware that were involved in the QA non-compli-
18 ances, and if it's of any assistance to the Board we would
19 be glad to read that list.

20 I think Mrs. Stamiris is wondering if there's
21 any connection with that list and the structural adequacy
22 of the building. To my knowledge, there is none, but we
23 will read the list if the Board wants us to do that.

24 (Discussion had off the
25 record.)

1 WITNESS HOOD: Mrs. Stamiris --

2 CHAIRMAN BECHHOEFER: Well, I was going to say
3 you could read the list, if you want.

4 MR. PATON: Yes, there are only nine or ten items.
5 It won't take that long.

6 Miss Wright will do that.

7 MS. STAMIRIS: Miss Wright, would you wait for
8 just a minute, please, until I find the reference here.

9 MS. WRIGHT: Sure.

10 MS. STAMIRIS: Thank you.

11 MS. WRIGHT: The first item is structural steel
12 for the HVAC intake fans and support, monorail, the exhaust
13 pipe hangers. That's the third item.

14 The fourth item is the exhaust pipe.

15 The fifth item is the exhaust pipe silencers.

16 The diesel generator -- I'm sorry; the sixth item is --

17 MR. MILLER: Could you go a little slower, please.

18 MS. WRIGHT: Sure.

19 MS. STAMIRIS: After the exhaust pipe, which was
20 number --

21 MS. WRIGHT: Would you like for me to start over?

22 CHAIRMAN BECHHOEFER: Yes.

23 MS. STAMIRIS: And number them, please, as you
24 read them.

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1 MS. WRIGHT: Surely.

2 The first item is the structural steel for the
3 HVAC intake fans and support.

4 The second item is the monorail.

5 The third item is the exhaust pipe hangers.

6 The fourth item is the exhaust pipe, and the
7 fifth item is the exhaust pipe silencers.

8 The sixth item is the diesel generator control
9 panels.

10 The seventh item is the diesel generator air
11 start piping and hangers.

12 CHAIRMAN BECHHOEFER: Air start?

13 MS. WRIGHT: Yes. The eighth item is the
14 structural steel, which is unrelated to the structural
15 integrity of the Diesel Generator Building but as it is
16 used as an attachment point for equipment.

17 The ninth item is the electrical braceways
18 and wirings.

19 That's all.

20 CHAIRMAN BECHHOEFER: Okay.

21 MS. STAMIRIS: Well, I guess I won't ask any
22 other questions at this point on that.

23 MR. PATON: Mr. Chairman, just for clarification,
24 there were one or two other items, but they have nothing
25 to do with the Diesel Generator Building. Do you want us

12-5-2 1 to name the other items?

2 CHAIRMAN BECHHOEFER: Well, why don't you,
3 just to keep them together.

4 MS. WRIGHT: Okay. There was chipping of the
5 containment wall and there were findings regarding cooling
6 pond riprap.

7 MS. STAMIRIS: Just to clarify while we're on
8 this subject, when I was taking notes of Mr. Brunner's
9 listing of items from this same inspection I had written
10 down the words "beams, plates and framework." And those
11 sound to me like they could have possible structural
12 application. And I guess I would like the NRC to check
13 out anything to do with beams, plates or framework that --

14 MR. PATON: We've done it, Mr. Chairman, we
15 have been advised that none of these items -- your
16 question is whether any of these items can affect the
17 structural adequacy of the Diesel Generator Building?

18 MS. STAMIRIS: Well, that's what I want to --
19 yeah, that's where I'm going.

20 And you have been advised that --

21 MR. PATON: I have been advised that there is no
22 direct connection. Now, as I was indicating to the Board,
23 further investigation may reveal some connection less
24 than direct, but my information now is there is no direct
25 connection.

1 CHAIRMAN BECHHOEFER: Let me ask Mr. Kane just
2 one question.

3 Could problems -- I don't know what they are --
4 with cooling pond riprap affect the potential settlement
5 of the Diesel Generator Building?

6 WITNESS KANE: Not having seen any of these
7 items that have been identified, I don't think I should
8 answer. But it seems to me it could only be remotely
9 possible.

10 It's my understanding that the riprap that is
11 being discussed is on the cooling pond, which would not
12 be a factor on the Diesel Generator Building.

13 CHAIRMAN BECHHOEFER: Thank you.

14 MS. STAMIRIS: I'll just try and do this to
15 clarify in my own mind, but, Mr. Brunner, do you have any
16 reference for the listing of beams, plates and framework
17 at the Diesel Generator Building that you can tell me
18 where that came from that you were reading?

19 MR. BRUNER: I was reading a list that was
20 drawn up by the company, and I can't really tell how those
21 items relate to the items that were read by the NRC Staff
22 except that I assume that they were probably included in
23 one of the items the NRC Staff has listed.

24 And, as I said, at the time of the phone call,
25 I don't have any knowledge that any of the items on the

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1 list affect the structural integrity of the Diesel
2 Generator Building.

3 WITNESS HOOD: Mrs. Stamiris, perhaps it would
4 be appropriate for me to comment. I do have a fair
5 understanding of the inspection items.

6 There is nothing in the inspection, to my
7 knowledge, that is related to the basic structural
8 integrity of the Diesel Generator Building or any other
9 structure. Nor is there anything in the inspection items
10 that relate to soils or soil settlement with what you
11 would call geotechnical matters.

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1 BY MS. STAMIRIS:

2 Q Mr. Hood, when you made that statement, do you
3 mean to say that there were no specific instances found
4 in this inspection of any -- well, that there were not
5 any findings which could have affected the structural
6 integrity of the building or the geotechnical things as
7 opposed to findings of improper methodology that -- let's
8 skip that and let me give you an example that would --

9 MR. MILLER: Excuse me. I really kind of
10 object to this. This is really a digression.

11 We've all agreed that the inspection report is
12 going to be out later this month. It's going to be
13 available for everybody to see, and there's going to be
14 testimony on it either in the month of February or
15 sometime after that.

16 Having characterizations of the document that's
17 not yet written by a variety of witnesses and attorneys
18 seems to me to be very unproductive.

19 MR. PATON: Mr. Chairman, I agree. I think
20 it's a very unsatisfactory way to go.

21 MS. STAMIRIS: I'm not asking questions about
22 the document at this point, I just want to get some
23 assurances how it will be handled in this hearing.

24 I just want to ask that if, for example --

25 MR. PATON: I'll answer that.

1 It's an inspection report which we intend to
2 put before this Board, and I assume there will be an
3 evidentiary session concerning it as part of the QA
4 hearing.

5 MS. STAMIRIS: Well, I think I can be correct
6 in assuming that if after having seen the document and
7 reviewed it is a part of the QA hearing, if there would
8 be implications, let's say, involving the structural
9 steel and the way that this was analyzed in some way,
10 which we found out at some time later did have some
11 indirect implications for structural integrity at the
12 Diesel Generator Building that we would not be closed
13 off from coming back and --

14 MR. PATON: That's up to Judge Bechhoefer,
15 if you can convince him that it is new information that
16 is relevant to his findings and he decides to hear it,
17 that's up to the judge.

18 MS. STAMIRIS: Okay.

19 CHAIRMAN BECHHOEFER: We certainly won't decide
20 it until we see the report.

21 MS. STAMIRIS: Okay.

22 BY MS. STAMIRIS:

23 Q Mr. Kane, I'd like to ask you for your opinion
24 of a few of the things in Dr. Peck's testimony and --
25 well, Mr. Kane, were there any findings in -- or, not

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1 findings, were there any statements in Dr. Peck's
2 testimony with which you disagreed?

3 A (WITNESS KANE) The earlier or the later
4 version?

5 Q Well, the later version.

6 A (WITNESS KANE) There would be portions, I'm
7 sure, where there could be a difference of technical
8 opinion. I have not gone through them and identified
9 them.

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them

1 Mr. Hood has just asked me, in my opinion,
2 are they significant to our conclusions, and my answer
3 would be no, because we were able to resolve our
4 differences by independent ways.

5 MS. STAMIRIS: Okay. Well, I'll skip the
6 questions I was going to ask you about whether you
7 disagreed with Mr. Peck.

8 I don't have any other questions from Mr. Kane
9 at this time.

10 CHAIRMAN BECHHOEFER: Okay, Mr. --

11 MR. MARSHALL: I would like to ask a few
12 questions, not very many, because the hour is late, but
13 there is -- I'd like to have both of you clarify a
14 couple of things for me.

15 RE-CROSS-EXAMINATION

16 BY MR. MARSHALL:

17 Q One is for Mr. Kane. Am I to understand this
18 afternoon that the geotechnical men on a large structure
19 such as the Diesel Generator Building do the formal
20 work at the start for the basis of the structure, for
21 the basis, for the structural work to be done to begin
22 with, foundations.

23 MR. PATON: Mr. Chairman, could I ask that the
24 question be read back or repeated. I didn't follow every
25 bit of --

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1 CHAIRMAN BECHHOEFER: Have you finished your
2 question?

3 MR. MILLER: Let's find out if the witness
4 understands it, Mr. Paton. You said yourself that's all
5 that's important.

6 MR. PATON: I didn't say I didn't understand it.
7 I asked that it be read back.

8 MR. MILLER: The look on your face spoke
9 volumes?

10 MR. PATON: Are we going to get into those
11 games?

12 I'd like to have the question read,
13 Mr. Chairman.

14 (Question read.)

15 WITNESS KANE: I don't perceive a question in
16 what I just heard.

17 MR. MARSHALL: Beg your pardon?

18 WITNESS KANE: I don't understand your question.

19 BY MR. MARSHALL:

20 Q Well, today it was my understanding that
21 Dr. Peck stated that the geotechnical men done the --
22 I'll call it the survey of the ground work -- before a heavy
23 structure like this is constructed they do an analysis
24 on it, they see whether -- they go in first and explore it
25 to see if it's going to withstand the weights, and so
forth.

Are you in agreement with that?
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1 WITNESS KANE: I am not sure I heard everything
2 that you have indicated that Dr. Peck has said, but I'll
3 answer your question by saying this. Does a geotechnical
4 engineer become involved when a large structure is going to
5 be built by trying to understand the foundation it is
6 going to be built on, and I would say yes.

7 BY MR. MARSHALL:

8 Q Then my next question is, in the instant case,
9 did the geotechnical men that made the original survey of
10 this particular job, were they Bechtel Corporation geo-
11 technical men or were they NRC men or were they Consumers
12 Power Company men?

13 A (WITNESS KANE) There are a couple of words I
14 would like to clarify. You said original and you said
15 survey. Are you talking about survey as being what a geo-
16 technical engineer does?

17 Q In that same context, yes.

18 A (WITNESS KANE) And if you are saying original,
19 why I think we ought to go back to the first one that per-
20 formed it, and it's my recollection neither the NRC nor
21 Bechtel was part of the original.

22 Q Bechtel?

23 A (WITNESS KANE) It is my understanding maybe
24 Bechtel -- I understand it was -- we are talking about the
25 geotechnical original investigation and I don't know whether

1 Bechtel was involved with that.

2 Q Now I still -- are you saying that you think
3 Bechtel was involved with that original work?

4 CHAIRMAN BECHHOEFER: He said just the opposite.

5 MR. MARSHALL: That is what I wanted to know.

6 Then would you please tell me who you think were
7 the ones who did the very first geotechnical analysis of
8 that work or whatever.

9 WITNESS KANE: It is my recollection that the
10 original geotechnical work was done by James & Moore.

11 Q But who were they employed by? Bechtel or Con-
12 sumers Power Company?

13 A (WITNESS KANE) I do not know.

14 Q Thank you. Now I have a question for you, Mr.
15 Hood.

16 A long time ago on your direct testimony, you said
17 that if you had your way as to that generator, that Diesel
18 Generator Building, you would demolish it and go for a
19 new option. Now that's not -- I am not concerned with that
20 but I am concerned with this. Should there be some steel
21 that was in that building discovered since that time that
22 was not up to standard? Would you accept that as a safety
23 issue, because you knew it wasn't up to standard just
24 because, say Mr. Miller and his boys said, we can't find
25 the requisition to trace it back to the fabricator to

1 guarantee that it is safe or not safe.

2 Would you accept that?

3 A (WITNESS HOOD) Mr. Marshall, I am not sure I
4 can answer that in the abstract, when you say structural
5 steel.

6 Q Well, I am saying would any type of steel that
7 doesn't reach the requirements of the satisfaction of what
8 the requirements are -- becomes inferior -- let's use that
9 word -- and you know it is inferior. Everyone knows it
10 is inferior. But, they can't find the fabricator who did
11 it in the first place. Is that -- would a requisition
12 trace it back to the source? If that -- would you accept
13 that as a safety thing, to allow it to go back or would
14 you want it tore out -- what would you do with it?

15 A (WITNESS HOOD) It is a very difficult question
16 to answer in the abstract. It depends on that particular
17 function of that structural steel. I assume, for example,
18 you are talking about the safety related structure.

19 Q That's true, true.

20 A (WITNESS HOOD) And quite clearly, there are cases
21 where we have a requirement of tracing equipment and
22 structural steel.

23 But to say that a given non-compliance in the
24 area of a structural number would always require a replace-
25 ment; I don't think I can make that statement. It is the

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kind of thing that our inspectors would be concerned about and would cause the generation of a non-compliance if the requirements were there.

But I cannot give you an answer in the abstract of what the outcome of what such a non-compliance would be. I can tell you that generally, such items are of concern to the Staff.

Q What I'm saying is this. To offset and to climb out from under, Mr. Miller says, I've tried everything I can but I just can't come up with those requisitions. We can't trace it back to the fabricator. Are you going to accept that?

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that. 1 MR. PATON: I object. That question doesn't seem
2 to be connected with anything.

3 MR. MARSHALL: It does, it certainly does. It
4 is a safety-related proposition.

5 MR. PATON: Could I ask, Mr. Chairman, if we are
6 in fact referring to any specific matter that is going on
7 right now?

8 CHAIRMAN BECHHOEFER: Are you referring to any-
9 thing specific --

10 MR. MARSHALL: Yes, I am. I read just recently
11 where there is something that come up down there, and they
12 said they can't trace it to a source. It has been left,
13 as he says, hanging in the abstract. I would like to know
14 when they get the thing hanging up by the neck somewhere.

15 MR. PATON: Mr. Chairman, I submit that the
16 question is too vague to have any meaning for this record.

17 CHAIRMAN BECHHOEFER: I can't tell whether it
18 has any relationship to the testimony --

19 MR. MARSHALL: We only have one Diesel Generator
20 that is sinking, and if they are going to let it sink right
21 on the site, I don't care anymore about that, about that
22 steel that is in there, but if they are not --

23 MS. STAMIRIS: Excuse me, I was going to ask a
24 recross question based on this at a later time, and if I
25 could ask it now, maybe it would help Mr. Marshall out.

1 CHAIRMAN BECHHOEFER: Well, we are trying to
2 determine whether any of this is relevant to their testi-
3 mony on settlements --

4 MS. STAMIRIS: I would like to try to tie it in,
5 although it necessarily has to be hypothetical.

6 Mr. Hood, I would like to ask you if you found
7 that you could not determine that adequacy of the material
8 in the structural steel of the Diesel Generator Building,
9 due to improper qualifications of that material and
10 equipment, how would you -- if you could prove that it was
11 adequate just as you couldn't prove that it was inadequate,
12 how would the Staff go about resolving whether indeed that
13 structural steel was adequate or inadequate?

14 MR. MILLER: I am going to object. I simply think
15 that there is no foundation in the record for any asser-
16 tions that the structural steel and the Diesel Generator
17 Building -- at least insofar as it relates to the struc-
18 tural adequacy of the structure itself, is somehow inade-
19 quate or is improperly qualified or anything else.

20 MR. PATON: I would like to object because the
21 question is based on a lot of hypotheticals. And if she
22 finds it is inadequate, in what way is it inadequate. You
23 can't be sure -- it raises so many questions that the
24 answer, I don't think, can help the Board and requires
25 Mr. Hood to contemplate all possibilities and I just don't

1 think it meaningful.

2 MS. STAMIRIS: Well, I agree that it is hypo-
3 theoretical because I said it was hypothetical in the first
4 place. And perhaps the most expedient thing would be to
5 wait until we have some specifics.

6 CHAIRMAN BECHHOEFER: I think you would have to.
7 There will be, undoubtedly, witnesses here when we get
8 more specific matters. I assume you are trying to relate
9 that to the future inspection report; is that correct?

10 MS. STAMIRIS: Yes.

11 MR. MARSHALL: Laying a foundation, that's all.

12 CHAIRMAN BECHHOEFER: All I have heard now to
13 date is that the structural steel that is involved is
14 unrelated to the integrity. Well, the questions would
15 have quite different answers so I think we will have to
16 sustain the objection at this time, at least.

17 Do you have further questions?

18 MR. MARSHALL: I have no further questions.
19 Everything has been adequately -- I have nothing further
20 to say. I can go home now.

21 CHAIRMAN BECHHOEFER: Mr. Miller might want to
22 say a few things.

23 MR. MILLER: I have just a few questions,
24 actually.

25

1 (Whereupon, the evening session
2 in the above-entitled
3 proceedings commenced at
4 6:00 p.m.)

5 CROSS-EXAMINATION

6 BY MR. MILLER:

7 Q Mr. Kane, you identified in your direct
8 examination by Mr. Paton, certain sections of the
9 Supplemental Safety Evaluation Report that you were
10 sponsoring. Are those sections in which you were the
11 principal author?

12 A (WITNESS KANE) Yes.

13 Q Are there any other sections in this report
14 that is, the Supplemental Safety Evaluation Report of
15 which you are the principal author?

16 A (WITNESS KANE) Yes. I have identified those
17 and other sections with respect to other structures.

18 Q Calling your attention to Page 1-2 of the SSER --
19 MR. PATON: Supplement 2?

20 MR. MILLER: Supplement 2, I beg your pardon.
21 The heading on that page SER Section 2.5.4 Stability of
22 Subsurface Materials and Slopes.

23 Were you the principal author of that paragraph?

24 WITNESS KANE: I have not sponsored it and I
25 have not indicated I have.

13-3-2

1 BY MR. MILLER:

2 Q Can you identify for us who that person is?

3 A (WITNESS HOOD) I am.

4 Q And Mr. Kane, would you turn to Page 3-25,
5 supplement to the SER. I would like to call your
6 attention to a numbered paragraph 4. Are you the
7 principal author of those two subparagraphs, 4-A and 4-B?

8 A (WITNESS KANE) I am not.

9 Q Do you know who is?

10 A (WITNESS KANE) It is my understanding it is
11 Mr. Rinaldi, but he may have had assistance from his
12 consultants.

13 Q Do you agree with the statements that are
14 found in Paragraph 4-A and Page 3-25 that the actual
15 measured settlements from September of 1979 to December
16 1981 occurred mainly because of dewatering? I
17 paraphrased the sentences there but may I ask whether you
18 agree with that conclusion?

19 A (WITNESS KANE) As I indicated, I did not make
20 the statements, so that I would have to do if I were
21 going to say I agree with it, I would want to go back and
22 look at the settlements during that time and estimate
23 what is due to dewatering and what is due to secondary
24 consolidation.

25 Q Do you recall what the magnitude of the

1 settlements that were actually measured between September
2 of 1979 and December 1981 were?

3 A (WITNESS KANE) I think they are on the order
4 between one and a half to two inches.

5 JUDGE HARBOUR: That specific time period in
6 Paragraph 4-A, that is September 1979 and December of
7 1981?

8 WITNESS KANE: That is what I understood he
9 asked me.

10 BY MR. MILLER:

11 Q In fact, Text Figure 7 shows settlement about
12 a half-inch; is that correct?

13 A (WITNESS KANE) That is correct.

14 Q And are you in agreement that those are the
15 settlements that were measured during the period
16 September 14, 1979 and December 31, 1981?

17 A (WITNESS KANE) In the testimony that I have
18 prepared and the orders that I have attended, I have
19 addressed the settlement during this time frame. And if
20 these are the same values as I would have a record in my
21 files, yes, I would agree.

22 The problem is, on my testimony, I do not
23 recollect. In my testimony, the time frame that we were
24 analyzing, I would like to look at my testimony. I think
25 there is a difference in the time frame from what has

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1 been indicated there --

2 Q But there certainly is a difference in the time
3 frame on the table on Page 2-33. That is, there is no
4 time frame that corresponds with the periods, the
5 September 1979 and the December of 1981; is that correct?

6 A (WITNESS:KANE) That is my problem. I know I
7 faced the settlements during the time frame that you are
8 asking me at one time and we had reached an agreement
9 with the Applicant on those values.

10 Now as I see the values, it is, to the best of
11 my recollection, they are in that area, in the area of
12 around a half-inch.

1 BY MR. MILLER:

2 Q All right. As you sit here today, Mr. Kane, do
3 you have an opinion as to what caused that approximate
4 half-inch settlement in the time frame, September 1979 to
5 the end of December, 1981?

6 A (WITNESS KANE) I would like to look at the
7 figure that gives me the time of the recharge test, and
8 that would be Text Figure 6.

9 Q Do you have a copy with you?

10 A (WITNESS KANE) I do, yes. The draw-down for
11 the recharge test appears to be concluded at the end of
12 December of 1981 and therefore, I would agree that those
13 settlements are mainly due to lowering of the water
14 tables.

15 Q All right. Just one more question in response
16 to some questions from Ms. Stamiris with respect to
17 Staff Exhibit 16, is it fair to say that your working
18 hypothesis as to the cause of additional settlement has
19 been experienced at Point DG-3; is that, dewatering has
20 caused the water table to be lowered from 15 feet lower
21 than it previously has been drawn down?

22 A (WITNESS KANE) All I know right now is that
23 the water table is below Elevation 592. I do not know
24 -- I cannot recall the figure that it is right now. So
25 if you are saying it is before it was lowered to 592 for

1 the recharge test and if you are telling me now it is 15
2 feet below that, you may be correct; I do not know.

3 Q If you will assume with me that that is the
4 case, would that be a good working hypothesis on which to
5 proceed as a reason for the additional settlement that is
6 being experienced at DG-3? I believe you testified
7 elsewhere.

8 A (WITNESS KANE) Would it be a good reason to
9 believe that that is what is causing the settlement?

10 Q Well would that be a way to proceed in your
11 investigation as a hypothesis that would cause additional
12 settlements being experienced?

13 A (WITNESS KANE) Very definitely.

14 MR. MILLER: Mr. Chairman, we have an
15 understanding with the NRC Staff, I believe, that insofar
16 as Mr. Kane has testified on matters that touch the
17 structural analysis of the Diesel Generator Building, his
18 cross-examination on those subjects will proceed following
19 Mr. Rinaldi's appearance.

20 MR. PATON: Mr. Chairman, that is pretty close.

21 CHAIRMAN BECHHOEFER: Following or as a panel?

22 MR. MILLER: Well that is up to Mr. Paton.

23 MR. PATON: We would not plan to do it as a
24 panel -- no, we do not plan it but I don't have any
25 strong objection to it.

1 The only distinction I would want to make is
2 we agree generally, but Mr. Miller indicated this was a
3 question concerning structural analysis and that's a
4 difference that we have. We construe this as having more
5 to do with geotechnical expertise as opposed to
6 structural expertise. But I think it is a matter involving
7 Mr. Weidner's testimony.

8 MR. MILLER: And how the settlement data were
9 used in the structural analysis.

10 MR. PATON: And how accurate the settlement data
11 is in the first place.

12 MR. MILLER: Certainly.

13 MR. PATON: But the matters involving
14 Mr. Weidner's testimony that I asked Mr. Kane about, yes.
15 We agree.

16 MR. MILLER: I have no further questions.

17 WITNESS KANE: I would like to indicate that
18 when that session would come up that I would also be
19 expecting Mr. Singh to come with me.

20 MR. MILLER: Yes, thank you.

21 JUDGE HARBOUR: I have just a question of
22 clarification relating to what you were just asking
23 Mr. Kane.

24 Have you made an attempt to determine the rates
25 of substance that is shown on Staff Exhibit 16 for the last

1 few months that are given there, and do you know what the
2 rate of settlement is?

3 WITNESS KANE: For the reason Dr. Peck and
4 others from Bechtel were unable to do it from last night
5 until this morning, and that is we are working with two
6 different drawings and two different scales and we are
7 trying to pick out points. I don't have before me a
8 legible drawing that shows me the dewatering. So to
9 answer your question, I may attempt, but it is tied to
10 all of those limitations.

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JUDGE HARBOUR: Mr. Miller gave you some assumptions as to the way to go. But if the rate of settlements per log unit of time that's shown as the total on that, is for assumptions twice the rate of settlement per log unit of time, that is attributable to secondary consolidation, does that mean that the settlement is roughly half attributable to each dewatering and secondary consolidation or is that too long a question?

WITNESS KANE: I am not sure about it being equal to half. But what I feel has to be looked at is first of all, is your half coming because you understand the slope is twice as deep in Exhibit 16?

JUDGE HARBOUR: That's correct.

WITNESS KANE: If you look at the two graphs, that may be true. But they are not part of the same --

JUDGE HARBOUR: If one draws a line through the last few months of data and extrapolates that line out to above unit of time, then it ends up being two and a half -- it approaches two and a half feet per log cycle of time which is twice the one and a quarter --

WITNESS KANE: Two and a half inches per log?

JUDGE HARBOUR: Yes, correct. But assuming that that's the case, then does -- would that mean -- that is the point I am trying to get clarified in my own mind, would that mean that half the settlement was attributable

1 to secondary consolidation and half was attributable to
2 dewatering or would all of it be due to dewatering?

3 WITNESS KANE: It would be my guess that it would
4 not be equally half, that the smaller portion -- and we
5 are not talking about the time frame for that dewatering
6 occurring. The secondary consolidation would be much more
7 of a part being caused by dewatering.

8 JUDGE HARBOUR: I don't have any further questions.

9 REEXAMINATION BY THE BOARD

10 BY CHAIRMAN BECHHOEFER: Mr. Kane, I have a few
11 different subjects I want to ask questions about.

12 Do you agree with Dr. Peck that transitory loads
13 and particularly, earthquakes do not induce appreciable
14 consolidation?

15 A (WITNESS KANE) For cohesive, and that would be
16 clay-type materials, yes.

17 Q Well, what about granular materials?

18 A (WITNESS KANE) It would depend on the condition
19 of the sand. When I say condition, I am talking about its
20 state of looseness or density under earthquake loading.
21 For the loose end, it could be a very significant settlement.
22 Dr. Hendron addressed -- and Staff is in agreement with
23 the amount of settlement that has been estimated to occur
24 for the sands and on both sides of the Diesel Generator
25 Building.

1 Q Well, aside from the ones that Dr. Hendron --
2 or aside from Dr. Hendron's estimates, you agree that if
3 you had an earthquake that would not -- or do you agree
4 whether there would be any affect on the further settlement,
5 say after such an earthquake?

6 A (WITNESS KANE) Yes, there would be.

7 Q And the rate of further settlement, I should say?

8 A (WITNESS KANE) The settlement in a cohesionless
9 soil such as sand, would be relatively rapid. It would not
10 take a longer period of time. It would occur within days.

11 JUDGE HARBOUR: Is this relative to the occurrence
12 of the earthquake you are talking about now?

13 WITNESS KANE: There's the magnitude of the
14 earthquake factor in that amount of settlement?

15 JUDGE HARBOUR: No, the question here -- I fore-
16 see the difficulty in during the earthquake and after the
17 earthquake -- the question was -- I wasn't sure that I was
18 hearing the answer from you. Would you ask the question
19 again?

20 BY CHAIRMAN BECHHOEFER:

21 Q Well, I have first asked whether the earthquake
22 itself would result in further consolidation during the
23 earthquake and then I later asked whether following an
24 earthquake, and let's assume it is the shutdown earthquake,
25 it would be any change in the rate of consolidation from

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then on.

A (WITNESS KANE) There would be settlements that would occur with the loadings of the earthquake. That, there would be some -- I believe some excess pore pressures. I'm assuming now that we are not allowing liquifaction to occur and we are just talking about shaking from the sand deposit. There would be some additional settlement which would occur after the earthquake. But that would be in a very short period of time and then after that, there certainly would be a decline in the rate of settlement.

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1 BY CHAIRMAN BECHHOEFER:

2 Q Back to what was originally predicted or
3 estimated?

4 A (WITNESS KANE) Actually having shaken down the
5 sand to a denser condition, you would be getting less
6 settlement that you would have had before.

7 Q Mr. Kane, what would be the effect, both at the
8 time of the earthquake and later in the future on the
9 rates of differential settlement that we have heard about
10 quite considerably at the Diesel Generator Building?

11 A (WITNESS KANE) At the Diesel Generator Building,
12 we understand that the south side is predominantly placed
13 and they would be undetected by the settlement on
14 earthquake loading. We understand the better portion of
15 the north is the sands where we are estimating the amount
16 of settlement under earthquake loading to be, if I am not
17 mistaken, .25 inches plus or minus .15 inches.

18 Therefore, after an earthquake, we would expect
19 the settlement to have increased that amount on the
20 north side and very little effect on the south side, and
21 that would be the differential settlement that would be
22 occurring.

23 Q Would that total, whether it be .83 or .75,
24 total amount of differential that is shown throughout the
25 life of the plant, would that include the results of the

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1 earthquake to which you have just testified to?

2 A (WITNESS KANE) From my understanding from how
3 that was arrived at, no. Those settlements are estimated
4 projecting the line which is being identified as a
5 secondary compression line which is under static loading.

6 We would have a settlement under earthquake
7 loading of the magnitude that I have just spoken of.

8 It could be actually an improvement under
9 earthquake loading, and the differential settlement that
10 now exists could be because we have had more settlement on
11 the south side, that differential settlement could be
12 improved. I am saying could be because it depends very much
13 on the transition between the sands and the clay and what
14 happens.

15 It is my understanding that the settlements
16 which we are anticipating, both on the static and
17 dynamic load, have been properly estimated and how they
18 are used in the structural analysis, I think is the
19 question.

20 It is my understanding that these settlements
21 that have been identified, have been used in the
22 structural analysis.

23 Q My next question goes to live loads, and perhaps
24 the dynamic loads, I was speaking about this morning.

25 Do you think that the addition of dynamic loads,

13-6-3 1 in particular, the beginning of operation of the building
2 of the diesel generators, will have a significant affect
3 on settlement?

4 A (WITNESS KANE) I do not feel there would be a
5 significant affect, and it is my recollection that a
6 detail of the technical specification will require
7 monitoring before the diesel goes into operation while
8 they are in operation, to evaluate that affect.

9 Q I asked Dr. Peck a number of questions along
10 the line of whether it would not have been more appropriate
11 to start back before anything was ever put on the ground
12 at all. And, would the slope and the eventual settlement
13 estimates prove to be the same when it is started way
14 back. Do you have any opinion on that?

15 A (WITNESS KANE) Yes.

16 Q I would like to know what it is.

17 A (WITNESS KANE) If your objective as far as
18 settlement is to understand its affects on the structure,
19 then the time that you would be concerned with measurements
20 of settlement would start when you place the structure
21 on whatever soil you are placing it on. And so what
22 settlement has occurred before then would not affect the
23 structure.

24 It may be useful information to know its
25 settlement history, such as having been loaded by a glacier

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and how do you preconsolidate it. That would be of interest but that is not going to affect the structure settlement -- from the time you place the structure there, that is what's going to have an impact on the structure.

Q Well could it affect the slope from which estimates of future consolidation are formed or predicted?

A (WITNESS KANE) There is some indication and discussions on that, and I would like to refer to a figure in Mr. Weidner's testimony. I think this will all clear it up.

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12-7fol

up.

1 I am referring to page 55. If we just take, say
2 Bay 1 and point at the southwest corner, and we say for
3 Line A, Line B, Line C and Line D measured settlements in
4 inches. What we have here is the actual settlement history
5 of the Diesel Generator Building beginning March of 1978
6 to 8-78, which I understand would be August.

7 So the structure -- we begin with March of 1978
8 because that was the day the reference markers were in-
9 stalled to the Diesel Generator Building. So this is in
10 early time and construction. At the end of this period of
11 1978, at is my understanding the walls of the structure
12 are up around elevation 656. Then we go through the next
13 time frame which is Line B and we are measuring the settle-
14 ment from 8-78 to the 40 surcharge, the full surcharge --
15 the full surcharge was started which was January of 1979
16 and we have measured settlements for that time frame. Right
17 now, we are not predicting any settlements. We are dealing
18 with measured settlements for both Line A and Line B.

19 Then we get to Line C and we are talking about
20 settlements from January of 1979 to 8-79 which is the day
21 when the surcharge was removed. It is the surcharge period.

22 We have measured settlement values for that time
23 frame. We go to the last period which is from the time
24 the surcharge was removed to the end of the plant operation.
25 And even within that period, we have utilized measured

1 settlements from 9-79 to 12-31-81. So even a portion of
2 those settlements have been measured here.

3 The only time frame that we are predicting
4 settlement for is from 12-31-81 to the year 12-2025. So
5 the amount of settlement that we are making a small part
6 of the settlement that we are dealing with with this
7 structure.

8 Q Well, does it matter which of these early actual
9 figures are used and which are not used in making a pre-
10 diction? What I am trying to figure out is whether it
11 makes a difference where you start in making a determina-
12 tion about the accuracy of your prediction in the future
13 and whether it was appropriate as Dr. Peck did, to start
14 about January 1979, I guess, or whether, as forming the
15 foundation for his prediction, not for his prediction it-
16 self, by getting the data which analyze it.

17 Well, should it have gone back as it does here
18 to March of 1978 or conceivably, should one have gone back
19 earlier than that in order to make a fair prediction on the
20 figure?

21 A (WITNESS KANE) There are two parts to your
22 question, and one is, if you are interested in what the
23 settlements do to the structure, then the time to be con-
24 cerned with the settlements is when you start to build the
25 structure. We have settlement data from March of 1978.

1 It is my understanding the footings were poured
2 in October of 1977 and the walls were started in, I think,
3 December or January of 1978 -- excuse me, 1977 -- and by
4 March of 1978, the walls were high enough because they
5 were able to put on a marker that could measure settlements.

6 So for the periods of what settlement is doing
7 to the structure, I think we have the information by having
8 actually measured it. Now they go back -- that's what we
9 are talking about what settlement does to the structure.
10 Then we start talking about prediction of settlement.

11 The measured settlements were every bit as impor-
12 tant as the predicted settlements because it is the total
13 settlement history which is induced in the stresses on the
14 structure.

15 The manner that Dr. Peck has used to predict
16 settlement -- and that is establishing the settlement of
17 the full surcharge load, is conservative, and that is why
18 we are in agreement with the settlements that are being
19 predicted for the time frame that we are really -- only
20 have to be concerned with for our prediction, and that is--
21 we made a deate, 12-31-81 and we said, beyond this time,
22 we will use the prediction to estimate the settlements,
23 and everything before that was measured.

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1 BY CHAIRMAN BECHHOEFER:

2 Q Well maybe one final question. Does it matter
3 that the actual data used by Dr. Peck does not include
4 the data from March of 1978 through January of 1979?
5 As I understand it, he did not make -- did not rely on
6 any earlier data at all. And in evaluating his particular
7 estimates which include the data on which they are based,
8 does it matter that he started in January of 1979 rather
9 than, say March of 1978?

10 A (WITNESS KANE) It does not matter from the
11 standpoint of the prediction. It matters from the
12 standpoint of -- they must have considered those
13 settlements before to understand the stresses that have
14 been imposed on the structure.

15 I think your question is, does it matter with
16 respect to prediction, and my answer would be no.

17 Q Yes, that's correct.

18 That is all the questions the Board has.
19 Mr. Paton? You get some redirect if you want.

20 MR. PATON: I don't want any redirect.

21 I understand Mrs. Stamiris has a question.

22 RE-CROSS-EXAMINATION

23 BY MS. STAMIRIS:

24 Q Mr. Kane, do you have any idea of what
25 settlement may have taken place between October of 1977

13-8-2 1 and March of 1978 through any rough estimations?

2 A (WITNESS KANE) It is my understanding what was
3 starting in October of 1977 were the footings and they were
4 completed -- I am going on memory now -- they were
5 completed by -- within a month's time and then the walls
6 above that level were not started until late December.
7 If that is true, then between October and December, I
8 would not be concerned with any settlement.

9 But now you begin to build the walls up and add
10 rigidity to the structure. The amount of wall that is
11 built there is not significant. There may be some
12 settlement but in my opinion, we are beginning at a
13 reasonable place with the best information that is
14 available.

15 Q Are you aware of any information estimating
16 settlement from October of 1977 to March of 1978, a
17 permanent site benchmark of any kind?

18 A (WITNESS KANE) Unrelated to the Diesel
19 Generator Building?

20 Q No, I am sorry. I mean at the Diesel
21 Generator Building.

22 A (WITNESS KANE) I am not aware of any survey
23 of settlement prior to March of 1978.

24 Q Mr. Kane, in your earlier analysis of the
25 geotechnical aspects of the surcharging at the Diesel

13-8-3

1 Generator Building, did you base your analysis upon data
2 received from the Applicant's other than the additional
3 borings that were taken at the request of the NRC?

4 A (WITNESS KANE) Yes.

5 Q And so your analysis is -- the validity of
6 your analysis is based on the validity of the data that
7 was gathered --

8 MR. STEPTOE: Objection, Judge Bechhoefer.
9 This is a question, against my better judgment, I allowed
10 to be asked two weeks ago. But unless Mrs. Stamiris is
11 prepared to lay a foundation for that kind of question,
12 have a witness come forward indicating that there was
13 something wrong with that data, then the question is
14 improper. It simply asks the witness to state a truism.
15 If the data he has given is wrong, then his conclusions
16 may be wrong. It doesn't help the Board in any meaningful
17 way.

18 MS. STAMIRIS: Well I would agree with
19 Mr. Steptoe that that can be assumed as a given, that if
20 the data was wrong, the conclusions would be wrong.

21 I would like to ask Mr. Kane whether he performed
22 or any of the members of the NRC performed any type of
23 spot checking as to some of the other witnesses have
24 talked about here, of either the raw data or the
25 calculations on that data.

13-8-4

1 WITNESS KANE: If the question is with respect
2 to the raw settlement data, we did not make any
3 calculations. We have asked region personnel to
4 understand how the surveying is conduct and to assure
5 themselves that it is proper.

6 That is the one check -- but we have not asked
7 for an independent survey nor have we -- I shouldn't say
8 -- there are sheets of raw data that we have been given
9 where I have verified that the settlement between this
10 time frame, as being indicated on a figure presented to
11 me -- but I am beginning with the assumption that the
12 raw data is correct.

13 BY MS. STAMIRIS:

14 Q Did you -- what percentage of the calculations
15 involving surcharge at the Diesel Generator Building
16 did the NRC Staff recalculate themselves, roughly?

17 A (WITNESS KANE) I have to understand what data
18 you are referring to.
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BY MS. STAMIRIS:

Q Well, I want to ask it in a general way to get an idea of how much of a check the NRC did on the calculations that were performed. So I don't want to specify certain calculations.

Would I be correct in understanding that the NRC did not reperform all the calculations submitted to them by the Applicant on this data?

A (WITNESS KANE) You would be correct.

Q Can you make any estimate in a general sense of what percentage, if any, the NRC did recalculate themselves?

A (WITNESS KANE) That is why I have to identify the data with respect to what calculations did we do to check that the raw data is correct with respect to settlement. I'd have to have an understanding of what is the entire base that you want me to take a percentage of.

It's very small, you know. What we generally do is in the critical time frames that we know are going to be analyzed, we will check that the settlements that have been given to us are proper for that time.

But with respect to the settlement data it is a very small percentage of the total readings.

Q Are you aware of examples where calculations

14-1-2 1 upon data were reperformed by the NRC and found wrong?

2 A (WITNESS KANE) By the NRC?

3 Q No, where the NRC did spot checks or rechecked
4 some calculations and found them to be wrong on the part
5 of the Applicant.

6 MR. STEPTOE: Excuse me. Is this confined to
7 the settlement data provided by the Applicant for the
8 Diesel Generator Building?

9 MS. STAMIRIS: Yes. Or, when I say settlement
10 data, I mean -- I do mean to include any data related
11 to the surcharge at the Diesel Generator Building.

12 WITNESS KANE: It's my recollection that when
13 we were trying to resolve the correct settlements to be
14 used in structural analysis there was a question of --
15 if I'm not mistaken, the Applicant chose to begin
16 analyzing in 8-78, and we took the position that we had
17 settlement data from March of '78 and, therefore, that
18 settlement should be addressed in your settlement
19 analysis.

20 If you consider that an error, then your
21 statement is correct. But I know of no instance where
22 in our review we found data which was being improperly
23 and used by the Applicant.

24 BY MS. STAMIRIS:

25 Q Okay. I'd like to ask Mr. Kane whether you

14-1-3

1 believe that some of the data obtained in the additional
2 borings requested by the NRC and the Army Corps of
3 Engineers to assess the secondary consolidation of the
4 surcharge are reached as a result of the surcharge. Do you
5 believe that any of this data did indicate that secondary
6 consolidation was not achieved?

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7 A (WITNESS KANE) Yes. It's my recollection
8 that in four of the borings, four of the six borings at
9 the Diesel Generator Building there were laboratory
10 consolidation test results where when a comparison is made
11 of the preconsolidation pressure, which comes about from
12 the laboratory consolidation test results, when that is
13 compared to the design load, which would affect the dead
14 load, live load and dewatering, when you make that
15 comparison of pressures there were, in several borings,
16 an indication that -- from the laboratory tests that the
17 pressure was less, the preconsolidation pressure was less
18 than the design level. And our interpretation of that was
19 there were some layers within these borings where we may
20 not have fully achieved primary consolidation.

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-dation.

1 We asked the Applicant to estimate the settlement
2 which remained because of that difference, which he did do,
3 and it is my understanding the magnitude of settlements
4 that remained was on the order of .2 inches to .4 inches
5 between the four borings. And when we looked at that
6 magnitude of settlement and compared it to what was being
7 predicted by the extension of the secondary consolidation
8 line that it was enveloped by that extension and we felt
9 there was no problem, that we were satisfied.

10 Q Okay. Mr. Kane, do you believe that if the
11 surcharge had been left in place longer than it was that
12 the secondary consolidation in these borings that you just
13 referred to would have been reached?

14 A (WITNESS KANE) If it were left longer, I believe
15 it would have been reached, yes.

16 MS. STAMIRIS: Thank you. I don't have any other
17 questions.

18 CHAIRMAN BECHHOEFER: Mr. Steptoe or Brunner?

19 MR. STEPTOE: Could we have just one moment?

20 (Discussion had off the
21 record.)

22 REDIRECT EXAMINATION

23 BY MR. BRUNNER:

24 Q Mr. Kane, even though you testified that in your
25 opinion there were some layers which were not in secondary

1 consolidation following removals of preload, I take it
2 from your testimony that in your opinion it did not affect
3 the validity of the Applicant's prediction of future
4 settlement?

5 A (WITNESS KANE) When you look at the Applicant's
6 prediction as being a conservative prediction, I would
7 answer you yes.

8 MR. BRUNNER: Thank you. I have nothing further.

9 CHAIRMAN BECHHOEFER: I just have one further
10 question.

11 EXAMINATION BY THE BOARD

12 BY CHAIRMAN BECHHOEFER:

13 Q Did you overhear the testimony this morning --
14 I guess I asked some questions and Mr. Paton asked some
15 questions -- concerning the accuracy of the optical surveys
16 or readings, and did you agree with Dr. Peck's responses
17 to those questions?

18 A (WITNESS KANE) It's my understanding that Dr.
19 Peck has said under ordinary conditions you could expect
20 an accuracy of survey of 1/16th of an inch. And then I
21 am not sure what his position is with respect to 1/8th of
22 an inch as to whether he feels that is appropriate for
23 the Midland site.

24 If that is his indication, then I would say I
25 would differ based on what I know exists at Midland.

14-2,pj3 1
2 But I really feel that accuracy of the survey is
3 dependent on the actual conditions that you're surveying.

4 It has been my experience based on highway
5 design and having this problem with respect to survey
6 accuracy. I have talked to two surveyors trying to get an
7 understanding of what accuracy would be reasonable for the
8 conditions as I think they exist at Midland, and they have
9 indicated to me a reasonable level of survey accuracy
10 would be on the order of 1/16th of an inch.

11 Q Are you satisfied that the surveys taken
12 are -- that the error bands which were testified to, one,
13 are within the range the Staff would find acceptable or --
14 yes, that's the question, within the range the Staff would
15 find acceptable.

16 A (WITNESS NAME) The error band used by the
17 Applicant, in my opinion, would be acceptable, and I
18 have not introduced the error band. It has been introduced
19 by the Applicant.

20 In my opinion, the best information is what you
21 have actually measured by surveying.

22 When you introduce error bands I think you have
23 to do more than take -- more than take advantage of a
24 favorable interpretation of that error band. I think if
25 you are going to look at error bands you have to look at
the worst and the best case of that error band.

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I don't feel that has been done in the error band that has been established by the Applicant.

I could refer you to Page 56 to illustrate what I just said. If the error band is plus or minus one-eighth of an inch, on Page 56 --

1 MR. STEPTOE: Excuse, me. This is Page 56 of
2 Mr. Weidner's testimony, is that correct?

3 WITNESS KANE: That is correct.

4 BY WITNESS KANE:

5 AA (Continuing) The error band on Page 56 for the
6 southwest corner, the line that is drawn by the Applicant
7 is plus one-eighth of an inch. Then if you go to the next
8 Bay, between Bay 1 and Bay 2, the straight line that is
9 there is actually taking advantage of a minus one-eighth
10 inch.

11 In my estimation, the width of the error band
12 and the way it's being used here is not appropriate.

13 CHAIRMAN BECHHOEFER: Then I take it we're going
14 to hear more about that subject later.

15 MR. PATON: That's what the Applicant indicated
16 they would intend to cross-examine Mr. Kane about, I
17 believe.

18 MR. STEPTOE: That's correct. This is a
19 subject that I would like to reserve until later, in part
20 because we'd like to see what the Staff's other witnesses
21 are going to say with respect to the structural adequacy
22 of the building. And my understanding is that they are
23 going to be filing some testimony tomorrow.

24 MR. PATON: That's correct.

25 MR. STEPTOE: And I don't want to --

1 CHAIRMAN BECHHOEFER: Okay. Well, I won't ask
2 any further questions at this time on that subject.

3 Is there anything further that anyone wishes to
4 ask this panel?

5 MS. STAMIRIS: I have one follow-up question
6 to the question Mr. Brunner asked.

7 RE-CROSS-EXAMINATION

8 BY MS. STAMIRIS:

9 Q Mr. Kane, I believe that Mr. Brunner asked you
10 if the data that we spoke about that appeared in the
11 additional borings which indicated to you that secondary
12 consolidations had not been reached in all of the borings
13 -- when he asked you whether it affected the validity of
14 their prediction, the Applicant's prediction of future
15 settlements, you answered by saying that the overall
16 conservative assumptions of settlement -- that the overall
17 assumptions of settlement were conservative enough to
18 envelope that and, therefore, it didn't indicate a
19 concern to you, but I want to ask you more precisely
20 whether it did affect the validity of the predicted
21 future settlement even if it is encompassed by what you
22 consider an adequate margin by their assuming that the
23 surcharge will be left in place?

24 MR. BRUNNER: I object. I don't quite
25 understand that question.

1 MS. STAMIRIS: If Mr. Kane understood it,
2 maybe --

3 MR. PATON: I understand it. Maybe Mr. Kane
4 understands it.

5 MR. STEPTOE: Judge Bechhoefer, may we have a
6 ruling on that?

7 CHAIRMAN BECHHOEFER: Well, I think Mr. Kane
8 should state what question he's answering. If he
9 understands it, he should state what he understands it to
10 be and then answer it.

11 BY WITNESS KANE:

12 A If I do something to predict something in the
13 future and realize the assumptions in that prediction,
14 have conservatism in it -- and I'm now referring to the
15 fact that the predicted settlement is being based on the
16 full surcharge still being there, which is conservative,
17 and if I'm thinking that conservatism can cover things that
18 I may not be perfectly right in and I come out to be
19 right, and then I don't think you have affected the
20 validity of that prediction.

21 BY MS. STAMIRIS:

22 Q Okay. And by that answer, then, you are basing
23 the overall validity of that prediction in part on the
24 envelope of conservatism which goes along with it?

25 A (WITNESS KANE) Yes. I want to now defend the

14-3-4

1 Staff. If I knew it was conservative, why did I ask for
2 the borings and the laboratory testing? Until I got
3 that data I didn't know what part of that foundation soil
4 was less than secondary consolidation. I didn't know its
5 thickness and I didn't know the degree or the magnitude
6 of the difference between the pressures. The laboratory
7 consolidation test permitted us to resolve that.

8 MS. STAMIRIS: Okay, I don't have any other
9 questions.

10 CHAIRMAN BECHHOEFER: Does anyone have any
11 further questions?

12 MR. BRUNNER: We have nothing further.

13 MR. PATON: Nothing further, Mr. Chairman.

14 CHAIRMAN BECHHOEFER: The panel may be excused.

15 WITNESS KANE: Thank you.

16 (Whereupon Witnesses Kane and
17 Hood were excused.)

18 MR. PATON: Mr. Chairman, could we talk about
19 schedules? It could be off the record as far as I'm
20 concerned.

21 CHAIRMAN BECHHOEFER: Yes. We'll adjourn until
22 tomorrow at 9:30.

23 (Whereupon, an adjournment was
24 taken in the above-entitled
25 cause until Wednesday,
December 8, 1982, at the hour
of 9:30 o'clock a.m.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the
NUCLEAR REGULATORY COMMISSION

in the matter of: CONSUMERS POWER COMPNAY (Midland Plant
Units 1 & 2)

Date of Proceeding: December 7, 1982

Docket Number: 50-329 & 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)