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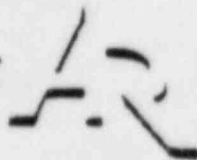
In the Matter of:

CONSUMERS POWER COMPANY)	DOCKET NOS 50-329 OM
)	50-330 OM
(Midland Plant, Units 1 & 2)	50-329 OL
)	50-330 OL

DEPOSITION OF WALTER R. FERRIS

DATE: December 11, 1980 PAGES: 173 thru 252

AT: Chicago, Illinois

ALDERSON  REPORTING

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

Telephone: (202) 554-2345

1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

3 BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

4 - - - - -x

5 In the Matter of: :

6 CONSUMERS POWER COMPANY : Docket Numbers:

7 Midland Plant, Units 1 and 2 : 50-329 OM & OL and
8 : 50-330 OM & OL

8 - - - - -x

9 Isham, Lincoln, and Beale
10 First National Plaza
11 42nd Floor
12 Chicago, Illinois 60603

12 Thursday, December 11, 1980

13 The continuation of the deposition of MR. WALTER
14 FERRIS in the above-entitled matter met, pursuant to
15 adjournment, at 8:00 a.m.

16 APPEARANCES:

17 On behalf of the NRC Staff:

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P R O C E E D I N G S

Whereupon,

WALTER R. FERRIS

a witness herein, called for examination by Counsel for the Nuclear Regulatory Commission, having been previously sworn by the Notary Public, was further examined and testified as follows:

EXAMINATION BY COUNSEL FOR NRC

BY MR. PATON: (Resuming)

This is the continuation of the deposition of Mr. Walter Ferris of Bechtel, Incorporated.

I want to place on the record a request that the NRC staff is making of Consumers and Bechtel. Will you provide the raw survey data of the initial readings of the building settlement markers, borros anchors and settlement plates for the Midland site?

This should include a plan that shows all survey monuments with elevations that are used in completing the survey -- change that to were used in completing the survey.

MR. FARNELL: Could you read back the question?

(Question read)

MR. FARNELL: I understand your request to go to all buildings at the Midland site since possibly the date of construction, and I think that request may be

1 overbroad, and I really don't see where some of these
2 buildings have anything to do with this litigation.

3 Also, I am quite frankly surprised that you
4 would bring this up after we have been -- settlement
5 has been discovered two years ago, and we have been
6 in this litigation for almost a year.

7 MR. PATON: Mr. Farnell, there is a lot of
8 information we have not been able to obtain, and this
9 is one of those pieces.

10 MR. FARNELL: This is something you requested
11 earlier?

12 MR. PATON: No, we have recently discovered
13 information that leads us to question the survey
14 reliability. Your saying that we are recently asking
15 for information amazes me. You know that we simply
16 cannot obtain enough information to evaluate your
17 proposed remedy in this case, so I don't think you should
18 pretend to be shocked that we are asking for information.

19 MR. FARNELL: I kind of look at this as
20 another one of your requests that we should be able to
21 read your mind and give you things that you have never
22 asked for before.

23 MR. PATON: No, no, I agree that we have
24 never asked for this information before, and I don't
25 expect you to read our mind. It's -- we have recently

1 discovered information that makes us question the
2 settlement information and we think that might help.

3 MR. FARNELL: Do you want all buildings?

4 MR. PATON: No, let's talk about that for
5 just a second. We would like to limit our request to
6 the diesel generator building, service water structure,
7 electrical penetration area, feed water isolation valve
8 pits, and retaining walls for the service water structure
9 and the intake structure.

10 MR. FARNELL: How about a time frame?

11 MR. PATON: Just a second.

12 (Pause)

13 MR. PATON: We would like the information in
14 a month.

15 MR. FARNELL: No, --

16 MR. PATON: You asked me for a time frame --

17 MR. FARNELL: That wasn't the time frame
18 I was referring to. I was referring to dates of which
19 this initial settlement, whatever that means --

20 MR. PATON: I think he means to go back to
21 the initial survey, don't you?

22 MR. KANE: Right.

23 MR. FARNELL: I have a suggestion. How about
24 since August of 1978? Is that when you want to go
25 back to? Do you want to go back to prehistoric time?

1 MR. PATON: Let's go off the record and talk
2 about it.

3 (Discussion off the record)

4 MR. PATON: We have had a discussion off the
5 record, and we have agreed that Bechtel will attempt to
6 have someone knowledgeable about this subject discuss it
7 with us in Ann Arbor next Wednesday, and we will then
8 discuss further our request.

9 MR. FARNELL: That's agreeable to us.

10 BY MR. PATON: (Resuming)

11 Q Mr. Ferris, in the year 1980 approximately how
12 much of your time have you spent on the Midland soils
13 problem? What percent of your time?

14 A I am making a very rough estimate, I would
15 say probably about two days per month -- that includes
16 meetings.

17 Q All right, what about 1979? How much of
18 your time?

19 A I would have to say about the same amount.

20 Q One more year -- 1978?

21 A I did not get involved in Midland until a
22 phone call from Afifi in early August of 1978, and
23 following that I probably spent two to three days per
24 month till the end of the year, most of that in meetings.

25 Q That's two days per month?

1 A Roughly, yes.

2 Q So, -- okay. That's in the last three years
3 a total of less than sixty days?

4 A It would be in that order, yes.

5 Q Okay, let me show you Kane Exhibit Number 12.
6 Mr. Ferris, would you look at Vu-Graf Number 10 attached
7 to Kane Exhibit 12, and I direct your attention to the
8 chart there that reflects the elevation of the pond?

9 A Yes.

10 Q All right, can you tell me what the elevation
11 of the pond was on October 13, 1978, and I assume that
12 the date up here is day one?

13 A October 13, 1978, is day zero according to
14 this scale, and the elevation looks to me to be about
15 elevation 622. I don't have a scale to give you more
16 precisely.

17 Q Fine, and then about January 26, 1979?

18 A At that point in time it looks like it's
19 about 626, in that order; again, I don't have a scale.

20 Q Okay, and then tell me the elevation of the
21 pond -- tell me the last date that you are able to see
22 on this chart.

23 A Well, the last date I can see is August 30,
24 1979, and again that looks like it's about 626 or
25 something like that.

1 Q And then does it continue for say seventy to
2 eighty days after August 26, 1979 -- does the level of
3 the pond stay constant?

4 A It looks reasonably constant. There seems
5 to be some minor fluctuations.

6 Q All right, let's call it at least sixty days.
7 So, through October, 1979, did it remain fairly constant
8 according to that chart?

9 A It looks like that -- that it remained fairly
10 constant.

11 Q Let me refer you to piezometer number forty --
12 piezometer elevation chart number forty.

13 A Yes.

14 Q My question is there's a line here labeled
15 surcharge removal completed --

16 A Right.

17 Q And it appears to be right at the end of
18 August. After that line there is a decline in piezometer
19 elevation that is reflected by that chart.

20 A Yes.

21 Q Is that caused by the piezometers returning
22 to ground water level?

23 A What is the elevation of this line?

24 Q I can show you another chart.

25 A It shows that it's less than 625?

1 Q Okay, it's -- just a minute.

2 (Pause)

3 A I think I know what your question is.

4 Q All right, I suggest to you that it's slightly
5 above 626. I will ask you to assume, and I can show
6 you another chart that shows the line I have marked here
7 as 625 would indicated that the top level at the end
8 of the rebound is slightly above 626. I have another
9 chart that I can show you.

10 A This is fine. I believe I already addressed
11 this yesterday.

12 Q You did.

13 A And, at that time I said that there is other
14 information I would need before I could interpret this
15 graph.

16 Q All right.

17 A The specific information that I referred to
18 yesterday was the pond level and the ground water level
19 in the vicinity of the diesel generator building.

20 Q All right.

21 A There may be other factors that I should also
22 look at and that would become apparent after I had
23 looked at those two factors.

24 Q Other than the ground water, what other
25 factor would have affected it?

1 A The one that immediately comes to mind is
2 that somebody could have dug a hole besides the piezometer
3 and changed this ground water table locally, but I
4 don't know that. There could be other factors that
5 could account for that.

6 I would want to look not just at one piezometer,
7 but all of the piezometers in that area to see if that
8 was an analogous reading or if this was typical of
9 the readings. If it was typical of the readings, then
10 I would have to find out what would cause that, and I
11 don't have that information here, and I very much doubt
12 today if I can evaluate it for you.

13 Q And I believe you said that you never did --
14 you never --

15 A I never did make an evaluation.

16 Q So, any conclusions that Bechtel has with
17 respect to those piezometer readings comes from someone
18 else?

19 A That is correct. I believe I said that
20 yesterday.

21 Q All right. Now, Bechtel has concluded that
22 prior to removal of the surcharge you were in secondary
23 consolidation, is that correct?

24 A That is correct.

25 Q And this piezometer, which is number forty,

11
1 clearly demonstrates a lower piezometer elevation after
2 the removal of the surcharge than before, does it not?

3 A Yes.

4 Q For example, during the month of October?

5 A Yes, the level is lower on that month.

6 Q Lower than it is in the month prior to removal
7 of the surcharge?

8 A That's right.

9 Q All right. To have that circumstance, doesn't
10 that mean that you must have had a substantial change
11 in ground water level between the removal of the surcharge
12 and the -- and October?

13 A One of the comments I said was that I would
14 like to know the area ground water level in the vicinity
15 of this piezometer before I would --

16 MR. FARNELL: He has already --

17 BY MR. PATON: (Resuming)

18 I understand he has testified he needs a lot
19 more data.

20 Q My question is this: regardless of any more
21 data, my question is essentially if, in fact, prior
22 to the removal of the surcharge you had squeezed out
23 all excess pore pressure -- let me ask you that -- do
24 you agree at this point here where you say you were in
25 secondary consolidation that all excess pore pressures

1 had been removed?

2 A That is what I testified to. I did not use
3 this graph to make that comment from.

4 Q All right, but all excess pore pressures were
5 removed.

6 A Excess pore pressure due to the surcharge.

7 Q Doesn't that mean that regardless of any
8 other information anywhere that if your piezometer
9 elevation is higher before the removal of the surcharge
10 and then is lower after the removal of the surcharge,
11 doesn't that mean that between this time when surcharge
12 was removed and this time when the piezometer level was
13 lower that you had a substantial change in ground water
14 level?

15 A Not necessarily, because there may be something
16 wrong with that piezometer, and I don't have the infor-
17 mation to determine that, and I'm not willing to say
18 that at this time.

19 MR. FARNELL: I think you beat that piezometer
20 to death.

21 MR. PATON: I'm not getting any information.
22 That's the problem.

23 MR. FARNELL: That's because you're not
24 asking questions that are intelligent.

25 MR. PATON: Now, I resent that, Mr. Farnell.

1 I don't appreciate that at all. I'm getting no answers
2 at all.

3 MR. FARNELL: You're getting answers, but
4 they are not the ones you want because they are not
5 the right questions.

6 MR. PATON: Here is the Chief Soils Engineer.
7 Bechtel is claiming they are in secondary consolidation
8 based on the piezometer level, and here is the Chief Soils
9 Engineer, and he doesn't know. So, I resent your telling
10 me that I am not asking the right questions. I am
11 asking very carefully drawn questions, and I'm getting
12 no answers.

13 MR. FARNELL: You're getting answers, but not
14 what you want.

15 MR. PATON: That's right. I'm not getting
16 any information that's fairly basic to this case.
17 That's why the NRC can't make its assessment.

18 MR. FARNELL: I doubt that.

19 MR. PATON: Okay, you doubt it.

20 BY MR. PATON: (Resuming)

21 Q Mr. Ferris, I show you piezometer number
22 thirty-six and ask you whether that general situation
23 that you have just described, and I will describe it
24 again if you want me to, is also true of that where the
25 piezometer elevation is higher prior to the removal of

1 of surcharge?

2 A I have to make the same comment of this. I
3 have not made the evaluation of the piezometer. I
4 cannot look at the record of a piezometer and evaluate
5 it for you directly. I think it's the same -- exactly
6 the same ground that we went over with regard to piezometer
7 number forty.

8 Q You say maybe the piezometer was what --
9 erroneous? You said maybe the piezometer was broken
10 or something?

11 A Maybe something was done there.

12 Q What could have been done?

13 A I have no idea.

14 Q Maybe something was done and you have no
15 idea what could have been done?

16 A I have not evaluated all the data, so I can't
17 tell.

18 Q My question is then, isn't the only explanation
19 for that change, a rapid change in ground water level, and
20 your answer is that's not the only explanation?

21 A That's not necessarily the only explanation.

22 Q And I am asking you what other possible
23 explanation could there be?

24 MR. FARNELL: He has answered that already.
25 He has gone into that before at least four times.

1 MR. PATON: No, he said the piezometer might
2 have broken, and I'm asking what other explanation, and
3 he hasn't answered that.

4 MR. FARNELL: He has answered that already.
5 He has gone into that before, and this is really trying
6 his and my patience, and I think you are wasting a lot
7 of time.

8 BY MR. PATON: (Resuming)

9 Q Do you have any other reason, other than the
10 piezometer could have broke?

11 MR. FARNELL: Asked and answered.

12 MR. FERRIS: I did give other reasons than
13 that. Look at the record.

14 BY MR. PATON: (Resuming)

15 Q For this change here, between the --

16 A Not specifically on that.

17 Q Well, that's what I'm asking.

18 A Oh, you're asking for that specifically?

19 Q No, what I am asking about specifically is
20 the change of elevation immediately prior to the removal
21 of surcharge and after it returned to this level.

22 A You are talking about this elevation?

23 Q Okay, this elevation, but let me put it
24 for the record. This elevation being the elevation
25 at the end of September.

1 A That elevation according to this is about
2 elevation 622.5.

3 Q Okay, my question is what are the possible
4 reasons that could have done that?

5 A I cannot list all of the possible reasons, but
6 the other reason that I mentioned, there may have been
7 some work going on there that I am unaware of, and would
8 have to find out about.

9 Q Let me ask you this. Is a rapid change in
10 ground water level a possible reason, regardless of
11 what actually happened? Is that a possible reason?

12 A Only if somebody pumped water from a hole
13 in that area. If they excavated a hole and pumped
14 water from it.

15 Q Okay. Now, we established a few minutes ago
16 that the ground water -- that the pond reached I
17 believe 626 feet in January, 1979, and stayed very
18 close to that through October, 1979.

19 A Right.

20 Q Do you have any idea when the seepage from
21 the pond, as it affected the area under the diesel
22 generator building, would have stabilized, and if
23 you don't understand my question --

24 A I understand your question, I don't know the
25 answer to that because I have not made an evaluation to

1 that specific.

2 Q Do you know if anybody in Bechtel has?

3 A I would very much assume that they have, but
4 I don't recall it, and I don't know the information from
5 having done such a study myself.

6 Q During the period of time when the full
7 surcharge was on the diesel generator building, is it
8 true that the settlement markers could not be monitored?

9 MR. FARNELL: What settlement markers? I
10 mean, all of them, one of them --

11 BY MR. PATON: (Resuming)

12 Q Do you know how many settlement markers
13 there were in the diesel generator building?

14 A I am sure I have been told. I don't recall
15 the number, and I don't recall that some of them were
16 inaccessible during that period.

17 Q Okay. I want to show you Figure 3 attached
18 to Kane Exhibit 8. There is a note at the bottom,
19 and I will hand it to you so that you can read it, but
20 I will read it for the record.

21 "Temporary markers at elevation 664 feet
22 were used during this period to estimate the settlement
23 of the markers."

24 A Could you read that again, please?

25 Q I will hand it to you so you can read it

1 yourself. I'm just reading it for the record. I have
2 one more short sentence.

3 "On September 14, 1979, the settlement was
4 again based directly upon the permanent markers."

5 I ask you to direct your attention to those
6 sentences.

7 A I think I understand that.

8 Q Okay, does that, after reading that, does
9 that clarify for you or refresh your recollection as
10 to whether any of the settlement markers were inaccessible
11 during the surcharge period?

12 A I believe what that is saying is because the
13 surcharge was inside the building, and you could not get
14 into the top of the surcharge inside the building, the
15 temporary markers were made that could read the settlements
16 of the surcharge inside the building during the period
17 when the surcharge was at its maximum level.

18 I believe that's what it is saying.

19 Q All right. Can you explain the word "estimate"
20 in here? It says: "Temporary markers were used to
21 estimate." Just a minute, let me go off the record.

22 (Discussion off the record)

23 MR. FARNELL: I'm going to object to your
24 question. I don't think it's been established that
25 Mr. Ferris had anything to do with that graph. Therefore,

1 there is no foundation.

2 MR. PATON: Okay, it's a Bechtel graph, if
3 Mr. Ferris can't answer my question, it's a perfectly
4 acceptable answer.

5 MR. FERRIS: I would like to answer your
6 question. I would like to give you an answer to your
7 question.

8 BY MR. PATON: (Resuming)

9 Q Okay, do you understand my question?

10 A I understand your question.

11 Q Go ahead.

12 A I personnaly did not write the notes on
13 this graph, and so I am not responsible for the English
14 that's there, but we do have people who are not English-
15 speaking people, and their use of words in English may
16 not be entirely correct.

17 I believe the person who wrote that should
18 be asked that question.

19 Q Okay. Do you know who that person is?

20 A I don't recall who it is.

21 Q Do you know whether the person at Bechtel
22 who interpreted piezometer data would be the same person
23 that wrote this note here?

24 A I do not.

25 Q Okay. Does Bechtel have any plans for

1 monitoring settlement of category one structures between
2 now and plant operation and after plant operation
3 starts at Midland at the diesel generator building?

4 A It's my understanding that they do have that.
5 You would have to get the details from the Midland project.

6 Q Do you have any knowledge as to whether this
7 plan has been submitted to the NRC?

8 A I do not. You would, again, have to ask the
9 project.

10 Q I assume you don't know whether they plan to
11 submit it to the NRC?

12 A I would assume they do, but I don't know that
13 for sure.

14 Q All right. How will Bechtel determine whether
15 buried conduits and pipes are settling during the
16 plant operation?

17 MR. FARNELL: I am going to object to that.
18 I think that it's been established already that he
19 isn't responsible for pipes; therefore, there is no
20 foundation, but he can answer.

21 THE WITNESS: Mr. Farnell is correct, I do
22 not know.

23 BY MR. PATON: (Resuming)

24 Q Explain to me in the organization -- these
25 pipes and conduits obviously are buried in the soil,

1 and you are the Chief Soils Engineer.

2 A Right.

3 Q What is the organizational structure that ends
4 up that you have no responsibility in that regard? Whose
5 responsibility is it?

6 A I believe -- maybe it was not clear from
7 what I said yesterday, but I believe the engineering
8 work in Bechtel is done by the project.

9 The project is supported by other specialists
10 as required for specific purposes, and the soils group
11 of the geotechnical group provides design criteria
12 to the project engineering group and other soils related
13 information when requested, and I do not know that
14 we have been requested to provide information on
15 settlement and pipes, and therefore I cannot address
16 that subject.

17 Q Okay. I think Dr. Afifi said something
18 similar to that. You respond to questions that are
19 asked by project engineering, you don't supervise the
20 construction?

21 A We are in a different division of Bechtel,
22 and we support their work on request.

23 Q Okay. Mr. Ferris, yesterday I asked you about
24 examples of your experiences where surcharging had been
25 applied after the structure had been partially or

1 completely finished.

2 A Right.

3 Q One was at Carr Fork, I believe, and the other
4 involved a tank, an oil tank, is that correct?

5 A It was oil tanks, but that's right.

6 Q Okay, and at Carr Fork, piezometers were
7 not used.

8 A That is correct.

9 Q I think you indicated with respect to the oil
10 tanks, piezometers were used?

11 A That is correct.

12 Q What was the piezometer behavior after the
13 surcharge was removed?

14 A I don't recall that. I am sure that informa-
15 tion must have been taken, but I don't recall.

16 Q Do you remember whether the piezometer
17 behavior was consistent with what you expected?

18 A I don't remember that, the job was done
19 quite a few years ago.

20 Q Okay. Mr. Ferris, we exhausted your recollec-
21 tion on your experiences with surcharging where the
22 structure was either partially or fully completed.
23 You gave us two examples.

24 Is that it, or did you have any other
25 experiences?

1 A I did have other experiences.

2 Q Of surcharging where the structure was
3 partly or fully complete?

4 A It depends on what you call a structure.

5 Q Do these other examples involve tanks?

6 A No.

7 Q Okay. Would you tell us about those other
8 instances?

9 A I believe yesterday I said there were four
10 cases that I can think of on surcharging, and actually
11 since then I thought of others, but I will stick with
12 the four.

13 Q No, you can give us all of them, but would
14 you start with the examples of those where the structure
15 was partly or fully completed?

16 A All right. This is one that you may have a
17 little more difficulty in understanding.

18 It relates to a tailings dam in Canada for
19 the Highland Valley Copper Mine at a place called
20 Lornex, L-o-r-n-e-x. There the embankment was built
21 in stages to permit improvement of the foundation so
22 that the dam could be built to a height of about a
23 hundred and fifty feet.

24 In other words, the foundation was preloaded
25 by the dam itself; we waited till piezometers dropped

1 sufficiently to then put on the next stage of the em-
2 bankment, and I am considering that an embankment is
3 a structure.

4 So, during construction of that structure,
5 there was in effect preloading of the foundation. The
6 foundation was of clay, and because we wanted to con-
7 solidate the foundation as quickly as possible, we
8 installed drains in the foundation.

9 The trade name of the drains is Geodrains,
10 G-e-o-d-r-a-i-n-s, consists of plastic and paper, and
11 installed by machine.

12 It might save a lot of questions if I tell
13 you that that work is published in the Pan-American --
14 the Proceedings of the Pan-American Conference in
15 Soil Mechanics that was held last year, I believe in
16 Chile.

17 Q Okay. Let me make a comment. Let me limit
18 my question to your experience where the structure was
19 completed, and then the surcharge was removed.

20 A Okay. The only other experience of that
21 type that I can recall, and it's not a personal ex-
22 perience, is the comments of Dr. Peck at the meeting
23 with NRC in February of last year when he said the
24 precedent for preloading a structure was the auditorium
25 in Chicago, and I believe that was around 1885.

1 Q You said that Dr. Peck said something like
2 this was the precedent?

3 A The precedent.

4 Q Can you tell us why that's considered to be
5 a precedent?

6 A I can't tell you that.

7 Q You mean Dr. Peck said it and you have no
8 idea why he said it?

9 A I can tell you why I think he said it, but
10 I can't tell you why he said it.

11 Q Fine.

12 A I think he said it because it was the earliest
13 recollection that he had -- earliest structure that
14 was preloaded in the structure.

15 Q You mean it's the precedent because it's the
16 first?

17 A The first in his recollection, but I cannot
18 speak for Dr. Peck.

19 Q Okay, do you know any more about this
20 auditorium that was preloaded in 1885 than you have
21 told us so far?

22 A No, I do not.

23 Q Do you know whether piezometers were used at
24 this structure in 1885?

25 A Do you want me to answer the question?

1 Q Yes.

2 A I don't know.

3 Q No, I don't want you to answer the question.

4 Other than your experience, do you have any
5 knowledge of other examples of surcharging after the
6 structure was partially or fully completed when surcharge
7 was subsequently removed?

8 A I can't think of any at the moment that
9 qualify for that specific case.

10 Q Do you know any references in the literature
11 to that subject?

12 A I do not.

13 Q Have you heard anyone in Bechtel or Consumers
14 Power make any comment or write a statement indicating
15 that the surcharging should have been held for a longer
16 period of time?

17 A I have never heard that statement, no.

18 Q Or have you read that statement?

19 A I don't recall having read it in those specific
20 words.

21 Q Okay. How was the height of the surcharge
22 selected?

23 A I believe it was related to the maximum
24 pressure that was imposed on the fill layer, as you
25 called it yesterday when I discussed the stratification

1 of the site soils, and I consider the fill to be one
2 stratum and then whatever is below that to be other
3 strata. I believe the intention was to stress the full
4 depth of fill to approximately elevation 600 to pressures
5 that equaled or exceeded the pressures that would occur
6 during operating life of the diesel generator building.

7 Q Would that include dead load and live load?

8 A I believe it was intended to include dead
9 and live load.

10 Q I think you indicated the weigh load would be
11 either equal to or exceed that final inspected load, but
12 did it exceed it by some percentage?

13 A I believe that information has been given
14 to the NRC at the public meeting in Midland at the end
15 of August of this year.

16 Q I am questioning your knowledge.

17 A I did not do the calculation.

18 Q Do you know what the percentage was?

19 A To my knowledge, the Vu-Graf that was given
20 to the NRC at that time -- shown to the public and the
21 NRC, and given to the NRC showed that the preload
22 stresses exceeded the design stresses.

23 Q Okay. You said that before.

24 A Yes, I did.

25 Q Exceeded, but exceeded by what percentage?

1 A I do not recall the percentage. It varied
2 throughout the height of the fill.

3 Q You said this information was presented at
4 a meeting in August of 1980?

5 A I believe it was August. It could have been
6 the beginning of September, but it was the public
7 meeting that was held in Midland, and Mr. Kane was
8 present at that meeting.

9 Q Do you recall who made that presentation?

10 Q I believe it was Dr. Peck that did, but I
11 frankly don't remember.

12 Q Okay, and was it Dr. Peck that developed the
13 information?

14 A It was either Dr. Peck or Dr. Hendrin, and I
15 could not recall which.

16 Q Do you know who developed that information?

17 A That was done by Bechtel -- the soils group
18 in Ann Arbor, the geotechnical group.

19 Q Under Dr. Afifi?

20 A Under Dr. Afifi's supervision.

21 Q Do you know who under Dr. Afifi?

22 A I don't recollect who it was.

23 Q All right. Do you know when that information
24 was developed?

25 A For the Vu-Graf?

1 Q Yes.

2 A No, I don't.

3 Q Do you know was it developed before or after
4 the surcharge was placed?

5 A I believe the information that was shown on
6 the Vu-Graf was prepared after the surcharge had been
7 placed and removed. I believe that particular Vu-Graf
8 was prepared for the public meeting.

9 Q Regardless of the Vu-Graf, can you tell us
10 who prepared the information that led to the amount of
11 surcharge? In other words, --

12 A Oh, I believe that was also done in the
13 soils group, of course at a much earlier time. I
14 believe there were estimates; I don't recall the precise
15 nature of those estimates.

16 Q All right. Do you personally have an opinion
17 as to whether a surcharge should exceed final load by
18 any percentage? Is there any rule of thumb that you
19 would follow?

20 A That depends on what you are trying to do.

21 Q It would depend on the particular situation?

22 A Yes, it would.

23 Q All right. Do you have any personal opinion
24 as to what would be appropriate at the Midland site?

25 A At the Midland site what we were trying to do

1 was minimize the settlement of the diesel generator
2 building, eliminate the settlement of the fill under its
3 own weight and the weight of the structure, and I
4 believe that has been achieved. I believe the settlement
5 readings show that.

6 Q You say you were trying to eliminate the
7 structure -- you were trying to accelerate --

8 A Well, minimize -- accelerate the settlement of
9 the fill under its own weight, and the weight of the
10 structure.

11 Q Okay, with that purpose in mind, do you
12 have any --

13 A The purpose was to get to a situation where
14 we could predict the settlement of the diesel generator
15 building over its forty-year life or whatever the life is.

16 Q With that objective in mind, do you have any
17 personal opinion as to the percentage that the surcharge
18 should have exceeded the final expected load?

19 A I can relate to the surcharge that was there.
20 I believe it was extremely successful in doing that.

21 Q Okay. I don't think you are answering my
22 question. My question is do you have any opinion as
23 to percent?

24 A I did answer your question. I said that the
25 amount of the fill that was put there clearly was

1 satisfactory since the results were satisfactory.

2 Q By what percent did the surcharge that was
3 put there exceed the final expected load?

4 A I don't know that.

5 Q Other than Midland, in your professional
6 experience with preloading where the surcharge after the
7 preloading was removed, do you know of any instance
8 involving pipes and conduits being buried in the foundation
9 soils?

10 MR. FARNELL: Could you read that back?

11 (Question read)

12 MR. FARNELL: I don't understand that.

13 MR. FERRIS: I think I understand the question,
14 and I can address it. I discussed with you yesterday
15 the Carr Fork project for the Anaconda Copper Company,
16 and that included two thickener tanks, these are big
17 basins, and each of those thickener tanks had an
18 underflow tunnel, I don't recall the size of that, but
19 you could walk into it standing up, so it was clearly
20 -- they were larger than six feet in diameter, and in
21 both those instances of those two tanks, those areas
22 were preloaded after the underflow tunnels had been
23 constructed.

24 Q Do you know any other examples?

25 A There may be others at Carr Fork, I just

1 do not -- oh, I do recall in the ore storage area at
2 the Carr Fork project there is a reclaim tunnel, part
3 of which was concrete, part of which was corrugated metal,
4 and that was beneath the most heavily loaded portion of
5 that plant. The ore pile was quite a high pile.

6 Q At Carr Fork were any of those buried pipes
7 or conduits effected by the surcharge?

8 A I do not recall that the underflow tunnels
9 at the thickeners were effected; I do recall that
10 there was deformation at the reclaim tunnels at the ore
11 storage pond.

12 Q At Midland do you know whether the pipes
13 and conduits under the diesel generator building are
14 category one?

15 A I would suspect there must be category one
16 pipes there, but I don't know which is category one.

17 Q Was any consideration given to that in
18 planning the surcharge program?

19 A Yes, there was.

20 Q What were those considerations?

21 A In evaluating what type of corrective treatment
22 to carry out at the diesel generator building, one
23 concern that we had was that some of the procedures we
24 considered did not take care of the pipes and conduits,
25 and we felt with the preloading fill that if damage

1 was going to occur, it would occur under the preload
2 and could be taken care of prior to operation of the plant.

3 Q Okay. Let me try to characterize your
4 answer, and if I don't do it fairly, please correct it.

5 I think I heard you say that it was -- that
6 your thought was that if the pipes and conduits under
7 the diesel generator building were going to be damaged
8 in any way because of the settlement, that your preload
9 program would just accelerate that matter and you would
10 get an answer to that and deal with it sooner rather
11 than later.

12 A That is not precisely what I intended to say.
13 I don't recall what I exactly said.

14 Q Please clarify.

15 A What I intended to say was that damage to
16 the pipes would occur during the construction period
17 and could be taken care of during the construction
18 period, whereas with other types of corrective treatment
19 that we considered, such as underpinning, the fill would
20 still have continued to settle under its own weight,
21 and some damage could have occurred after the plant
22 had gone -- might have occurred after the plant had
23 gone into operation.

24 For that reason -- one of the reasons we
25 used the preload was that we could take care of these

1 problems during construction.

2 Q Did you consider whether the preload program
3 would aggravate in any way the damage to the piles from
4 settlement. By that I mean -- I think I understood
5 you to say that it might have accelerated that damage,
6 but would it have made it any worse?

7 MR. FARNELL: Damage -- I don't think it's
8 been established that there has been any damage.

9 MR. PATON: Do you understand my question?

10 MR. FERRIS: I understand your question, but
11 I don't recall the extent to which we considered that.

12 BY MR. PATON: (Resuming)

13 Q Do you have any present opinion as to whether --
14 ignoring the fact that the surcharge program may have
15 accelerated any damage to the pipes?

16 A I don't know that the pipes have been
17 damaged, so I can't answer the question. That's my
18 problem.

19 Q Have you never heard in Bechtel any discussion
20 whether those pipes and conduits are presently undergoing
21 stress and in fact may now be overstressed?

22 A I have heard discussions of stress in pipes.
23 I do not specifically recall that they related to
24 the diesel generator building, and therefore, since it's
25 not an area that I feel I'm expert in -- stress in

1 pipes, I prefer not to discuss it.

2 Q Have you ever heard anyone in Bechtel
3 express an opinion that any of the pipes at the Midland
4 facility are presently overstressed -- the pipes in
5 the ground?

6 A I believe I was present in a meeting when
7 such a discussion took place.

8 Q Somebody in Bechtel said that some of the
9 pipes may be overstressed?

10 A My recollection is that at bends in pipes
11 the stresses were very high. I don't specifically
12 recall that they were overstressed, but they were very
13 high stresses.

14 Q Who said that?

15 A I think it was Bimal Dhar, but I could be
16 wrong.

17 Q Have laboratory consolidation tests been
18 conducted on plant fill material in the diesel generator
19 building area following the removal of the surcharge fill?

20 A Not to my knowledge.

21 Q Are there any locations where a slope slide
22 of the cooling pond embankment could prevent the
23 functioning of a category one pipe?

24 A I have not specifically looked at that,
25 so I would not be able to say right now.

1 Could you tell me what you mean by slope
2 when you say that?

3 Q Let me show you Kane Exhibit 3. I am going
4 to show you Kane Exhibit 3 which purports to be a plan
5 of the service water pump structure, a portion of the
6 cooling pond, and dikes immediately -- the baffle dike
7 and the dike on the side of the cooling pond, and ask
8 you if that would assist you?

9 Frankly, I do not know the source of that
10 document. I think it was introduced by the Applicant.

11 A Could you tell me which specific slopes
12 you mean and which pipes you are talking about?

13 Q Let's go off the record.

14 (Discussion off the record)

15 BY MR. PATON: (Resuming)

16 Q Mr. Ferris, I want to show you Kane Exhibit
17 Number 3 which, as I said before, I am not sure of the
18 source of this, it was introduced by the Applicant, but
19 it appears to show a portion of the pond and it appears
20 to show -- appears to show a portion of the cooling
21 pond, and it appears to show the inner pond that's
22 called here "emergency cooling water reservoir," and I
23 ask you whether on the portion of the baffle dike that
24 is shown and the portion of the dike on the other side
25 of the emergency cooling pond, do you know whether

1 there are any category one pipes in those two portions?

2 A I believe there is a pipe on each side of
3 category one, but I am not absolutely sure of that.

4 Q Okay. Are there any locations where a slope
5 slide of the cooling pond embankment could prevent
6 the functioning of those category one pipes?

7 MR. FARNELL: He said he doesn't know for
8 a fact they are category one pipes.

9 BY MR. PATON: (Resuming)

10 Q Let me ask you to assume just for the sake
11 of the question that those are in fact, as you think
12 they might be, category one pipes.

13 A I have a problem with the rest of your
14 question.

15 Q Do you have a problem with the expression
16 slope slide?

17 A Yes, I do. Are you talking about the
18 embankment?

19 Q Yes.

20 A Okay, I still have a problem.

21 Q Let me ask you this. Do you consider that
22 there is any failure of the embankment dike that could
23 effect what I have asked you to assume to be those
24 category one pipes?

25 A I haven't assumed anything about failure of

1 the dike. All of the analyses that I have seen show that
2 the dike is stable.

3 Q Okay. Could a slide of the cooling pond
4 embankment prevent the functioning of category one
5 pipe -- let me ask you preliminarily, --

6 Do you know where the category one pipe is?

7 A It's my recollection that they go along
8 both sides here, and they are in the till. I am not
9 certain that they are category one, but there are
10 pipes on both sides.

11 Q Okay. Could a --

12 A I am not sure they they are both category
13 one. I am sure one of them is.

14 Q Okay. Could a slide of the embankment
15 effect the functioning of those pipes?

16 MR. FARNELL: I thought he said he had problems
17 with that which you haven't cleared up yet.

18 MR. PATON: You don't understand the question?

19 MR. FERRIS: I understand what you are saying,
20 but I have problems with it because the information
21 I have on embankment that I've seen indicates it has
22 an adequate factor of safety.

23 BY MR. PATON: (Resuming)

24 Q You are indicating that it couldn't possibly
25 slide? Is that what you are saying?

1 A I didn't say that. I am saying what I know
2 about the embankment.

3 Q I am asking you to assume that it does slide.

4 A I see. Okay.

5 Q Would it affect the functioning of the pipe?

6 A If I made that specific assumption, which I
7 am not certain is a reasonable assumption, then I
8 believe it may be possible that a pipe could be damaged.

9 Q Does Bechtel have a policy of taking control
10 samples during construction to check the adequacy of
11 compaction in various embankment zones?

12 MR. FARNELL: What time period are we
13 talking about?

14 MR. PATON: Today.

15 MR. FERRIS: I don't know that there is
16 a specific policy.

17 BY MR. PATON: (Resuming)

18 Q Is there a practice?

19 A There is a practice.

20 Q And they do follow that practice?

21 A As far as I know they did on those jobs that
22 I'm involved with.

23 MR. FARNELL: He said there was a practice,
24 and I don't think we have got what the practice is.

25 MR. FERRIS: There's a practice of taking

1 quality control samples in fill during construction.

2 BY MR. PATON: (Resuming)

3 Q Does Bechtel have a practice of taking record
4 samples during construction to check the adequacy of the
5 compaction in embankment zones?

6 MR. FARNELL: I object and ask for a definition
7 of record samples.

8 MR. PATON: The witness hasn't indicated he
9 has any problem with the question.

10 MR. FARNELL: I don't know --

11 MR. PATON: Do you understand the difference
12 between --

13 MR. FERRIS: I'd like to know what you mean.

14 BY MR. PATON: (Resuming)

15 Q Okay. Is it your testimony that you do
16 not know the difference between record samples and
17 control samples?

18 MR. FARNELL: He said he didn't know what
19 record samples --

20 MR. FERRIS: I want to know what you consider
21 record samples.

22 MR. PATON: I am asking the questions, Mr. Ferris.

23 MR. FARNELL: That's not --

24 MR. PATON: My question to you is do you
25 know the difference between record samples and control

1 samples?

2 MR. FARNELL: He does not know what you
3 mean by record samples.

4 MR. PATON: Fine, let him answer the question.

5 MR. FARNELL: He can't answer the question.

6 MR. PATON: Why don't you just let him
7 answer the question if he knows the difference between
8 record samples and control samples.

9 MR. FARNELL: He can't answer because he
10 asked for a definition of record samples and you haven't
11 given it to him.

12 MR. PATON: All right. You are telling me
13 he cannot answer that question, is that correct?

14 MR. FARNELL: He already answered your
15 question. He needs more definition.

16 BY MR. PATON: (Resuming)

17 Q Do you know the difference between control
18 samples and record samples?

19 A Well, a control sample can be a record sample.
20 That's the problem I have, and so I want to know what
21 you mean by record samples when you asked me that question.

22 Q You said to me a control sample can be a
23 record sample?

24 A Right.

25 Q Can a record sample be a control sample?

1 A Not all record samples as I define them are
2 control samples.

3 Q Tell me the difference between the two.

4 A I can tell you the definition I have for
5 record samples in use in embankments, and as a check
6 that the embankment is constructed as the designer
7 intended.

8 In other words, that the properties -- the
9 engineering properties of the embankment are equal or
10 better than the assumed property and design.

11 It is on some embankments, not all embankments,
12 but it is on some a practice to take samples at specific
13 locations defined by the designer, not by the consulting
14 management people, but by the designer, and those record
15 samples include where appropriate undisturbed samples,
16 field density samples, gradation -- that's grain size
17 distribution samples, and compaction -- laboratory
18 compaction samples.

19 Q These are record samples?

20 A At specific locations they are. Now, it
21 may be that part of those is also a quality control
22 sample. The compaction test, and the field density
23 test, and the gradation test may also be quality
24 control samples. That is my definition of record
25 samples. I do not know if it's your definition.

1 Q My definition is not relevant or even
2 competent. I am not competent. I asked you your
3 definition.

4 A Okay. Well, it was the question prior to that.
5 You asked me a question that referred to record samples,
6 and I wanted to know what samples you were referring to.

7 Q I was getting to your understanding.

8 A Okay.

9 Q Let me try to characterize very briefly
10 what you said, and please tell me if it's a fair
11 statement. It may not be a fair statement.

12 MR. FARNELL: Let's break before we go into
13 characterizations.

14 MR. PATON: Okay.

15 (Short recess taken)

16 BY MR. PATON: (Resuming)

17 Q Mr. Ferris, I asked you a question about
18 record samples a few minutes ago, and I want to rephrase
19 that question.

20 Does Bechtel have a practice of taking record
21 samples during construction to confirm the adequacy of
22 soil paramaters?

23 A I thought I had answered that. I said not
24 in every case, but in some dams that has been done.

25 Q Okay.

1 A But not in all dams.

2 Q All right. Was a program of taking record
3 samples for the above purposes initially planned by
4 Bechtel for the cooling pond embankment at Midland?

5 A I cannot answer that for sure. I was not
6 involved in the design of that dam.

7 Q Okay. Do you recall having a telephone
8 conversation with Mr. Kane about this subject of an
9 intent to take record samples at the cooling pond
10 at Midland?

11 A I recall having a telephone conversation with
12 Mr. Kane where we discussed, or where I discussed record
13 samples, and I believe the comments I made that had
14 record samples been taken, it was my opinion that his
15 concerns about the dam would have not existed today.
16 That is basically what I recall.

17 Q You don't recall expressing any intent on
18 Bechtel's part to take those samples?

19 A I don't recall that I said that. I don't
20 recall that I would have had that information available
21 to me.

22 Q And you don't have any --

23 A I might have said that had I done the dam
24 I would have required record samples and therefore they
25 would have been available, but I don't recall saying

1 that this was an intent on the part of Bechtel.

2 Q Okay. What's my next question -- if you had
3 done the dam. If you had done the dam, would you have
4 recommended the taking of record samples?

5 A I believe I would have. It's very hard
6 for me to say, but I think there is a very high
7 probability.

8 Q Do you have any idea why record samples were
9 not taken?

10 A I have no idea at all. I had nothing to do
11 with the design of the dam or the construction.

12 Q Do you know in your profession would it have
13 been good engineering practice to take those record
14 samples?

15 A I don't believe that would have been the basis
16 on which I would say good engineering practices. I
17 don't believe it's essential to say that to have had
18 good engineering practice.

19 Q All right. Your statement is that you were
20 not involved with this project at the time a decision
21 was made, or at the time when record samples would
22 have been taken?

23 A I think I was much more specific than that.
24 I think I said I was not at all involved in the
25 construction of the dam.

1 Q You weren't involved at all?

2 A No, not at all.

3 Q Do you know enough about the dam now to know
4 whether you would have recommended taking record samples?

5 A No, I think you asked me that question in
6 a different way, and I said it was my feeling that there
7 was a high probability that had I designed the dam I
8 would have asked for record samples.

9 That's the best I can do for you.

10 Q In generally accepted engineering practice
11 concerned with dams, what soil parameters should be
12 established for materials actually placed in a retention
13 embankment to confirm that values adopted in the design
14 stage were attained?

15 MR. FARNELL: Could I have that read back,
16 please?

17 (Question read)

18 MR. FARNELL: Unless I am missing something, that
19 question doesn't make any sense.

20 MR. FERRIS: I have a problem answering
21 that question, because I'm not absolutely sure what
22 it means.

23 MR. FARNELL: I will ask you to rephrase it.

24 BY MR. PATON: (Resuming)

25 Q What is the purpose of taking record samples?

1 A Record samples as you defined them?

2 Q As you defined them.

3 A As I defined them, the purpose of those is
4 to provide information to the designer that the dam as
5 constructed meets the design parameters that he used.

6 Q All right. Now, let me try the question again.

7 In generally accepted engineering practice,
8 what soil parameters should be established for materials
9 actually placed in a retention embankment to confirm
10 that values adopted in the design stage were attained?

11 A I still have the problem.

12 MR. FARNELL: Same objection.

13 BY MR. PATON: (Resuming)

14 Q Is your problem with what soil parameters?

15 A The problem is with generally accepted
16 practice.

17 Could you read back?

18 Q Generally accepted engineering practice --
19 that does not have a meaning for you?

20 A Earlier I said that I did not believe the
21 taking of record samples as I defined them was essential
22 to good engineering practice.

23 Q Okay.

24 A Therefore, I could conceive that I could
25 exclude those in responding to you, and I could respond

1 to you in that respect.

2 Q I understand your answer.

3 A Okay.

4 Q Mr. Ferris, one more time just for clarification.
5 I think what you said was you don't consider taking
6 record samples to be required by good engineering
7 practice?

8 A I don't believe it's an essential.

9 Q Does that answer hold true for the Midland
10 case which involves a nuclear facility?

11 A I would say it holds for that and any other dam.

12 Q Does good engineering practice -- would good
13 engineering practice require at the Midland facility
14 dam or dike that you confirm that soil parameters
15 adopted in the design change were -- in the design
16 stage were actually attained?

17 MR. FARNELL: Could I have that read back,
18 please?

19 (Question read)

20 MR. FARNELL: Is that the end of it?

21 MR. FERRIS: The answer to that is yes.

22 BY MR. PATON: (Resuming)

23 Q Do you do it by some means other than record
24 samples?

25 A It could be done by other means.

1 Q What other means?

2 A Well, the thing that is essential to good
3 engineering practice is that you control the placement
4 of the fill with field density and compaction test, and
5 by inference having met the field density required,
6 the other parameters will be attained.

7 Q Then if density and compaction are controlled
8 as you just indicated, it would not be required to
9 take record samples?

10 A In order to be considered good engineering
11 practice, that is quite true.

12 Q Okay, I understand, and that applies to the
13 Midland?

14 A That applies to the Midland or any other
15 embankment.

16 Q Okay. Has Bechtel evaluated the consequences
17 of a postulated failure of any portion of the cooling
18 pond embankment?

19 MR. FARNELL: You are assuming that they
20 postulate a failure, right?

21 BY MR. PATON: (Resuming)

22 Q I asked him have you evaluated the consequence
23 of any postulated failure of any portion of the cooling
24 pond embankment?

25 A I personally do not recall having done that.

1 Q Do you have any knowledge whether anybody in
2 Bechtel did that?

3 A I do not recall that I have been told that,
4 but I am saying that I do not know whether they have
5 or they have not done that.

6 Q Who in Bechtel would know that?

7 A The Bechtel project engineer on Midland
8 should know.

9 Q Is that Mr. Curtis?

10 A Yes, it's Mr. Lynn Curtis, C-u-r-t-i-s.

11 Q Do you know of any fact indicating a need
12 to investigate potential downstream damage caused by
13 failure of the dike at Midland?

14 A Could you repeat that question again, please?

15 Q Yes. Do you know of any fact that would
16 indicate a need to investigate potential downstream
17 damage caused by failure of the dike at Midland?

18 A Yes, I believe the chief of engineers was re-
19 quired to evaluate safety of the dam -- of all dams -- on
20 that basis. That was one of the items that was of
21 concern. You are talking about a global requirement?

22 Q No, my question is addressed --

23 A Well, Midland is a dam.

24 Q I am talking -- do you know of any fact
25 concerned with Midland that would indicate a need to

1 investigate the potential for downstream damage caused
2 by failure of the dike at Midland?

3 A Well, I believe it is a requirement that one
4 look at that, but I personally do not know that.

5 Q I am not talking about general requirements
6 to look at it, I mean is there anything that you know
7 or Bechtel knows about the dike at Midland?

8 A I don't know of anything.

9 Q To your knowledge has Bechtel made any
10 investigation of downstream damage that could be caused
11 by a failure -- any failure of the dike at Midland?

12 A I do not know whether they have or have not.

13 Q Okay. Mr. Ferris, I hand you Kane Exhibit 8
14 and direct your attention to page two, the fifth line.
15 It has the figure \$400,000. Let me read that sentence:

16 "Furthermore, it is estimated that borings
17 per area which would be required in accordance with the
18 staff's request would cost a minimum of \$400,000, not
19 including applicant's overhead project engineering
20 costs and possible damage to install components and
21 structures."

22 I ask you to look at that sentence. In fact,
23 look at any part of the document you want to. My
24 question is going to be whether that \$400,000 cost is
25 reasonable in your opinion.

1 A. I don't know what it's made up of, so I
2 can't address that. I have heard the number before, but
3 I don't know.

4 Q. Who in Bechtel would have the responsibility --

5 A. Again, I would have to refer you to the
6 project engineer.

7 Q. I am reading from a sentence in the first
8 complete paragraph on page thirteen of Kane Exhibit 8.
9 "Standard penetration tests in the fill at these locations
10 show blow counts between ten and sixty with two ex-
11 ceptions, near the surface on three and seven."

12 A. What is this document -- what is it
13 referring to? Oh, I see.

14 Q. You can read any portion of the document you
15 want. It's a response to our request for borings of our
16 June 30 letter.

17 A. Okay, I have read it.

18 Q. All right, do you know whether -- it's indicated
19 there that borings with standard penetration tests were
20 completed when the piezometers were in the dike. Do
21 you agree with that?

22 A. Yes.

23 Q. Do you know whether that information -- the
24 borings with the standard penetration values -- have
25 ever been submitted to NRC?

1 A It says here they are going to be provided
2 in response to question forty-six.

3 Q Okay.

4 A I don't know if question forty-six has been
5 submitted.

6 Q To your personal knowledge do you know
7 whether that information has ever been submitted?

8 A I don't know whether it has or has not.

9 Q Do you know when those standard penetration
10 tests were taken?

11 A Well, the piezometers were put in before
12 the cooling pond was built, so it must be quite some
13 time ago.

14 Q Approximately how long ago?

15 A I don't recall precisely when the pond was
16 filled, but it would have been some time prior to 1978 I
17 would think.

18 Q Okay, thanks.

19 The blow counts of three and seven which
20 were indicated in that sentence I just asked you to read,
21 is that a cause for concern with respect to dike
22 stability?

23 A Not necessarily. I would need to know where
24 they were and what material was there. The sentence
25 says "at two exceptions near the surface of three and

1 seven," and it's very common to have low blow counts
2 near the surface.

3 Q All right.

4 A Without knowing more about it, I could not
5 respond to you.

6 Q Okay. Do you have --

7 A I need to know the material and look at the log.

8 Q Do you have any personal knowledge as to
9 whether Bechtel ever did look at the material or
10 investigate that further?

11 A I don't recall who installed the piezometers.
12 Are you saying that Bechtel installed the piezometers?

13 Q Regardless of who installed the piezometers,
14 do you know whether Bechtel ever conducted any inves-
15 tigation with respect to those low blow counts?

16 A I am not aware whether they have or not.

17 Q Do you have any professional experiences
18 where hydraulic fracturing caused instability of an
19 embankment?

20 A What do you mean by instability?

21 Q Let me ask you, in your opinion do you
22 understand the word instability -- your judgement with
23 respect to embankment.

24 A I understand instability.

25 Q Okay, I am asking you as you understand the

1 word instability.

2 A I personally do not know that -- of my own
3 personal knowledge that that has caused instability
4 as I define instability.

5 Q How do you define instability?

6 A Instability in my opinion would be failure.

7 Q Have you ever heard -- you know, you have
8 answered from your own personal experience.

9 A Right.

10 Q Have you ever heard of any instances where
11 hydraulic fracturing has caused failure of an embankment?

12 A I have not heard that it has. I have heard
13 cases where it has caused damage.

14 Q Would you tell us what you have heard about
15 those instances?

16 A Yes. On a Bechtel project in Montana, at
17 Colstrip, C-o-l-s-t-r-i-p, there was an earth embank-
18 ment there about the same height as the Midland em-
19 bankment, and in drilling a hole into the core of the
20 dam, the dam was fractured over a length of about a
21 hundred feet is what was quoted to me. I did not
22 personally see it.

23 I would be very concerned if that happened
24 to an embankment.

25 Q Do you know any more about that situation?

1 For example, what caused -- you said it was a hundred
2 feet what?

3 A A hundred feet long.

4 Q The damage?

5 A The crack was a hundred feet long, that's
6 what I was told.

7 Q Do you know how long it took to develop the
8 hundred-foot crack?

9 A A few seconds.

10 Q It happened immediately?

11 A Right, very quickly.

12 Q What was the purpose in drilling the hole
13 where this crack occurred immediately there?

14 A There had been excessive underseepage at
15 the dam, and we were attempting to obtain information
16 in the dam and in the dam foundation in order to come
17 up with corrective foundation.

18 Q You were doing sampling -- taking a sample?

19 A In actual fact, what they were doing was
20 grouting in the dam.

21 Q You mean you drilled the hole and then you
22 were going to put some material in the hole?

23 A Yes, under low pressure.

24 Q Under low pressure?

25 A Yes, drilling the hole for grouting is my

1 recollection.

2 Q All right. To your knowledge was there ever
3 an investigation as to the cause of the cracking? For
4 example, was it because when the hole was drilled it
5 wasn't done properly?

6 A Well, I would assume it wasn't. It was
7 during the drilling of the hole that it occurred.

8 Q Okay, but I mean is it possible -- I mean,
9 do you know the cause?

10 A I believe it was hydraulic fracture.

11 Q Do you know whether it was caused by the
12 fact that the hole was drilled and improper procedures
13 were followed or done carelessly?

14 A I don't know that. It was a competent
15 driller doing it.

16 Q Okay. Could the grouting have caused that?

17 A No, it was during the drilling of the hole.

18 Q Prior to the grouting?

19 A Yes.

20 Q Okay. To your knowledge no one ever determined
21 why the hundred foot crack occurred?

22 A I believe everybody attributed it to hydraulic
23 fracturing.

24 Q Had grouting been done in any other holes
25 anywhere near the hole where the cracking occurred?

1 A That I don't recall.

2 Q Have you exhausted your knowledge of anything --
3 any instance you ever heard where hydraulic fracturing
4 has occurred?

5 A Well, I know in the literature there is
6 reference to hydraulic fracturing, but I have exhausted
7 my personal experiences.

8 Q Okay. Have you ever heard any comments by
9 any Bechtel consultants concerning the likelihood
10 or the danger of hydraulic fracturing at the cooling
11 pond at Midland?

12 A Yes, I believe there have been comments that
13 that is a possibility.

14 Q Is Dr. Grey -- is there a Dr. Grey that is
15 a consultant?

16 A Not on the Midland project as far as I know.

17 Q Have you ever heard anyone -- strike that.

18 You say there is not a Dr. Grey that is a
19 consultant for Bechtel on the Midland project?

20 A You didn't ask me that.

21 Q All right. Let me ask you that question.

22 A I know there is a Dr. Grey at the University
23 of Michigan, but I do not know if he has consulted on
24 the Midland project.

25 Q Do you know if he has ever made a comment

1 about the likelihood of hydraulic fracturing at Midland?

2 A I have never heard that.

3 Q Have you ever seen anything written to that
4 effect?

5 A I do not recall seeing anything written on that.

6 Q Okay. What precautions would you take to
7 prevent hydraulic fracturing when drilling?

8 A I would refuse to drill is the simplest way
9 of avoiding it.

10 Q Assuming that you were going to do some
11 drilling in an embankment --

12 MR. FARNELL: Are you just talking about
13 embankments in general?

14 MR. PATON: At Midland.

15 MR. FERRIS: Well, I think one thing I would
16 do first is discuss it very seriously with our con-
17 sultants to see what factors would need to be considered,
18 but I believe it is a potential danger to drill in a
19 dam that has water against it.

20 BY MR. PATON: (Resuming)

21 Q Okay. It is your opinion that hydraulic
22 fracturing is a real danger in the Midland case, is
23 that correct?

24 A I think it could be a real danger in the
25 Midland case. I think it involves a liability that

1 I don't believe is justified.

2 Q Okay. Could be presents a possibility which
3 I am suggesting is not too helpful. I am asking you --

4 A Well, I don't know whether it could or could
5 not happen, but I don't want it to happen.

6 Q In other words, you don't have any specific
7 knowledge, you are just saying it's a possible risk so
8 why take it? Is that what you are saying?

9 A I am saying that it happened once before to
10 my knowledge in a dam of that size with a competent
11 driller working, and the person who was watching it was
12 a geologist of about forty years experience, and if it
13 happened under those circumstances, it's more likely to
14 happen with people who are less experienced watching it.

15 Q Okay. Isn't it fairly common practice to
16 investigate dams by borings after they are completed?

17 A I do not believe it is fairly common practice.

18 Q Was it ever common practice?

19 A I do not believe it was ever very common
20 practice.

21 Q Do you think the reason -- do you think
22 hydraulic fracturing is one of the reasons that it's not
23 common practice?

24 A I can't answer that; I don't know.

25 Q Okay.

1 A I would like to make one statement to add to
2 that last answer I gave you. Can I do that?

3 MR. FARNELL: Yes.

4 MR. FERRIS: In answering that question, I
5 made the assumption that the dams had water against
6 them as the dam at Midland has water against it right now.

7 BY MR. PATON: (Resuming)

8 Q This is when -- is it usual when a dam is
9 complete -- when a dam has just been finished to have
10 water against it or not?

11 A Sometimes it does, and sometimes it doesn't.

12 Q You can't say it's more often one way than
13 the other?

14 A Right, unless you tell me more.

15 Q Where there is not water against a dam when
16 it is complete, is it common practice to take borings
17 after the completion of the dam?

18 A Not in my experience.

19 Q So, your answer is that it's not common
20 practice would apply whether there is water against
21 the dam or not?

22 A In my experience that is correct.

23 Q Okay, and how many -- can you approximate,
24 generally, how many personal experiences you have where
25 that statement would hold true?

1 A You mean how many earth dams have I been
2 involved in?

3 Q Yes, and obviously if it's a large number
4 you can approximate.

5 A It's quite a large number. I would say
6 more than twenty.

7 Q All right, let me ask you this, in the
8 year 1980?

9 A In the year 1980 the number of dams I have
10 been involved in?

11 Q Yes, sir.

12 A In 1980 probably not very many -- probably
13 two or three.

14 Q In those two or three was any drilling done
15 after the completion of the dam?

16 A Not to my knowledge.

17 Q In none of those instances?

18 A Not to my knowledge.

19 Q All right. Go back either a year or two,
20 whatever, in your memory.

21 A I can simplify it. I do not ever recall
22 drilling in a dam when water was against it.

23 Q All right.

24 A I do recall drilling to install piezometers
25 in a dam when there was not water against it, and that

1 was a very special case.

2 Q Do you ever recall drilling in any dam
3 whether there was water against it or not for a purpose
4 other than installing piezometers?

5 A No, I don't offhand.

6 Q Are you familiar with a program of the
7 state of California, Division of Dam Safety?

8 MR. FARNELL: Will you be more specific?

9 MR. FERRIS: I think you need to reword
10 the question, too.

11 BY MR. PATON: (Resuming)

12 Q From that statement you don't know what I'm
13 talking about?

14 A I don't know of a program. California was
15 the first state in the United States that had a dam
16 safety group if that's what you are referring to.

17 Q You mean to your knowledge, they do not have
18 a program?

19 A They very actively -- I would not call it
20 a program. That's the word I'm having problems with.

21 Q Okay. You say they did not have a program?

22 A They have a group of people who evaluate
23 dam safety.

24 Q Do you know whether they had a program to
25 investigate stability of dams?

1 MR. FARNELL: What time?

2 MR. FERRIS: I think I know what you are
3 asking about. Because of seismicity in California, the
4 state required that certain dams be investigated. It
5 is my recollection that the dams that were investigated
6 were hydraulic fill dams, which are not the type of
7 dam that you have at Midland.

8 BY MR. PATON: (Resuming)

9 Q I am sorry, hydraulic what?

10 A Hydraulic fill dams. They may have enlarged
11 beyond that, but that's the part that I am aware of.

12 Q Explain that, please, sir -- hydraulic fill dam.

13 A It's a type of dam that has not been commonly
14 used in the United States since the Port Peck Dam,
15 which the Corps of Engineers was involved in in the
16 late '30's.

17 The soil is made into a slurry, and the
18 slurry is discharged into a pond, and the courser
19 particles fall at the sides, and the finer materials
20 stay in the middle. So, you have a segregation that
21 creates a core with courser materials than the shells
22 of the dam.

23 Q In connection with the state of California --
24 the program of the state of California, Division of
25 Dam Safety, were undisturbed samples taken for lab

1 testing similar to what's being asked for by the NRC?

2 A I do not know the answer to that.

3 Q In projects under the National Dam Safety
4 Program were undisturbed samples taken for lab testing
5 similar to what is being asked by the NRC?

6 A My understanding of the National Dam Safety
7 Program is that where there is a problem that then
8 additional investigation may be required, but I per-
9 sonally have not been involved in any single case of that.

10 Q Your testimony is that under ordinary
11 circumstances they would not take such?

12 A I believe under ordinary circumstances where
13 there is no evidence of a problem, I am unaware that
14 they require boring.

15 Q Do you know where there is indication of
16 a problem that they would take borings?

17 A I believe the draft that was prepared by
18 the Corps of Engineers for dam safety in their phase
19 two study would make allowance for samples to be taken,
20 but I don't recall if they specifically say boring or
21 what.

22 Nor do I recall whether they discuss whether
23 the reservoir is full or empty.

24 Q Off the record.

25 (Discussion off the record)

1 BY MR. PATON: (Resuming)

2 Q Before you started the surcharge program at
3 the diesel generator building, what were Bechtel's
4 limits on total and differential settlement?

5 A For what?

6 Q Settlement of the diesel generator building.

7 MR. FARNELL: For what purpose?

8 MR. FERRIS: You mean recorded in the FSAR
9 or what?

10 BY MR. PATON: (Resuming)

11 Q I am asking you before you started the
12 surcharge program, did you make any determinations as
13 to what you felt?

14 A I did not.

15 Q Okay. I will finish the question so that
16 the transcript reads right.

17 Did you make, before you started the surcharge
18 program, did you make any estimate of total and differen-
19 tial settlement to be expected from the surcharge program?

20 A Not that I am aware of, other than the
21 reference I made to you yesterday.

22 Q About the six to eighteen inches?

23 A Of Dr. Peck's statement in a meeting, but
24 there was no calculation.

25 Q Did you make any estimate or calculation

1 concerning how much total or differential settlement
2 the building could tolerate?

3 A I did not.

4 Q Did anyone?

5 A And I would not, I am not a structural
6 engineer.

7 Q Did anyone at Bechtel make such a study?

8 A I do not know.

9 Q Prior to the surcharge to your knowledge did
10 anyone estimate the amount of cracking that the building
11 could tolerate?

12 A I do not know the answer to that either.
13 That's a structural problem.

14 Q Do you have any opinion as to whether it is
15 important to establish settlement limits prior to
16 starting the surcharge program?

17 MR. FARNELL: Are we talking about the
18 Midland surcharge program, and if we are, which I
19 assume we are --

20 MR. PATON: You are right, we are.

21 MR. FARNELL: Then it has been asked and
22 answered and gone into in depth.

23 MR. PATON: No, I haven't. I really haven't
24 asked him his opinion whether or not it's important
25 to establish that limit. He said he didn't know whether

1 they were established.

2 MR. FARNELL: I think that was dealt with
3 yesterday.

4 BY MR. PATON: (Resuming)

5 Q Do you have any opinion on that?

6 A No, except for the opinion I expressed
7 yesterday that it was my opinion that Dr. Peck made
8 his statement of six to eighteen inches in relation to
9 the need for the instrumentation taking care of whatever
10 settlement would occur rather than the precise settlement.

11 Q My question is do you have an opinion?

12 A Well, I made that statement because I think
13 it is a valid statement. That is my opinion.

14 Q Okay, Dr. Peck's statement -- okay.

15 In other words, you adopt his statement?

16 A I do not know that that's the reason he
17 made the statement, but it is my opinion that it is,
18 and I think that it's an important consideration.

19 Q You are referring to the statement you made
20 yesterday about the six to eighteen inches?

21 A Yes.

22 Q My question is do you have a personal opinion
23 as to whether it is important to establish settlement
24 limits?

25 A It's important for the instrumentation to

1 establish broad limits.

2 Q Okay, and I understand your statement yesterday
3 had to do with the ability of the instrument to measure
4 the settlement.

5 A Yes, and that's for the same reason that I
6 am making that statement right now.

7 Q In the Midland case is it an important safety
8 consideration to establish prior to the surcharge program
9 what the settlement --

10 MR. FARNELL: What do you mean by safety?

11 MR. FERRIS: What are you talking about?
12 It's not clear to me what you are talking about.

13 MR. PATON: I am talking about the Midland
14 Nuclear facility, and I am talking about the diesel
15 generator building, and I'm asking you whether it is
16 an important safety consideration --

17 MR. FERRIS: I thought you were talking
18 about the preload.

19 MR. FARNELL: I don't know what you mean by
20 safety consideration.

21 MR. PATON: You say you don't know?

22 MR. FARNELL: I don't know what you mean
23 by safety consideration.

24 MR. PATON: You don't know what I mean?

25 Okay, I'm going to let the record stand right there.

1 You say you don't know what I mean by safety considerations.
2 That's okay.

3 MR. FARNELL: Safety considerations with
4 regard to the diesel generator building, yes.

5 MR. PATON: I just said that.

6 BY MR. PATON: (Resuming)

7 Q Do you understand the question?

8 A I don't understand the question, because I
9 thought you were talking about preload fill, and then
10 you started talking about the building.

11 Could you please rephrase your question so
12 that I understand which it is you are talking about?

13 Q Okay. I am talking about do you feel it
14 is an important consideration prior to imposing the
15 surcharge to establish what the maximum settlement could
16 be that the building could take?

17 A The maximum settlement may not be important.
18 The differential settlement could be important with
19 regard to cracking.

20 Q Fine. Now let me ask you as to differential
21 settlement, do you consider it important to establish
22 prior to surcharge program what the maximum limit of
23 differential settlement would be resulting from the
24 surcharge?

25 MR. FARNELL: Could you read that back, please?

1 (Question read)

2 MR. FERRIS: I don't believe it is that
3 significant.

4 BY MR. PATON: (Resuming)

5 Q Did you do it?

6 A I did not do it.

7 Q Did anybody at Bechtel do it?

8 A I do not know whether they did or did not.

9 Q Do you know who in Bechtel would know whether
10 that was ever done?

11 A Well, I believe Dr. Afifi might know.

12 Q Okay. Do you think it's important prior to
13 the imposition of the surcharge to establish maximum
14 allowable cracking limits that you might expect from the
15 surcharge program?

16 A For the diesel generator building?

17 Q For the diesel generator building.

18 A Well, the diesel generator building at
19 Midland is a very husky building, and for that reason,
20 I do not consider it was a very important consideration.

21 Q So, was it not done, or was it done? I
22 assume from your answer it was not done?

23 A To my knowledge, no.

24 Q You say it's a very husky building?

25 A Yes, it's an unusual building in that it

1 is designed to protect the diesel generators from turbine
2 missiles and tornado missiles. It's unusual in a
3 building in that it has quite thick walls and is quite
4 rigid.

5 Q You are indicating that for that reason --
6 okay. You have stated your answer.

7 To your knowledge is there any cracking in the
8 diesel generator building at this time?

9 A I don't know at this time. I did see
10 cracking prior to placing the preload.

11 Q Do you know whether when a building is cracked
12 whether that means allowable standard code limits have
13 been exceeded?

14 A You would have to ask a structural engineer that.

15 Q Okay. A fair answer.

16 Do you know whether Bechtel has completed any
17 analysis of the cracks at the diesel generator building?

18 A I don't know what analyses have been done on
19 the cracks.

20 Q Do you know whether any analysis has been
21 done?

22 A I believe some analysis must have been
23 done because I heard Mr. Rotz discuss this subject at
24 Midland in February of this year. I believe it was
25 February of this year.

1 Q Okay. That terminates the deposition.

2 MR. FARNELL: I would like to take a few
3 minutes. I may have some questions.

4 (Short recess taken)

5 MR. FARNELL: Back on the record. I have a
6 few questions.

7 EXAMINATION BY COUNSEL FOR APPLICANT

8 BY MR. FARNELL:

9 Q Mr. Ferris, do you recall yesterday responding
10 to a question by Mr. Paton concerning whether consolida-
11 tion tests are a reasonable method to predict settlement?

12 A Yes, I do.

13 Q Do you recall your answer to that question?

14 A I said they were reasonable.

15 Q Is that answer dependent on any factors?

16 A Yes, it is. The question is a general
17 question and I responded to give a general answer.

18 I think in instances where you would have
19 better data, then I would not use the consolidation
20 test. for specific cases like the diesel generator
21 building at Midland where we have better data than we
22 would get with consolidation tests on undisturbed samples.

23 The case I was referring to, the general
24 cases where you go to a site and there is no information,
25 then that is the only basis for making an evaluation of

1 settlement.

2 Q Do you recall yesterday testifying concerning
3 soil stratification in regard to underpinnings for
4 service water structure and other structures at Midland?

5 A Yes, I do.

6 Q Was it your testimony that you needed to
7 know the soil stratification prior to making design
8 underpinnings for these buildings?

9 A Yes, I was relating to the pile foundations,
10 and to do that you need to know where the barium stratum
11 is, and in my reference to stratification, I was
12 talking in gross terms in relation to fill as one stratum,
13 and till or any layers below that as additional strata.

14 Q Do you need to know the substratum prior to
15 designing these underpinnings?

16 A You must know the stratum into which the
17 piles are going to be founded.

18 Q My question was whether you needed to know
19 any substratum?

20 A Oh, beneath that?

21 Q Or above that.

22 A I don't believe so at the Midland site. We
23 already have a lot of information.

24 Q Do you recall yesterday some testimony you
25 gave concerning borings and initial site investigation?

1 A Yes, I recall discussing that briefly.

2 Q Was it your testimony that it was normal
3 practice to do borings to determine soil characteristics
4 on an initial investigation of a site?

5 A Yes, it is very normal practice.

6 Q Is it normal practice to do borings after
7 construction has been done or is partially completed
8 on a site?

9 A That is unusual insofar as soil exploration.

10 Q Do you consider the NRC request for borings
11 to be unusual?

12 A I believe it is unusual at the Midland site.

13 Q It would not be responded to in normal
14 practice?

15 A I believe that their borings refer to construction
16 fixes at a number of locations, and we have provided means
17 for checking those fixes by other and better procedures.

18 Q Do you have an opinion concerning the
19 stability of the dam at the Midland site?

20 A No, I don't.

21 Q Do you consider the dam to be stable?

22 A Yes, I do.

23 Q That's all the questions I have.

24 MR. PATON: Okay, I have a couple of questions
25 now.

EXAMINATION BY COUNSEL FOR NRC

BY MR. PATON:

1
2
3 Q Mr. Ferris, I want to ask you about your
4 response to Mr. Farnell's question about whether the
5 staff's pending request for borings is unusual. I
6 believe that you responded that it was an unusual
7 request?

8 A Yes, I did.

9 Q And the reason is that you have a better way
10 to provide the information you believe the staff wants,
11 is that correct?

12 A I believe so, yes.

13 Q Don't you consider that since the subject
14 being addressed is a nuclear power facility that
15 even if the information you have provided is better,
16 isn't it appropriate that you also submit the other
17 information to use as verification of the information
18 you have submitted?

19 A You mean the borings?

20 Q The borings.

21 A A major problem I have with the borings is
22 that it may confuse matters, and I believe I discussed
23 that yesterday.

24 Q Okay. You're afraid it may confuse the NRC,
25 is that correct?

1 A No, I am afraid it may confuse the NRC or
2 anybody looking at it.

3 Q Don't you think that that matter would be
4 better decided by the NRC?

5 A I believe we are the engineers on the plant,
6 and it's my opinion that it's not -- I believe it has
7 a potential for creating a problem.

8 Q Okay, but NRC does have some function that
9 calls on them to review the safety and to make an
10 assessment of the safety of this facility.

11 MR. FARNELL: This whole line of questions --
12 there is no foundation. I mean you are asking him to
13 tell us about what the NRC's function is, and it's
14 up to the NRC.

15 MR. PATON: Exactly, and I would like to state
16 on the record why. He just stated very, very clearly
17 that he has made a judgement that the NRC does not
18 need this information.

19 MR. FERRIS: Because we provided better
20 information.

21 BY MR. PATON: (Resuming)

22 Q Okay. So, it is your opinion that the NRC
23 does not need this information?

24 A That is my personal opinion.

25 Q And it's your opinion that the NRC is in

1 error in asking for this information?

2 A I do not think that it is in the best interest
3 of the NRC to ask for that if it is going to create a
4 problem, and it is for that reason that we have discussed
5 this matter.

6 Q Do you think the NRC thinks that that boring
7 information is going to create a problem for them?

8 A I don't know --

9 MR. FARNELL: I object to speculation.

10 BY MR. PATON: (Resuming)

11 Q You don't know?

12 A I can't think for the NRC.

13 Q I submit that that's exactly what you are
14 doing.

15 Mr. Ferris, with respect to the word unusual,
16 would you describe the soil settlement problem that
17 exists at the Midland facility as unusual?

18 A Yes. Maybe I should have used
19 the word unnecessary rather than unusual, but I would
20 say it is somewhat unusual -- the soil condition in
21 the fill.

22 Q To your knowledge has Bechtel ever been
23 involved in a project with any problems similar to what
24 exists at Midland?

25 A We have had compaction problems before.

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Q Have you had any compaction problems at any site similar to the extent of those at Midland?

A Not to the extent of those at Midland.

Q No further questions.

MR. FARNELL: Fine, I have no further questions.

(Whereupon, at 11:45 a.m., the taking of the instant deposition ceased.)

Signature of the witness

SUBSCRIBED AND SWORN to before me this _____ day of _____, 1980.

Notary Public

My Commission expires:

